

The Barriers to the Implementation and Enforcement of the Building Code Standards Structural Provisions for Mid-Rise Residential Buildings: The Case of Nigeria.

By

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DECLARATION OF ORIGINALITY

I declare to the originality of the work submitted in this thesis in accordance with University of Strathclyde regulations that all work presented is my own research except as certify in acknowledgment. I also declare that neither this thesis nor the original work contained therein has been submitted to this institution or any other for a Diploma, Bachelor Degree and Master Degree by me or any other person.

I further declare that this thesis is my own work, where other research work is reference, the extent to which this work has been used is fully indicated and acknowledge through citation in the thesis and within the list of references.

Sunday Ukwé-Nya Yakubu

DEDICATION

This thesis is dedicated to my Beloved Aishat Louisa and my Children Uyo G., Uredo G., Ufedo G. and Uto-ojo G.

ABSTRACT

The implementation and enforcement of the Building Code Standards Structural Provisions for mid-rise residential Buildings in Nigeria have caused severe consequences regarding structural building collapse in the development of mid-rise residential building projects. This is as a result of poor level of implementation, enforcement, and compliance and the key factors and causal factors that impede and impact risks on consumers the development of the industry and the professional practice. This research identifies and examines the failures within the research context framework (Technical, Legal, administrative and Sociological) for mid-rise residential building projects through quantitative and qualitative research analyses. And data were collected through the administration of paper-based questionnaires, semi-structured face-to-face interviews, site case measurement of mid-rise building developmental projects, and focus group discussion which were structured around the key factors, causal factors, and the impact risks associated with the implementation's development, professional practice and consumers. This targets professionals and other relevant stakeholders, key staff of the companies, and mid-rise residential building development projects. Using SPSS for quantitative analysis and NiVivo 10 software as the basis for qualitative analysis, the findings reveal that the administrative related failure was the most influential in leading to Poor-implementation, enforcement, and compliance with building code standards and regulations in mid-rise residential projects, followed by the technical failure and to a lesser extent sociological factor, together with a new exploratory approach to enhance compliance. In view of these findings, this research highlight the need to develop a credible, and acceptable best practices for building enforcement control to improve administrative failure, technical failure, and sociological failure aspects of building code standards and regulatory compliance within mid-rise residential development projects in Nigeria, which should encompass monitoring, the continual review of compliance, and training for capacity development for positive social impact.

Keywords: Building Regulation, Implementation, Structural provisions, Accountability, Residential Housing, Nigeria

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James 1:5 (NIV) says “If any of you lacks wisdom, you should ask God, who gives generously to all without finding fault, and it will be given to you”. And Exodus 31:3 (NIV) says “And I have filled him with the spirit of God, with wisdom, with understanding, with knowledge, and with all kinds of skills”.

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DEFINITIONS OF TERMS

- Building:** An enclosed structure built or constructed, with a roof for living, entertaining or manufacturing.
- Codes:** Any set of standards set forth and enforced by a local government agency for the protection of public safety, and health.
- Building failures:** Occur when the building loses its structural credibility to support the designed load.
- Building collapse:** Refers to the sudden breaking or tearing a part of any structural elements of building structures.
- Standards:** Consist of specific level of mandatory controls used as a measure that help enforcement of policies.
- Enforcement:** An act of implementing or compelling compliance with law, rules or policies (Control)
- Implementation:** A specified set of activities designed to put into practice an activity or decision of known dimensions.
- Compliance:** an act of conforming or yielding to a wish or command (Obedience or cooperation)
- Regulations:** rule, directive made and maintained by authority Enforcement officials.
- Rules:** Ultimate power or authority governing procedure of activity within an area (Control).
- Development control:** government building planning control agency in Nigeria, through which land use and building projects are regulated.
- Procedures:** Step by step instructions to assist in implementing various policies, standards and guidelines.
- Guidelines:** Consist of recommended non-mandatory controls which serve as reference in the absence of applicable standards.
- Policy:** Principles or process adopted or proposed by any Nation, industry, and an individual.

Stakeholders: A person or group of people who can affect or be affected with the industry policies, objectives, and actions.

Professionals: Those trained and competent or skilled in the building development projects

Legislation: Process of making or enacting laws.

Enactment: The passing of a law by a legislative body.

MEANING OF ABBREVIATIONS

BC	Building Code
BCIE	Building code implementation and enforcement
BCSR	Building Code Standards and Regulations
BR	Building Regulations
CFA	Confirmatory Factor Analysis
EFA	Exploratory Factor Analysis
IBC	International Building Code
IBRC	Independent Building Regulation Commission
ICC	International Code Council
IE	Implementation and Enforcement
IEBS	Implementation and Enforcement of Building Standards
MBC	Model building codes
MLE	Maximum Likelihood Extraction
MRRB	Mid-Rise Residential Buildings
NBC	National Building Code
NBTE	National Board for Technical Education
NHBC	National House Building Council
NVQ	National Vocational Qualification
SBCD	Standards in Building Codes Development
SEM	Structural Equation Model

CHAPTER 1:

INTRODUCTION

1.1 Introduction to the Subject Matter

Residential building (shelter) ownership is an identity of pride in Nigeria, and those who are sheltered ignore the house-roof fights with the rain¹. Hence; having buildings with adequate standards and regulations working, free from fear of structural collapse with standard health and safety for the buildings and occupants can never be overlooked in the development of building construction and management industry (Chiu, RLH 2007). Building residential dwellings is as old as human existence, and the implementation and enforcement started centuries ago from dwelling in the cage to mid-rise residential buildings; and now intelligent and more advance 3D printed structures which requires adequate knowledge of standards and regulations for structural compliance in the construction process (Mosaku et al (2006) cited in Mbamali, I. and Okotie, A.J, 2012).

Residential buildings (Shelter) have been described as second most basic human needs after food (Turner, M, 2001). These mid-rise residential buildings (MRRB), intelligent and 3D advance structures are investment with greater monetary value which requires compliance with standards and regulations for continuous improvement of investors' confidence. This Building practices has also undergone a great deal of changes in response to the dynamic nature of our needs and development and should be protected from human induced forces and those forces of nature like strong wind, earthquake and ice tsunami to protect occupants from injury and structural collapse (Turner, 2001).

Turner (2001) argued that minimum standards of building construction should be established with essential nature of rules and objectives that can best be implemented to provide protection for the buildings and the occupants. The study suggests this will enhance compliance by professionals and other relevant stakeholders responsible for building habitable structural buildings without failure. Codes are designed to protect buildings from structural failure, and the people and property inside them from death and extreme adverse effects on health and safety. Building code (BC) standards and regulations laid a solid foundation on which professionals boast of their work meeting minimum standards in a particular jurisdiction (Ghosh, S.K, 2002). All residential buildings and their construction and management stages are regulated by building codes (BCs), which seek to harmonise best practises, materials, methods and processes to achieve a building that is habitable (Ayedun C A, Durodola O D, and Akinjare O A 2012).

In achieving housing quality as a result of demand for residential constructions, building regulatory agencies, professionals, and relevant stakeholders should be within the driving force of policy

¹ Who owns a house never hear the cry of those outside beating by the rain.

development for housing planning (Imrie, R. 2004). Bakhtyar, B., Zaharim, A., Sopian, K. and Moghivni, S. (2013) argued that housing shortage in developing countries for the poor people is in high magnitude which requires urgent attention to stop the breach of building standards and regulations in the development of residential building projects.

The drive for residential building ownership among the low and middle in-come earners has left urban centres in chaos and unplanned due to poor-implementation and building enforcement control for standards compliance among the professionals and other relevant stakeholders in the building development projects in developing countries (Kabir, B. and Bustani, S 2009; Malele (2000) cited in Olaitan and yakubu 2013).

The springing up of residential development projects in Nigeria without considering the quality of the building and that of the environment and human safety which were the main motivating factors for the introduction of first building standard in circa. 3000BC is a dangerous trend (Dodo, M. 2014; Trombly, 2006). Building codes (BCs), which stipulate minimum standards for building health, safety and the wellbeing of the occupants and their environments, have been in existence from the time humans began manipulating their own environment. The first recorded case that set a minimum standard for building practices was the Code of Hammurabi in ca. 3000 BC (Trombly, 2006).

Kimani, M and Musungu, T (2010) noted that the increased urban pressure on residential buildings and other facilities is due to lack of government unplanned urbanisation in line with the urban growth. The study argued that majority of urban centres in developing countries are not planned and where plans exist, enforcement for compliance to standards and regulation is absent. Ahmed, A. and Dinye, R. D. (2011) argued that setting minimum standards for residential building development projects in developing countries is a necessity in planning the urban growth, as a result of building industries significant contributions to government revenue, job creation and investment opportunities for various entrepreneurship (Brockner, J., Higgins, E. T., & Low, M. B. 2004).

Brockner *et al* (2004) argued that, focusing favourable regulations on developmental Building projects is a boost to the building industry for investors and therefore encourage standards and sound practices that will keep building and occupant's safe.

Building code implementation and enforcement of several countries was never a bed of roses; even developed countries today took the pain of implementing and enforcing minimum standard by their successive government and those standards were upheld to generations with continuous improvement despite some visible challenges confronting the development, improvement and implementation of those standards. The good examples of those resiliencies were London plaque

and fire, Chicago fire, San Francisco earthquake and the Burning of Rome, and the Pakistan earthquake (Jain, V. K and Leiva, G., 2010; Trombly, 2006; Mumtaz, J. S and Ilyas, M. 2008). These countries refused to surrender to the problems of fire outbreak, diseases and earthquake and today they are being referred to as developed Nations although the development, review and enforcement of building codes is seen from disaster aftermath rather than a willing tool of various countries (Al-fahad Y. J 2012).

Nigeria as it were has a set standard which regulate the structural provisions of mid-rise residential building (MRRB) projects for planning, design, construction process and post-construction. Those minimum standards are expected to be complied with by the professionals, clients and other relevant stakeholders in the building construction industry. However, poor-implementation, and enforcement of the standards and regulations created lapses for shoddy practices, which in turn, resulting to incessant collapse of structural aspects of mid-rise residential buildings within the country. This has been wrapped up on the National Building Code, 2006 (NBC)² Standards and Regulations because of the code visible shortcomings, including; non-enactment, poor implementation, inconsistent regulations, guidelines and standards, silence on penalties in the event of building failures and lack of basic sustainable building practices (Jambol, D.D, 2012; Obiegbo M E 2008; Dahiru D, Abdulazeez, A D, and Abubakar M (2012); Olusola K O, Ojambati T S and Lawal, A F, 2011).

Dahiru *et al* (2012) maintain that more has to be done from the governmental administrative system apart from developing the code in putting measures to make it workable through creating conducive atmosphere for its operation, necessary legal backing and empowerment of enforcement officers.

Background to the study Area: Nigeria

The study area Nigeria lies in the coast of West Africa, bordered by the Bight of Benin and the Gulf of Guinea in the south. Nigeria is bordered by Benin, Cameroon, Chad, and Niger; it shares maritime borders with Equatorial Guinea, Ghana, and São Tomé and Príncipe and divided by two major rivers, River Niger and River Benue which confluence at Lokoja, the capital city of Kogi State (Nations online project).

Nigeria came into existence after the Amalgamation of the southern and Northern protectorates into one nation called Nigeria in 1914. Flora Shaw, a British journalist who later married Fredrick Lugard, Governor General coined the name Nigeria³ (Encyclopaedia Britannica). The Federal Republic of Nigeria has 36 administrative States and one Federal Capital Territory Abuja as shown in Figure

² NBC – In this Thesis mean National Building Code

³ -(NIGER-AREA) a name coined by Flora Shaw while gazing out at the River Niger and River Benue that stretched in the 19th century

1.1, which comprises of 774 Local Government Councils (Municipal Councils) and six geo-political zones (Olufemi, O., Ayangbile, O. and Abiodun, O. 2015).

Nigeria is located on *latitude and longitude 10° 00' N and 8° 00' E* The total area of 923,768 square kilometer falls within the latitude and longitude; about four times size of UK (243,610 km²) (Nations online project). The latitude and longitude of the capital of Nigeria, Abuja, is 9° 12'North and 7° 11'East. The longitude of Nigeria is to the east of the Prime Meridian with the time difference of one hour ahead from the Greenwich with a population of about 173.6 million people with an estimation of 193m in 2020 (UN-Habitat, 2008 cited in Olufemi *et al* 2015; The online Encyclopaedia Britannica).



Figure 1.1: Map of Nigeria

Source: (Google Earth 2016)

The research focus is on the Barriers to the Implementation and enforcement (IE) of the Building Code (BC) Structural Provisions (SP) for Mid-Rise Residential Buildings (MRRB):

1.2 The Research Background

It has been established substantially from previous research that building code standards and regulations aim to stipulate minimum standards for building health, safety and the wellbeing of the occupants and their environments. However, the fear of structural failures as a result of poor-implementation and non-compliance brought the principle of an 'eye for an eye' in the earlier civilisation of buildings code standards and regulations (Trombly, 2006:5; Jain and Leiva 2010).

The poor-implementation, inadequate enforcement control, inadequate codes and violations of various provisions of building code standards and regulations universally has brought severe consequences of structural failures, death, investment loss and extreme adverse effects of human and natural disasters (Jain and Leiva 2010; Slotterback, C. S. 2008). Slotterback (2008) argued that implementation should be innovated at the center of planning and project development process for any successive government for sustainability and improvement in other to avoid negative human and environmental impact within our locality.

May, P.J (2007) noted that standards and regulations have also embraced innovative reform for implementation from traditional approach to more experimental and results oriented approach. This include: voluntary compliance, self-auditing involving fidelity of compliance by regulated third party or agencies, performance-based regulation approach that emphasise results rather than specific set of activities or technology and administrative based regulations that minimise harms, take responsibility and adhering to plans (Lyon & Maxwell 2001; Potoski & Prakash 2004; Coglianese et al 2003 all cited in May, 2007).

Institutional structure and individual assigned roles for implementation action with an expected enforcement outcomes is described by May (2007) as regulations regime; which its prescriptive practices and sticking to imposed needless burdens on regulated society and industry create non-compliance and poor implementation without innovation.

For this research; what impedes implementation?

Impediments to building code standards and regulations are not new within residential housing development and building construction industry. Field & Rivkin (1975) cited in May (2004), three (3) decades ago indicted prescriptive building code as a barrier to innovation in mid-rise residential construction in the publication of building code burden. Seidel, 1976, Seidel 1978 survey replicated by Ben-Joseph, 2002 cited in May (2004) categorise barriers to housing development and implementation into: firstly, cumbersome decision-making process which result in delay in approval and construction; secondly, inconsistencies in regulatory requirements and inspections and finally

recently added citizen opposition to affordable housing development from the survey of homes in the construction industry.

Barrett, S. M (2004) described policy implementation in the late 1960s to early 1970s as the period of growing concern for effective public policy and governance to improve public policy decision-making process. In which, two (2) basic school of thought for implementation approaches were widely debated as top-down model and bottom-up policy making process and implementation (Berman, 1978; Hjern, Hanf and Porter 1978 cited in Barrett 2004). These were considered crucial for policy performance on attitudes to discretion in comparing implementation outcomes against original policy objectives (Bacharach and Lawlor 1980, Lipsky 1980, Prottas 1979 cited in Barret, 2004).

This research attempts to answer the research first basic question- Barriers; why implementation of policies should fail?

Barret (2004) noted that lack of clear policy objectives, multiple actors and agencies can create communication and coordination problems in implementation, inter-and intra-organisational value interest between actors and agencies and limits of administrative control (relative autonomies among implementing agencies) are constraints to successful implementation. Similarly, substantial research further attempts to identify barriers to the implementation and enforcement of building code standards and regulations with the following descriptions. For example, Dahiru *et al* (2012) argued that lack of enlightenment campaign, lack of legal framework from development control and government policies hinders the implementation of NBC, 2006. Tanko, J.A., Ilesanmi, F. A., & Balla, S. K. (2013) argued that weak regulation and monitoring cause implementation failure in Nigeria building construction sector. Omeife and Windapo stresses that absence of professional experts in administrative decision-making process are constraints to implementation, and Olagunju et al (2013) further stresses that lack of forensic technology in the building industry cannot really give the exact causes of building collapse in Nigeria.

The poor-implementation and weak enforcement control of NBC 2006 (not enacted at the time of this research) standards and regulations which sets minimum standard for building practices has left many dead, many structural aspects of buildings collapse in every States of the Federation, most especially in Lagos, and severe impact risks of investment loss within the MRRB construction and projects in Nigeria (Olusola et al 2011). The Building process from Planning through design, construction and management is very complex, and requires a very strong regulatory regime

(structure and implementation action) and compliance mechanisms to sustain expected standards (May, 2007).

This strong regulatory structure for implementation involves; administrative re-organisation, delegation of enforcement and third party certification, introduction of electronic building plan submission, review process, progress tracking and electronic storage for monitoring (basically a one-stop approval process) and public involvement in planning to reduce conflict (May, 2007). Developing countries suffers persistent non-compliance with building standards and regulations more than the developed nations were regular review and update of the building standards and regulations to meet best practice is periodically conducted (Windapo and Rotimi 2012).

Mbamali and Okotie, (2012), Dahiru et al., (2012) described mid-rise residential building development projects implementation and compliance stages in Nigeria from design, construction and inspections, and post construction to have shown visible constrains to compliance and implementation within the process. For example in Nigeria, enforcement control are established institution, which its rules and regulations can be broken through societal class and individual personalities or by approaching a well-placed influential individual within the society (Okpala, 1984).

All the studies presented in this section within the Nigeria context admitted that NBC (2006) poor-implementation and enforcement of building code standards structural aspects causes building collapse. However, for a variety of reasons not all of the studies attempted to investigate in-depth why the implementation and enforcement of this NBC (2006) has become so difficult to enforce and complies with among the professionals and other relevant stakeholders of the building construction and management industry in Nigeria. It is also worth noting that May, (2004:221) identify a research gap in his work and recommended further research into 'sources of regulatory process barriers' for better understanding of regulatory process within the USA.

This study attempts to find out those constrains to the implementation, enforcement and compliance to NBC standards and regulations in Nigeria within the administrative, legislative, technical and socio-logical framework of the building code standards and regulations. In which, the legislative aspect involve the legal framework and sanctions, the social aspect involve the people and their interactions with the built environment through corporate responsibilities, the administrative aspect deals with BC discharge of administration functions and the technical aspect deals with the technical requirements for pre-design, design, construction and post construction stages of building ((Casa, 2012; Al-Fahad, J. E 2012).

The review of various authors on approaches to building code standards and regulations implementation and enforcement has also strengthened the theoretical base of this research on

strategic approach to implementation and enforcement of the NBC. Such contributions including; enhancement capacity building through training and development of professionals and all other relevant stakeholder (Agapiou, A. 1998; Muya, M., Mulenga, M. N., Bwalga D. C., Edum-Fotwe F.T and Price, A.D.F. 2003 and 2004; Ghosh, 2002; Mumtaz & Llyas 2008); accessing best practices of implementation and improvement circles (Fixesn et al 2005; National Implementation Research Network, NIRN, 2015); standards and regulations innovative enforcement approaches for compliance (OECD, 2000; Greenstreet, 2010); strong regulatory structure and clear policy objectives (May, 2007; Barret, 2004); innovative E-submission process for approval stage and introduction of third party inspectors (May, 2007; Barret, 2004, Yu, S. et al, 2013); introduction of performance-based (innovation for result) regulation rather than prescriptive (restrictive) regulations (Lyon & Maxwell 2001; Potoski & Prakash 2004; Coglianese et al 2003 all cited in May, 2007) and Virtuous circle model and Policy, standard enforcement strategies of all the stakeholders emphasising roles to ease implementation of standards (Pindre et al 2013; Dixit, 2008).

This study being armed with various researchers work now aims to apply most successful approach to Nigeria sector in addressing the following areas;

- a) Conduct a historical development of BCs and the review of the provision of NBC 2006 which relates to structural provisions of mid-rise residential building projects and implementation process;
- b) Install and appraise international best practices of standards and regulations implementation process;
- c) Establish and assess the key internal and external factors affecting the implementation and enforcement of structural provisions of mid-rise residential building construction practices in accordance with Nigeria building code standards and regulations;
- d) Assess the level of enforcement and compliance to NBC 2006 provision in the current practices of structural aspects of high-rise residential building construction projects in Nigeria and
- e) Examine determinants of non-compliance with structural building code standards and regulations in mid-rise residential development projects among the owners, contractors, building construction managers, artisans, professionals and the industry within the administrative, legal, technical and social context framework of the building code provisions.

This is an attempt by this study to finding a lasting solution to poor-implementation and enforcement of NBC (2006) through effective implementation and enforcement approach for

compliance among the professionals and other relevant stakeholders in the building construction and management industry in Nigeria.

The next section is to justify the motivation behind this study having established the introduction to the subject matter and the background to the research.

1.3 Research Justification

The pressure exerting on infrastructure, on residential buildings and other social amenities in urban areas was as a result of poor planning and poor implementation of little plans which is not corresponding with the rapid urbanisation. Urban planning and regulations is a continuous review process for improvement in keeping the minimum standards and regulations for buildings construction process, infrastructure, people and the environment safe from health hazards and structural failures (Kayode, O. F. & Bayo, A. O 2012; Kimani & Musungu 2010)

The Nigeria building industry, the Professionals in the built environment, government building regulatory agencies and other relevant stakeholders credibility has been questioned repeatedly by local and international NGOs, and the populace over the incessant collapse of buildings; which left many dead, some permanently maimed and investment in building properties worth billions of Naira destroyed (Dahiru et al 2012). This monumental challenge has been traced to the problems of poor implementation and weak enforcement control of national building code standards and regulations NBC 2006 (not enacted at the time of this research) in Nigeria which could have guided the pre-design, construction and post-construction of building development projects in Nigeria by various studies (Jambol, 2012; Obiegbu 2008; Dahiru *et al*, 2012; Olusola *et al*, 2011; Windapo and Owolabi, 2008).

The deplorable condition of the Nigeria building industry without investment drive is as a result of human activities within the administrative, technical, legal and social aspects of the structural provisions of National Building Code (NBC, 2006) which is a document that set minimum standard for building design, construction and post construction practices for health, safety and occupant's wellbeing. The industry can overcome these challenges with strong theoretical research and empirical evidential proof directing at the root-cause (source) of the constraints to implementation, enforcement and compliance as agued by May, 2004.

The NBC (2006) current version though with some level of irregularities and lack of legislative power stated various procedures for building design, construction and management with responsibilities of

professionals for implementation and compliance and building development control for enforcing the compliance. However, an associated problem within administration, technical, legal and social features of the NBC 2006 has made the implementation and enforcement unrealistic.

NBC (2006) challenges apart from re-production of the old aliens base code which its reference standards from USA, UK and EU has undergone various changes to meet the global best practices over two decades without NBC (2006) single review encouraged the use of conventional building materials against the local building materials, and the implementation and enforcement is hardly heard about in many cities in Nigeria, taking exception of some parts of Federal Capital Territory (FCT) and some part of Lagos. NBC lacks popularity thus; compliance and implementation by any individual, State, Municipal area and Federal government is optional because it has not been enacted and lacks legal backing (Dodo, 2014; Dahiru *et al* 2012; Mbamali 2012).

Nigerian various researchers attributed these pathetic situations of the building industry to poor NBC 2006 ineffectiveness, poor legislation, grand and petty corruption within the system at various level of administrative system and internal professional war has been identified as the brain behind the poor implementation of the NBC 2006 (Kabir & Bustani 2009; Ameh & Alabi, 2013; Ayedun et al, 2010; Olangunju et al 2013; Tanko, et al 2013).

The nature of this research involves identifying and examining the factors that impede the implementation and enforcement of mid-rise residential Building development, its enforcement and compliance according to NBC standards; to establish the causal factors of the impediment and also to examine the impact to which the Features impede the enforcement and compliance with structural provisions of building code standards and regulations within the building sector in Nigeria. In which, this research has identified a multitude of inter-locking key factors and causal which affects BC standards and regulations enforcement and compliance; including: legislation, absence of approved standards, inadequate implementation process, lack of code awareness, lack of good leadership, lack of political interest or will, , high poverty level, high professional fees and insufficient public dialogue. This is in addition to the causal factors which are associated with the impact risks on poor implementation of the BC on consumers and the development of industry & professional practice. These include: corruption, professional rivalry, lack of unity & mutual suspicious, inadequate capacity building, absence of professional involvement in decision making, lack of respect for the poor and public opinion, abuse of human rights and unemployment from various reviews (Ayedun et al, 2010; Olangunju et al 2013; Tanko, et al 2013; Dahiru *et al* 2012;

Mbamali 2012; Jambol, 2012; Obiegbu 2008; Olusola *et al*, 2011; Kayode, & Bayo, 2012; Kimani & Musungu 2010).

The need to reduce the nature and impact of administrative, technical, legal and social failures of Building Code Standards and Regulations (BCSR) became a motivation for this research; since no record of this kind of in-depth study has been conducted into the numerous problems of poor implementation and enforcement control of NBC 2006 structural provisions for the mid-rise residential building (MRRB) development projects in Nigeria. This is through effective strategies for implementation and building enforcement control policy framework to reduce the nature and impact of the challenges in the building construction and management in Nigeria.

The next sections present the research aim, objectives that guide the provision of the research, the research questions and the research hypothesis.

1.4 Aim and Objectives of the Research

The researcher discovered the problems associated with structural provisions of Building Code standards and regulations (BCSR) for mid-rise residential building construction process due to poor Implementation and enforcement of NBC (2006). In addition, the rate of mid-rise residential building collapse in the building construction industry in Nigeria has prompted all concern professionals to find out the root causes for possible solution.

The Principal Aim of this study is to identify and examine the factors that impede the implementation and enforcement of the mid-rise residential Building construction practice according to building code standards and regulations in Nigeria.

The following objectives shall guide the research development and provision:

1. This study shall conduct a historical development of BCs and the review of the provision of NBC 2006 which relates to structural aspect of mid-rise residential building projects and implementation process. In achieving this objective a desktop-based review of the various features of BCs from previous research and types of BCs existing globally and their challenges were conducted and at the same time a review of previous studies on NBC 2006 provisions on structural aspects of mid-rise residential building projects implementation and enforcement process to identify similar studies done and also study various sections of NBC 2006 drafted document which relates to structural

building design construction and management to identify the various content of the structural aspects which relates to control of building works;

2. To install and appraise international best practices of standards and regulations implementation process. To achieve this objective this study conducts a desk-top based review on the theoretical perspectives of the provisions of standards and regulatory theories and implementation framework which relates to stages, teams, drivers, and assessment and improvement strategies;
3. To establish and assess the key internal/external factors affecting the implementation and enforcement of structural aspects of mid-rise residential building developmental projects in accordance to BCSR. First the study conducts a desk-based review on stakeholders such as government that formulate development policies, professionals, industry and suppliers, end-users, and the general public to identify internal/external factors which affects the implementation of MRRB construction process according to BCSR. Secondly, the study then present those identified factors to various stakeholders including; professionals, academia, industries, government agencies, municipality, the bodies, the legislators, the end-users, civil societies and NGOs and the general public through a well-structured questionnaire survey to be examine with statistical tools (EFA/SEM analysis) to establish the factors that most affect the building implementation and enforcement of the structural provisions of BCSR within the context of legal, technical, administrative and socio-logical framework;
4. To assess the level of enforcement and compliance to NBC 2006 provision in the current practices of structural provisions of mid-rise residential building construction projects in Nigeria. To achieve this objective, desk-based study and case studies were employed, these involve drafting structured questionnaires survey for all enforcement officials in government Ministries and agencies, professional regulatory bodies and semi- structure interview for industries, and site visitation for enforcement and compliance measurement of mid-rise residential building development projects by mapping with National Building Code structural provisions standard as the objective criteria for the measurement and
5. To examine the causal factors and the impact risks of non-compliance with structural building code standards and regulations in mid-rise residential development projects among the owners, contractors, building construction managers, artisans, professionals and the industry within the context of administrative, legal, technical and socio-logical framework of the building code standards. EFA/one factor CFA and SEM analysis of the

factors were employed to achieve this objective to establish which aspects of the BC context framework mainly causes or are leading to non-compliance with standards and regulations. Of which, this research advocate policy frame work focus on the findings of the study as an outcome of the research to improve regulatory failures.

This research outcome include: The development of conceptual building control enforcement policy framework for the BC structural aspects within the MRRB development projects in Nigeria.

1.5 Research Questions

It is significant for all research questions to be independent. However, they should have basic requirements for strong argument of the original research data for the kind of problem the research seek to address. For example, the question should measure a specific fact (s); the facts should be able to match with the theory; it should clearly prove certain method as best to other methods and it should critically evaluate available theories, concepts or hypotheses (Prasad, S., Rao, A. & Rehani, E. 2001). For this research the reframing questions are in Table 1.1

Table 1.1 Research Questions

	Reframing the research questions
a)	What are the key internal and external factors which affect the implementation and enforcement of the structural provisions of the BC, its enforcement and compliance among the professionals and other relevant stakeholders in the building construction industry?
b)	What are the acceptable implementation best practices principles?
c)	What is the enforcement and compliance level of BCSR structural provisions in the current mid-rise residential building development projects in Nigeria?
d)	What are the causal factors that impede the implementation and enforcement of the Nigeria BC structural provisions?
e)	What are the impact risks associated with the poor implementation and enforcement of the BC structural aspects on consumers, the development of the building industry & professional practice?

(Author construction 2016)

1.6 Research hypothesis

The research hypothesis is a formal statement that presents research expected outcome between an independent and dependent variable; or hypothesis can be described as a tentative statement of the research problem viewed by the researcher from the general public (sector) statement; It is also a statement or explanation that is suggested by knowledge or observation but has not been proved or disproved (Creswell, 1994; Sarantakos, 1993: 1991; MacleodClark J and Hockey L 1981 cited in Prasad, et al. 2001).

The research hypothesis=H₀

The Null hypothesis which serves as a basis for this research argument for testing is stated as follows:

H₀ = The enforcement of the Nigeria Building Code Structural Provisions fails because of failures in legislative system.

1.6.1 Delimitations of the Research Scope

- This study recognised the existing National Building Code (2006) as the minimum official regulations and standards application to Nigeria mid-rise residential building projects although not enacted at the time of this research;
- This study investigated the problems associated with the Building Code structural provisions within the administrative, legal, technical and socio-logical framework to identify the various factors or barriers that impede the implementation, enforcement, and compliance of BCs structural provisions for mid-rise residential building (MRRB) development projects in Nigeria;
- This study focuses on the key/causal factors and impact risks affecting the implementation, enforcement and compliance with the existing NBC 2006 structural provisions within MRRB in Nigeria building construction industry, and
- This research did not measure the quality of building materials used in the MRRB development in Nigeria both within the structured questionnaire survey, site case measurement and semi-structured interview but the focus was on the standards and regulations requirements in NBC 2006 provision for the mid-rise structural provisions of building construction process.

At this point the clear research methodology overview of how to carry out the research to achieve the objectives and tackle the research questions will now be presented in the next section

1.7 Research Methodology Overview

Figure 1.2 describe the overview of this research methodology for investigating the research problem

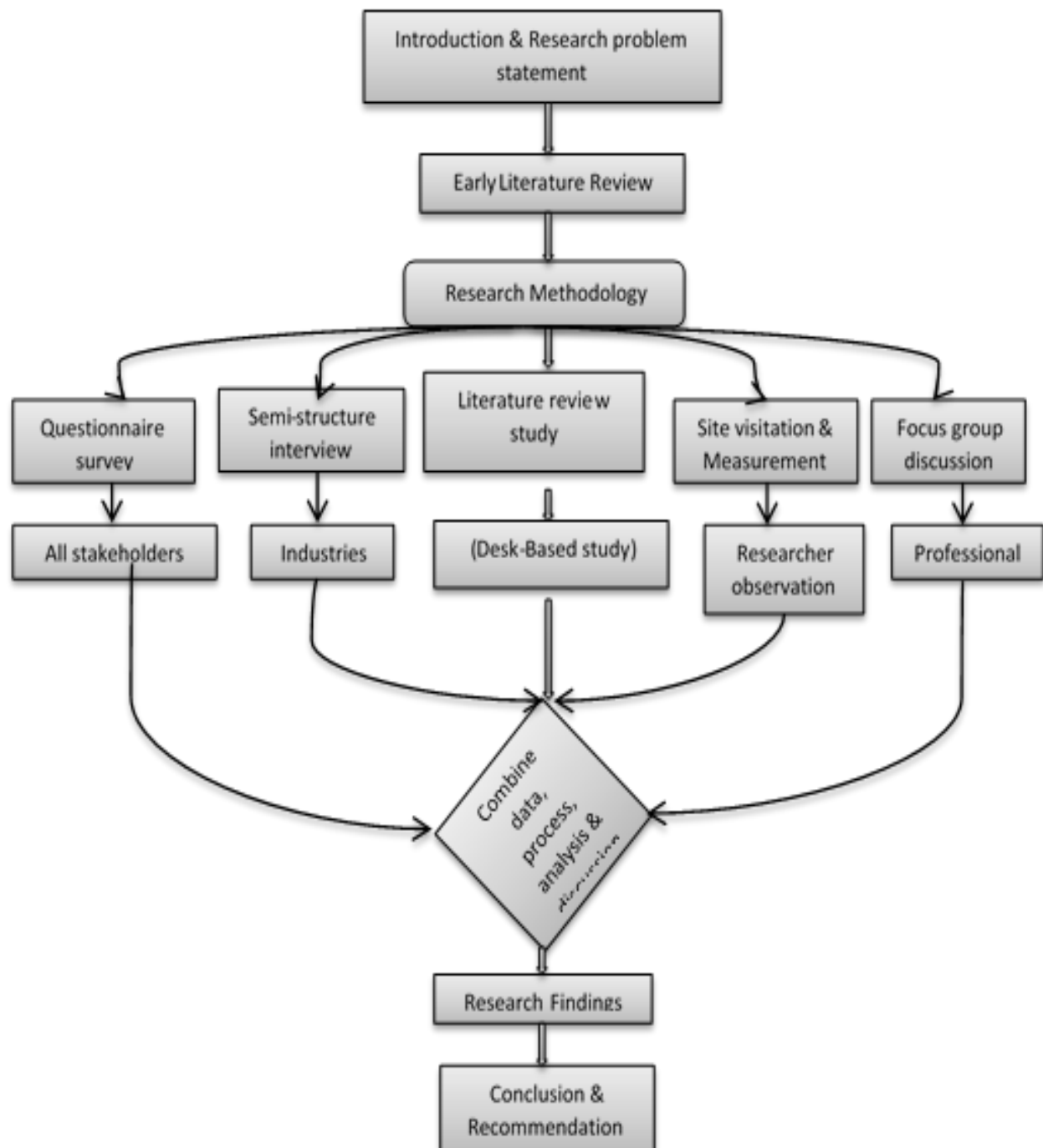


Figure 1.2: Research Methodology Overview (Author construction 2016)

Statement of Research Methodology

There are several tools used for data collection process and analysis in any research process. This research used different research methods (Mixed methods) for data triangulation as indicated in the research methodology overview above, namely; structured questionnaire, semi-structured interviews, literature reviews, site case measurement, and focus group discussion.

Questionnaires – multiple-choice questions with scales of values from 1-5 were used to measure standards and regulations combining open and closed questions. The questionnaires approach was the drop-and pick methods in which 600 papers based were distributed and 63% valid response rate was achieved for the analysis. The statistical tools used for the analysis are: descriptive statistics-Factor Analysis (both EFA and CFA), and Structural Equation modelling (SEM) Analysis, regression factor score analysis, weighted mean and relative Index for ranking, Pearson correlation coefficient, analysis of variance and simple ANOVA.

Interviews: Semi-structured face - to - face Interviews were mainly with the industries (Companies) with key professionals and other relevant stakeholders responsible for the building development to support questionnaires in the investigation of the problems and

Focus group discussion: this qualitative technique consists of group meetings, with limited numbers of participants (usually a minimum of 3 and maximum of 8 belonging to the same age bracket and profile and the moderator. Several questions are prepared beforehand to stimulate discussion and debate on the key areas of this research. The analysis of both the interviews and focus group was by the use of Nvivo 10 software for qualitative research analysis.

Literature Review: This method was the used of desk-based research to investigation the existing problems of implementation, enforcement, and control and obtaining best international practices for effective compliance.

Site case measurement: for observation and measurement of building development projects for cases of implementation, enforcement, and compliance. Graphical representation and percentage level of threshold were employed to present and analyse the activities into non-compliance, partial compliance, and full compliance respectively.

Table 1.2 is a summary example of individual task and methods in achieving the research objectives and the research questions. This is to serve as a guide for milestone achievement from phase 1 tasks to phase 2 data analysis and conclusions of this research.

	Tasks	Literature Research on task 1-4	Research Methods for Study objectives and questions investigations
Phase 1	Task 1	Task 1- The History and Development of Building Codes Standards and Regulations	-Desk-based Historical review of BC development & comparative analysis of types, challenges and -Desk-based study of NBC 2006 provision on HRRB implementation & enforcement which relates to structural aspects of buildings.
	Task 2	Task 2- Implementation of Regulations and Standards: Theoretical Perspectives	-Desk-based review on theoretical perspectives of standards & regulations implementation framework, stages, teams, drivers & fidelity improvement strategies.
	Task 3	Task 3- Factors Affecting The Development and Implementation of the Structural Aspects of the Nigeria Building Code	-First desk-based review to establish factors affecting the implementation & enforcement of structural building, -Secondly, Questionnaire survey for professionals and other relevant stakeholders, industry interview
	Task 4	Task 4- Enforcement For Compliance to Standards and Regulatory practices and Nigeria approaches within regulatory framework	-First desk-based study - questionnaires and interview for all enforcement officials in government Ministries & agencies, professional regulatory bodies and - Site visitation for enforcement and compliance measurement of high-rise residential building construction projects.
Phase 2	Task5	Data collection, processing, analysis & results	-Statistical tool for Exploratory factor analysis of the key and causal factors to establish which aspects of the BCs are leading to non-compliance with standards and regulations.
		What is the enforcement and compliance level of NBC structural aspects in the current mid-rise residential building development projects in Nigeria?	Research Methods are: case studies (site visitation for measurement, as built drawings and approval drawings), questionnaire survey, and structured interview for enforcement officers (Development control), Government ministries that regulates house building and professional regulatory body.

	What are the key internal and external factors which affect the development and implementation of the structural aspect of the BC, its enforcement and compliance among the professionals & other relevant stakeholders in the building construction industry?	Research Methods are: questionnaire survey building on-policy makers, professionals, suppliers, end-users & general public the questionnaires & interview for the industry.
	What are the causal factors that impede the implementation and enforcement of the features of the Nigeria BC structural aspects?	Research Methods: Questionnaire survey and semi-structured interview
	What are the impact risks associated with the poor implementation and enforcement of the BC structural aspects on consumers, the development of the building industry & professional practice?	Research Methods: Questionnaire survey and semi-structured interview
	Data presentation, process, analysis, results, findings, conclusions & recommendations	Thesis Write-Up and Submission

(Author

construction

2016)

1.8 Structure of the Thesis

Thesis structure usually is a brief overview of activities within any research. This research activities is divided into two (2) phases as shown in Table 1.2 The first phase is the theoretical aspect of the study that covers the research introduction in chapter one (1) and the general literature review starting from chapter two (2) through to chapter five (5) underpinning the research theoretical base point.

Phase two (2) deals basically with the practical and analytical approach through field work case measurement for data collection to support the theoretical base of the research. This phase present the methodology to obtain data in chapter six (5) , Chapter seven (6) presents the data, processing of the data, and analysis of results of data gathered from field survey, case measurement, interview and focus group discussions. This study went further to present the research findings and discussions in chapter 7 and finally presented the research conclusions and recommendations in chapter 8.

Chapter 1: Introduction:

This aspect covers the introduction to the subject matter, research background, the core issues like aims and objectives, research questions and hypothesis, justification and the research delimitation of scope, methodology overview in underpinning the research introductory aspects.

Chapter 2: The History and Development of Building Regulations the theoretical appraisal of implementation principle best practices:

This chapter presents the overall review of the Building Code as a subject matter, what it is, its origin, identifying the features, its uses and the types in existence and the development and adoption process in becoming a law and finally present examples of challenges facing the building codes standards and regulations globally for poor implementation, inadequate enforcement, violations for non-compliance and inadequate building code standards and regulations for human and natural challenges and present the process of implementation and the international best practices.

Chapter 3: Factors Affecting the Development and Implementation of the Structural provisions of the Nigeria Building Code:

This chapter presented review on evolution of building development projects in Nigeria and went further in the overview review of development planning policies and laws in Nigeria from the British

rule to date. This chapter also look at the Nigeria Building Code standards and regulations with respects to Structural provisions for MRRB development process. In which, the case of structural collapse of building, the key factors and causal factors which impede implementation, enforcement for compliance and the impact the impact risks associated with poor implementation and enforcement to the consumers, the professionals and industry development were reviewed.

Chapter 4: Enforcement for Compliance to Standards and Regulatory practice and the Nigeria approaches within regulatory framework:

This chapter involves the review on competing regulatory theories and typological framework, determinants of non-compliance with structural BC regulations within MRRB projects in Nigeria. This chapter also review standards and regulations innovative design for easy compliance and the research conceptual building control enforcement policy framework for the BC structural provisions within MRRB projects in Nigeria.

Chapter 5: Research Methodology

This chapter present the overall methodology plans for the thesis achievement, it involves the action to be taking, how to take it and what to use while taking those action. The chapter started with introduction in section 1 research design such as descriptive survey and objectives were presented in section2, specific strategy for the research action paradigm and approaches such as pragmatic and qualitative/quantitative and mixed methods were stated in section3 while section4 clarify the issue of methodologies and methods. Section 5 -7 in this chapter presented the multiple methods of desk-review, questionnaires, interview & laboratory experimental construction uses in carrying out the research to increase triangulation were presented. The Chapter then presented limitations of the research data obtained.

Chapter 6: Data presentation, process & statistical analysis

This chapter involves presentation of framework for data analysis, qualitative data (Semi-structured Interview & focus group discussion) presentation and analysis. This chapter also present and analyse quantitative data from questionnaire survey and the site case measurement. The variables indicators were also ranked statistically in this chapter and exploratory statistical factor analysis including Pearson Correlation results and the regression factor score. This chapter further presents analysis and results of One-Way ANOVA of variance in comparing the mean of factor score. The chapter also integrates all the findings from research triangulated data into one for discussion.

Chapter 7: Discussion of research findings

This chapter discusses the main findings from the analysis in order to produce comprehensive answers to the principal aim and objectives of the research within the research framework (Legal, administrative, technical, and socio-logical aspects of BCSR).

Chapter 8: Research conclusions and recommendations for further research from this research.

1.9 Summary of Key Research Findings

- **key factors that constrain the implementation and enforcement of BCs**

What this research aimed to achieve was to first, identify and examine key factors that constrain the implementation and enforcement of BCs. It was observed that the structural provisions of the BCSR were not being adequately implemented as a result of administrative failure, technical failures, and socio-logical failure at all levels of implementation and enforcement of structural provisions of the Building Code Standards and Regulations (BCSR). These failures adversely affected the implementation and enforcement of the technical features by the various professionals and building control agents involved in the building construction process and therefore, created lapses in the quality of building developmental projects of structural aspects which results in the collapse of structural members of mid-rise residential building projects in Nigeria. These were blamed on causal factors that significantly increased building risks over time.

- **Main influential factors leading to poor-implementation, enforcement, and compliance**

This study aimed in identifying and examining the main influential factors leading to non-compliance with structural BC standards and regulations in MRRB projects in Nigeria within the research framework (Legal, administrative, technical and socio-logical). The findings also indicates that administrative failure is the main influential factors leading to poor-implementation, enforcement and compliance with structural provisions of BCSR followed by technical failure and to a lesser extent socio-logical failure of this research framework for the mid-rise residential building projects in Nigeria.

- **Causal factors and the influences on poor implementation, enforcement and non-compliance**

Specifically, this study aimed also to determine whether there is a relationship between the causal factors and the influences on poor implementation, enforcement and non-compliance with standards and regulations. The results suggest that decision making, corruption and professional

rivalry, professional vested interest, leadership and political will which all relates to administrative research context framework, show a stronger relationship as training and development, capacity building, and technological expertise relating to technical framework show moderate relationship. Similarly, human rights, respect for public opinion and public dialogue which relates to social framework show lesser relationship and all the three aspects identified statistically contribute to poor implementation, enforcement and non-compliance of BCSR.

- **Findings implication**

The finding indicates that an administrative failure of the research framework effect is stronger on both technical/socio-logical frameworks for compliance issues. The implication is that for successful implementation, enforcement and compliance to avoid structural failures; professionals and relevant stakeholders have to be trained technically in new technological developments, and the greatest influence of administration as it relates to corruption, rivalry and decision making must be re-designed to reduce the impact on other factors in compliance with building standards and regulations in MRRB development projects as suggested by the new theme or concept revealed from the research findings to enhance implementation, enforcement and compliance through credible building control policy framework.

- **Conclusions**

In conclusion of the findings, three aspects of BC standards and regulations have been identified as influential to poor-implementation, enforcement and compliance, these including; administrative aspect as the most influential, followed by technical aspect, and the least influential is the socio-logical framework. It has explained clearly how, level of enforcement and compliance with structural provisions of mid-rise residential buildings projects was not satisfactory.

The findings have shown that clear understanding of the implementation and enforcement problems of the structural provisions of building code standards and regulations for mid-rise residential building projects in Nigeria would help to develop comprehensive strategic building enforcement control framework, it findings will also assist building code enforcement officials and professionals to develop certification of MRRB projects at different stages with focus on identified skills shortages areas, which results in technical failures of the structural provisions of the BCSR.

It also revealed that CSR adherence by companies and successful administrations can be a vehicle which can lead to massive compliance in overcoming the socio-logical failures of the structural provisions of BCSR in mid-rise residential building projects in Nigeria.

CHAPTER 2:

THE HISTORY

AND

DEVELOPMENT OF BUILDING REGULATIONS

AND THE

THEORETICAL APPRAISAL OF

IMPLEMENTATION PRINCIPLES BEST

PRACTICES

2.1 Introduction

In this chapter a presentation of building code standards and regulations as a subject is made; viewing it from a lay man's perspective to a technical direction by different researchers. The chapter is aimed at re-establishing the origin of building code standards and regulations formulated by the great Babylonian king Hammurabi based on simple principle of an 'eye for an eye'.

It try to identify the features of building code as administrative, technical, legal and social features with details of their logical relationship and how a problem of one affects the application of the entire building code . It presented the structure of the building code detailing the content that should be arranged in chapters and those to serve as appendices. in this chapter, the uses of building code and where it can be applied and how the building code is developed and adopted is also discussed in details with standards used in the development presented along with the types of building code development around the globe. The chapter deals with the challenges of building codes, inadequate enforcement of building codes, where code is not rich enough or inadequate and where codes are just being violated by practitioners.

This study can now start the discussion on various sections as introduced above in this chapter.

2.1.1 Building Code Defined (BCs)

This study first look up at the simple meaning of building code standards from our daily dictionaries as presented here;

Dictionary.com: Defined Building as “a relatively permanent enclosed construction over a plot of land, having a roof and usually windows and often more than one level, used for any of a wide variety of activities, as living, entertaining, or manufacturing” or ‘anything built or constructed’ and Codes: as “any set of standards set forth and enforced by a local government agency for the protection of public safety, health, etc., as in the structural safety of buildings (building code) health requirements for plumbing, ventilation, etc. (sanitary or health code) and the specifications for fire escapes or exits (fire code). It is also “A systematically arranged collection or compendium of laws, rules, or regulations”. Or “Any authoritative, general, systematic, and written statement of the legal rules and principles applicable in a given legal order to one or more broad areas of life”

Wikipedia.org: Defined “A building code, building control or building regulations, as “a set of rules that specify the minimum standards for constructed objects such as buildings and non-building structures”

Oxford Advanced Learner's Dictionary: Defined **building** as “a structure such as a house or school that has a roof and walls. Or the process and work of building” and

Code: as “a system of words, letters, numbers or symbols that represent a message or record information secretly or in a shorter form” or “A set of moral principles or rules of behaviour that are generally accepted by society or a social group, a strict code of conduct”. It is also “A system of laws or written rules that state how people in an institution or a country should behave, the penal code”

Technical experts presented Building Codes as follows:

Casa Association (2012:5) define BC as “regulations that governs specific jurisdictions and are normally statutory governance documents that provide the legal framework and mandate for ensuring the benefits, welfare and conveniences to all persons in relation to all building processes”.

Merriam-Webster online: identify building code as “a Systematic statement that govern and constrain the design, construction, alteration, and repair of buildings. Such codes are based on health, and quality of life of building users and neighbours, and vary from city to city”.

The building (Scotland) Act (2003), sees building codes as a ‘regulation to secure the health, safety, welfare and convenience of persons in or about buildings and of others who may be affected by buildings or matters connected with buildings, the conservation of fuel and power and further the achievement of sustainable development’

Council of American Building officials, (1997) cited in Al-Fahad 2012:29) refer Building Code to “a family set of documents, which coordinate with each other to address specific scopes of technical application. This set of codes generally consists of four documents: a building code, a plumbing code, a mechanical code and an electrical code”

The study of Liebing (1987) cited in the work of Al-Fahad (2012:23) tried to summarise all aspects of the building code presented by different authors to come up with a more comprehensive definition of building code as “a series of rules, regulations, or statutory requirements, adopted by local government jurisdictions, enacted as law, which sets minimum acceptable safety standards for all types of construction and occupancies; addresses aspects of construction design, practices, uses, materials, systems, and owner occupancy; adopted and administered for the protection of public health, safety, and welfare; encompasses general construction and structural requirements, in both remodelling and new construction, by using numerous reference standards. Other associated codes generally encompass electrical, plumbing, and mechanical systems”

For the purpose of this study the building code standards is philosophise as a regulatory instrument that sets minimum standards for all building designs and construction; including installation of all building services, post-construction and the environmental requirements, accepted by all concerned stakeholders for enforcement, implementation and compliance within administrative, technical and legal framework requirements for the sociological comfort of the occupants within and outside the buildings in a particular jurisdiction.

Now this study can present the origin of building code standards

2.1.2 Origin of Building Codes Standards

Building Code (BC) standards and regulations as described above by various research is a detailed set of government policy instructions developed to regulate the activities of building practices, procedures, and materials supply mechanism for the purpose of safeguarding the community, environment and the public health and safety (Cassa 2012; Burby, R. J., May, P. J., Malizia, E. E., & Levine, J. 2000).

Trombly, B. (2006) argued that, the building code; which set standards in regulating the activities of building construction is as old as human existence but prominence started with the performance code of Hammurabi instituted by great King of Babylon (King Hammurabi) on a simple principle of an 'eye for an eye'⁴. Figure 2.1 is a summary of the law code of Hammurabi.

⁴ It means that for whatever wrongdoing a person does, it is fair to pay back with the same thing for justice.

The Code of Hammurabi (circa 3000 B.C.)

The Law Code of Hammurabi

Hammurabi's Law Code is the most important collection of all rules and laws of the Mesopotamian times.

It was erected by King Hammurabi of Babylon in Sippar, the city of the sun god Shamash, at around 1792 - 1750 BC.

Did you know...
...that the phrase 'an eye for an eye and a tooth for a tooth' came from Hammurabi's laws?

It means that for whatever wrongdoing a person does, he has to pay back with the same thing to make it fair.

This artwork was found in 1901-1902, during an excavation led by Jacques de Morgan. De Morgan (1857-1924) is a French mining engineer, geologist and archaeologist. The Law Code is his most significant find, because it allowed deeper study into the Ancient Mesopotamian life.

Bibliography:
 *Brooks, Philips, "Ancient Civilisations"
 *Law Code of Hammurabi, king of Babylon, <http://www.louvre.fr/en/oeuvre-notices/law-code-hammurabi-king-babylon>
 *The Sampsons Law Visual World Library, "Ancient Civilisations"
 *Jacques de Morgan, http://en.wikipedia.org/wiki/Jacques_de_Morgan

This picture depicts King Hammurabi 'receiving' the order to write the laws from Shamash, who is also the god of justice.

The rest of the stele is made up of writing which is divided into three parts:

The first part is a prologue about King Hammurabi's empire, how it was made, his achievements, and his job as king to "destroy the wicked and the evil", and that "the strong might not oppress the weak".

The second part is a lyrical epilogue about the king's great legal work and how to make sure this good work is sustained in the future.

The third part makes up over half the stele. It's written in simple everyday language for all citizens to understand. It consists of 282 rules and issues concerning daily life. It's divided into chapters, and the main ones are about slavery, trading, farming, owning properties, etc. The biggest chapter is about family life, and it has rules regarding marriage, children, inheritance, etc.

The rules in the stele are written in cuneiform script in the Akkadian language.

By: Nadia T. J

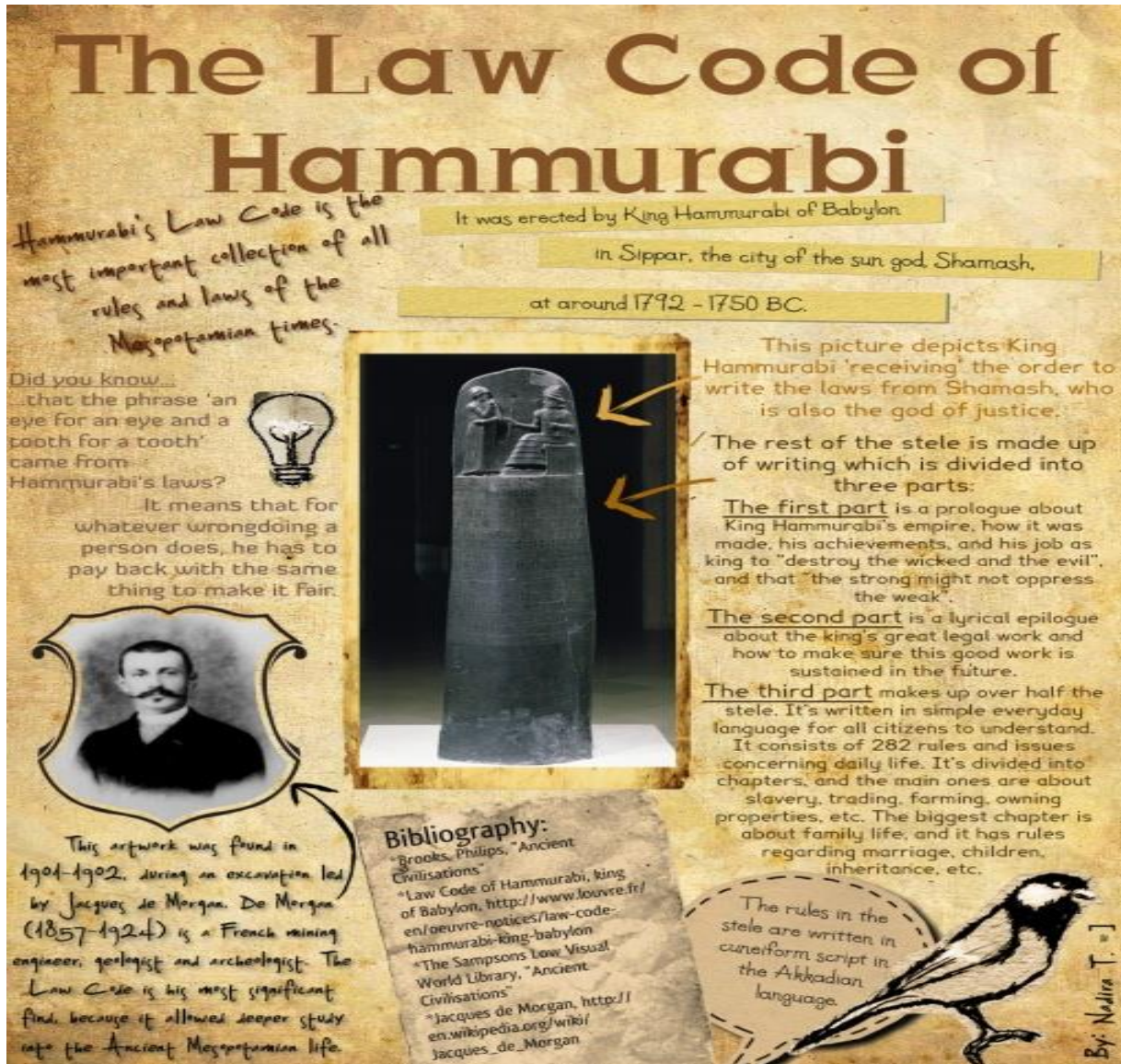


Figure 2.1 : The Law Code of Hammurabi

Source: (Google Earth)

Hammurabi's code on Diorite stele divided society into three (3) social classes as presented in Table 2.1

Table 2.1 : Social division of Hammurabi code

Social classes	Social Rights and fines
Kings, Priests, and Nobles (The Amelu)	-Family man with registered birth, registered marriage, registered death, -full of rights & ancestral inheritance -may cause injury to people for retaliation -pay heavier punishment for crimes & misbehaviour -Pay high fees and fines
Artisans, Merchants, Scribes and Farmers (The Muskinu)	-Not necessary poor but may not have landed property -there are free & not bound -pay smaller fines & fees -pay less offering to gods -accept compensate for injures -cannot be mixed with nobles in the city
Slaves (Ardu)	-Form numerous classes -could buy property and hold even slaves -master responsible for clothing, feeding, pay medical bills -marry wife for him & the children remain slaves until he can buy them to freedom

Source: (Author construction 2016)

One of the oldest known writings of early civilization is the Code of Hammurabi⁵. Hammurabi was the founder of the Babylonian Empire over 5,000 years ago. The portion of the Code of Hammurabi which related to buildings read as from 229-233 on the Diorite stele also describes by Hooker and King (1999) cited in Laubscher (2011:24)

- If a builder build a house for a man and complete it, that man shall pay him two shekels of silver per SAR (approx. 12 sq. ft.) of house as his wage;
- If a builder has built a house for a man and his work is not strong, and if the house he has built falls in and kills the householder, that builder shall be slain,
- If the child of the householder be killed, the child of that builder shall be slain;
- If the slave of the householder be killed, he shall give slave for slave to the householder;
- If goods have been destroyed, he shall replace all that has been destroyed; and because the house was not made strong, and it has fallen in, he shall restore the fallen house of his own material, and

⁵ Van De Mierop, M. (2008). King Hammurabi of Babylon: A Biography (pp.1-172)

- If a builder has built a house for a man and his work is not done properly and a wall shifts, then that builder shall make that wall good with his own silver (Laubscher , 2011; Hammurabi code online)

The Code of Hammurabi though quite harsh by today's civilisations of fundamental human rights; shows that, civilization has tried to bring about some control over building construction safety. The Code is divided into sections for the nobles and kings, artisans, farmers and merchant and then the slaves. The code emphasis was basically on minimum standards for building safety although payment was considered in the first part of 229-233 (Hooker & King, 1999 as cited in Laubscher, 2011).

First part of the Code is a prologue about the King Hammurabi Empire, how it was made, his achievements and his job as a king to destroy the wicked and the evil and that the strong might not oppress the weak.

The second part is a lyrical epilogue about the king's great legal work and how to make sure his good work is sustained in the future.

The Third part makes up over half the standing stele. It's written in simple everyday language for all citizens to understand. It consists of 282 rules concerning daily life. It's divided into chapters and the main ones properties, slavery, farming, trading, and others. And the biggest chapter is about family life, marriage, children, inheritance, and others.

The Code of Hammurabi deals with sustainability of the strong legal system, the first parts tried to eliminate oppression from the strong and mighty while the third part was made simple not rigid and prescriptive like we have in our code today. If all citizens could interpret the code compliance will be easy (ICC, 2009; Hooker & King, 1999 cited in Laubscher, 2011)

Having established the origin of building codes with it strong technical prescription and strong social class division the next section can now be presented to know the family of the building codes.

2.2 The Core Family of Building Code standards and regulations

Council of American building officials (BOCA) (1992) classify set of codes into four documents as follows: Building code, Plumbing code, Mechanical code and Electrical code, which can uniformly exist within the building code as a single document. A summary of the core family of the building code is shown in Figure 2.1

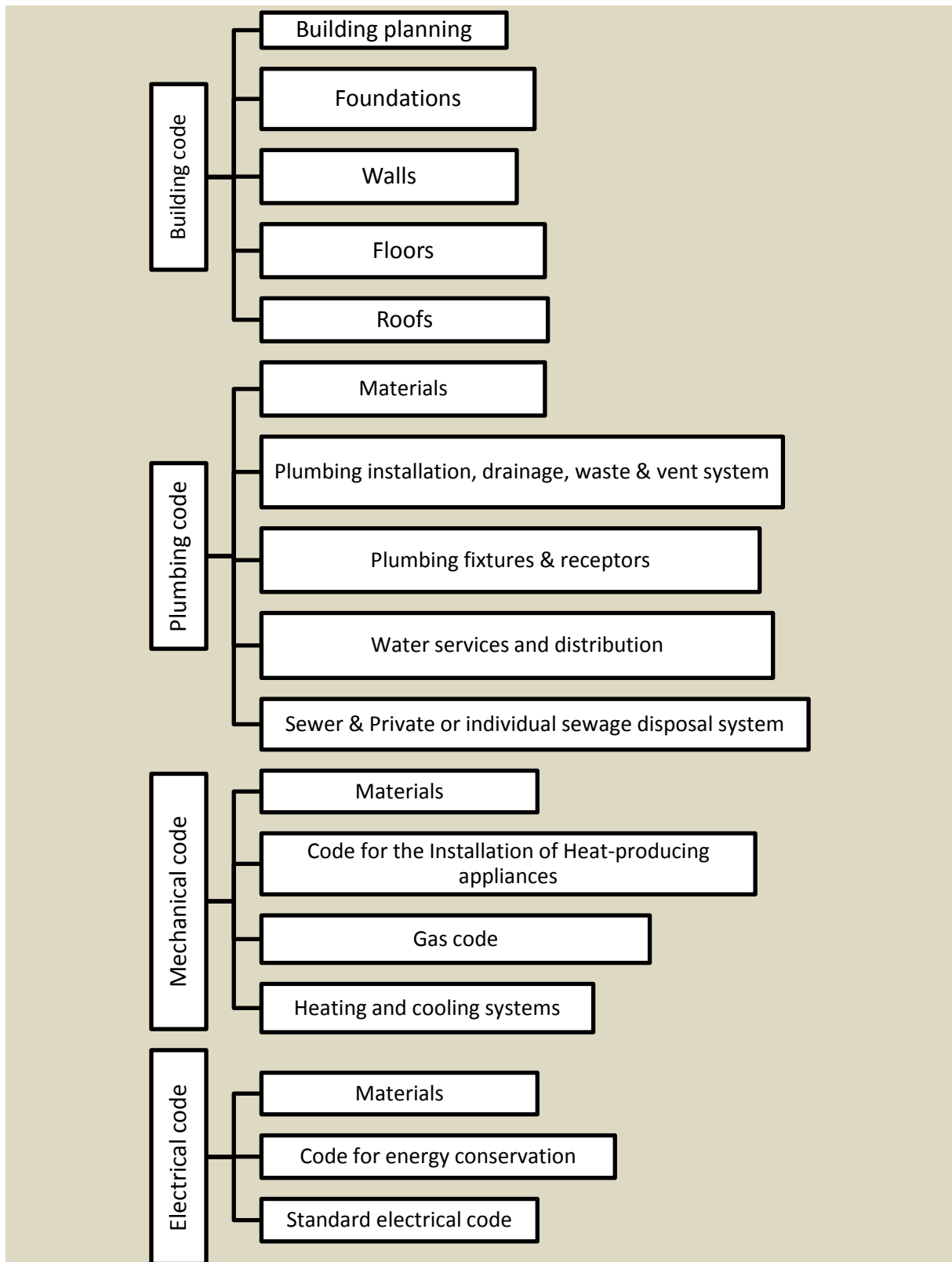


Figure 2.2: The core family of the building code standards

Source: (Author construction 2016)

This research focus is on the building code which consists of the planning, foundations, floors, walls and roofs (structural aspects) within the administrative, technical, legal and socio-logical features of the building code standards and regulations shown in Figure 4.2.

2.2.1 The Application and Use of Building Codes

Previous research has contributed significantly to BC standards and regulations uses in the Building construction and management industry, including; ICC (2009), Cassa (2012), Tedd (2008), and Al-Fahad (2012).

Kubba (2008) cited in Al-Fahad (2012) attest that BC codes is used by professionals for technical analysis of architectural and engineering designs, construction details for builders, contractors and subcontractors, building developer, urban planners and facility managers. The study further stresses that the BC is also used in stipulate administrative guidelines for inspection of building construction and management to regulate the permit issue and implementation process.

Casa (2012) profess about the uses of building codes standards in identify current global best practices in building and environmental quality, providing administrative guidelines for prudent governance process to building construction, and also for the enforcement of various requirements for the BC standards and regulations.

Laubscher (2011) affirm that all standardized references used in building design; construction and post-construction are provided by BC for building safety and occupant's wellbeing.

In Tedd (2008), the use of BC in Singapore ranges from providing comfort to occupants within and outside the buildings such as advocacy of greening all building, providing guides on penalties for violations, implementation guides on construction, installation of services and mandatory energy provision.

ICC (2009) identify application and use of building code as administrative use for policy and implementation, technical use for technical requirements implementation, legal use for legislative and legal requirements and social usage for all social relationship between the people and the code.

Dahiru et al (2012) describes the importance of Building code standards as setting the minimum standards on building pre-design, design, construction and post construction stages with a view to ensuring quality, safety and proficiency of our building industry.

This study, having reviewed the various authors' studies on the application and use of BC standards and regulations, therefore construct a table in harnessing the uses according to code features for easy identification as presented in Table 2.2

Table 2.2 Applicable Uses of Building Codes in accordance to Code Features

s/no	Codes Features	Applicable use area
1	Administrative use of Building Codes	-Apply for regulations on standards for design, construction, & supervision -Development planning -approval and implementation process -Occupancy certification -Administrative guides for inspection -Permit issue and building implementation process
2	Legal Use of Building Codes	-Used in empowering the stipulated requirements through Enactment of the code -Aids the adoption process as legal document through legislation -Applying for conformity to design, construction and post construction - provide guides for penalties
3	Social Applicable usage	-Basically apply to occupants comfort with technical provision -Used for occupants health & safety in the use of building & public facilities -Used in the provision of adequate lighting & ventilation in buildings
4	Technical Usage	-For general application of codes by building professionals for design such as architectural, structural and services drawings, -Requirements in the construction & installation of building materials -Detailed specifications design, construction & Post construction Stage - Supervision and progress monitoring procedures of buildings

Sources: Information from (ICC 2009, Casa, 2012, Tedd, 2008, Laubscher 2011, Al-Fahad 2012)

Table construction (author 2016)

2.2.2 Standards in Building Codes Development (SBCD)

ICC (2009) describes standards used for building code development as a published document that has passed approved test for certification and being accepted by an institution or group of experts in manufacturing such materials or documents.

Laubscher (2011) declared that building standards is an official technical reference document, which set standards for building and construction works through quality, performance, size, measurement criteria and the methodology of operations.

In the opinion of NBC (2006) standards are reference standards documents for the building code development and not to be treated for implementation process.

Shardy, A., Abdul, R.A, Hanizun, H.M. and Jaafar, M. (2013) construct that industries, manufacturers in developing countries have no regard for standards like ISO 14001 (Environmental management system EMS) and ISO 9000 (Quality management system). This is part of the ISO 14000 family of international standards covering environmental impact that reduces waste, cost and risk to human life (greenhouse gas emissions). ISO 14001 is the standard that covers the design and implementation of an EMS (Megali, D. 2009). Ken, W (2004) note that ISO 14001 is a generic standard applicable to organisations of all shapes and sizes like construction or manufacturing. Inaki H., Landin, G. A., and Molina-Azorín, J. F (2011) stress that, a well designed and implemented environmental management system should address the delicate balance between maintaining profitability and reducing environmental impact, but the case of developing country manufacturing industries is all about profitability and not global best practices.

The ISO 9000 family addresses various aspects of quality management and contains some of ISO's best known standards (Avinash, K. S 2010). The standards provide guidance and tools for companies and organizations who want to ensure that their products and services consistently meet customer's requirements, and that quality is consistently improved (David, O. S. 1996). ISO 9000 sets out the criteria for a quality management system. This standard is based on a number of quality management principles including a strong customer focus, the motivation and implication of top

management, the process approach and continual improvement (Woan-Yuh Jang and Lin Ching, 2008).

Standards must be adopted by reference from both local and international standardized organisations for codes of practice. Such Institutes and recognised local and international standards as identified from review are in shown in Table 2.3.

Table 2.3: Institutes and recognised international reference standards

Acronyms	Full meaning
UBC	Uniform Building Code
ASTM	American Society for Testing and Materials
ANSI	American National Standards Institute
AWS	American Welding Society
EC	European Committee for Standardisation
TC	Technical Committee called International Organisation Standard ISO/TC
NFSC	Nuclear Facilities standard committee
NFPA	National Fire Protection of America (NPFA1-NPFA8506 for different Standard from fire Etc.)
NCPM	Non –residential Centre provider manual (Texas)
RISC	Risk Informed Standard Committee
NIS	National Industrial Standard
ASME	American Society for Mechanical Engineers
BS	British Standards
AWPA	American Wood Preservative Institutes
AFoPA	National Forest Products Association (APA Glued Floor System of Chicago)
ANS	The American Nuclear Society

Source: (NBC, 2006; ICC, 2009; Al-Fahad, 2012; Yong Tu, Ir, 2009)

2.3 Types of Building Codes

There are basically two types of building code standards and regulations development and implementation practices for approval and enforcement control across the globe; namely:

- The National building codes (NBC), which are mandatory nation-wide application codes developed by the government agencies or quasi-governmental standards organizations and then enforced across the country by the central (Federal) government;
- The second type is called a Model building codes (MBC) used when the regulation of building construction absolute right rested within the local authorities (Turner, M. D., 2001).

Although, MBC described as based primary on local control-it is applicable where building regulations are determined to be uniform and adopted throughout the entire local government of federation. For examples, California adopted MBC for her 500 local government jurisdictions (Turner, 2001) and USA has basically three (3) model codes widely accepted for adoption within the state for over the past 75 years now: the Uniform Building Code (UBC), the Standard Building Code (SBC), and the National Building Code (NBC). In which, State and Municipal Authority adopt any of the 3 with little or no modifications, until in 1994 when the 3 groups consolidated into one organisation called ICC and latest compressive model building code standards was published in 2009 (Jain, V. K and Leiva, G., 2010).

This research can now present how the MBC is being developed

2.3.1 Process of Model Codes Development in the World (PMBCD)

Model building codes can be developed through standards organizations such as NGOs, Private sector, capable individual⁶ with the interest of the people but must be through a network of development communities with representatives from the various affected sectors and government (Munta, J.S and Ilyas, M., 2008).

Model building codes (MBC) have no legal status unless adopted or adapted by an authority having jurisdiction, developers of model codes urge public authorities to reference model codes in their laws, ordinances, regulations, and administrative orders. When MBC is referenced in any of these legal instruments, a particular model code becomes law (Muntaz and Ilyas, 2008).

⁶ Person (s) with professional years of experience and research experience

Muntaz & Ilyas (2008) described such practice of reference in legal instrument's as adoption by reference. When an adopting authority decides to delete, add, or revise any portions of the model code adopted, it is usually required by the model code developer to follow a formal adoption procedure in which those modifications can be documented for legal purposes (Ghosh, S. K. 2002).

2.3.2 Approaches of Building Codes Development (ABCD)

Building codes standards and regulations has different approach to its development. Basically, two known approaches have been agreed after collapsing the functional approach into performance by many scholars and the second approach is prescriptive approach (ICC, 2009)

- **The prescriptive approach⁷**

Turner (2001) has described substantial scholarly research to building code enforcement and compliance design as either systemic (strict without innovations) or facilitative accommodative (flexible for innovations). Similarly, Joachim, W.E (2012) describes prescriptive approach as strict to rules and no personal innovative methods; arguing that, the approach is traditional and involves the specification of materials, the composition and the construction methodology. Watemeyer (2003) cited in Laubscher J. (2011) note that prescriptive approach resulted in building end product that is distinct without innovative elements in the structure.

- **The performance approach**

Watemeyer (2003) cited in Laubscher (2011) moved that performance approach driven force is the requirement for individual needs and expectations. Joachim (2012) argued that performance approach accommodate cultural differences, it is internationally friendly that allows various innovations and assessment of construction methodology.

Layton Brent (2011) describes adopting a performance-based building codes standards and regulations to economic improvement, facilitating greater innovations and efficiency in the building sector. The study stresses further that, moving away from heavy-handed regulations (prescriptive) to fostering innovations and permitting alternative solutions will improve economic performance of the industry. For example, New Zealand embraced performance-based building code in 1988 initiated in 1982 through the Office of the Review of Planning and Building Control (ORPBC) to improve quality

⁷ More reading on performance and prescription regulations

House, M., Street, A., & Park, R. (2008) Prescriptive Codes vs. Performance-Based Codes: Which One Is The Best Fire Safety Code For The Brazilian Context? Safety Science Monitor, 1–10.

of building services of construction, inspections, and compliance. Similarly, USA, Britain, Japan and Australia are all using performance-based building codes at the moment.

In which, Trombly (2006) argued that UBC, BOCA, SBC, ICBO were all prescriptive and restrictions to innovative designs and technology before the introduction of performance-based code of IBC in 2000. Similarly, Greenley & Manager (2008) urged those using British Standard (BS) to adopt Euro-code that is friendlier and easily adaptable to different environment.

Greg Foliente G.C (2000) argued that performance base building code development approach has been advocated and practices by many countries in the past because of easy and friendly implementation. Examples of such developed countries that have adopted the use of performance base code that allow innovations in problem solving include; United Kingdom (1984), New Zealand (1988), Sweden (1994), the Netherlands (1996), Norway (1998), Canada (1995-2003) and USA (2001) all has been using performance base building code(Layton, 2011; Al-Fahad, 2012).

Greg Foliente (2000) note that performance based approach building standards and regulations is applicable in building production from initiation (conception) to occupancy and also in building quality control. Greg Foliente stress that the freedom encourages more innovations in design & construction along the production line while in regulation; performance allows innovation and cost maximisation while buildings and occupants health and safety is being protected.

2.4 Development and Adoption of Building Codes (DABC)

Section 2.4.1 has described processes for the development of the building codes standards and regulations by various authors, including; Muntaz and Ilyas (2008), Ghosh (2002).

This study can now present procedures for the adoption of building codes standards and development.

2.4.1 Formal Model Code Adoption Procedures

Ghosh (2002), Muntaz and Ilyas (2008), outlined the following procedures as the typical process to any building code standards and regulations adoption by the Central or National government, State government and the Municipal government. The study note that, the process involve legislative

body at all levels of government, the network capacity of technical review board, and the public input before it can be adopted as standards and regulations. A summary of the code development and adoption process at both Federal, State & LG (Municipal) is shown in Figure 2.4.

- **The Legislative body**

The process will require a drafting of legislative framework for the various legislatures by an intelligent lawyer that doubles as a mediator and negotiator between the proposed standards and the body of legislature at the Federal, the State, Municipal council and the council commission for adoption of the building code standards (Ghosh, 2002).

- **Network Capacity of Technical Review Board or Agency**

These are agencies or board saddled with the responsibilities of regulating building construction practices in any country. For example in Nigeria, there are existing institutions that are capable with human resources in reviewing and adopting the building code for implementation, including; Federal Ministry of Lands, Housing and Urban Development (FMLH&UD), Standard organisation of Nigeria (SON), Council of registered Engineers (COREN), Council of registered Builders (CORBON), Architect registration council of Nigeria (ARCON), Town Planning registration council of Nigeria (TOPREC), Quantity surveyors registration council of Nigeria (QSRCN), Estate surveyors & Valuers registration council of Nigeria (ESVRCN) and Land surveyors' registration council (LRCN), all these Government agencies and technical board are the technical review Board for easy adoption process.

- **Public Input**

Ghosh (2002) argued that consultation is key during the process of BC standards and regulations adoption and everyone that the BC is going to affect directly or indirectly should not be left out in the process of consultation for their absolute input through written documents to be submitted for review and also through public hearing on all the submissions and the proposed code for adoption. (Mumtaz and Ilyas 2008)

Typical State Building Code Adoption Processes

Ghosh (2002) note the procedures of State BC adoption as follows:

- State technical review Board or Agency
 - Reviews recommended code,
 - Establishes amendment revisions,
 - Presents proposed code to Legislature,
 - Then the State Legislature,
 - Receives public Input,
 - Passes enabling Legislation,

- And the recommended Code becomes law (Ghosh 2002)

Alternatively,

- The State Legislature delegates power to the State Technical Board or Agency
- State technical review board or agency reviews recommended code
- Receives public Input
- Approves Recommended Revisions
- Recommended Codes becomes Law (Ghosh 2002)

Local Council (Municipal) adoption processes:

Ghosh (2002), Muntaz and Ilyas (2008) all notes the typical process for the BC standards adoption within the Local Council or Municipal as follows:

- Building Department or Appointed Technical Committee,
- Reviews recommended code,
- Establishes recommended revisions,
- Present proposed code to Council or Municipal Commission,
- Then the Council or municipal Commission,
- Receives public Input,
- Passes Enabling Legislation,
- And the amendment code becomes law

(Ghosh, 2002; Mumtaz & Ilyas 2008). Figure 2.3 is a summary of the Federal, State & LG Codes Development & adoption Process.

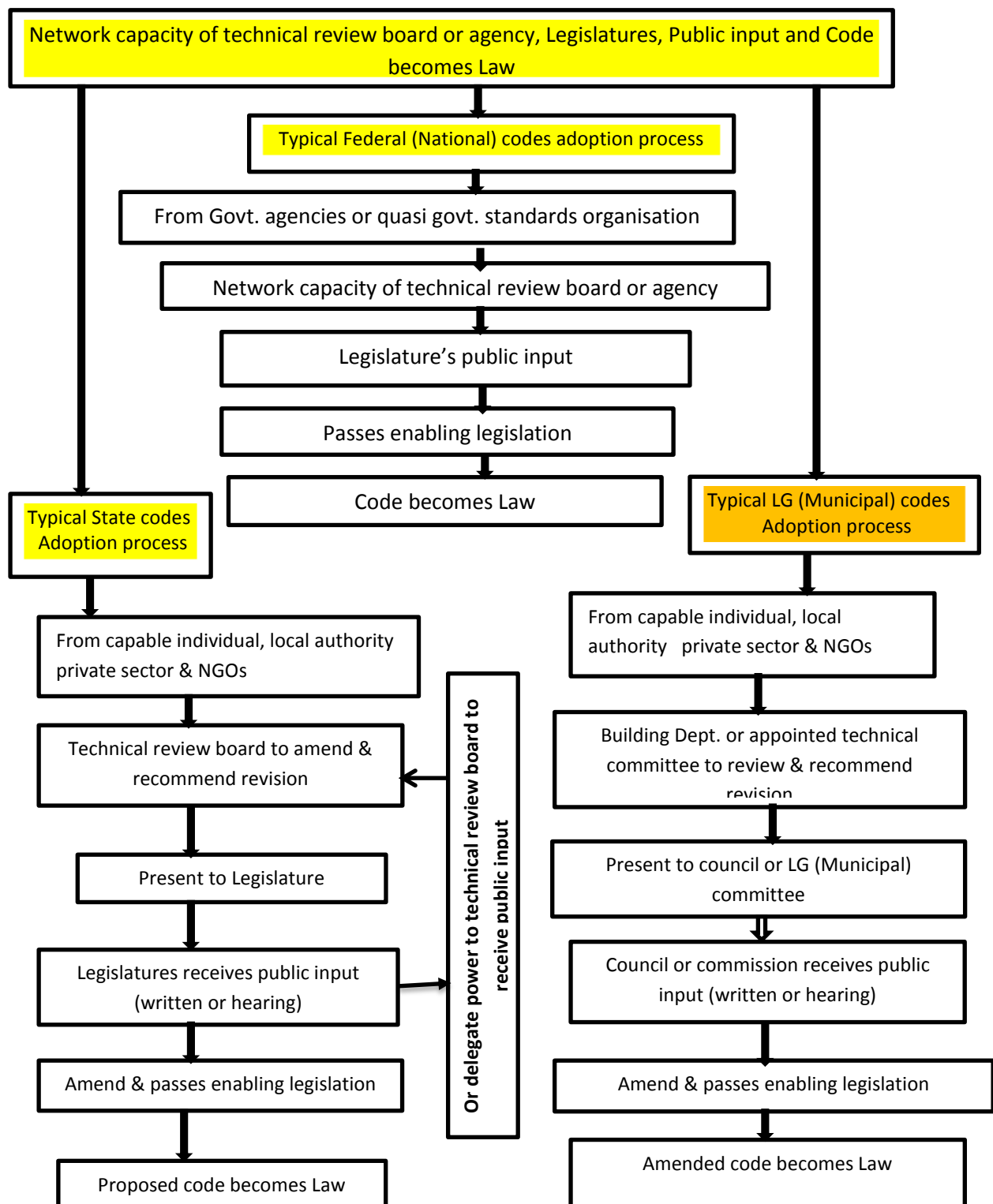


Figure 2.3: Federal, State & LG Codes Development & adoption Process

Source: (Author construction 2016)

2.5 Building Codes and their Challenges

2.5.1 Associated Problems of Inadequate Enforcement, and Inadequate building Codes with BC standards and regulations

From the BC reviewed, this study observed that majority of BC standards and regulations are faced with diver's problems peculiar to their own region. To understand the extent of various problems of inadequate enforcement, and inadequate building code around the world many research publications were reviewed and recorded cases of global happening were obtained.

For example, in **USA**, the BC as its stand now is inadequate to environmental challenges of snow taking over the cities and trapping buildings and people from the report on CNN, SKY NEWS, BBC (November 2014). In the same vein, Burby, R. J., May, P. J., Malizia, E. E., & Levine, J. (2000) argued that the USA BC standards has not been given adequate enforcement to protect the people, buildings and the environment as desired. Jain and Leiva (2010) proclaimed that Hurricane Andrew in 1992 exposes the inadequacy of enforcement of construction practices in the USA to protect people and homes since majority of buildings were blown off by the Hurricane. Figure 2.4 is an example of buildings taking over by snow reported in November, 2014.



Figure2.4: Examples of USA inadequate BC AP Photo/Carolyn Thompson Snow covers a street at

daybreak Wednesday, Nov. 19, 2014, in south Buffalo, N.Y. snowstorm has buried sections of western New York in more than 5 feet of snow.

In Canada, Sustainable Development Commission (2007) argued that earthquake and ice tsunami should require regulations that will safe buildings and people and the structural integrity of Canada buildings. Example of the ice tsunami crashing into homes in Canada is shown in Figure 2.5.



Figure 2.5 Examples of Canada inadequate BC for Rare 'Ice tsunami' crashes into Minnesota town homes May 14, 2013. Source: (Google earth 2014)

In London: Grenfell Tower fire non-compliance results in the death of 80 persons in 14th June, 2017 as a result of poor insulation, cheaper flammable exterior cladding violated the building safety regulations as shown in figure 2.6.



Figure2.6 Grenfell fire safety regulation violations (Source: Google earth)

2.6 Overview of the Nigeria National Building Code (NBC 2006)

Nigeria as it were, had no uniform building code (BC) governing the residential building construction and management as it has been established from studies until 2006 (Obiegbu 2008; Omeife and Windapo 2013). This created several environmental challenges of

- “Plan-less-ness of towns and cities;
- Incessant collapse of buildings, fire infernos, built environment abuses and other disasters;
- Dearth of referenced design standards for professionals;
- Use of non-professionals,
- Lack of maintenance culture and
- Use of untested products and materials”

All of these problems motivated the Defunct National Council on Housing and Urban Development (NCH&UD) to institute the process of evolving a National Building Code in 1987 in solving the problem (NBC, 2006, p. iii-v).

Omeife & Windapo (2013) established that this was to ensure rightful professionals are engaged for building quality, safety and occupant’s wellbeing to reduce the negative impacts the BC will have on the environment. Obiegbu (2008), Dahiru *et al* (2012) attest to the process of NBC 2006 development to mitigate the hazardous trends in the building construction industry in providing the minimum standards for building predesign, design, construction and post construction stage with a view to ensuring quality, safety and proficiency in the building industry. (ibids) confirmed that stakeholders were duly contacted although the consultation process was not detailed for analysis by the NBC 2006 and the various studies reviewed. The review process as presented and supported by Obiegbu (2008), Omeife & Windapo (2013), and NBC (2006) were as follows;

- Consultation of stakeholders
The groups that contributed to the success of the production of the first edition of the National Building Code as stated in NBC 2006, includes: the seven professions of the Building Industry and their respective Regulatory Bodies, (i.e. Architecture, Building, Engineering, Estate Surveying and Valuers, Quantity Surveying, Land Surveying, and Urban and Regional Planning), and resource persons at various stages of the production of the BC and all other stakeholders in the Building Industry (NBC, 2006).
- Workshop by the defunct Federal Ministry of Works and Housing at (Administrative Staff College of Nigeria) ASCON, Badagry – Lagos State in 1989,
- Another workshop was held at the Gateway Hotel, Ijebu-Ode, in Ogun State in 1990. The product of the Ijebu-Ode BC was approved by the then National Council on Housing in

1991. Unfortunately this document was not ratified by the then Federal Executive Council for use in the Country,

- In 2005 the 1991 approved document was re-presented to the 2nd National Council on Housing and Urban Development held in Port-Harcourt, November, 2005 and the Council directed that the document be widely circulated to all stake holders for input to facilitate the production of an acceptable National Building Code,

Consequently, the Draft document underwent some restructuring from three parts to four parts as follows:

- Part I -changes from Administration and Environment to Administration
- Part II- forms Classifications and Requirements, subdivided into two major divisions: Sections 4 and 5 then Sections 6–12 respectively. The second division charges the major stakeholders in the Building Industry to produce their own requirements as per the working tools from Sections 4 and 5.
- Part III-forms the Enforcement part of the Codes. The entire Building Process is divided into four (4) convenient stages for easy implementation
 - Pre-Design Stage – Requirements and Enforcement;
 - Design Stage – Requirements and Enforcement;
 - Construction Stage – Requirements and Enforcement; and
 - Post-Construction Stage – Requirements and Enforcement.
- Part IV- is made up of a separate part namely, schedules, where all supportive documents, data, tables, information and all sorts of relevant and approved application forms to Part I, II, and III can be found (NBC, 2006, Obiegbu 2008).

The then Hon. Minister of Housing and Urban Development (2006) Mimiko, O. Cited in NBC, 2006, agreed that the objective behind the review of NBC 2006 was to bear in mind that the draft document approved for the review was based essentially on foreign codes. In which some elements of the BC do not have direct relevance to our environment. Secondly to encourage professionals in the building industry to produce the most appropriate BC suitable to Nigeria environment for subsequent use and application.

This study critical view at the objectives for the institution of the building code in 1987 reviewed and represented in 2005 after eighteen (18) years of being inactive and not enacted by the national assembly after eleven (11) years and the same problems rolling their eyes at us after twenty-seven (27) years gives this study a concern to question the objectives that gave birth to the Building Code in 1989, 1990 and 1991-2005 and now the same 1989 document as NBC 2006 with little or no changes within the systems.

Some of the questions raised by this study concerning NBC 2006, including;

- ✚ How the consultation was made for the various professional's inputs?
- ✚ Was the interest of various professionals and relevant stakeholders resolved before the final draft?
- ✚ Was the contractors and end-users part of the workshop?
- ✚ What about civil society or labour union representing the interest of the masses,
- ✚ Was the public including artisans/tradesmen part of any of the workshop?
- ✚ How was the workshop geographical location for jurisdiction inputs on available practices and cultural interest? and
- ✚ If any relevant NGO or international organisation was present to make inputs on international best practices.

In the opinion of this study answering the above questions will easily reduce the problems of Building Code implementation and enforcement challenges surrounding the implementation of structural provisions of mid-rise residential building, legal backing, professional vested interest and rivalry and public awareness challenges in Nigeria.

2.6.1 Structure of the Current Nigeria Building Code (NBC 2006)

Omeife & Windapo (2013) insist that the structure of NBC 2006 Table 2.4 divided into four parts is to assist all professionals involve in the building construction and management industry to easily identify their responsibility for buildings and occupants health and safety as well as the enforcement of the building design, construction and post-construction process by development control.

Dahiru, *et al* (2012) stress further that the NBC 2006 structures is quite good and encouraging but still lack basic sustainable practices as advocated by international best practices, the study solicit for the inclusion of sustainable practices as obtainable globally.

Table 2.4: Structure of NBC 2006

PART 1: ADMINISTRATION	PART 11: TECHNICAL (PROFESSIONALS).
Sections Section 1-Citation and Commencement Section 2-Interpretation, Definitions and Abbreviations Section 3 -The Establishment of a building Code Advisory Committee (BCAC)	Sections SECTION 4-Building Design Classifications SECTION 5 -Building Construction Classifications PRE-DESIGN STAGE SECTION 6 -Environmental and General Building Requirements DESIGN STAGE Section 7-Architectural Design Requirements. Section 8-Civil/Structural/Geo-Technical Design requirements. Section 9-Service Engineering Design Requirements CONSTRUCTION STAGE Section 10-Building Materials and Components Requirements Section 11-Building Construction Requirements POST-CONSTRUCTION STAGE Section 12-Posts –Construction Requirements
PART 11: ENFORCEMENT	PART IV SCHEDULES AND REFERENCES
Sections Section 13-Control of Building Works	Sections SECTION 14 -Referenced Standards SECTION 15-Compliance Forms. (NBC, 2006, p.35)

Source: Adapted by Author from (NBC 2006, Omeife & Windapo, 2013)

2.6.2 Problem of Adapted Standards of Nigeria NBC 2006

This study sees standards as a uniform guiding technical document for the methodology, the process and the practices for the execution of (implementation) individual activities. This study sort to establish various standards used in the drafting of NBC 2006 for clarification and discovered that standards acronyms used indicates that NBC adapted the entire standards of the Europeans and the Americans with the latest reference cited being that of BS 4071 of 1986 but the majority of the standards start from 1954-1980 with 1970-1980 been the predominant features of the Standards as seen in section 14 of NBC 2006. For example, the Uniform Building Code (UBC) adopted by NBC (2006) has undergone various reviews as revealed by Trombly, B. (2006) from 1915 to 2000 into a unified ICC/IBC (2000) building code with latest version as ICC 2009.

Similarly, the British Standards (BS) and European Committee for Standardisation (EC) used by NBC 2006 has developed international standard called Euro-code already in circulation.

In Europe, the Euro code is a pan-European building code which superseded the older national building codes and standards (European commission, 2003).

European commission (2003) advised all international countries using the British standards as their national building code to adopt the Euro code which superseded the older national building code. Both IBC of ICC and Euro-code of EU welcome international adoption of countries using their standards for the construction industry but Nigeria NBC is far yet to be aligning with these best global practices of implementation despite having the code originated from the international environment.

2.7 Evolution of Construction Development projects in Nigeria

Mosaku et al (2006) cited in Mbamali and Okolie (2012) confirmed that Nigeria building development practice has gone through a great deal of profound changes in the history of Nigeria right from the colonial era when building materials were directly imported from abroad. However, organized building design and construction processes in Nigeria can be traced to Royal Army Engineers Public Works Department in 1930s who were handling construction of projects without any external contractors (Olowo-Okere (2006) cited in Mbamali and Okolie 2012; Isa, R. B., Jimoh, R. A., and Achuen, E.(2013).

Isa *et al* (2013), Mbamali and Okolie (2012, p.144) all noted that contractors such as the British and Italians were introduced into the constructions in Nigeria from 1940s when Nigeria government

began the ten (10) year Development plans⁸. (ibid) argued that Nigeria independence of 1960 brought construction growth and the 'oil Boom' of 1970s leading to the introduction of indigenous and more foreign contractors handling the various developmental projects of the government. But the results as presented were worrisome, that the projects lacks proper planning, poorly executed with low quality materials and nationwide abandonment of such projects as evidence of abuse of contracts at that time. For example, the multi-billion dollar Ajaokuta Steel Complex including the mass housing projects in Kogi State, Nigeria. The construction standards and projects' quality nose-diving brought forward the recommendation of direct labour system for capital project delivery in 1984 13th annual conference by National Council of works when emphasis was placed on physical development from the 4th National Development Plan, which were also abused later and abandoned (Kayode, O. F and Bayo, A. O, 2012; Isa *et al* 2013; Mbamali and Okolie 2012).

This study has a firm view from the reviewed that 'oil Boom' of 1970s exposed the industry to corruption that sacrificed quality and conscience to shady practices that brought the building construction industry to her knees today in Nigeria.

2.7.1 Overview of development planning policies and law in Nigeria

The Nigeria Land and Development Planning, dated back to the colonial era as a pioneer of organised land and town improvement administration in the country (Kayode, O. F and Bayo, A. O, 2012).

Historically, the land tenure and planning system in Nigeria had a traditional land ownership where family, community and individual had the right to land. The owner of land is the family, the clan the village or the community (Ghebru, H., Edeh, H., Ali, D., Deininger, K., Okumo, A. and Woldeyohannes, S. 2014).

Emir, an Oba, an Obi, Attah, Chief or even a district head exercised authority traditionally over land within their jurisdiction. This is called the customary right of land tenure system which is purely by inheritance. But the land use Act of 1978⁹ that nationalize lands empowers Governors to utilise the land for the betterment of the state on behalf of people of the state. This has created conflict between the government various ministry of lands and the community because of their farm,

⁸ Enactment of town and country planning ordinance (No. 4 of 1946) by the colonial government. This ordinance was based on 1932 British Town & Planning Act

⁹ Professor Akin L. Mabogunje (2007). LAND REFORM IN NIGERIA: PROGRESS, PROBLEMS & PROSPECTS. Chairman, Presidential Technical Committee for Land Reform

children and the unpaid compensation by the governments. See also (Usaid Country Profile Property Rights and Resource Governance, Nigeria) for land tenure system and associated problems.

Nigeria development planning evolves in five different significant stages from the colonial era, which include: Lagos Town Improvement Ordinance to control Sanitation and development, Nigeria Town planning ordinance based on British Town and Country Planning Act, Land Proclamation Law, Land use Act and Urban and Regional planning Decree (Kayode and Bayo 2012; Olufemi, O., Ayangbile O. and Abiodun, O 2015). Table 2.5 present the summary of the genesis of planning system, development planning policies and laws in Nigeria from the British rule to-date.

Table 2.5: Development planning policies and Law in Nigeria from British rule

Stages	Planning Policies and Law	Date
1	Kings, Attahs, Chiefs, Obas, Emirs were the owner of land traditionally and that was respected.	Local Tradition
2	British Colony under the treaty of cession ¹⁰	1861
3	Lagos Town Improvement ordinance to control Sanitation and Development was Promulgated.	1863
4	Indirect rule ¹¹ of Land administration promulgation of Lord Lugard.	1900
5	Cantonment Proclamation ¹²	1904
6	Establishment of Town planning for Southern and Northern provinces ¹³ .	1914
7	Town planning committee dissolved-no legal backing and Health Board established instead.	1914
8	Health Board senior public servant supervise urban planning and development.	1914 to 2 nd World War
9	Enactments of Township Ordinance No. 29. First ever attempt to control building patterns in Nigeria cities like Jos, Lagos, Kaduna, Enugu, and port Harcourt benefited.	1917
10	Lagos executive development board (LEDB) was established	1928-1930

¹⁰ Land ownership transfer to another entity

¹¹ That Urban settlement should be controlled by native chiefs, kings, and family head while European Quarters should be government reservation areas.

¹² City control by native's kings slammed with different planning standard but Europeans or Government reservation areas were given physical planning and infrastructural development concentration.

¹³ Initiate development planning schemes, approving building plans by local advisory board and district officers.

	to improve on Lagos slum development.	
Development Plans and policies		
11	10 year Development plan ¹⁴ . Enactment of town and country planning ordinance (No. 4 of 1946) by the colonial government. This ordinance was based on 1932 British Town & Planning Act.	1946-1956
12	Mineral Act Enacted by Colonial Government to control Pollution & drainage.	1945
13	Regulations on Building lines and Infrastructure (road), land acquisition.	1948
14	Public Health Law to control overcrowding, disease in urban areas.	1957
15	1946 Town and Country planning ordinance retained but replaced Ordinance with Law.	1960 (Independent).
16	National Development Plan: 1 st focus was economy. 2 nd focus was still economy but little of housing introduced.	1970-1974
17	3 rd National Development Plan that brought about urban development policy of water, sewage, housing, town & country planning	1975-1980
18	Enactment of Local Government reform Law for administration of lands at grassroots.	1976
19	Land Use decree. No 6 ¹⁵	1978
20	4 th National Development Plan emphasis was placed on physical planning.	1981-1985
21	Promulgation of decree No.3 for the establishment of Town Planners Registration Council. (TOPREC) ¹⁶	1988
22	Committee to review law of town and country planning in	1991

¹⁴ Welfare and development plans (Ordinance) organised for senior government officials which marks the systematic development plan in Nigeria for the reconstruction of town and village and all developmental plans are subject to approval by Governor General.

¹⁵ designed to curb land speculation, ease the process of land acquisition by government, co-ordinate and formulate tenure modernization

¹⁶ To regulate and control the practice of town and country planning in Nigeria, to determine the standard of planning in Nigeria by institutionalization of physical planning first planning school as technical college (The Polytechnic Ibadan)

	Nigeria.	
Urban and regional Planning Law		
23	Nigeria Urban and Regional Planning Law (NURPL) were formulated by the 1991 committee. Decree NO.88 of 1992 on 15 th December, 1992	1992

Information sources: ((Kayode and Bayo, 2012; Olufemi, O., Ayangbile O. and Abiodun, O. 2015, Act 1992.NO.88). (Author table construction)

Nigerian Urban and Regional Planning Act (Act 1992.NO.88) submitted that 4th National Development Plan of 1981-1985 emphasis that physical planning and development was the brain behind the establishment of the developmental urban planning law in Nigeria.

Nigerian Urban and Regional Planning Act (Act 1992.NO.88) responsibilities were:

- To provide legal framework for the implementation of planning policy;
- Provide urban settlement guides and classification development parameters;
- Facilitate preparation of development plans and planning schemes
- Assigns development planning and control roles to the Federal, States and Local government and
- To introduce strategies for effective monitoring for enforcement of planning laws at all levels of government. See Act 1992. No 88 (Nigeria Urban & Regional Planning Law) Appendixes 4A for Laws on control of physical development.

This study can state firmly at this juncture that Nigeria existence from the British rule to date has made significant attempt in development planning policies (see Appendix: H for Archives records of some Ordinance).

However, Aluko, O. (2011) noted that despite these efforts, and creation of supporting agencies for environmental protection and environmental health sanitation, implementation of those policies and law was and is still a re-occurring problem in Nigeria. Nigeria development planning policies and law ratification were seen in two established physical planning and development law, including; Land Use Decree. No. 6 1978 (Land Reform Act 1978) and Act 1992.No 88 (Nigeria Urban & Regional

Planning Act). The third is the embattled Building code standards and regulations (NBC 2006) that is still pending ratification by the national assembly.

2.7.2 Development Planning Permits Procedures (DPPP)

In current building practices within Nigeria, the structural aspects of house building construction involve the following stages: from building design for approval by urban planning department to building construction to the monitoring and inspection by the development control department.

Building development control, this was established by Act 1992. No 88 as a department at both Federal (controlling of Federal lands and development plans), States (controlling state owned lands and development plans) and at the Local council for (council owned lands and development plans) has the following procedures for the stage by stage application and approval processing of structural building development plans as expected by Nigeria development planning policies and law (Nigeria Development Control approval Documents, 2014; Author's professional practice experience). Figure 2.7 summaries the development approval process for structural buildings. The supporting documents to be attached as required by the planning regulations with the complete sets of building plans include the following:

- Environmental Impact Assessment report (EIA for factory or industrial buildings);
- Site analysis report for all building plans, and
- Letter of attestation that started in 2011 by Development control Abuja and other some states for Builders and Engineers who are involved in the erection of high-rise residential buildings in the wake of incessant structural building collapse.

The attestation letter must include: The name, the professional qualification, must be member of CORBON or COREN, Photocopy of certificates, residential address and functional telephone numbers (Development Control approval Documents, 2014; Author professional practice experience)

Ground for rejection of Building plans processing

The approval documents that will present some ground of rejecting development planning application, including;

- If site is within the government interest ,
- If layout plans for the area is not submitted or properly titled,
- Lack of proper setback from roads and adjoining sites,
- Site under high tension, gas or NNPC or rail way setback pipe line,
- If the drawings are not produced by registered professionals (Architect, engineers), and
- In the case of land swap.

(Source: Nigeria Development Control approval Documents obtained a copy 2014; Kogi State drafted Master Plan final report, 2009)

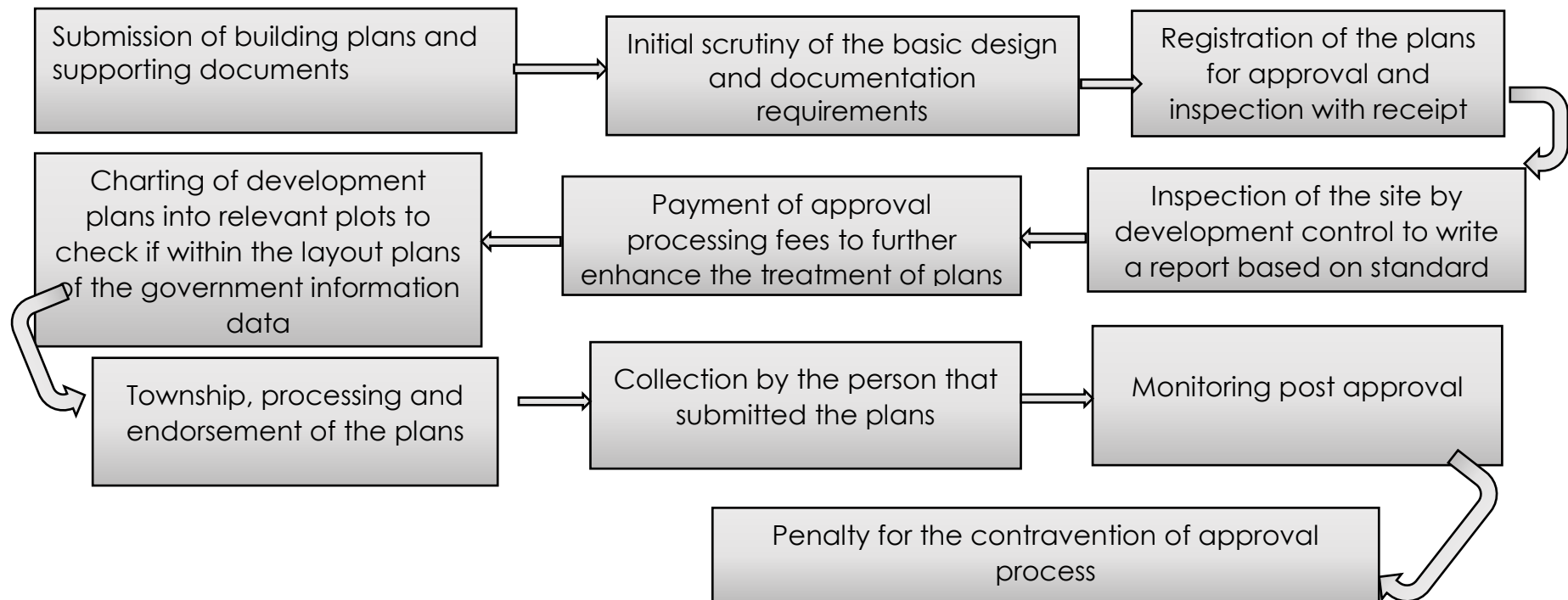


Figure 2.7: Structural building development approval process

Source:

(Author

construction

2016)

2.7.3 Land development Plan Zoning Methods

Land development plan zoning distortion and urban sprawl across Nigerian cities is not a new phenomenon, poor implementation of planning and development policies happens to be a contributing factor. Land zoning as a matter of fact does not apply in Nigeria land development and physical planning process because standards and regulations are enforced through societal class and individual personalities, which tend to be more influential than institutions, standards and regulations, and the law and at the same time approaching political well-placed individual in the society can guarantee land swaps from one use to another (Gbebru et al, 2014; Jibrin and Garba, 2012; Okpala 1984).

Development land zoning methods according to Ghebru et al (2014), Kogi state drafted Master Plan final report (2009) comprises of the mixed land use zone where both (residential, commercial, industrial and institutional are mixed together), recreational land use area (leisure, playground), residential land use, industrial estate and institutional Development (schools, religious group). However, Jibrin and Garba (2012) reported that land swap by developers using Educational plots or Religious plots for housing development in Abuja, Nigeria due to housing shortage with the help of development control has significantly affected the land development plan and zoning implementation practices in Nigeria.

This research agreed with Ghebrue et al and Jibrin and Garba from professional practice experience across some cities in Nigeria, namely; Port-Harcourt (Rivers state), Owerri (Imo State), Lokoja (Kogi state), Kaduna (Kaduna state), Lagos, Minna (Niger state), and Abuja) that land development plan zoning methods is only implemented were government officials have interest for personal development or one of their political associates have some interests and not really for the infrastructural advancement of the low and middle in-come earners developing areas in the society.

2.8 Appraisal of Implementation best practices

2.8.1 Implementation Defined

Implementation is defined as a specified set of activities designed to put into practice an activity or program of known dimensions. What this implies is that, implementation processes are purposeful and are described in sufficient detail such that independent observers can detect the presence and strength of the 'specific set of activities' related to implementation (D. L. Fixsen, S. F. Naoom K. A. Blasé, R. M. Friedman, and F. Wallace, 2005).

2.8.2 Interventions for Implementation Success

Implementation process can never be driven without innovative process for the implementation. Rogers (2003) cited in Meyers, D.C., Durlak, J. A., and Wandersman, A (2012) defined innovations as an idea, practice, or object that is perceived to be new by any individual or an organisation or group of persons or the community (Fixsen et al, 2005). It has been established among researchers of the growing importance of implementation science as an approach to bridging the existing gap between research, policy and practice (Meyers et al 2012; Fixsen et al 2005).

Ploeg, J., Davies, B., Edwards, N., Gifford, W., and Miller, P. E. (2007) described that, the persistent problems of providing high-quality practice is the gap of implementation between research and practice; the research therefore advocate an appropriate guideline practices tools for closing that existing gap.

Dyke, M. K. (2015) argued that the existing gap between research and practice globally is the implementation gap. The study further confirmed that implementing officers don't use innovations with fidelity (performance assessment), don't build capacity to sustain innovations and don't scale innovations to provide benefits to citizens and society. Example of the research to practice gap is presented in figure 2.8



Source: (Dyke, M. K. 2015) Figure 2.8 Research to Practice gap. Adapted from (Dyke 2015)

Dyke (2015) argued that the gap (implementation) in figure 2.18 above can only be successfully bridged through intervention in innovation for implementation. Meyers et al (2007) describe that, investigation into the methods to translate implementation research evidence into practice through collaborations for leadership was a new innovation which bring new ideas, and these ideas have found their way into recent dissemination and implementation-related frameworks. Lack of innovations, lack of adequately defined programs impedes effective outcomes of implementation (Fixsen et al, 2005; Dyke 2015; Fixsen et al 2013; Meyers et al 2012). Fixsen et al (2013) and further proposed a criteria for defining usable intervention for implementation success for any program as follows;

- ✚ Clear description of the program which must include the clear philosophy, values, principles which provide guidance for all program decisions, its consistency, integrity and sustainability across organisation departments. It must also state beneficial population of the program when fully implemented,
- ✚ Clear description of the essential functions of the program features showing existence in a particular location sometimes called core intervention components, active ingredients or practical elements,
- ✚ Operational or practical profiles describing the core activities of the essential functions of the program that allow teaching, learning and practicing of the program for consistency amongst practitioners at the level of actual delivery, and
- ✚ A practical performance assessment (called 'Fidelity') of practitioners who are using the program as it relates to the program core values and philosophy and this can be done repeatedly in the typical human services context for success.

2.8.3 Implementation Framework

Implementation process has been presented in different formats from the review of literatures. Some describe the major steps involved in the implementation process at other times they are refined conceptual framework (either graphical representation or narrative format of key elements to be studied) based on literature research and practical experience (Meyers et al 2012).

For a successful outcome of any program or practice, there must be an active implementation framework to answer what needs to be done as effective intervention of innovations and how to establish what needs to be done, who is responsible to do the work for positive outcomes; in human service settings is described as effective implementation and therefore enabling contexts is described as the thriving place for effective interventions and effective implementation to produce

the socially significant outcomes (Metz and Schroeder 2015). Example of active implementation framework is as presented in figure 2.9 below

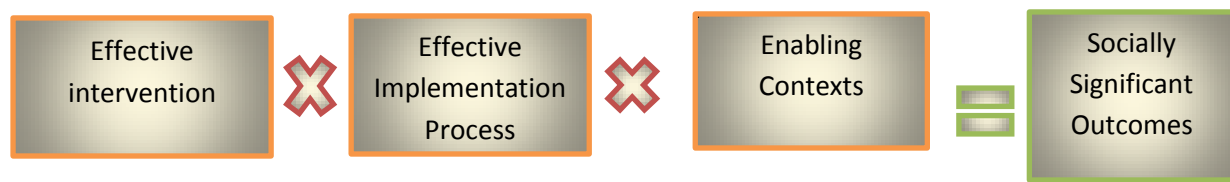


Figure2. 9. Active Implementation formulas for success. Adapted from (Metz and Schroeder, 2015)

Based on this established review, a formula for successful uses of evidence-based programs in typical human service settings can be characterized as: Effective interventions x effective implementation process x enabling environment for implementation = improved outcomes. Note that the formula for success involves multiplication. If interventions are not effective (intervention = zero) then the intended outcomes will not be achieved. If implementation supports are not effective (implementation = zero), then the intended outcomes will not be achieved (Fixsen et al 2005).

The framework of implementation provide an overview of expected ideas and practices that shape the complex implementation process and can also help practitioners and researchers use others' ideas of similar project successful implementation process (Meyers et al 2012). However, a well-defined program and practices will show five essential components within the implementation framework as argued by Fixsen et al (2005). These include;

1. a SOURCE (Several parts of the original program that was developed, evaluated, attempted implementation of the program),
2. a DESTINATION (This involves the individual practitioner and organisation that adopts, support, houses and funds the installation and on-going use of an innovation),
3. a COMMUNICATION LINK (Implementation team 'PURVEYOR' who work to implement the program with fidelity),
4. a FEEDBACK (constant flow of reliable information about performance of individuals, teams, and organizations acted upon by relevant practitioners, managers, and purveyors) and
5. INFLUENCE (social, economic, political, historical, and psychosocial factors that have effect directly or indirectly on people, organizations, or systems). Example of the framework for Implementation of Defined practices and program is represented graphically in figure2.10

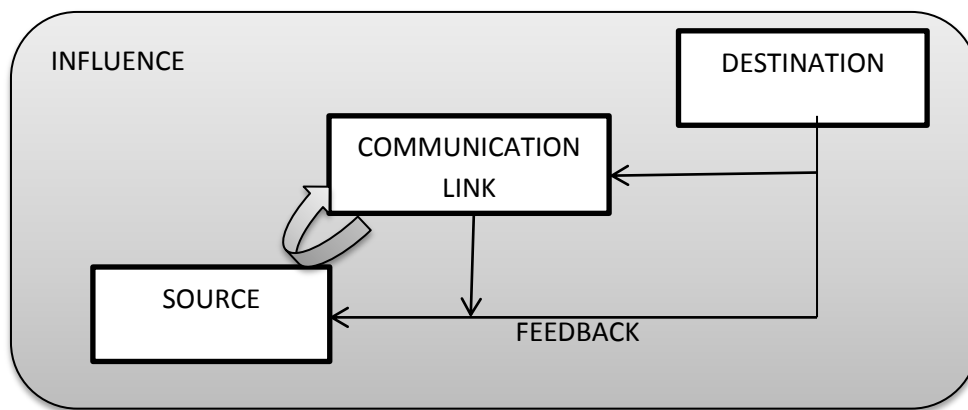


Figure2.10: Framework for Implementation of Defined practices and program

Source: Adapted from (Fixsen, Naoom, Blasé, Friedman and Wallace 2005)

2.9 Critical stages in the implementation process

Meyer et al (2012) describe implementation frame work as the window into the key attributes, facilitators and constrains related to promoting implementation. Figure 2.21 is an example of stages of policy implementation framework as suggested by Fixsen, Naoom, Blase, Friedman, & Wallace, (2005). Fixsen, et al (2005) advised that active implementation framework start-up plan should be with usable intervention with the following criteria: Essential Function, Clear Descriptions, Operational Definitions and Performance Assessment System as earlier described above. Fixsen et al 2005; Meyers et al 2012; Fixsen 2013 and Metz and Schroeder (2015) all established the four critical stages in policy or standards implementation process as presented in figure 2.11, including; exploration, installation, initial implementation and full implementation.

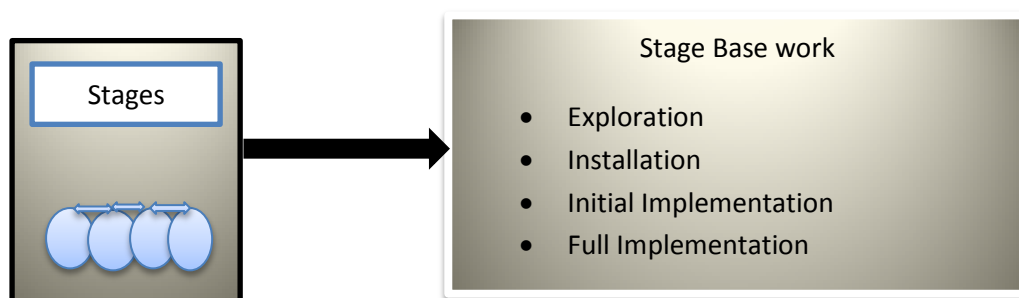


Figure2.11. Stages of policy or standard implementation process adapted and modified by this research from (Fixsen, Naoom, Blase, Friedman, & Wallace, (2005)

2.9.1 Exploration, Installation, Initial and Full implementation stages

- **Exploration and Adoption Stage**

Exploration stage is a critical starting point of the implementation process as described by Fixsen et al 2005. The study presented that the purpose of exploration is to assess readiness on what is needed by both the program and the host community and organisation, the enabling resources on ground for the program by the implementation team (Purveyors) such as capacity and information technology; at this point decision to continue or not for the program is taken (Meyers et al 2012; Metz and Schroeder 2015).

- **Installation stage**

Fixsen et al (2005) install this stage set the needed wheel of progress when decision to proceed for implementation is reached. The function of the stage is to acquire sets of activities needed for the work ahead, including; recruitment of qualified staff, securing space for offices, acquiring need technology (Computers, phones etc), assurance of initial and continuous training for staff, assurance of performance assessment (Fidelity) tools, securing of funding streams and access any other materials that may aid the progress of the work (Fixsen et al 2005, Metz and Schoeder 2015)

Fixsen, D., Blasé, K., Metz, A. and Dyke (2013) argued that at this stage all implementation drives comes into play to assure a sustainable and integrated approach to change and performance in the system.

- **Initial implementation stage**

Fixsen et al (2013), Fixsen et al (2005), Dyke (2015) all noted the possibilities of returning to status quo (the usual ways) because of the fragile and complex nature of challenges at this first time of innovation trial. During the initial stage, staff and implementation practitioners are trying to use newly developed innovative skills (for example, evidence based program) for organisation policy or cultural change and so require education, practice, and time to mature (Fixsen et al 2013; Fixsen *et al* 2005). The same studies advocate external support for staff development, administrative adjustment of organisation roles and functions to align with the program to surmount any awkward outcome and compelling forces of fear of change inherently difficult and complex work of implementing something new citing Joyce and Showers (2002) in Fixsen *et al* (2005).

- **Full implementation Stage**

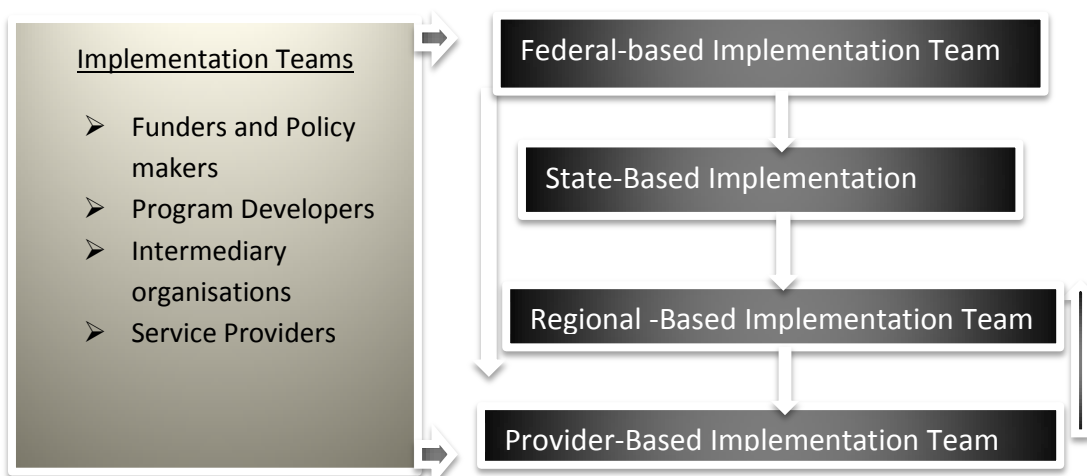
In this stage, the new innovative ways of providing services which was tried and perfected are now the standard format in the organisation, the community and the district immediately it is being integrated (Fixsen *et al* 2005). Fixsen *et al* (2005) describe the program to be fully operational when it is so integrated in the system above organisation, individual districts, community, state, federal and leaders who will come and go but the active implementation remains within the system (Fixsen *et al* 2013). For continue improvement and development of the evidence-based programs, implementation teams remain a vital contributors on the ongoing success of the program through effective practices, maintaining and improvement of the policy over time and through transitions of leaders and staff to avoid the impact of change on practitioners and organisation and for program or policy sustainability (Fixsen *et al* 2005; Fixsen *et al* 2013; Metz and Schoeder 2015).

The vital implementation team's contributors to the success and sustainable policy or program are presented in the next section.

2.9.2 Implementation Teams

Those who do the work of implementation are the teams; Fixsen *et al* (2005p.12) called them the "PURVEYOR" - an individual or group of individuals representing a program or practice who actively work with implementation sites (program sites) to implement that practice or program with fidelity and good effect. Metz and Schroeder (2015) describe implementation teams as those that provide a program or practice structure accountable to move intervention through stages of implementation for any new innovation.

Implementation of policy framework happens from the international, national down to district level. Metz and Schroeder (2015) establish this phenomenon with a framework for implementation teams as represented in figure2.12.



Source: (Adapted from Metz and Schroeder 2015)

Figure2.12: Framework for Implementation Teams.

2.9.3 Multi-Levels Influence on Implementation Success

It is eminent belief from experience that leadership and organisational structures without innovation will definitely not succeed very long. Organisation and external factors pose a great influence at all levels of implementation (Metz and Schroeder 2015). Fixsen et al (2005) further stresses the idea of the influences on successful implementation into three (3) components, including; Core implementation components: which involve training, coaching and performance measurement, secondly, organisational components: selection, program evaluation, administration and system intervention and the last component is influence factors: Social, Economic and Political. The summary example of these multi-level components for the implementation success is shown in in figure2.13

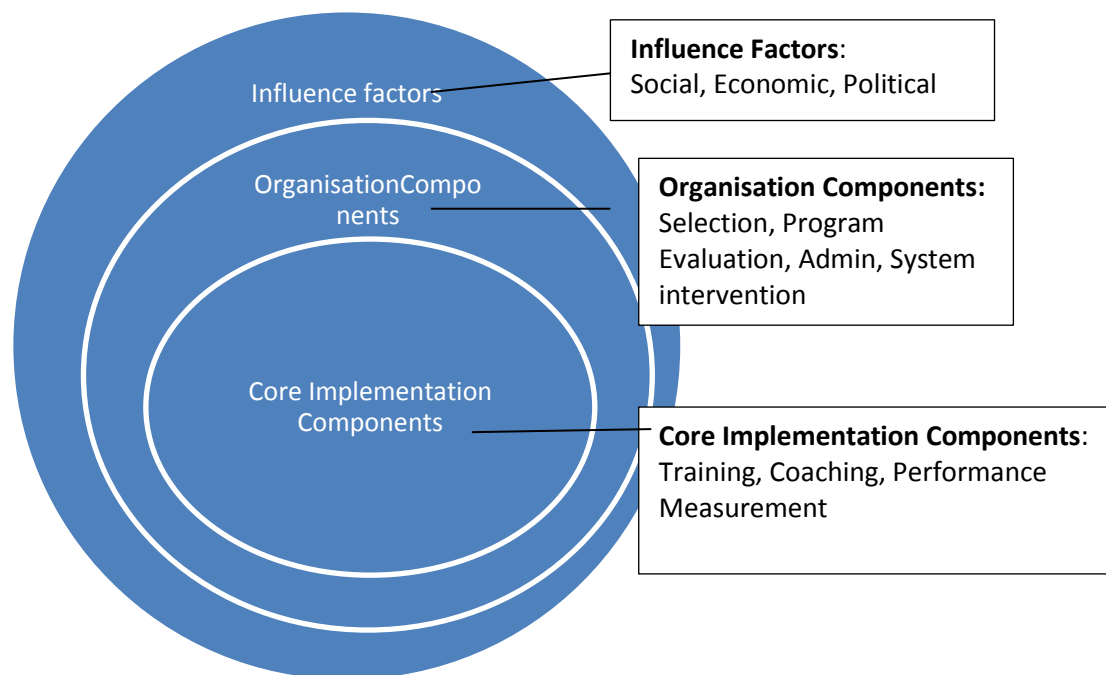


Figure2.13: Multi-level Influences on Successful Implementation Outcomes

Source: Fixsen, Naoom, Blase, Friedman, & Wallace, (2005)

2.9.4 Core components of standards or policy implementation

Core components refer to the most essential and indispensable components of an intervention practice or program (“core intervention components”) or the most essential and indispensable components of an implementation practice or program (“core implementation components”) (Fixsen *et al* 2005, p.24). To be sure, enabling policies, funding sources, facilitative administrator, capable trainers, coaches and evaluators are treated important, completely use interventions and core implementation components should be in place to reduce the exert pressure directly on consumers who uses intervention (Fixsen *et al* 2005).

The core implementation functions consist of training, coaching the practitioner on the job, periodic assessment of performance (fidelity), and using that information to improve the performance of professionals or practitioners who are carefully selected for the position. With these core implementation components in place (and functioning at a high level of competence themselves), practitioner behaviour can be routinely changed and improved to assure competent performance of implementation practices supported by core implementation components engine of change which are referred to as implementation drivers as argued by some research, including; (Fixsen *et al* 2005; Metz and Schoeder 2015; Fixsen *et al* 2013; Meyers *et al* 2012).

2.10 Implementation Drivers

Blasé, K., Dyke, M. K., and Fixsen, D. (2013-2015) form that, implementation science as a newly developing expertise have faced several inherent difficulties among the scholars, thus limited resources on the methodological framework for measurement. The problems are complex and require that attention should be given to multiple actions over an extended period of time as suggested by Van Meter and Van Horn (1975, p.450-451) cited in Blasé *et al* (2013-2015). Implementation drivers are the engine of change, dynamic and interesting interactive ways to produce consistent uses of innovations and reliable outcomes for everyone and it is categorised as Competent, Organisation and Leadership support drivers (Fixsen *et al* 2005).

2.10.1 Competent Drivers

Competency Drivers – are mechanisms to develop, improve and sustain (through staff selection, training and coaching with stakeholders) one’s ability to implement an intervention as intended in order to benefit individual, communities and implementation teams and staff who have been selected for the implementation program ((Fixsen *et al* 2005; Fixsen, D., Blasé, K., Metz, A. and Dyke

2013). Staff selection, training and coaching as competency drivers for successful implementation process is explained as follows.

Selection

Recruitment and Staff selection is an implementation driver rarely mentioned and evaluated by scholars in human services. However, it is the starting point for building a competent workforce that has the knowledge, skills, and abilities to carry out implementation at every level (Blasé et al 2013-2015; NIRN, 2015). Selection of effective practitioners, organisation staff excellent trainers, effective coaches, skilled evaluators, facilitative administrators and effective purveyors goes beyond academic qualifications or experience to required essential skills.

Blasé et al (2013-2015); NIRN (2015) admit to difficulties in certain practitioner characteristics to teach in training sessions so consideration should be given as part of the selection criteria (e.g. basic professional skills, basic social skills, common sense, good judgment, knowledge of the field, ethics, social justice, willingness to intervene, willingness to learn) in specification of required skills and abilities within the pool of candidates, methods for recruiting likely candidates that possess these skills and abilities, and procedure for interviewing candidates.

Training

Staff training as a competence driver requires innovations for behavioural change at the supervisory, practitioner, and administrative support levels. This change is required at five (5) critical stages, including; pre-contemplation, contemplation, preparation, action and maintenance (work to sustain the behaviour change). Figure 2.14 is a summary of the stages for behavioural change adapted from Dyke 2015. Innovation-based training helps practitioners (and others) in an organization learn when, where, how, and with whom to use or not the new skills (Blasé et al 2013-2015); NIRN (2015). NIRN (2015) describes training content as variable depending on the practice or program but the approaches and methods to imparting knowledge, skills and abilities to train practitioner seem common. Those common approaches were described as training related to the history, theory, philosophy, and values of the practice or program in lecture and discussion format.

Fixsen et al 2013; Meyers et al 2012; Blasé et al (2013-2015); NIRN (2015) all noted that, implementation best practices and science indicate that good training includes ample opportunities for demonstrations and rehearsal to practice the skills received and feedback on the practice (post-test of knowledge). In this way, the trainer (coach) will know the strength and weakness of

practitioner for improvement and at the same time will help organizations make use of these data to continue to improve training methods within the industry.



Figure2.14: The Stages of Behaviour Change

Source: Adapted from Dyke M. K 2015

You must understand the behaviour of context and practitioners before you can design your own effective implementation strategy.

“Central to the framework is the initial analytical and explorative assessment that leads to a ‘behaviour diagnosis’. According to the framework of the Behaviour Change Wheel in Figure 2.15 below, inner circle represent source of behaviour, this behaviour diagnosis is decisive for selecting intervention functions (training, incentives, etc.) and policy categories (legislation, communication, guidelines, etc.) to support the intervention” (Ejler, N., Ostensen, J., Graff, D., and Dyrby, T. (2017).



Figure 2.15 Behaviour Change Wheel

Source (Adapted from Ejler,N., Ostersen, J., Graff, D., and Dyrby, T. 2017)

Coaching

NIRN (2015) argued that staff coaching is an important integral part of competence driver because most skills needed by successful practitioners can be introduced during selection and training but really skills are learned on the job with the help of a coach to impart craft knowledge. An effective coach provides “craft” information along with advice, encouragement, and opportunities to practice and use skills specific to the innovation (e.g. engagement, construction process, post construction)(Fixsen 2005; Blasé et al 2013-2015). NIRN (2015) noted four main aspects of coaching as supervision, teaching and practical engagement, assessment and feedback and provision of emotional support to the trainee.

The full and effective use of human service innovations requires behaviour change at the practitioner, supervisory, and administrative support levels. Training and coaching are the principal implementation methods in which behaviour change is brought about for carefully selected staff at the initial stages of implementation and throughout the life of implementation practices and programs and other innovations (Fixsen 2005; Blasé et al 2013-2015).

2.10.2 Organisation Drivers

Organization Drivers – are mechanisms to create and sustain hospitable organizational and system environments for effective services. It involves systems intervention, facilitative administrator and decision making data support. Facilitative administrator in the building construction industry could be legislators, ministries, boards, agencies supervisor, implementation teams, and professional regulatory body who changes organisation practices and support system intervention to help them in establishing a hospitable environment for the use of innovations and the use of effective implementation for practitioner. Decision Support Data system availability is an essential part for guiding the process of establishing innovations which of course might support a focus on the quality of the outcome rather than on the process (Fixsen et al 2005; Fixsen, D., Blasé, K., Metz, A. and Dyke 2013).

Systems Intervention

Implementation takes place in an unpredictably political environment, community, state, and federal; social, economic, cultural, and political and policy dynamism and can be overwhelmed by funding, policy and regulations regularly at odds with the service delivery of most effective

expectations and requirements of the program or practice (NIRN, 2015). The purpose of systems intervention is to identify possible constraints and facilitators for innovation, to create an externally and internally acceptable environment for the new way of work (innovation) and to contribute to cumulative learning in multi-level implementation projects at the same time remain vigilant at community, state, and federal levels for both windows of opportunity and threats to fidelity and sustainability (Dyke M. V., 2015; NIRN, 2015).

Facilitative Administrators

NIRN (2015) describes administrative decisions and support in the implementation process as proactive, vigorous and enthusiastic attention to reduce implementation barriers and create administrative enabling environment for practitioners. Facilitative administrators should regularly ask for feedback from all level of the implementation sites with particular attention to satisfaction and fidelity of the outcome. Dyke M. K., (2015) present the purpose of facilitative administrators as: Facilitates installation and implementation of the implementation Drivers (Selection, Training, Coaching and Leadership technical and adaptive issue), aligns policies and procedures for the implementation program, takes the lead on Systems Interventions and create enabling place, time to make work of practitioners and supervisors easier.

Decision Support Data

Effective organisations have data collection and reporting system for management decisions and outcomes, for continuous quality improvement for interventions, implementation support and organisation functioning (NIRN, 2015). The purpose of Decision Support Data is to make information readily accessible and useful to practitioners, analyze the relationship of measure of fidelity to outcomes, to guide further program development in line with data results and analysis and to also engage in continuous quality improvement for interventions, interaction with Core Implementation Components and for consumers and funders further actions (Dyke M. K 2015; NIRN 2015).

2.10.3 Leadership Drivers

Leadership Driver – focuses on providing the right leadership strategies for the types of leadership challenges. These leadership challenges often emerge as part of the change management process needed to resolve adaptive issues, provide guidance, and support organization functioning, and technical problems for setting time and effort goals (Fixsen et al 2005; Fixsen, D., Blasé, K., Metz, A. and Dyke 2013). The consistent use of the drivers will bring about reliable benefits for the practice and the program (Metz and Schroeder 2015). Figure 2.16 summarises the Implementation drivers adapted from Fixsen et al 2005 is presented below.

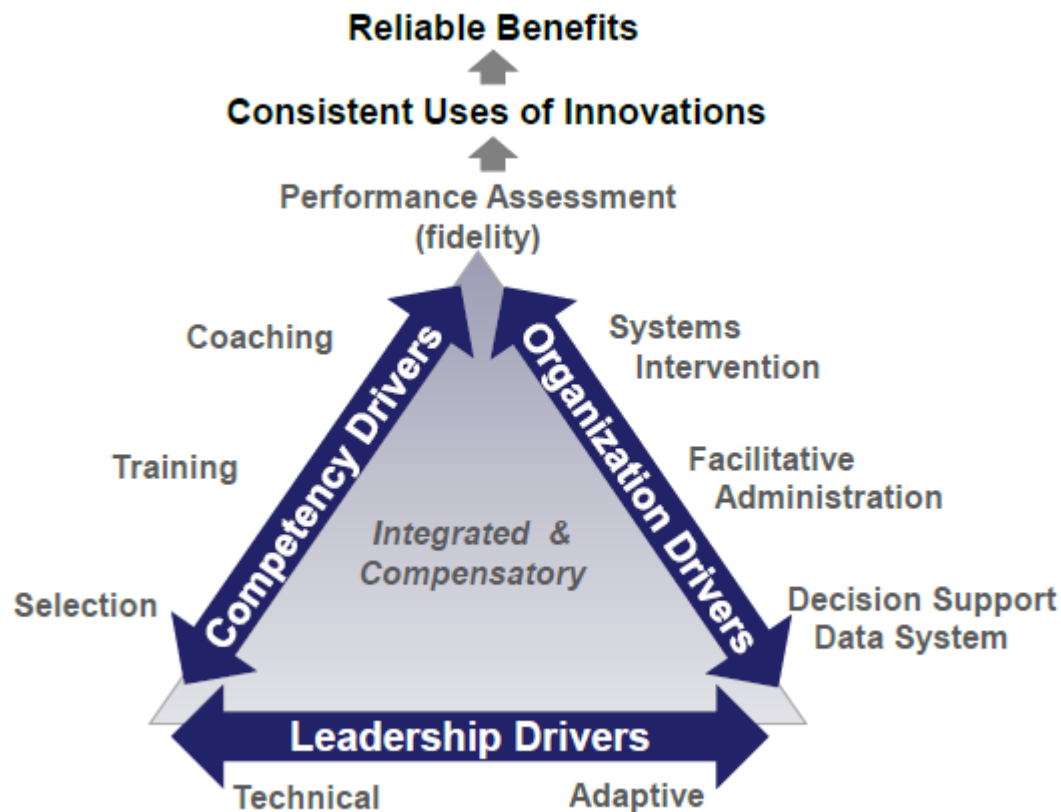


Figure2.16: Implementation Drivers

Source: Fixsen, D. L., Naoom, S. F., Blase, K. A., Friedman, R. M. & Wallace, F. (2005).

Experience has shown that success or failure of any change is attributed to leadership contributions. National Implementation Research Network (NIRN 2015) describes good leaders by their results. In the opinion of Fixsen et al (2005); Blasé et al (2013-2015) leadership is an attribute to people exhibiting needed authority for effective practice or program and sustain them over time as changes occur. For example, leadership needs change as implementation progresses: therefore adaptive leadership styles who are responders, managers, emphasise on policies and procedures of the practice are needed to sustain the change in a complex and uncertain zone (Blasé et al 2013-2015).

Technical leadership styles are engaged to respond quickly to issues that may arise in the implementation process which organises group to solve problems and regularly produces results. They are good management to the continuing implementation supports (e.g. selection interviews, performance assessments, system interventions) for effective programs over the long run. In the midst of continual social and economic changes that impact human services, the need for adaptive leadership never goes away. Sometimes the same people provide both kinds of leadership, but precaution should be taken in such cases. Appropriate placement of adaptive and technical style of

leadership depth and breath, policy alignment with functions and accountability is a step towards successful program implementation (Blasé et al 2013-2015). An example of effective policy to practice feedback (form follow functions) for a successful implementation process of policy alignment with functions is presented in figure 2.17

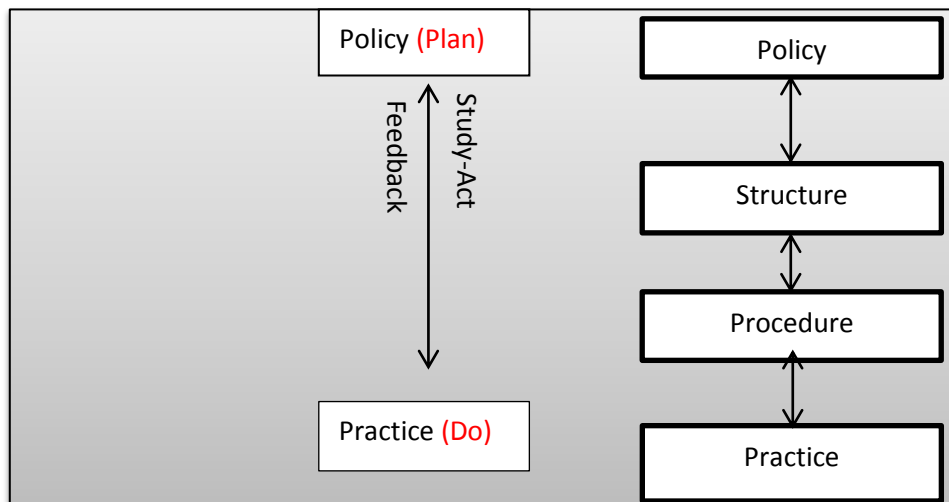


Figure2.17: Policy-Practice-Feedback (Form Follow Functions)

Source: Adapted from (Fixsen 2006)

2.10.4 Assessment of Implementation performance

Fixsen et al (2005) named Performance Assessment as (Fidelity assessment). The study argued that, most effective innovations and interventions failed to produce positive effects for lack of implementation, thus making performance assessment a critical part of implementation. Fixsen et al (2005) describes aspects performance assessment is designed to assess and measure as;

- Context measures: refers to the necessary requirements that must be in place to the high-level of program performance (e.g., staffing qualifications or numbers, practitioner-consumer ratio, supervisor-practitioner ratio, location of service provision, prior completion of training),
- Compliance measures: this provide the extent to which the practitioner uses core intervention components for the program, and
- Competence measures determine the extent to which the core intervention components were delivered with skills learned and attention to craft knowledge for the consumers (Fixsen et al 2005; NIRN, 2015).

The usefulness of performance assessment (Measures of Fidelity) is important; Professional trainers can use the information to their professional development, administrators can use the information to assess the quality of training and policy-practice, implementation team can use it as a guide for implementation at the practice and program development levels and very useful to researchers as an outcome measures for some studies and as independent variables for exploratory research (NIRN 2015).

2.11 Strategies to Improve the Implementation of Standards and Regulations

2.11.1 Virtuous Circle to Curb the Circle of Blame

A body of growing literatures shows that changing from the norms of original way of life is usually a difficult task for people even in the house building industry concerning standard regulations. For example, Pinder J., Schmidt, R., and Saker, J. (2013) presented that changing a building to satisfy new standards by owners or occupants is always associated with cost of materials, labour, and loss of time and income, which invariably hinders people from such change. The study stresses that the motives for adaptation or change should be clearly outlined for voluntary choices.

According to Pinder *et al*, stakeholders in the building construction industry divergent views of change from the non-professional practices to professional standards practices of cost time consuming and labour intensive without considering the benefits to their health and safety of the building is a dangerous trend to building code standards implementation.

The studies of Fellows R. and Liu A. M.M (2013, p.) established that culture models the behaviour of people with regards to building construction which sometimes is a symbol of cultural identity and the environment, therefore implementing standards in those buildings might be a difficult challenges to them. This implies that any building standards for construction project that refuses to consider the various 'deep-seated' cultural formation of the environment will affect both the long and short term benefits of the standards and project.

Of similar kind, Salama, A.M (2006) , Agboola and Zango, (2014) argued unanimously that, regulations and standards of buildings must identify with the way of life of the people along their norms and taboos, ideas, values & religion and occupation which all combined to give them satisfaction as part of the standards and regulations for design criteria of affordable buildings. The study stress that, it help for satisfactory participation in building construction process that will bridge the gap of compliance and enforcement of standards.

Pinder *et al* (2013, p.455) submits that to construct more adaptable buildings in terms of standard regulations, cost considerations and cultural considerations as argued by different authors the stakeholders' mind-sets change' which will help in resolving the circle of blame among the stakeholders concerning standards and regulations should be developed; which should involve all professionals and relevant stakeholders and the design and implementation process as shown in Figure 2.18

For example, the Nigeria building construction industry is currently overwhelmed with building structural challenges with accusations from professional's to government of legal bias and vis-visa, can adapt the virtuous circle to curb the circle of blame and reduces the impact risks of poor implementation of BC standards and regulations on the industry and professional practice.

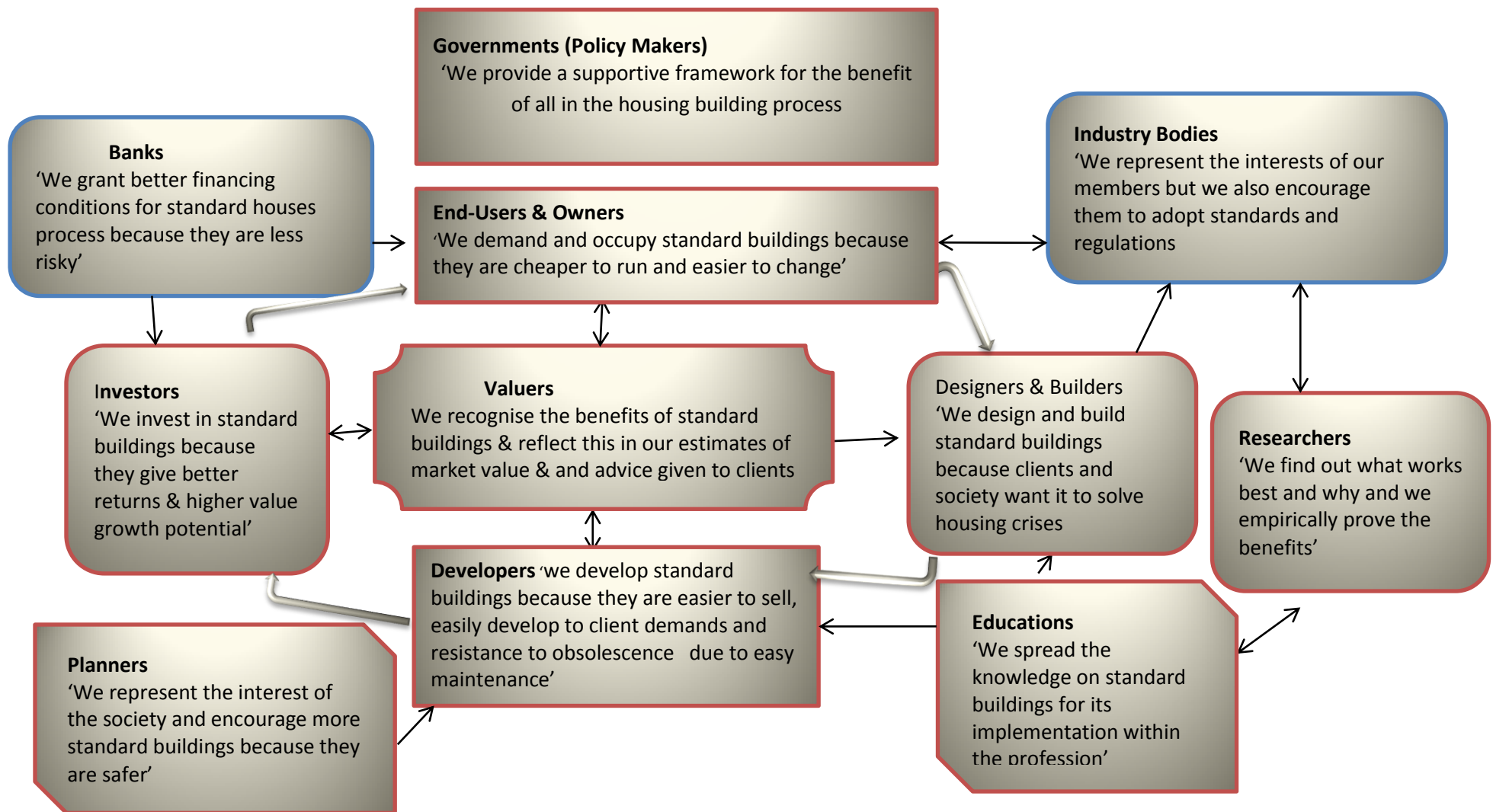


Figure 2.18: Creating a Virtuous circle for standards adaptation (Adapted and modified to suit the study from Pinder et al 2013, p.455 as the study adapted from Hartenberger, 2008)

From figure 2.27 above Pinder *et al* (2013) opined that government policies and regulations have a greater influence on the mind-sets of the people concerning choices of buildings projects. The study stress further that all potentials that exist in the building industry development will be dancing before investors and developers if standards is being adhered to and does not restrict or limit building construction to a certain norms within an area. The concept explain how the stakeholders' mind-sets can be changed if government regulations favour building development projects. For example, the developers will not develop buildings without values but the buildings that attracts investors for better returns on investment, with insurance cover and with structural integrity. Of which, the investors will be looking at end-users and owners attraction with quality, demands and insurance selling point. Designers and builders design and build what the society and client wants while planners encourage the developers to produce buildings with structural integrity in the interest of the society. The researchers continue digging out gaps and finding solution for educators to spread the benefits of their findings. This virtuous circle by Pinder *et al* (2013) is a quality representation of how partnering among the professionals and relevant stakeholders could bring greater achievement in the built environment for building standard implementation process.

Now this study can present another strategy for easy Implementation of Building Code standards and regulations

2.11.2 Cordial working relationship and collaborative trust among stakeholders

The working relationship among the stakeholders in the construction industry is quite complex as agreed by many literatures reviewed but harmonically working relationship among these complex structure through feedback and recognising the strength and weakness of each other enrich the industry (John B. and Sara P., 2006). Collaborative working relationship is not limited to the construction industry alone according to the body of research; everyday business, social gathering and government ministries need understanding to work together in the interest of the aim to be achieved. For example, Agapiou, A., Flanagan R., Norman, G. and Notman, D (1998) upholds that stakeholders should develop cordial relationship for the interest of clients and projects and denounce the current practices of opponent attacks which exist in the construction industry. The study further suggests that there should be an ever burning interest to make the relationship works to achieve the desired goals among the stakeholders. Agapiou *et al* (1998) stressed further that the

cordial working relationships may not be free from constraints but closer ties among the stakeholders in closing the existing gaps and wastages will go a long way in overcoming the obstacles to create trust and reduces the mutual suspicions of construction professionals. This school of thought was emphasised by highlighting some key factors for effective partnership relationships as “Compatibility among stakeholders, each stakeholder norms of practices, high degree of internal trust, robust team building and genuine openness towards those outside the partnership (Agapiou, et al 1998, p.359).

Peter Demian & David Walters (2013) established that this collaborative working relation has been enhancing with the introduction of Building Information Modelling (BIM) in the building construction management. Ham, N.-H., Min, K.-M., Kim, J.-H., Lee, Y.-S., and Kim, J.-J. (2008) confirm that BIM introduction into the construction industry will boost relationship among the stakeholders of building construction because of the central diver’s benefits to the entire professionals to generate design fast, detect risk and conflict, estimate cost, and generate supply chain for construction management. Ham, *et al* (2008) presented that BIM software is used differently by different organisation to suit their purpose with great collaborative effort from professionals and relevant stakeholders.

Another strategy for easy implementation of BC standards and regulations is training of professionals and management team

2.11.3 Training as a great tool for implementation process

Construction industry in the world is complex and skill labour-intensive especially in the developing countries where advance technology for the production process is scarce (Muya, Mulenga, Bwalya, Edum-Fotwe, and Price, 2004). Skill training and development within the construction industry will not only enhance construction quality but also have advantage to improve productivity (ratio of input to output) and meet industry desired output of standards and regulations compliance (Apaluwah A. O and Apaluwah A.O.S, 2015). Adams (2001) cited in Apaluwah and Apaluwah (2015) says that, skills training and development differs with possibility of confusing the term and intent of the word, therefore this study skills focus is within the activities that influences employment and earning in the structural aspects of building projects for both the professionals and the artisans. Construction industry in this digital age is characterizing with advance technology, modern construction methodology and high-tech materials that require consistent improving of skills to meet appropriate industry implementation needs (Agapiou, A., Price, A.D.F and Mccaffer, 1995).

Training of young artisans and professionals in various technical vocations for industries in the UK to meet standards implementation process is dated as far back as 1563 with different stages of apprenticeship as submitted by Agapiou A. (1998, p.512) as: “the traditional guild apprenticeship from the twelfth century to 1563’, the statutory apprenticeship system introduced with the Statute of Artificers in 1563 until 1814, the laissez-faire apprenticeship system arising from the repeal of the Statute of apprenticeships in 1814, and allowed to continue until 1964, and the system introduced with the industry training boards in 1964, such as the Construction Industry Training Board (CITB), whereby the state came to aid, regulate and partly manage apprenticeships”. In which, Agapiou, *et al* (1995) categories available skills training within UK construction training centers as; plumbing and sheet metal, carpentry/joinery, bricklaying, plastering, painting/decoration/sign-writing, scaffolding, electrical, roofers, paving, glazing, plant operatives, bar bending, steel erecting, flooring, and crane drivers. However, Muya et al 2004 describes Zambia trade schools as lacking some required programmes in the Zambia construction industry such as; roofing, paving, scaffolding, glazing, light/ventilation, crane operative and steel fixers although admits to some informal and unconscious apprenticeship training acquired on the job in some aspects of the skills therefore putting the industry in danger.

Construction skills training in Nigeria is more worrisome than that of Zambia, with not only unconscious apprenticeship but also unconscious professionals or non-professionals hijacking the industry without training and experience of building projects implementation as argued by Muya et al (2004) and Agapiou et al (1995). Of which, construction projects are poorly finished, collapse of structural aspects and other structural defects overrun the Nigeria building industry as a result of skills shortages among the professionals who manage the skills of artisans (Oladiran O. J, 2015).

To sustain implementation innovations and scale implementation process to provide benefits to citizens, professional practice, the industry and the society, training must be provided within the building construction practice (Dyke, 2015). Implementation of any program requires basic skills and the Nigeria construction industry is not an exception. Of recent, a number of training and developmental policy initiative (National Vocational Training Qualification Framework NVTQF) targeting skills development by the Federal Government through National Board for Technical Education (NBTE) established by Act No. 9 11th January, 1977 of vocational qualification as a way of encouraging skills development in Nigeria emerged in 2010 (Okwa A. A, Musa, J. 2015; Apaluwah and Apaluwah 2015). However, David Seyi (2014) argued that it was not the first time, confirming that there were concerted efforts by the Church Missionary Society (CMS) in vocational training of farming, metal, bricklaying and carpentry in 1895 similar to that of UK training in 1814 to 1964

presented by Agapiou but government's various unsuccessful policies and taking over from CMS in 1925 hinders the continuous implementation process. This recent innovative idea if sustained will transport the Nigeria building construction industry into the Global construction skills training light of such country like UK or Zambia as presented by Agapiou (1998) and Muya et al (2004).

However, Agapiou (1998) established that funding can cause difficulties in the implementation process for both the craft men, the training providers and the government agencies since the training requirements are difficult to predict within some localities and also dictated by large building projects and new technologies; access to information through research funding and incentive funding to encourage trainees to attain a recognized qualification should be provided. Clarke and Wall, 1998; Ziderman (2001) cited in Muya et al (2007) affirm that government contributes to financing vocation and technical training in most countries and also regulate other funders but in some countries craft skills trainees do contribute through payment of user-fees at a subsidized rate, but stress that employers mode of funding is the only sustainable and supplementary to government funding. For example, in Nigeria, the skills training and development in the construction industry was driven by SURE-P partnership projects with Nigeria Institute of Building (NIOB) of the last administration, the present administration scrapped SURE-P since 2015 in the fight against government corrupt agencies. This is a step backward in the skills training and development initiative of the NIOB/NVQ proposals confirming the fear of Agapiou on funding issues; indicating clearly that training and development within the construction sector initiated cannot absolutely be dependent on government for funding, thus; this study support Muya et al 2007 advocacy for supplementary funding from employers and subsidize registration fees for the trainees at the same time encourage investment in training by establishment of private construction training and development centers in the NVQF policy.

This framework initiative is in line with similar study for young entrant's enrolment into National Vocational Qualification (NVQ) in the UK construction industry as described by Agapiou et al (1995). Both UK NVQ and the Nigeria NVQ framework are based on national standard with regards to technology, market and employment patterns and also with the similar policy makers and regulators called NBTE in the Nigeria case and National Council for Vocational Qualification (NCVQ) for UK. However, the NVQ of the UK was employer-led rather than education-led or government agencies-led, such as been driven in the Nigeria case for the purpose of job creation and not really the issue of quality skills shortfalls in the Nigeria building construction industry (Agapiou et al, 1995).

Agapiou (1998) presented that Construction industry can play a vital role in the training qualification of tradesmen and artisans which will invariably assist the implementation process by defining what makes you qualify for the job, the role of that work within the building construction industry and the designing of performance criteria with more emphasis on performance criteria for the training instead of mere listing of syllabus to be covered in assessing the trainer. The summary of the role of construction industry in training for easy implementation is shown in Figure 2.19

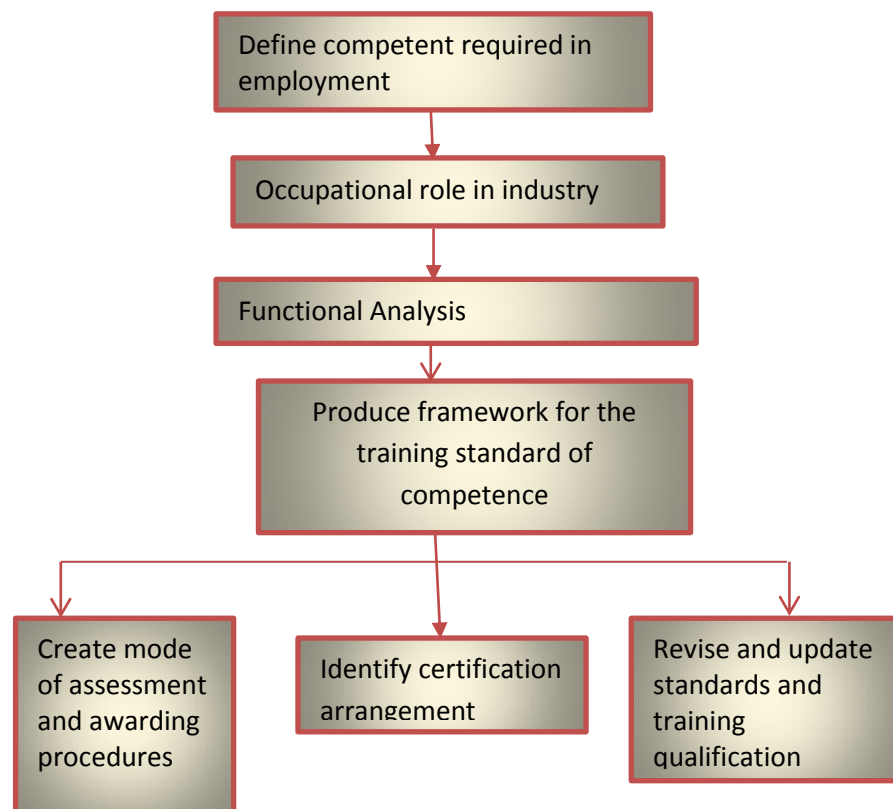


Figure 2.19: The role of Construction Industry Bodies in Training.

Source: (Adapted from Agapiou. 1998)

At this stage, this study can present the role of each stakeholder to the successful implementation of house building construction process in Lokoja Municipality, Nigeria.

2.11.4 Supportive roles of stakeholders in the implementation process

- **Professional Expert's roles to support the Implementation Process**

As earlier presented, previous research has made significant contributions of different professional bodies, governments and agencies, educators, researchers, suppliers and professionals as key players in the implementation of building process. For example Agapiou et al (1998) cordial working relationship, Agapiou (1998) training for implementation process, Pinder et al (2013) stakeholders' mind-set change virtuous circle.

Arya, A. S. (2008) profound some basic expertise contributing ways to the implementation of standards and regulations process in the building construction projects, which was adapted and modified by this research as follows:

- The experts should produce guidelines which could easily be understood by the construction workers, masons, carpenters and for adoption in the implementation of building construction process,
 - Working bylaws such as ethics of building construction should be made in such a way that are fully transparent and make everyone in the construction industry accountable for building safety and standard compliance,
 - The experts should carry out more research on how to improve the enforcement of standards and regulations in the building construction process, and
 - Young professional should be encouraged to specialise through skills training and development programme (Arya, A. S. 2008).
 -
- **Government Support for the Process Implementation**

To support the implementation process from the policy directive (administration) Anand (2008) and other researchers' suggestions include:

- Develop strong legal framework that will sustain the process. Legal system that will empower the process from planning to execution and compliance. e.g. Arya (2008) presented various government initiatives for India code implementation and called the legal support of governments as Techno-legal Regime,
- Another aspect governments actions is required is funding. The process cannot be sustained without the support of various governments through funding. The guidelines of the source of fund, the disbursement process should clearly be analysed. The study of Agapiou (1998) insists that funding can hinder the genuine intentions of government especially if the

channel through which the fund gets through is having a problem. Arya (2008) does have the view of Agapiou that a strong financial system from government can be the only saving grace for any innovations that will benefit humanity,

- As earlier presented in the study by Agapiou (1998) established that for skills acquisition in the construction industry and to sustain the skills in line with technology and working practices change training must be established. Government action is needed in the training of building Professionals such as architects, engineers, builders and then masons, bar benders (Iron benders), carpenters, plumbers and electrician to keep the process and for quality implementation of the process,
- Many researchers (e.g. Dahiru et al 2012, Dixit, 2008) has previously presented that awareness creation can go a long way in assisting implementation process. Governments can assist through media programmes such as TV, Newspapers and video of the test (Anand, 2008) of innovative system to proof the working viability of standards for the building construction process. Figure 2.20 summarise government policy and standards enforcement strategy.

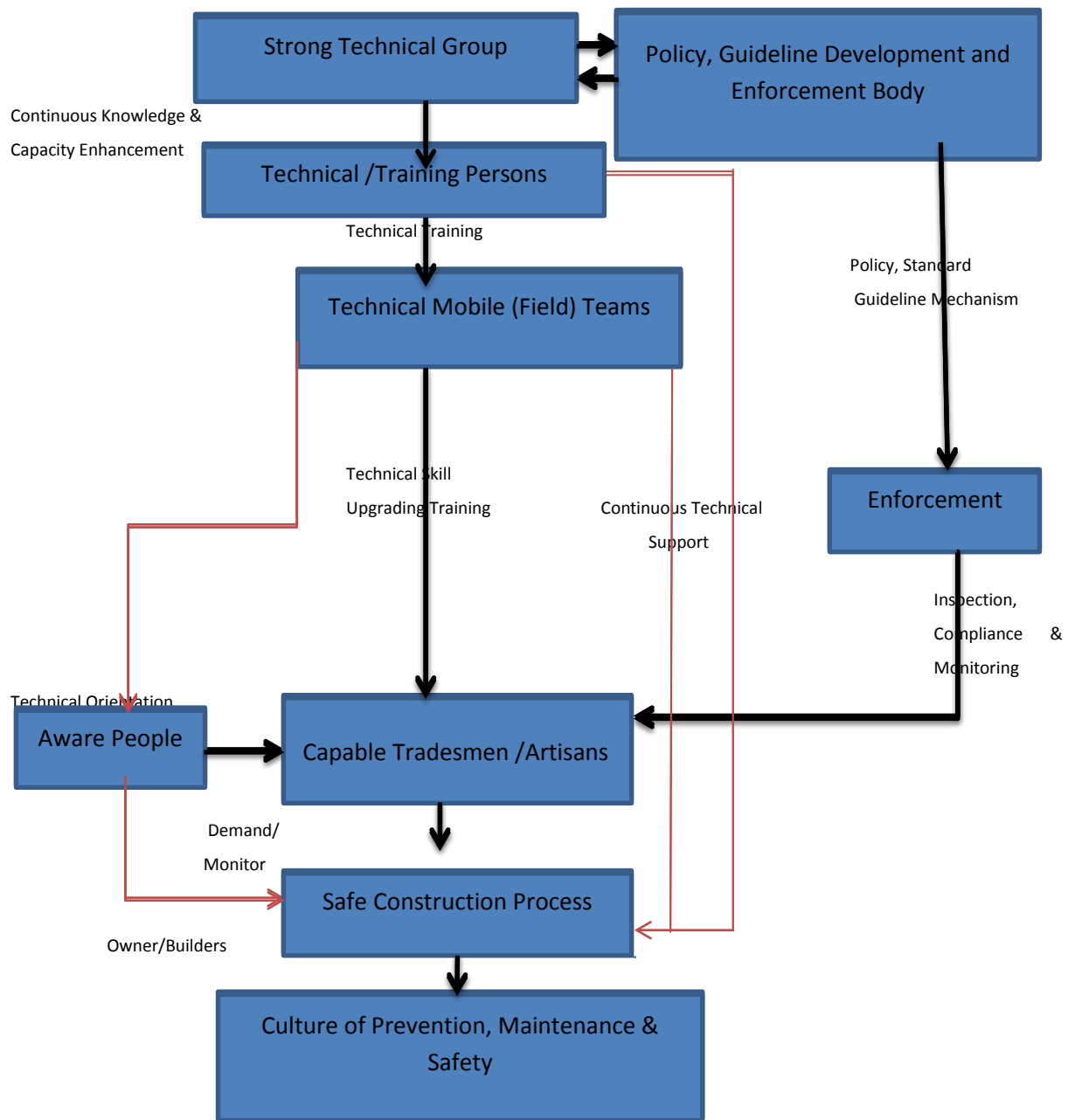


Figure 2.20: Policy, Standard and Enforcement Strategies.

Source: (Dixit A. M, 2008, p.64)

Figure 2.29 shows that unless there is a very strong policy guideline development in the enforcement body the process can easily fail. Dixit, A. M (2008) therefore opined that awareness must be created at the top-policy enforcement level as regards the monitoring of the process. The construction process should be adequately monitored, educated to people and penalised those that go against the set standards. The process should be encouraged with strong legal instrument as

earlier presented in this study. Dixit demands from the society the needed response to compliance towards the implementation of the building code standards and regulations.

- **Municipal (LG) Government roles in the implementation process**

The Municipal (LG) government which comprises of different departments apart from the council members such as rural development and physical planning and works and housing has a vital role to play in the implementation process. The sole responsibility of promoting and facilitating the provision of standards and regulatory implementation under their jurisdiction rest within their shoulders, therefore, adequate functional and legitimate structure for quality implementation of the building programmes must be put in place by engaging the Municipal authority. This can be harnessed by studying the government structure and functions for building process at the Municipal level presented by Casa A. (2012) and this research author's professional experience as follows:

- Define the standards and regulations delivering goals of the Municipal area,
- Roles of maintaining standard and regulations for health and safety in developed and developing areas of the Municipality,
- Municipal roles on regulation of land use and development process,
- Enforcement and monitoring process of Municipality responsibility on creation and maintenance of public facilities such as drainages, and conveniences,
- Roles and strategies of Municipality in resolving building development projects crisis (author professional experience 2014),
- Responsibility of maintaining land titles, as residential, commercial, recreational and industrial functions in the Municipality (author professional experience 2014), and
- Possibility of serving as guarantor and facilitator to building developers at the Local Government to create assurance of maintaining standards (author 2014).

Considering engagement of these structure and functions of the Municipal government will assist in the quality implementation process with the community.

2.12 Implementation Improvement Cycles

Dyke M. K (2015) describes implementation improvement cycles as the hallmark of a 'Learning culture' which, its continuous practice will lead to perfection. Active implementation is based upon three (3) improvement cycles: the plan-do-study-act (PDSA), Usability testing and practice-policy communication loops developed by Bell Labs in the 1920s to improve quality and reduce errors in design and manufacturing and has become useful in many applications in human services. However,

improvement cycles in implementation process work is usually based on PDSA by Shewhart 1939 for quality process improvement cycle cited in Moen R. 2015; NIRN 2015).

3.12.1 Plan-Do-Study-Act (PDSA)

PDSA cycles basically involves 'trial and Learning' through rapid cycle problem discovering and solving steps within a cycle (Dyke M. K 2015; NIRN 2015). The plan should be operationalised in leading to development of training process and creating a measure of fidelity to interpret the outcomes performance (NIRN 2015). Figure 2.21 presents the summary of PDSA describes below.

- Plan – decide what to do (objective, questions and predictions, plan to answer the questions who, what where, and when),
- Do – do it (be sure to carry out the plan, collect the data, begin analysis of the data),
- Study – Look at the results (complete the analysis of the data, compare data to predictions and summarise lessons learned), and
- Act – Make adjustments (what changes is required, good practice or repeat cycle?)

Cycle: Do over and over again until intended benefits is realised.

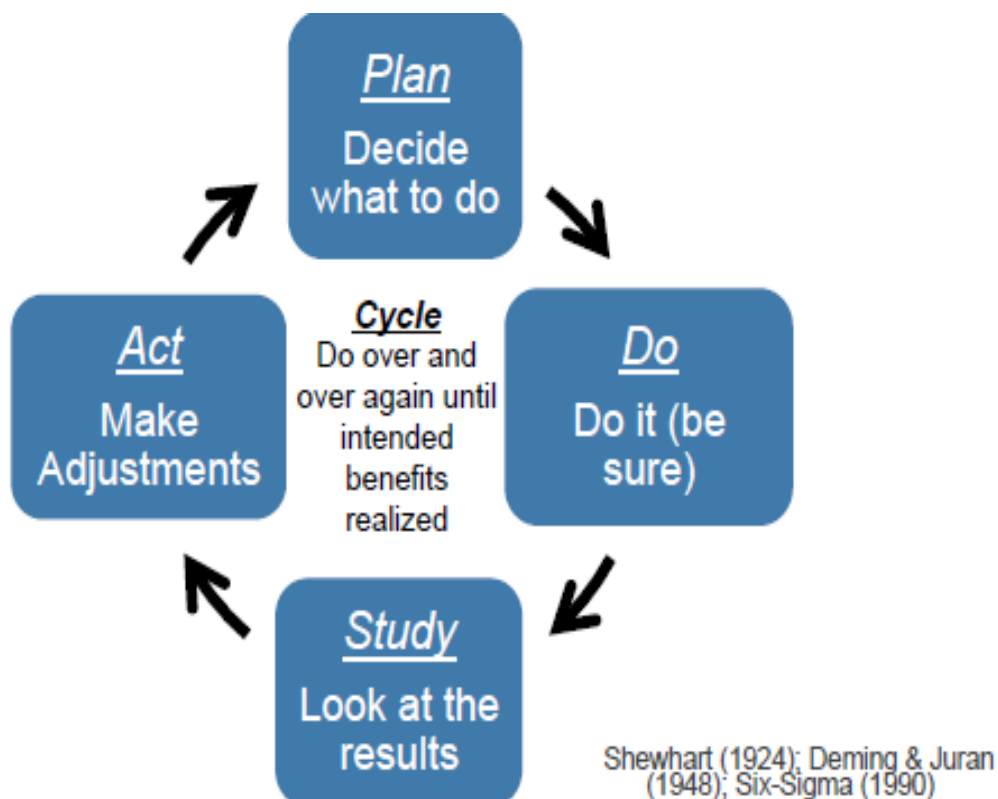


Figure2.21: PDSA Cycles: Trial and Learning Source: Adapted from Dyke M. 2015

2.12.2 Usability Testing

This test was originally designed for computer software for hundreds of lines of codes written by teams of programmers to develop some software packages as new word processing and spreadsheet programs (NIRN, 2015). The study further stressed that, the real goal of usability test is to improve the program. Thus, running multiple tests (3 different times to detect errors and improve on) became imperative to achieve the purpose, which was achieved with deeper test probe in the third phase of the usability test. The application to this study is that, an innovation needs to meet the criteria for the practice and program, the more clearer the core components of a practice or policy are now the more readily an innovation can be implemented successfully (Fixsen et al 2005; NIRN, 2015).

2.12.3 Policy-Practice Communication Loops

Implementation of policy framework requires change and system transformation within the practice, the organisation and systems at all levels. Knowing what needs to change and how much change is required per time to achieve the desired outcomes is the problem practice-policy communication loop is out to address by studying the structure, procedure and feedback towards successful practice and program implementation (Blasé et al 2013-2015, Fixsen 2006). The goal is to create a learning culture from their own experience and modifies the structure and design to reflect the learning process (NIRN, 2015; Fixsen and Blasé 2012). For the success, direct and frequent communication from the practice level to the policy makers and administrators level (the practice-policy communication loop shown in Figure 2.22) should be frequent to hear success, data collection, descriptions of experiences, constrains to make full and effective implementation at the practical stage with the help of implementation teams who have the skills, and abilities to help practitioners and staff make full and effective use of the innovations and enabled policy. At the same time solve whatever problems before approaching policy makers and administrators to intervene in how the systems work (NIRN, 2015; Fixsen and Blasé 2012).



Figure2.22: practice-policy communication loop

Source: Adapted from (Fixsen D.L and Blasé K.A 2012)

2.13 International Implementation principles for best practices

The Office of Special Education Programs (OSEP) in USA has been recognized as model for other government agencies seeking to support the development of implementation capacity in human service systems (NIRN, 2015b). Similarly, Ejler, N., Ostersen, J., Graff, D., and Dyrby, T. (2017) of Ramboll group of the European Union presented new approaches to acceptable policy implementation which also collaborated with the work of Fixsen et al (2015), NIRN (2015b) on USA State Systemic Improvement Plan (SSIP) for implementation best practices.

NIRN (2015) presented the following principles as best practice of implementation. These including;

- Focusing on systemic (administrative) change by creating an enabling environment (Enabling Context),
- Choosing one well-documented need as the target (Transformation Zone),
- Developing system capacity for implementation so that evidence-based practices related to the need can be used with fidelity and good outcomes (Implementation Drivers; Implementation Teams),
- Using data (evidence from result) to make purposeful changes that can improve the system (Improvement Cycles), and
- Phasing in the new requirements over a number of years (Implementation Stages) (NIRN2015)

The Ramboll 2017 white paper conclusion of best implementation principles is based on interviews with 30 public sector executives which confirms the need for a 'Let it Happen, Helping it Happen, and Making it Happen Strategy' for effective implementation of policy.

The report has the following best practice for effective implementation. they are:

- Enabling is key to implementation; instead of old straight rules of implementation, change attitudes as the enabling key.
- Implement through capacity building. The lesson here is that executive should ensure active participation and within the organisation adequate capacity building.
- In dealing with resistance of implementation from human side, which are normally management resistance, cultural resistance, technical technical, competence barriers to change the leadership must approach and the strategies for overcoming the four types of barrier to change to implementation.
- As a leader or executives of implementation, you should try and understand the behaviour you want to change through assessment of the intended innovation, using acceptable assessment tools such as: CFIC (Consolidated framework for advancing implementation science), PARIS (Promoting Action on research Implementation System), ORCA (Organisation Readiness to Change Assessment) using behaviour change wheel, and EBPAS (Evidence Based Practice Attitude Scale).
- Another best practice is getting implementation through the four phases: Implementation is dynamic with logical process. Jumping the guns will create distortion the competency check, adaption to the new innovation, putting up more effort for the transformation and the maturity process for effective results.
- Changing peoples behaviour by the help of behaviour change wheel, and
- Team work and involvement of all practitioners.

Sabatier and Mazmanian (1979: 484-485) cited in OECD (2013) note that implementation rules might differ across countries when involving people, agencies and contexts. However, present some useful effective policy implementation examples from five conditions. These include:

- The programme is based on a sound theory relating to changes in target group behaviour.
- Policy decisions have to contain unambiguous policy directives and structure the implementation process in a way that increases the chances of good performance of target groups.
- The leaders and implementing agencies require significant managerial and political skills and commitment to the goals.

- The programme also needs to be supported by organised constituency groups and few key legislators throughout the process.
- The priority of objectives is not undermined over time by conflicting public policies or changes in socio-economic conditions (OECD, 2013).

Lesson from these best practices can be adopted as recommendation for effective implementation approach in the Nigerian context.

2.14 Summary

The chapter started with clear definition of Building code from dictionary to technical authors and this study approach to the definition.

The origin of the BC was re-established from various authors as the code of Hammurabi in circa 3000 B.C, with identifications of its societal division into three classes of the nobles, priest and kings, artisans, traders, farmers and then the slaves. Details of builder's reward in the event of success or failure were provided in the chapter.

The BC standards and regulations was critically viewed and identified within the family of plumbing codes, mechanical codes and electrical codes which can work harmoniously within the framework of the building code standards. The applicable uses of the features in the house building construction industry for policy framework development, planning development, implementation process, empowering, legislation, designs, specifications, supervision, materials, comfort, health & safety were all presented.

The chapter went further in presenting the typical structure & chapter contents of the BC using ICC own IBC and the Euro-code as an example. Thereafter, the two types of BC in existence were presented as National Building Code (NBC) and Model Building Code (MBC) which are regulated by the national government or the regulation of buildings is rested with the local government respectively. The prescriptive or performance approaches of the BC development were detailed with each advantages and disadvantages. The chapter states that MBC and performance approach to development is being advocated by this study.

The BC adoption processes before it can become a law were given as through the legislative body at various levels, technical review board or agency, public input (written or public hearing), passes enabling legislation after review of recommendation and it becomes a law.

The section also presented pictures of inadequate codes, violations, and codes challenges around the world.

It is clearly understood that implementation process are purposeful and are described in sufficient details for easy implementation. The chapter went further in explaining usable interventions criteria for the successful implementation process as clear description of the program values, principles and philosophy, clear description of essential functions, operational or practical profiles describing the core activities and a practical performance assessment (fidelity).

The chapter stated categorically the five (5) essential components within the framework of implementation for any defined policy, practices or program which includes: the source of the original program, the destination of the innovation for the individual, organisation and funders that support or adopts the program for implementation and the communication link among the implementation purveyor for fidelity. The next essential component is feedback as flow of information about the performance, individual, teams and the organisations and the last component is the influence of economic, political, social, historical and psychological factors that have direct or indirect effect on program entire systems.

Within the chapter, the critical stages of policy or program implementation were detailed as exploration, installation; initial and full implementation at the same time presented the teams responsible for implementations which including; the policy makers and funders, program developers, intermediate organisation and services providers.

Another aspects to implementation success constrains is the identification of multi-level influence of organisation and external factors at all levels of implementation as core implementation components (training, coaching and fidelity), organisation components (selection, evaluation, administration and system intervention) and influence factors (social, economic and political).

Clear overview of implementation drivers as the engine of change in the implementation process were explained in details, with each driver; competency driver, organisation driver and leadership driver clearly presented and detailed with their components.

It was also clear that implementation process fails when it lack assessment of performance (fidelity measurement) which include context measures (requirements e.g. staff qualifications), compliance measures (extent of core intervention in use for the program implementation), and competence measure (extent the interventions skillfully delivered to standard).

The chapter present detailed explanations on implementation improvement process which includes: Policy-practice communication loop (between the administrators (policy makers) and the practitioners, beneficiaries and the implementation team), Plan-Do-Study-Act (PDSA); Plan – decide

what to do; Do – do it (be sure carry out the plan); Study – Look at the results, and Act – Make adjustments. And finally closes with international best practices of policy implementation.

CHAPTER 3:

FACTORS AFFECTING the

IMPLEMENTATION and ENFORCEMENT

Of the STRUCTURAL PROVISIONS

Of the

NIGERIA BUILDING CODE Standards

3.1 Introduction

This chapter presents factors affecting the development and implementation of the structural aspect of the Nigeria building code standards within the building construction and management practices.

This chapter also identify and presents building code standards features (Aspects) and the chapter try to identify structural aspects of MRRB construction process with evidence and the various degrees of structural failures and collapse within the building construction and management practice in Nigeria due to BC poor implementation, enforcement, and compliance problems, and the concerns of the stakeholders about the structural failures.

The key factors affecting the implementation of the BC standards structural provisions in projects developments; and the causal factors and impact risk of poor-implementation of BC standards structural provisions, and the summary of findings were presented in this chapter.

Now the Chapter discussion according to sections

3.2 NBC features and their regulatory problems

- **Features of Building Code**

Building Code as a document has different components that work together to ensuring the building safety and benefits, welfare as well as conveniences to all persons in relation to all building processes (Cassa, 2012). This study has critically reviewed the Code of Hammurabi to have concluded that it was the first code also to have analysed the various features of Building Code into administrative, technical, legal and sociological aspects consideration as described below.

- ❖ First part of Hammurabi code is the description of how the Empire came into existence, the achievements of the King and policy on the strong and the weak.
This study looked at the first part as pure administrative issues from the king.
- ❖ The second part analysed the king great legal work and how this good legal work can be sustained in the future;
- ❖ The third part consists of 282 rules concerning the daily life of the citizens and in a clear language for their understanding.
This study also looked at the third part as a social concern of the code while the
- ❖ Fourth part is also clear about technical standards for a builder to building right.
(Hammurabi code)

In the same vein Productivity Commission (2004) cited in Al-Fahad Jasem Y. (2012) unveiled the four aspects of building codes as; Legislative-legal aspect of building rules and regulations, social aspect-deals with the relationship of the people with respect to code and the built environment, administrative aspect-deals with building code administration and discharge of its functions in any country and the technical aspect-deals with technical requirements for pre-design, design, construction and post construction stage of buildings (Act, 2013; ICC, 2006 and ICC, 2009).

NBC (2006) standards are identified with three parts: Administration- deals with aim, scope, functions and committee formation that answers all administrative and operational issues of building code to minister, technical-answers all requirements about professionalism of practice as it relates to design, construction, post construction and the general environmental requirements by professionals and enforcement-(Legal)-deals with enforcing regulation, violation & sanctions and all legal status of the building code.

The social part of the building code is not clearly shown by NBC (2006) but the occupancy of buildings showing details of the certificate of habitation deals with the comfort of the people which relates to people and the built environment as identified by Al-Fahad (2012) and this study from the code of Hammurabi therefore considers that as sociological aspects of the building code. Figure 3.1 is the summary of the different features of building code standards administrative, technical, legal and sociological aspects of the building code process.

In line with the review of various authors this study philosophise the graphical presentation of logical relationship between the different features of the Building Code standards which must be collectively tackled for easy implementation.

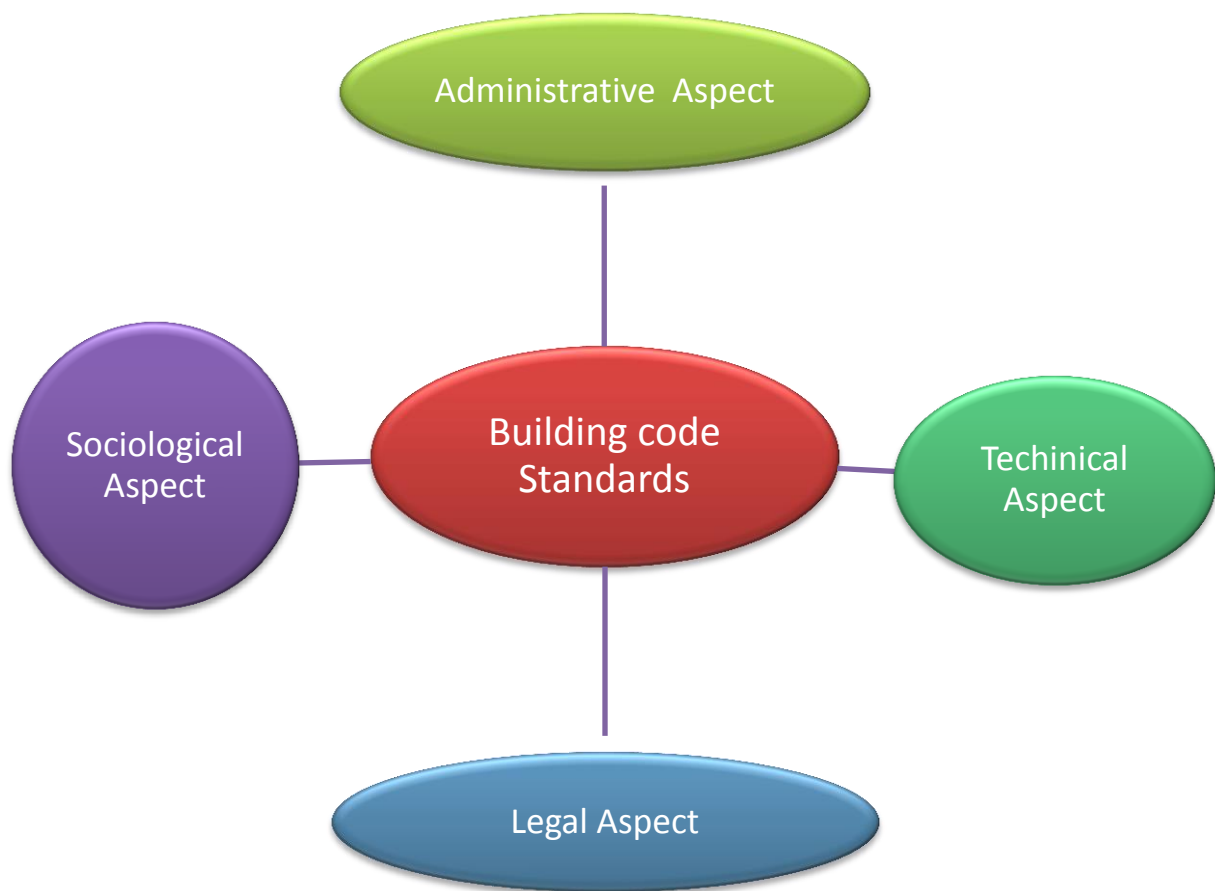


Figure 3.1: Administrative, technical, legal and sociological aspects of the building code process

Source: Author construction 2016

All the features exist equally within the frame work of the relationship with the whole four features forming a union at the central idea (Building code standards and regulations).

This logical relationship shows that all parts of the building code is dependent on another; the implication is that a problem in one part will affect the whole structure of the building code standards and regulations, vis-a-vis any identified solution to the problems should reflect in all.

At this point the study can now present the building code standards and regulatory problems in Nigeria as identified from contextual analysis and professionals and relevant stakeholders input.

- **Regulatory Problems of NBC 2006 Features**

Various researchers wrote about the problems confronting the NBC 2006 in different format. For example, Jambol, D.D. (2012), Obiegbu, M. (2008), and Obiegbu, M. (2006) unanimously argued that, the NBC 2006 standards and regulations lack enactment (Legislation problem) and various implementation challenges in the building construction practices and management. Windapo and Rotimi, R. (2012), submitted with other researchers that, incessant collapse of buildings is a technical problem associated with lack of government commitment as a result of corruption, delay of building approvals by development control, lack of inspections for enforcement which aids in the use of substandard materials, and non-professional infiltrating the industry building construction practices. Of which, poor workmanship, low quality buildings and used of low quality materials have become the other of the industry. Other problems identified with NBC 2006, include: lack of innovative provision for technology advancement (Olagunju, *et al* 2013; Olusola *et al* 2011).

Omeife and Windapo (2013) added their voices on implementation that the NBC 2006 has professional competency problem, while Dahiru *et al* (2012) stressed that there is no basic sustainable issues concerning buildings and the environment as well as NBC 2006 lacking publicity. Oyinlola A. (2011), Ayedun *et al* (2012) stressed further that, the open corruption which exist within all levels of building development process affects implementation of NBC 2006 and Fagbenle and Oluwunmi (2010) posited that the NBC 2006 is still saddled with the problem of political interference as well as the informal sector for the development of the industry.

Al-Fahad J. (2012) argued that the problem with all building standards and regulation in developing countries is lack of respect for the social aspect of the BC which deals with the comfort of the house building occupants. The study submitted that most BC development process lack awareness creation, consultation or adequate dialogue among the people especially the low social class therefore making compliance and implementation very difficult. A summary of the NBC 2006 features problems is presented in Figure 2.2.

From the review of various studies this study presents the problems of NBC 2006 in relation to BC features for easy reference and problem identification in a graphical form.

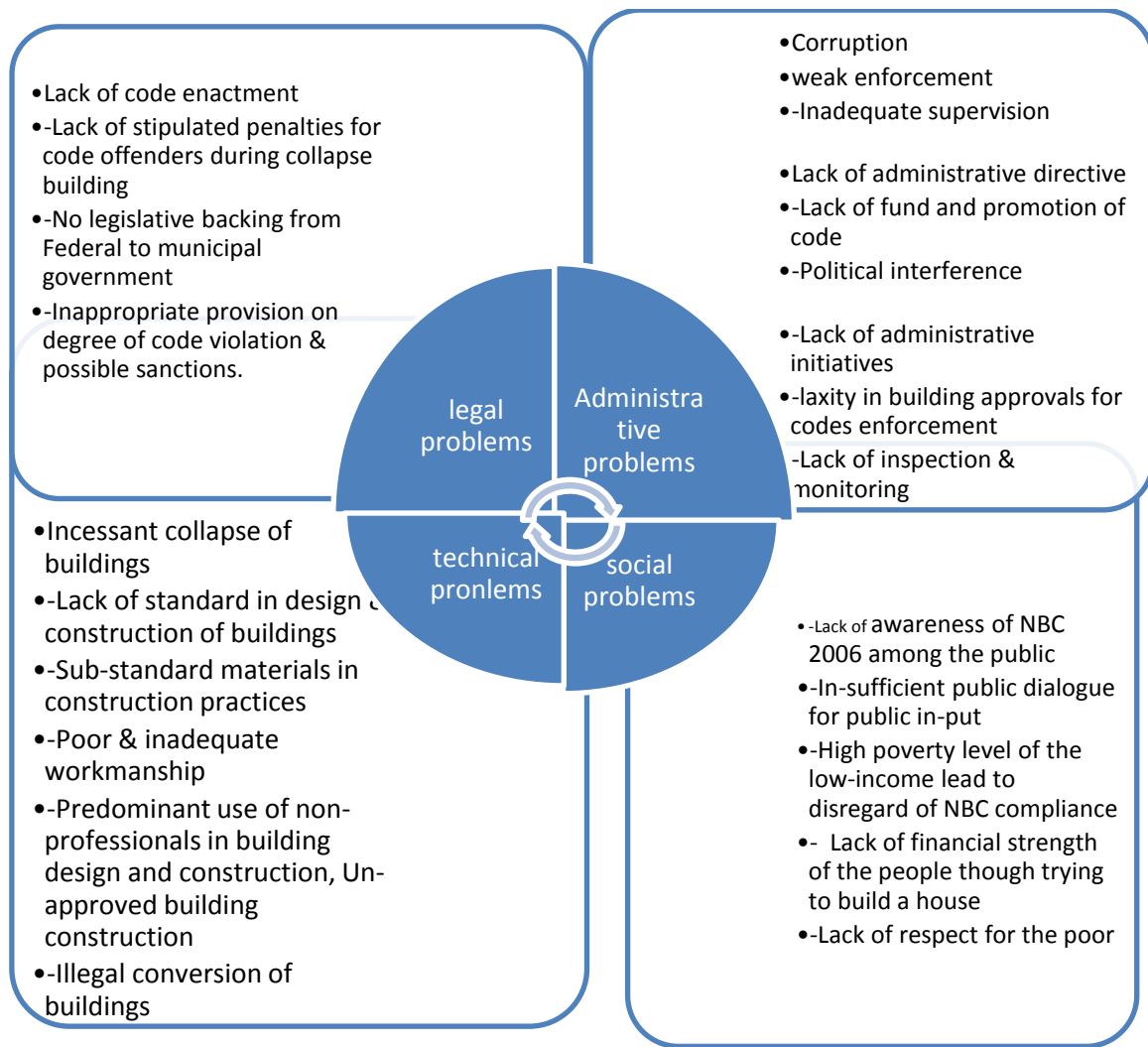


Figure 3.2: Problems of NBC 2006 Features

Source: (author construction 2016)

The features of building standards and regulations graphical idea above shows that BC is the centre of idea or centre of discussion surrounded by many problems legal, administrative, technical and social factors, contribute to the subject matter of building code standards and regulations. The individual problem of legal, administrative, technical and social problems affects the functionality of the BC standards and regulations. The whole problems are in a circle indicating that all the problems affect each other in general overwhelming the centre. To eradicate the BC problems it must be solved simultaneously of the legal, technical, sociological and administratively not to pollute the central idea of its basic objectives through their correspondences.

Now this study can present the structural aspects of the mid-rise residential building construction process.

3.3 Structural aspects of MRRB construction process

Astrand, R. N (2002) categories core building structural elements into structural and non-structural aspects for the purpose of design, construction and post-construction process as seen in Figure 3.3.

Astrand (2002) argued that structural aspects of building engineering is primarily driven by the creative manipulation of materials and forms of the structure with underlying mathematical and scientific ideas, focusing on achieving structures that is functionally sound and safe for occupants when subjected to expected load. International building code 2006, 2009 and NBC 2006 (section 2.55, 5.3.4, 6.2, 8.9, 10.25) standards and regulations all note that foundation, floors, walls and roof are the structural aspects of buildings.

The purpose of this identification is to establish uniform structural provisions of mid-rise buildings within the global construction industry in line with the core structural aspects identified and considered by this research, which include: foundation aspect + floors and slabs aspect + walls aspect + roof aspect in Nigeria.

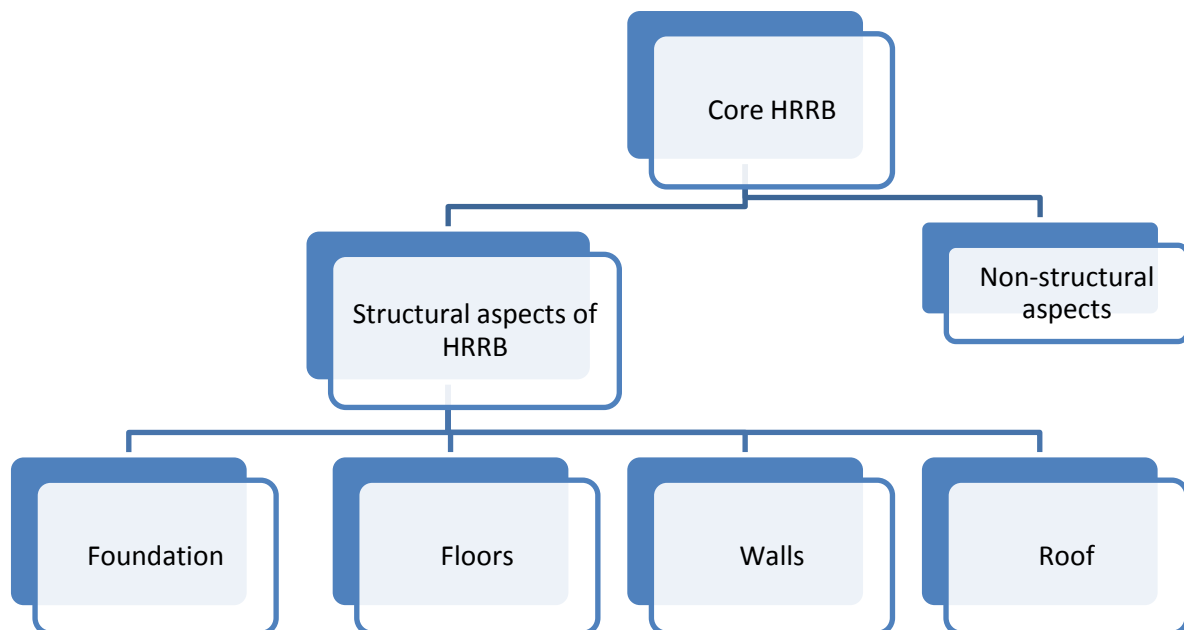


Figure 3.3: Building structural elements

Source: Jack built Manual, 1990 adapted as cited in (Astrand, R.N., 2002)

The identification of core high-rise residential building (HRRB) structural and non-structural elements presented in figure 3.3 shows the clearer view of the scope, of what, the work of core HRRB elements entails. The structural elements as identified consist of foundation, floor, the walls and the roof which is considered within the standards and regulatory requirements for the construction

process. However, Nawi, M. N. M et al (2011) argued that, there are various constrains to the implementation and compliance of structural criteria for building construction, not only in conventional buildings but also in pre-fabricated structural aspects of buildings. Table 4.4 is a summary of constrains to the selection and implementation of structural elements of building construction process.

Table 3.1: Constrains to the selection and implementation of structural elements of building construction.

Author	A) cost and financial issue	B) poor skill knowledge	C) Legal and cultural issues	C) Logistics and supply chain issue	D) Lack of government incentives and	E) Lack of communication and integration	F) Lack of technology and readiness	G) Resistance from professionals and	H) Lack of understanding of building regulations	I) Lack of standard code	J) Lack of standard code	K) Manufacturing capability & involvement issue	L) Lack of assessment, certification, training and education	M) Lack of resources, R&B, IBS centre	N constructability issue
IBS workshop, 2011		x			x					x					
Kamar et al, 2009	x	x	x	x		x	x	x	x	x	x	x			
Hamid et al, 2008						x				x			x		
Hussein, 2007				x			x			x			x		
CIMP, 2007		x				x									
Nawi et al, 2007a	x	x						x					x	x	
Nawi et al, 2007b					x			x						x	x
Chung, 2006				x											
Faizul, 2006				x											
Haron et al, 2005	x														
Fikri, 2005												x			
Nawi et al, 2005		x	x	x				x					x	x	
Thanoon et al, 2003a	x	x					x			x			x		x
CIDB, 2003		x			x										
Razali, 2003										x			x		
Warsawski, 1999								x		x					

Source: Adapted from (Nawi, M. N. M et al 2011)

From table 3.1 presented above, six (6) authors agreed on lack of building code and standards, 6 authors on lack of assessment, certification, training and education and 7 authors on poor skills and knowledge as constrains to structural aspects of building selection and implementation.

However, this research after engagement with professionals and other relevant stakeholders, and more reviews identify and presented 60 constrain variables for measurement.

3.4 Recorded Cases of Structural Building Failures in Nigeria

The figure 3.4 and 3.5 below illustrates an example of catastrophic recorded cases of building failure across the country. Bayo (1995, cited in Tanko et al, 2013), Kingsley (2010), Windapo and James (2012) and author recorded a total of 63 structural building collapse: three cases from 1976–1978, 19 cases from 1982–1995, and 42 cases from 2000 to 16 September 2014 in Nigeria. There have been 742 recorded deaths, 96 injuries and 63 building failures. Fagbenle and Oluwunmi (2010) argued that professionals and non-professionals undermined the regulation of BCs for structural buildings because of inadequate legislation and unaccountability in the industry. The study recommended the life imprisonment as the minimum punishment for those involved in any building collapse. Of recent, the disaster continues as at 22/07/2017, 4 storey completed building collapse at Obosi Anambra State, the same 22/07/2017: Mid-rise uncompleted building collapse at Oke-Odo Lagos, Mother/daughter dead + 4, and on 26/07/2017, 3-storey building collapse at Orlu Imo State, at 18/08/2017: 4-storey building collapse at Illorin Kwara State (3 injured), and at 29/08/2017: 3 –storey residential building collapse at Ojo Lagos (Author records).



Figure 3.4: Catastrophic Structural Building Failure of SCOAN in Nigeria (Google earth)



Figure 3.5: Catastrophic Structural MRRB Failure

Source: (online Life style magazine Friday, 8 June 2012)

The challenges facing the building construction and management industry in Nigeria has been widely propagated by various studies. For example, Obiegbu, M. (2008), Olagunju et al (2013), Dahiru et al (2012), Mbamali and Okolie (2012), Isah et al (2013), Omeife and Windapo (2013), Kawu (2013), Jambol (2012), Ayedun et al (2012), Fagbenle & Oluwunmi (2010) and others.

Obiegbu et al (2008) attribute the non-enacted NBC 2006 standards and regulations which is a guideline to high-rise building construction as the root cause of structural failures.

Dahiru et al (2012) affirm that structural failures can only be stopped with public campaign to create awareness on the dangers shady practices and disregard to building standards and regulations could cause to the industry, the professional practice and the general public. Omeife and Windapo (2013) stresses that disregard to professional's involvement and the continued use of non-professionals in the house building construction sector in Nigeria could only bring property loss, death and increase cost. Olagunju et al (2013) argued that all assumed causes of structural failures in structural building construction process in Nigeria cannot be authenticated since the industry lack forensic technology analysis to determine that.

In the opinion of Kawu (2013), a structural failure has become an ice challenge to professional women in the building industry. The study opined that all professional women should use their women language to lobby for BC standards and regulations enacted among the various government that will foster collaboration and effective communication to stop the collapse.

Ayedun et al (2012) formed that tilting arguments on who is responsible for the structural failures and pointing accusing fingers on developers and material qualities can never be a solution while presenting some overwhelming building collapse around the country. Fagbenle and Oluwunmi (2010) agreed with Ayedun et al (2012) that enormous recorded cases of building collapse should be enough reason to seek solution to the problem and break the influence of the informal sector that grip the house building and construction industry.

This study documented and created a database link of some [recorded cases of building failures](#) across the country showing date of the collapse, the state, house building type, number of death or injury and the possible causes of the building collapse as adapted from various reviews and author's personal records.

This study can now present how the professionals and relevant stakeholders view the structural building failure in Nigeria

3.4.1 Views of Various Stakeholders about the Failure in Nigeria

- **Reasons attributed to building failures by Professionals**

The rate at which building collapses in Nigeria, the frequencies of their occurrences and the magnitude of the losses being recorded in terms of lives and properties are becoming alarming (Olagungu *et al* 2013). The incidents are becoming very unprecedented and have become a major source of concern, not only to the government at all levels but to all well-meaning Nigerians and most especially the professionals and relevant stakeholders in the building construction industry. Oloyede *et al* (2010) cited in Ayedun *et al* (2012) describes the causes of building collapse in Nigeria abnormal factors not obtainable in many other developing nations.

Ede (2010), cited in Ayedun et al (2012:3) further stresses that, apart from the generally known causes of HRRB collapse such as design flaws, ageing, material fatigue, extreme operational and environmental conditions, accidents, terrorist attacks and natural hazards, that the 'Nigerian factor'¹⁷ become a prominent issue to contend with. (ibid) argued that, the 'Nigerian factor' raised its ugly head in different forms; such as corruption, lawlessness and the presumption from the populace even among the educated client that an architect or any other professional in the building industry can assume all forms of responsibility in the building development projects in Nigeria.

¹⁷ The open and shameless corruption display by Nigerians in any position of authority

- **Building contractors point of view about building failures**

Causes of building failure and collapse from the building contractors as presented by Tanko *et al* (2013) from the analysis of the field survey shows that, Dilapidating structure, illegal conversion/alterations/floors additions to existing structures, use of sub-standard building materials and defective design/structure were the first ranked among contractors respectively. The study observed that Inadequate/lack of supervision/inspection/monitoring and use of faulty construction methodology were the least ranked among them.

- **End-Users/Owner perspective to the building failures in Nigeria**

Faulty construction methodology, use of incompetent contractors, poor Workmanship by contractors, defective design/structure and inadequate/lack of supervision/inspection/monitoring were top ranked while illegal conversion, alteration, addition were not all the causes of the collapsing of buildings to them as presented by Tanko *et al* (2013). It is worthy of note that both professionals, contractors and developers agreed that dilapidated structures as accused by the government were not actually the cause of building collapse.

- **Opinion response of some government officials concerning the building failures**

A vanguard newspaper Columnist Alfred O.U reported in [Vanguard, July 8, 2003] that some building collapse, in Nigeria, has practically become the norm rather than an aberration. It seems like every time one turns around, there is always a story about a new incident of building collapse somewhere in the nation. Kayode and Bayo (2012) believed the cases are easily swept under the rug without any consequences to the government, and even if attempts are made to get to the bottom of the causes of the incidents, investigators always run into obstacles.

Tanko *et al* (2013) describes government and her enforcement agency's views to the problems as Professional Negligence to adhere to approval instructions & stop work order, lack of building development approval, dilapidated structures without maintenance, use of sub-standard materials, lack of technical staff for the construction of HRRB, shady practices among contractors and professionals, and Inadequate supervision of professionals and some government enforcement officials.

- **View of the private sector and manufacturers of building materials**

The private sector and the manufacturers of building materials could be considered bias due to various disagreements trailing their opinion concerning the situation of Nigeria building industry.

Omoh, J. and Franklin of Vanguard Newspaper (February 10, 2014) reported that, Dangote, the only producer of new 42.5MPa grade insisting that Standard Organisation of Nigeria (SON) ¹⁸should stop the use of 32.5MPa cement grade to curb building failures. Other cement manufacturers, including; Ashaka Cement Plc, Lafarge WAPCO Plc, and Northern Cement Company of Nigeria, Sokoto and United Cement Company Plc, Calabar rejected the claim, arguing that 32.5MPa has been in Nigeria for 54 years and also the public should be given a chance to choose between products and fair competition for quality.

Yakubu (2012) disagreed with cement theory based on field work survey obtained from construction site and manufacturers of blocks. The study stresses that 32.5MPa cement and 42.5MPa grade has nothing to do with the production quality but it is a product of mix design that creates quality. The methodology of mixing and cement Re-bagging has been the major factor affecting the quality of concrete and block production in Nigeria. This was buttressed by the reaction of an academic engineer when the house of representative made a recommendation to SON for the implementation of 42.5MPa cement grade, calling the whole process 'heap of nonsense' that the concrete strength is a product of mix design be it 24MPa, 35MPa and 42MPa (Dr Emeka Ezeajugh Thisdaylive.com July, 6 2014 retrieved July 10, 2014).

- **Insurance Policy**

To partially combat this seeming insurmountable and intractable problem, a new Building Insurance Act has recently been promulgated in Nigeria. Under this act, owners of storey buildings from two floors and above, under construction, who fail to insure them with a registered insurance company now stand the risk of paying N250, 000 (£874.13) fine or three years imprisonment [Vanguard, July 9, 2003].

- **View of International Organisation on Nigeria**

Table 4.5 present the World Bank rating on her objectives in Nigeria. This clearly indicates the view of international organisations on Nigeria building industry, which may not be different from what they have seen in other sectors.

¹⁸ Regulators of building materials standards in Nigeria

Table 3.2: World Bank performance program rating relative to its objectives in Nigeria

Bank Strategic goals	Achievement of associated country assistance strategic results	Bank program outcome ratings
Strengthening environmental management	No meaningful progress to tackle environment management. Government lack commitment.	Unsatisfactory
Delivering social services and empowering communities	-	Moderately unsatisfactory
Achieving better educational outcomes	Some increase in access occurred, but progress overall uneven. There was no improvements in the quality of education and no institutional strengthening	Moderately unsatisfactory
Improving health Status of population	Progress on Millennium development Goals was uneven. Some success at federal while little progress at the state level.	Moderately unsatisfactory.
Promoting Private sector development	Overall growth in agricultural production. Privatization of state owned enterprises.	Moderately satisfactory
Overall risk rating		Low
Overall Implementation Progress (IP)		Moderately unsatisfactory
Improving state-level governance	Very little progress occurred over the period	. Unsatisfactory
Attacking corruption	Problem remains daunting.	unsatisfactory
Creating the		unsatisfactory

basis for sustainable non-oil growth		
Enhancing federal infrastructure	Ports were privatized and some progress was made on power sector restructuring. The overall infrastructure, however, remains poor.	Moderately unsatisfactory
Enhancing state-level infrastructure	Little progress was made on municipal water and urban infrastructure. The Issue of state finances for maintenance remains unaddressed.	Unsatisfactory

Source: (World Bank Development Report NoISR3037 Public Disclosure Copy retrieved online July 2014.)

From the Table 4.5 presented above the international lenders and funders of Nigerian projects are already sceptical about the corrupt nature of the nation who cannot stand up to the responsibility as government of the people. A nation that virtually failed all the parameters set for the evaluation can actually be termed a failed state. A country where money grows wings and flies out of government coffers without traces cannot be trusted with developing a masses oriented programme (Oyinloa A.O, 2011).

Tanko *et al* (2013) opined that all incident brings with it unhealthy finger pointing, bias and personal interest from the survey, where the building designer or architect swears to have designed in accordance with established standards and points accusing fingers to the builder as culpable. The builder or contractor, on the other hand, vows to have built according to plans and specifications and returns accusing fingers at the designer. Of course, as the blame game unfolds within the stakeholders, in the “great Nigerian tradition, palms are greased and before long, the issue dies away without any consequences to errant professionals” (Tanko *et al* 2013, p.4). The answer to this problem should be resolved through balancing of individual interest.

3.4.2 Balancing professionals and relevant stakeholders interest

Political philosopher Charles Blattberg (2004) has criticized stakeholder theory for assuming that the interests of the various stakeholders can be, at best, compromised or balanced against each other. Blattberg argues that this is a product of its emphasis on negotiation as the chief mode of dialogue for dealing with conflicts between stakeholder interests. He recommends conversation instead and the view of Blattberg is being supported by Miles & Samantha (2012). However, Bourne L. (2010, p7-16) submitted 5 steps to stakeholder management, including; 'Identification of all stakeholders, Prioritization to know who is important to project, Visualisation (Mapping) to understand the overall stakeholder community, Engagement through effective communication, and Monitoring the effect of the engagement'.

However, this study has a different opinion on Bourne L. (2010:8-9, 2006:7) while align with Boatright (1994) on 'prioritisation of stakeholders' to know who is important and who is not. The team members suggested by Bourne who are to agree on prioritise rating of importance in the stakeholder circle methodology for a project will keep changing with different projects which may not reflect the true picture of the industry or professional interest.

Each stakeholder has an area of specialisation, prioritising and calling some important and influential as suggested by Bourne (2010,) will keep the conflicts among the stakeholders recycled in the building construction process. For example, in the building construction process in Nigeria, we have the industry, community, employees, client, suppliers, an architect, a builder, engineers, construction managers, urban planners, a surveyor both quantity and land surveyor and estate managers and all these groups influences the building construction process at different stages significantly. Tagging any as most influential at any stage will definitely create nursing of grudges till the stage that the other person is tagged most influential and important.

This study therefore agreed with Boatright (1994) that, no preferential treatment should be meted to any stakeholders at any level but equal treatment because they are not different from each other whether stock or stake.

To buttress the argument this study provides some Models to balance the interests of stakeholder's for easy implementation to support the argument.

This study supported the ideas of Freeman (1984) who submitted that interest of stakeholders can be balanced by investigating, interacting for score keeping and Mitchel et al (1997) cited in Scott Reynolds *et al* (2006) who argued that interest of stakeholders list should be collected and prioritise and Bourne (2006) on prioritisation and identification with Blattberge (2004) supported by Smiles & Samantha (2012) who argued that stakeholders interest can be balanced with emphasis on negotiation through dialogue in conversation and the idea of Frooman (1999) cited in Scott J.

Reynolds *et al* (2006) that constructing constructive negotiation may be the answer to stop the argument and that of Longo *et al* (2005) cited in Dima J. (2008) that matching each stakeholders expectations and values for common satisfying interest. Building on these arguments; this study therefore proposed a graphical model called Interest Negotiation Tree to fill the gap of graphical representation left by various authors in balancing the interest of professionals and relevant stakeholders as presented in figure 3.6.

Suggested Negotiations Terms of Reference from all relevant stakeholders

Negotiations terms of reference as suggested by this research include: but may not be limited to;

- Determine clearly the stakeholders negotiation strategy,
- Identify the stakeholders negotiation priorities for matching,
- Determine the percentage of acceptable expectation list for negotiation from each stakeholders forum to be not less than 60% majority of interest,
- Choosing & retaining each stakeholder executive member to represent and facilitate negotiation proceedings,
- Determine appropriate methodology to collect and analyse relevant information for negotiation and also to include:
 - Background data collection on the representative integrity for each stakeholder,
 - Consultations to ensure the list represent 60% majority interest,
 - Feedback channels.
- Communication between all stakeholders before & after agreement reached,
- Determine the Leadership strategy;
 - Chairman/executive,
 - Quorum: Quorum for meeting to be a majority of the negotiation committee,
 - Governance: decisions & recommendations to be taken by majority vote of committee members or through consensus as the case maybe,
 - Meetings frequency and time, and
 - Composition of the committee members.
- Preparing and tabling negotiation proposals, and
- Determine final outcome, distribution strategy for implementation of the policy agreement

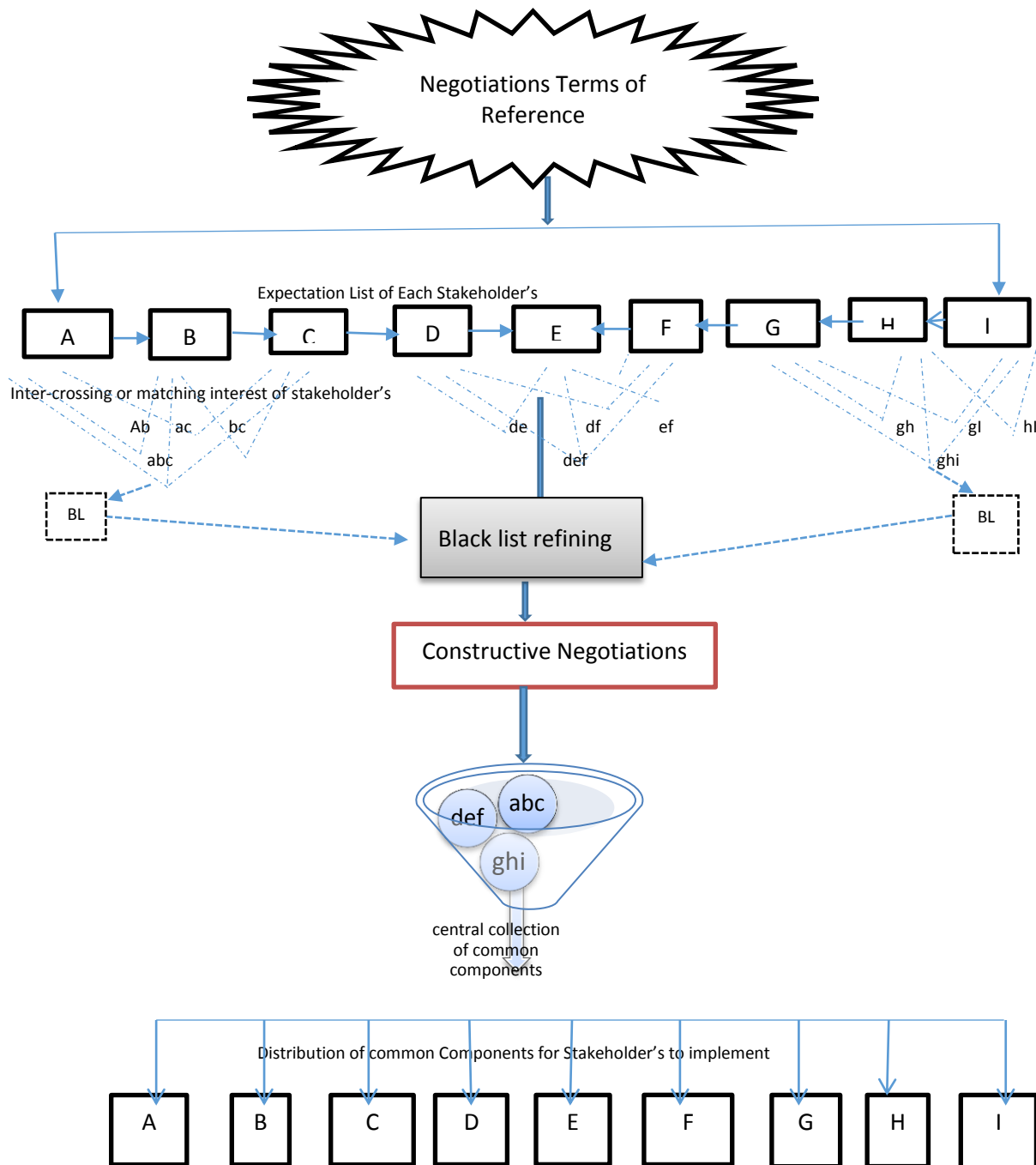


Figure 3.6 Stakeholders Interest Negotiation Tree-Graphical Model

Source: (Author Construction 2015)

Where;

A - I = Represent Identified stakeholders that influence the building construction process in Nigeria; including: government, professionals, Enforcements departments, supply chain, contractors and others as identified.

BL (Black list) = the uncommon list that is out of the intersection point with other stakeholders interest.

This model formed that the blacklist (BL) with a backward dotted arrow indicates the stakeholders interest that does not intersect with each other which might be a strong argument for some stakeholders not to be blacklisted, so the model created a point of refinement of those blacklist for possible accommodation after refining and those that cannot be refined are therefore pushed for negotiation. As indicated in the model, the terms of reference is being used for all the process from drafting the expectation list as the arrow shows which are pushed through to refining of blacklist and to the constructive negotiation point where all should be discussed and filtered negotiation parts are merged into a whole part emphasising synthesize strong outcome as common components which is then distributed to each stakeholder according to the terms of reference for implementation. The Model also allow each stakeholder to access the common components which serve as the heart of the balance interest due to different functions as might be outlined in the terms of reference for each.

3. 5 Key Factors Affecting the Implementation of BC Structural Element Provisions

The body of literature reviewed presented various factors that impede the implementation of the structural Provisions of the building code provision. These factors include:

- **Awareness of the NBC and a lack of legal framework**

Dahiru et al (2012) argued that the lack of awareness among the populace reduces the degree of compliance with the required regulations. The more people are aware of the existence of these regulations within their municipality the better; their awareness partly determines the extent to which people will comply with the regulations. Further, Dahiru et al (2012) stressed that lack of legal framework makes legislative support difficult. Another key factor is uncontrolled urban growth. Abubakari and Romanus (2011) observed that urban growth was not adequately controlled due to the rapid, chaotic growth of cities during a rapid period of industrial development as witnessed in counties such as Nigeria. There was a massive exodus of migration to the cities in search of greener pastures, which created squatter settlements and informal sector activities that continued to grow because of implementation problems (Wafula, 2012). The increased urban pressure on buildings and facilities is due to a lack of government unplanned urbanisation in line with urban growth.

The majority of urban centres in developing countries are not planned, and where plans exist, enforcement is absent (Kimani & Musungu, 2010).

- **Implementation process**

An inadequate implementation process and manpower for enforcement is another key factor identified in reviews. Berrisford (2010) showed that unclear implementation procedures for structural aspects of buildings and inadequate resources, including; funding and technical manpower within the local authority to enforce implementation of building development were a serious challenge in African cities (Berrisford, 2010). The study observed that the local council had neither clear standards for implementing each of the structural aspects of the code provisions nor the technical expertise and adequate funding in the areas of building health inspectors, and mobilisation of staff on projects site visitations.

- **Approved standards and regulations**

Absence of approved standards and laxity in the approval process also discourage developers to submit their drawings for approval and start development immediately without worrying about consequences of their actions. If the approval process can be hastened, barriers to the implementation of building regulations will be eliminated (Berrisford, 2010).

- **Government directive and promotion**

Lack of government directive and promotion is also identified as key factor hindering the development and implementation of the structural aspects of the BCs provisions in Nigeria. The development policies in developing countries have been characterised by failures as a result of bureaucratic decisions, delays, poor specialised bodies, ineffective local institutions and staff, lack of institutional framework for development planning and the lack of or inadequate participation by the beneficiary population, as cited in many African countries – Botswana, Kenya, Zambia, Zimbabwe, Tanzania and Nigeria (Berrisford, 2010). The federal government's concentration of power has left local governments with no experts to drive policy formulation and implementation in an effective direction (Berrisford, 2010).

- **Political will and Interference**

Political Interference or lack of political will at all levels is also cited as another factor hindering the further implementation and enforcement of building code provisions. Obiegbu (2008) confirmed that the government, both central and local council (Municipality), lack commitment to building regulations, which has clearly been seen in the case of Nigeria's BCs, which have come before the national assembly for decades without legal backing.

- **Professional fees**

In the opinion of Nyangweso, (2007) a high professional fee is also identified as a constraint to implementation. On average, each professional charges 3–15% of the total cost of building development projects as professional fees. For example, land within a developing area or satellite towns in Abuja costs about N600, 000,000 (£13,333.33) for 450.00 m² of land. Such high costs may discourage developers to involve professional in the development of building construction, thereby increasing the risk of building collapse much further (Berrisford, 2010).

Other factors that impede the development and implementation of BCs in developing countries are as follows; absence of a national building safety strategy, out-dated and incomplete building legislation, lack of data regarding the country's building market and legislation requirements in both the public and private sectors, weak private-sector technological capability due to a shortage of adequately trained staff, out-dated by-laws, quality control and safety systems, inability to enforce building control and development Initiatives and underfunded regulatory agencies lacking skilled staff and other necessary resources, resulting in inadequate inspection, monitoring and certification capabilities (Sanewu et al, 2011; Kimani & Musungu, 2010).

3.6 Causal Factors/Impact Risk of poor-Implementation of BC Provisions

A number of studies have identified causal factors associated with the poor implementation and enforcement of building code provisions within Nigeria as a whole.

- **Corruption**

Ayedun et al (2012) and Oyinola (2011) agreed that corruption at different levels of political leadership and amongst stakeholders impedes the implementation and enforcement of standards in Nigeria.

Corruption in Nigeria, as presented by the authors, comes in different dimensions: lack of quality education for children, election manipulation by money and bribery, and backdoor business decided

in one man's sitting room to steal public resources (Transparency International, 2013). The Civil Society Organisations Report (2008), Transparency International (2013), Ayedun et al (2012), Oyinola (2011) and others attributed the following reasons to corruption in Nigeria:

- Weak government corruption fighting institutions,
- Lack of access to public information,
- Pre-bargaining and negotiation,
- A low record of punitive punishment for corrupt officials,
- Insincerity of government,
- Insecurity of informants,
- Systemic disorder,
- Poverty, and
- Nepotism

However, corruption is difficult to measure without appropriate guides on tools to measure the indicators (UNDP, 2008). UNDP (2008:7) advised the following steps, including; 'the scale and scope of indicators, what is actually being measured, the methodology adopted and the role the internal and external stakeholders play in generating the assessments'. The only possible way of differentiating corruption is by the scale which is categorised as petty (everyday corruption among citizens) and grand or political (large sum of money) with the following indicators measuring tools, namely;

Perception-based indicators: subjective opinions from experts and citizens;

Experience-based indicators: actual personal experience measurement of government officials and citizens;

Indicators based on a single data sources: publications from organisations without seeking assistant from someone data;

Composite indicators: work by aggregating different measures by other sources (third-party) and comparing practices globally, and

Proxy indicators: this involves assessing corruption through indirect measures by "aggregating many voices and signals of corruption" (UNDP, 2008:9) within governance systems. It measures for example good governance to citizens, public disclosure and accountability of government officials and offices and anti-corruption measures (UNDP, 2008).

- **Professional involvement in decision-making**

Lack of professional involvement in house building construction is another causal factor that impedes implementation. Omeife and Windapo (2013) argued that a lack of professional participation in house building construction affects the implementation of standards, thereby causing building collapse. Hence, Agapiou et al (1998), therefore, called for greater efforts to enhance the collaboration and coordination of all stakeholders working towards better housing for all.

- **Professional rivalry and mutual suspicions**

Agapiou et al (1998) upheld that professionals should develop cordial relationships for the interest of clients and projects, and denounce the current practices of opponent attacks, which exist in the construction industry. The study suggested that there should be an interest in making the relationships work to achieve the desired goals among stakeholders, recognizing that cordial working relationships may not be free from constraints, but closer ties among stakeholders in closing the existing gaps and wastages will go a long way in overcoming the obstacles to create trust and to reduce the cost of construction. The study highlighted some key factors for 'effective partnership relationships', such as "Compatibility among stakeholder, each stakeholder norms of practices, High degree of internal trust, Robust team building, Genuine openness towards those outside the partnership" Agapiou et al (1998: p.359).

- **Inadequate capacity building**

Another causal factor that impedes the implementation of structural aspects of house building is inadequate capacity building. Dixit (2008) stated that implementing BCs could be easy through capacity building by training all management, professionals, and artisans/tradesmen (etc.) to develop control. The risks associated with non-implementation of the BCs due to causal factors were incessant collapse of structural aspects of buildings, loss of investors in the sector, unplanned cities, and non-professionals in the industry, substandard building materials, and congestion of houses, blockages of drainages and roads, and environmental pollution.

3.7 Determinants of Non-compliance with Structural BC Regulations within MRRB Development Projects in Nigeria

Windapo and Rotimi (2012) established that the global construction industry suffers from persistent non-compliance with standards and regulations. Unlike developed nations, which regularly review

and update their building standards to meet best practice, construction industries in developing countries place little effort into regulatory compliance, despite the continuous growth and construction of high-rise residential buildings (HRRB) (Dahiru et al., 2011; Nigerian National Bureau of Statistics, 2015).

Mbamali and Okotie (2012) argued that industry and government stakeholders should stabilise the industry by increasing adherence to regulations, which in turn would attract investors, increase the industry's contribution to gross domestic product (GDP) in line with the levels seen in developed nations, and create employment. For example, the Nigerian construction industry's real contribution to GDP was 2.88% between 2010 and 2011, but the share to GDP in 2012 stood at 3.05% (Nigerian National Bureau of Statistics, 2015).

In current MRRB development projects in Nigeria the compliance process includes design planning approval and inspections, both during and after construction. Non-compliance with building code (BC) standards has been a contributing cause in several cases of structural collapse (Mbamali and Okotie, 2012; Dahiru et al., 2012). Dahiru et al. (2012) stated that non-compliance with BC standards in Nigeria is due to corruption in the approval process, and places the blame on professionals in the construction industry, as well as Government officials, emphasising that high-rise residential development projects in Nigeria have been characterised by non-compliance with structural BC standards and regulations. Windapo and Rotimi (2012) defined compliance as 'conforming to or being in accord with rules/established guidelines, such as specification, policy, legislation, standard or law, or the process of becoming so' (citing Sarbanes-Oxley Act, 2002), while Laubscher (2011) declared that 'building standards is an official technical reference document, that sets standards for building and construction works through quality, performance, size, measurement criteria and the methodology of operations.' Abdullahi et al. (2013) argued that industries and manufacturers in developing countries have no regard for standards compliance, even to well-known standards such as ISO 14001 (Environmental management system) and ISO 9000 (Quality management system). For example in Nigeria, standards and regulations are not enforced through an established institution, but rather through societal class and individual personalities, which tend to be more influential than institutions, standards and regulations, and the law (Okpala, 1984). Furthermore, rules and regulations may be broken by approaching a well-placed individual within society (Okpala, 1984).

Ayedun et al. (2012), Olagunju et al. (2013) and Olusola et al. (2011), all noted that building development projects in Nigeria do not comply fully with structural BC standards and regulations. In order to validate the claims in the literature, this study conducts research into key and causal factors

affecting the implementation of structural aspects of the Nigerian BC, drawing on contextual analysis and international experience as presented in chapter 4.

3.7.1 Causation of Non-Compliance with Building Standards and Regulations in MRRB

The causal factor of non-compliance with building regulations varies from country to country, and from state to state. For example in Kuwait, Al-Fahad (2012) established that the administrative system, and technical and social factors, are the major challenges to non-compliance with standards facing the building industry, which results in unauthorised buildings, the illegal conversion of buildings, street conversions to refuse dumps, and sub-standard houses, especially for middle and low-income earners. Sharkheyli et al. (2012) argued that non-compliance varies according to the general context of the social, economic, cultural, legal and the quality of the urban and environmental conditions of the affected areas. Arimah and Adeagbo (2000) suggested that the extent to which stakeholders in Nigeria are aware of existing standards and regulations, largely determines the extent of their compliance. Although high, medium and low quality buildings may exhibit a significant response for awareness, this does not translate to compliance in terms of air-space, occupancy ratio, zoning, over developments of plots resulting in poor circulation, inadequate space and overcrowding among the low and medium income areas. Non-compliance, according to Arimah and Adeagbo (2000) and Alnsour and Meaton (2009), is mostly by poor and illiterate people because of their low quality of life. Arimah and Adeagbo (2000) further opined that factors affecting non-compliance are grouped into institutional, administrative and public. The content and intent of the regulations institution are not in compliance with the socioeconomic characteristics, culture and values of the public, because they are outdated, foreign, rigid and restrictive. For the administrative factor, the inter-agency co-ordination for effective implementation is lacking within the agencies. There are other plausible reasons provided for non-compliance with structural BC standards and regulations in Nigeria, drawing on contextual analysis and international experience, including ignorance of the law, and Windapo and Rotimi (2012) argued that the majority of low and medium income earners undertaking developments within satellite communities are ignorant of the requirements of the building regulations in Nigeria. Corruption, due to systemic and leadership disorders, is another contributing factor to non-compliance (Ayedun et al., 2012), together with a lack of professional participation in the development of HRRB projects in Nigeria (Omeife and Windapo, 2013), professional rivalry and mutual suspicion, a lack of technical knowledge, and an

inadequate capacity to train construction site workers (Agapiou, 1998). Training has been shown to enhance skills in new technology and educates regarding changes in professional practice (Dixit, 2008).

.3.7.2 Evidence of Non-Compliance with Building Standards and Regulations

It is obvious that non-compliance with building standards and regulations is not limited to Nigeria, but also occurs throughout the world, and the literature reports non-compliance in countries including Scotland, Canada, Kenya, South Africa and Ghana (Sanewu et al., 2011; Baiche et al., 2006; CASA Association, 2012; Building (Scotland) Act, 2003; Laubscher, 2011).

Laubscher (2011:40) noted that in South Africa there was a problem of code 'uniformity' and government failed promises of reviewing every five (5) years which was not done in 2000 or 2005 after the publication of the revised edition in 1991. However, in 2008, Notice NO. R.574 was published in the government Gazette NO: 31084 on council recommendation. Laubscher (2011:40) noted that '1st October, 2008 (Government Gazette No. 31084, 30 May, 2008:45-68) marked the operational of the National Building Regulations (NBR) and Building Standards Act (103, 1977), which was declared by the honourable minister of trade & industry (see also Wafula and Talukhaba, 2011).

Sanewu et al. (2011) described that the short-comings of Kenyan building regulations dated back to colonial-era irregularities, a lack of modern requirements within the BC, and the absence of non-accountable parties when a building collapses; these factors compelled the country to review its existing code in 2009 (see also Kimani and Musungu, 2010). The CASA Association (2012) affirmed that Ghana, on the 22nd May 2012, initiated a forum for construction professionals to review their BC with respect to climate change, disaster risk reduction, and sustainable growth development. Having discovered the BC lacks international best practices for green architecture, environmental quality, energy efficiency, and disaster risk reduction, the forum aimed to incorporate these into the Ghana BC (GBC). This was followed by the provision of administrative guidelines for the prudent governance process, efficient management of the guidelines for compliance, and the provision of a communication roadmap for public ownership of the GBC (CASA Association, 2012). Baiche et al. (2006) described how in 1990 and 2000, the Canada Mortgage and Housing Corporation and the Ontario Home Warranty Program undertook a survey to evaluate the cause of forty-four (44) building failures and to document the extent of these failures in order to identify the key underlying factors. In Scotland, the Building Standard system, administered and enforced by local authorities, was responsible for some limitations in protecting public interest and the discharging of duties, such as preparing the building regulations and associated guidelines, providing views on compliance to

assist verifiers (currently local authorities) in decision making, granting the relaxation of regulations in exceptional cases, maintaining a register of Approved Certifiers, monitoring and auditing the certification system and the performance of verifiers, and verifying Crown building work. This led to the establishment of the Scottish Building Standards Agency (SBSA), which was created as part of an implementation approach in June 2004, and then as a directorate in April 2008, for the Built Environment, which combines architecture policy, building standards and planning. The Scotland Building Standard division, which acts on behalf of Scottish Ministers, helps to facilitate the functions of the Scotland Building Standard with compliance to building regulations (Building (Scotland) Act, 2003).

However, in Nigeria the problem of non-compliance is overwhelming from visible contributing factors concerned with a lack of legislative backing for building standards and regulations, inadequate awareness, corrupt leadership, and poor implementation and enforcement processes (Dahiru, et al., 2012; Olagunju *et al.*, 2013; Olusola et al., 2011; Omeife and Windapo, 2013). For example, Olaitan and Yakubu (2013) presented a regulatory enforcement failure and non-compliance practices for the BC provision in developing areas of Lokoja, Nigeria after observing 167 buildings, for which only 28 buildings (16%) had obtained approval, 10 had at least one professional (0.59%), and none of the site visits were recoded for enforcement, indicating a total regulatory failure of enforcement. The study presented a damning report on the regulatory failure and non-compliance practises of the building code provision. The survey is summarised as in table 3.3 below.

Table 3.3: A summary of Building regulatory failure & non- compliance practices

Building type	No. of houses observed	No. of building approval obtained	No. of visits by Development Control during construction	No. of architects, builders and engineers involved	Drainage provision	Road setback allowed	Total
Storey buildings							
BOldPQrts	5	1	0	1	2	1	10
GDM	5	2	0	2	1	0	10
Z8	7	2	0	0	0	5	13
Felele	15	4	0	2	1	2	24
Bungalows							
BOldPQrts	30	5	0	2	1	3	41
GDM	25	3	0	0	1	4	33
Z8	20	4	0	0	0	9	33
Felele	60	7	0	3	0	2	72
Total	167	28	0	10	6	26	237

Source: Adapted and modified from Olaitan and Yakubu, (2013: p.145)

Where: BOldPQrts=Back of old poly quarters, GDM=Gadumo, Z8=Zone 8

The study presented in Table 2 observed 167 buildings, of which, 28 buildings obtained approval, representing 16%. Ten had at least one professional, amounting 0.59%, and 0.0% of site visits were recoded for enforcement indicating a total regulatory failure of enforcement.

3.7.3 Potential Solutions to the Problem

Various authors have made useful suggestions as potential solutions to the problems of non-compliance to building standards and regulations in Nigeria. For example, Fagbenle and Oluwunmi (2010) suggested life imprisonment of any professionals or non-professional found guilty, whilst other authors and professionals with relevant stakeholder suggestions include legislative enactment of the BC, monitoring and evaluations of building development projects by professional bodies, empowerment of enforcement agencies, the introduction of an independent regulatory body, the insurance of building projects, the introduction of forensic analysis to aid in knowing the actual causes of failure, skills training, and continuous professional development (Olagunju *et al.*, 2013; Ayedun *et al.*, 2012; Dahiru *et al.*, 2012; Tanko *et al.*, 2013).

3.8 Summary

This chapter has traced the construction development projects in Nigerian to 1930s Royal Army Engineers Public Works department and the introduction of indigenous contractors and foreign firms during the oil boom which brought corruption and shady practices of building construction projects in Nigeria. The British rule has been credited with initiating the development planning policies and law in Nigeria in 1861-1863 which passed through different development plans and policies of ten (10) year development plan of 1946-1956 and urban and regional planning law (Act 1992. NO. 88) Policy framework. Section 4.3.1 in this chapter describes development planning permits for structural buildings from submission of building plans and supporting documents to monitoring post approval process. The chapter also presents that land development plan zoning methods does not exist significantly in Nigeria as a result of societal class and zoning distortion of standards and regulations.

It was also established that government recognises the problems of the built environment which prompted the process of evolving NBC in 1987 as a results of plan-less-ness, abuses of built environment, collapse of buildings, lack of reference standard and use of untested products, use of non-professionals and lack of maintenance culture. Of which, NBC 2006 was the product of the

evolving process of 1989, 1990, and 1991 to 2005. In this chapter, the reference standards used in the development of NBC 2006 is purely of British and American standards which have undergone various reviews. The chapter went further in identifying BC features into administrative, technical, legal and sociological aspects as well as the problems identified with each features of the NBC 2006 were graphically presented.

This chapter re-established the four structural aspects of HRRB construction process as foundation, floors, walls and roof and constrains to selection and implementation of these structural aspects of building constructions by various authors. Cases of structural building failures were identified and presented with catastrophic picture evidence with views of professionals and relevant stakeholders with a bottom line of bias and unhealthy finger pointer among the professionals and relevant stakeholders. In view of this, interest negotiation tree, philosophised by this study is presented in balancing professional and relevant stakeholders' interest.

This chapter firmly identified and established the key factors affecting the implementation of BC structural element provisions; causal factors/impact risks of poor-implementation on professional practice the industry development and the consumers.

Having justified the content and context of factors affecting development and implementation of the building code structural aspects of the NBC 2006, this study can now present enforcement for compliance to standards and regulations approach in the next chapter

CHAPTER 4:

ENFORCEMENT FOR COMPLIANCE to

STANDARDS AND REGULATORY PRACTICE

And

NIGERIA APPROACHES within REGULATORY
FRAMEWORK

4.1 Introduction

This chapter focuses on enforcement for compliance to standards and regulations within the structural aspect of the Nigeria building code standards. The chapter is sub-divided into 5 sections, 5.1 to 5.6 including the summary, starting with definition of regulations, enforcement and compliance. The chapter present details of regulatory theories and the typological regulatory framework, with different models or approaches to regulatory implementation and examples of regulatory practice and non-compliance in Nigeria. It also assessed determinants of non-compliance with structural BC standards and regulations within mid-rise residential building (MRRB) development projects in Nigeria; detailing the causal factors, non-compliance evidence and potential way out from the mess. In this chapter, innovative regulations enforcement design for easy compliance which include different approaches of pyramid of self-regulation and responsiveness with effects of regulatory failure on building economic demand and the monitory practice for compliance improvement were also discussed. The chapter present step-by-step details of the conceptual building control enforcement policy framework for the BC standards structural aspects in MRRB projects in Nigeria and summary to the chapter and leading point to next chapter.

Now the Chapter discussion according to sections

4.1.1 Regulation, enforcement and compliance defined

Regulation as a matter of fact has been debated with its definition forced to the direction of author's research (Johan den H. 1999). Johan (1999) established that various researches never attempted to give a definition because of this problem. But regulation defined at dictionary.com is a "rule, directive made and maintained by authority. It is also an action or process of regulating or being regulated". From the observation of various studies on regulations, all research has something in common which is law to control some process from higher authority.

In view of this, regulation for the purpose of this research means the application of mandatory administrative rule to control the building construction industry with respect to structural BC standards, social and economic behaviour by all levels of government within the professionals, industry and consumer interest.

For example, government regulates to improve the transparency in decision making of any corporation or interest group. (UNIDO Regulation Training Module 5), she mandated all groups to comply with lay down rules for certain behaviour with penalty of sanctions attached for violations

and also government regulation can force industry to observe rules on production process, supply of goods, out or stay within a particular market and keeping to production line without delving into another line of market production (Johan H. 1999).

This study can now define enforcement and compliance

Greenstreet Berman (2010), Subedi, J. K (2008) described enforcement as an advisory visits to projects sites, routine inspections of progress and assisting professionals with compliance as well as licensing and formal enforcement action.

Dictionary.com defined compliance as an act of conforming or yielding to a wish or command. It is a cooperation to do right the command.

With clear understanding of various aspects of standards and regulations, this study can describe the activities in a simple format as shown in figure 5.1

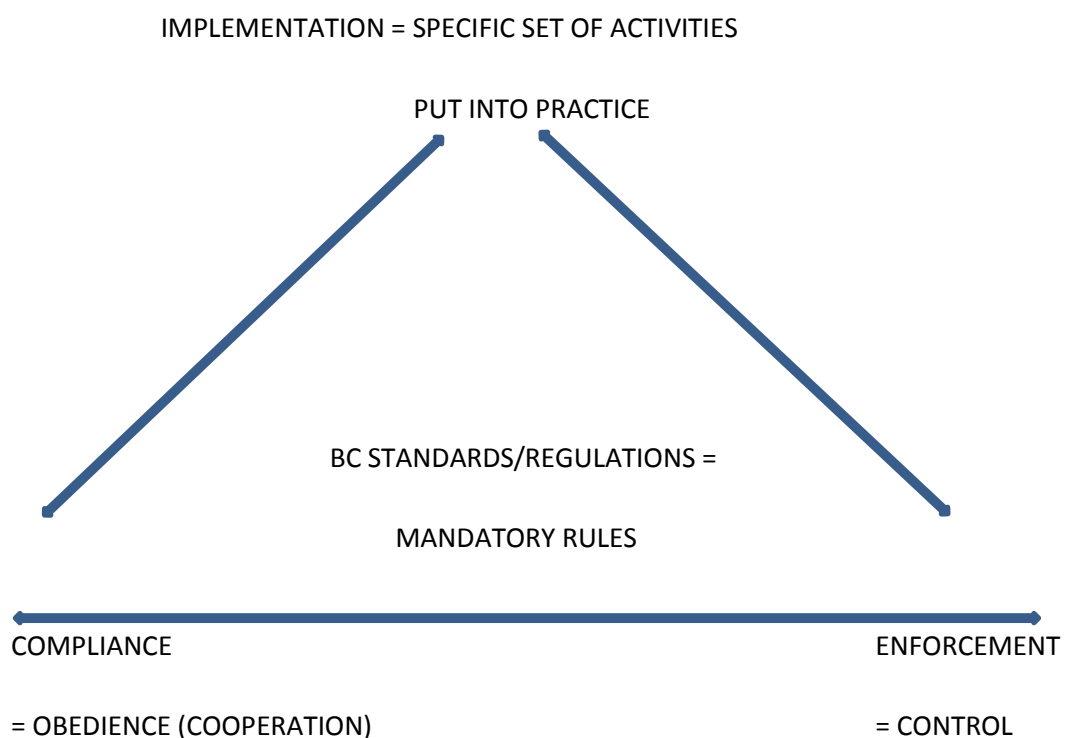


Figure 4.1: Description of standards and regulations activities

Source: (Author construction 2016)

4.2 Regulatory theories and typological framework

4.2.1 Competing Regulation Theories

The theories of regulation is centred on three types with positive and normative economics assumptions within the theories of public interest or public protection, theory of regulatory capture or private interest theory (economic regulatory theory called Chicago theory) and the modern theory of credible commitment

Public interest theories

Research holds that a public interest theory was first developed by Arthur Cecil Pigou as a welfare economic theory in 1932 for government to regulate within the public interest for correction of inefficient or unfair market practices. However, the theory was highly criticised by Lionel Robbins & Frank Knight due to some analytical errors discovered by Ronald. H Coase (1960) while analysing the problem of social cost from the work of Pigou that interest of the public can still be protected without necessarily by government intervention (New World Encyclopaedia retrieved March, 2015).

Johan den H. (1999) institute that public interest theories of regulation were the first group of regulations that aimed at public interest in the allocation of inadequate resources for the collective interest of the general public goods. Arrow (1985) cited in Johan (1999) argued that these scarce resources allocation is dependent on market mechanism. Arrow (1970), Shubik (1970) cited in Johan (1999) argued that regulation by government is an instrument needed to control unbalanced practice behaviour, imperfect competition, missing market and unwanted market result to improve the allocation of the scarce resources through facilitating, maintaining or imitating the market behaviour.

In the opinion of Martins, M. V. M (2009) public interest theory is a regulatory intervention that occurs in the interest of the general public at large while Stigler .J.G (1971) stresses that any regulation that inflicts injuries to the general public is not in the interest of the people. For example, laws and legislative or executive practices which the general public refused and it is being forced on them is an injury to the people and not in the interest of the people.

Jorgen G.C (2010) stated that the assumption of public interest theory of regulation agrees with the classical theory of bureaucracy of Weber (1921) which follows procedural rules or organise structure. For example the public servants in ministries are given a specific assignment that others

will not do because it is not their task, they are employed through civil service commission and promoted by some merits which seniority and date of first appointment is number one priority.

This study believes that following this particular hierarchical order without changes will not be in the interest of our modern society where exploration and innovative thinking creates the world of science around us.

Martins MVM (2009), Johan den Hertog (1999) insists that the industry market mechanism can be regulated by government as normative theory to correct industry failures and improved public welfare or as positive theory to serve some interest groups or individuals. The four structures of the industry market to be regulated is as shown in Table 4.1

Table4.1: Four models of industry market structure for regulation

	N0 of firms	Ease of entry/exit	Product type
Perfect competition	Many	Easy	Standardised
Monopolistic competition	Many	Easy	Differentiated
Oligopoly	Few	Difficult/Barriers	Standardised/Differentiated
Monopoly	One	Very Difficult	Unique

Source: (Adapted by author from Martins MVM 2009)

Martins (2009) affirm that economic regulation is very important in an environment where industry market monopoly exists. However, industry within oligopoly can also be playing games in the situation they attempt to maximise profits by employing every means that is under their control. Cournot & Bertrand cited by Martins (2009) still kept faith that oligopoly are better than monopoly which make sustained collusion likely with both. Johan (1999) and Jorgen (2010) suggested antimonopoly legislation that will monitor industry market operation process and maintained perfect competition and prohibiting monopolistic competition. Stigler (1971) stated that industry will lobby legislators for any regulation that can make them fix price easily, restricts other competitor's products, regulation that has direct monetary subsidies and gives the existing firm power to control the market entry of potential new industry.

For example, Nigeria cement manufacturing industry is 70% owned by Dangote group and the company control the price by increasing it at will without any legislation to stop that as results of political and financial interest.

Criticism of public interest theory

Public interest theory which opined regulation is the answer to industry failure has the following criticisms:

The first criticism was on the theory of industry market failure from different perspective that resource allocation appears efficient with the exclusion of transaction cost in the analysis, competition likely to be for the market and not in the market as stated. Of which, market mechanism process itself can compensate for any inefficiencies of adverse selection (Dahlman, 1979; Baumol, Panzar and Willig, 1982; Cowen, 198) cited in Johan, 1999) respectively.

Another criticised aspect of the theory is the assumption that government regulation is effective and can easily be implemented without cost. Posner (1974) cited in Johan den Hertog (1999) argued that transaction costs and information costs which are the brain behind industry market failure were not considered but assumed to be absent in the case of government regulation. The theory of public interest established that social regulation and economic regulation must be weighed against each other to determine the efficiency but lack of applicable standard of justice and lack of relationship information between justice and efficiency has made the imperials testing difficult. The Final criticism of Posner as presented by Johan (1999) was that the theory is incomplete as follows: lack of view on how the public interest (interaction of participants) will translate to regulatory (political decision-making) actions that will maximise socio-economic welfare, the theory did not specify the branch of industry that should be regulated with those to benefits and those that will not, the form of regulation was also not predicted by the theory such as subsidies, restriction of market entry, or price regulations (Stigler, 1971).

Theory of Regulatory Capture or Private Interest Theories (Economic theory)

A Private Interest theory of regulations was the offspring of public interest theory when research shows significant distrust of the first theory (Jorgen.G.C 2010; Stigler, 1971; Johan, 1999). It was developed by political scientist with the assumption that in the course of time the regulation will catch up and serve the branch of self-motivated interest, the regulatory power is to the benefit of few interest groups. In which, those who control regulatory policy in this theory do for the political support that might come as votes or monetary support from industries as contributions for campaign. The regulation monitoring process will nosedive because of the priorities of the politicians or the industry in question (Stigler 1971; Johan, 1999; Martins, 2009; Jorgen, 2010).

For example, MTN Nigeria is a telecommunication provider that came from South Africa in 2001. The operational licence was granted to the firm with some clauses that favours the executives and the legislatures which includes free calls; some percentage recharge of every poor Nigerian goes back to those selected political individuals; in returns, the firm made per minute calls of the service too expensive for ordinary Nigerians. The political turmoil and mistrust of 2003/2004 between the then president, vice-president and legislatures brought the situation to bear. In which, more licence was granted to some telecom providers like Etisalat from United Arab Emirates and Globacom Nig who then crashes the calls to per second.

Criticism of Private interest theory

The following are some of the criticisms presented by Martins (2009), Johan den H. (1999) about capture regulatory theory.

There was no clear difference between the capture regulatory theory and public interest theory, at the same time the capture regulatory presentation on why a group of interest group can succeed in forcing an industry to their interest but cannot stop them from formation was not cleared. Another criticism was that the regulation may benefit the interest groups of consumers more than the selected branch as claimed, regulation of product safety and labour conditions of service are not considered by industry because it affects their profit margin. The new tendency of deregulation seems to contradict the basic conclusion of the theory and strong problem of asymmetric information will exist between the policy makers and the legislatures (Stigler 1971; Johan, 1999; Martins, 2009; Jorgen, 2010).

The Modern Theory of Credible Commitment

Jorgen (2010) established that it is ideal for regulatory authority to be delegated to an agency (third party) devoid of executive procedural. The assumption of the theory effectiveness is that, the agency director general and staff to be experts who will use his/her professionalism in handling regulatory issues. The agents must also exercise their regulatory power in line with the given mandate from government or principal council.

The choice of entrusting regulation to an independent body from the government according to Jorgen (2010), Johan (1999) is to improve technical and complex decision-making process that requires expertise. This regulatory choice is also to create a long-lasting regulatory policy that is

without political mortality and to create trust for investors that need guarantee and assurance for credible regulatory policies for their investment because of the short term of political actors.

Jorgen (2010) argued that private investors do not trust the inconsistency of adequate regulatory policies in the hands of the electoral interest, therefore requires an autonomous agencies or independent regulators to act as regulators who will decide on individual cases and dish out rules in accordance with the mandate received. Economist welcomes this approach unconditionally (di Mauro 2009; Die Welt am Sonntag 2009 cited in Jorgen, 2010).

Jorgen, (2010) described how credible commitment theory places itself and shared the belief of the public interest and that of regulatory capture theory and still maintained a distinction. With public interest theory, it displays some confidence in the public service and with capture theory shares the opinion of mistrust of politician's disposition.

Despite embraced of this theory from all sectors; some questions were posed for the validity of the independent regulatory administration and policy such as: For how much of time can the independent regulators be subject to political concern? Will the independent regulator deviate from the given mandate along the line and their interest not conflicting with that of politicians?

Table 5.2 adapted from Jorgen (2010) describes the basic claims, behavioural assumption and validating evidence of the three (3) regulation theories in other to build up confidence for the questions raised.

Table 4.2 Basic claims, Behavioural assumptions and validating evidence of competing models of regulatory administration theories.

	Public interest regulation	Regulatory capture	Credible commitment
Basic claim	Civil servants act according to general law set out to further the public interest	Civil servants biased in favour of regulated business	Civil servants apply scientific knowledge to further good regulation
Behavioural assumption	Civil servants as office carriers	Civil servants self-interest motivated	Civil servants as professional norm abiders
Field of relevance	Economic and social regulation	Economic and social regulation	Economic regulation
Validating evidence			

Supporting evidence	Merit bureaucracy Strict public law regulation of procedures Integration into ministerial hierarchy applying strict politics- administration dichotomy	Close cooperation with regulated business Exclusion of third party interests Revolving doors careers	Delegation to independent regulators Staffing with relevant professionals Exclusion of affected interests Evidence-based decision making
Disproving evidence	Interference from political executive Bargaining with external interests Institutional integration of external interests	Career transfers rare Broad inclusion of affected interests Strict regulation of decision making procedures Decisions against regulated business	Regulatory authorities integrated into executive hierarchy Institutional integration of affected interests Political interference into decision making De facto bargaining with affected interests

Source: (Adapted by author from Jorgen, G. C. 2010)

This study now with clear understanding of different competing theories of industry regulations can now present approaches to regulation implementation

4.2.2 Different Approaches (Models) to Regulatory Enforcement

The ultimate aim of all building standards and regulations is to make sure that development plans and building constructions process is implemented in line with standards for occupant health and safety (Benjamin T. 2006; Scottish Border Council (SBC), 2014).

Below are different models adapted by different countries to implement or enforce standards and regulations. There are basically three (3) approaches or models to regulatory enforcement around the globe, of which, innovations for the application of the approach to achieve the desired results may be different from one country to another. Yu, S., Evans, M., Kumar, P., Wie, Van L., and Bhatt, V. (2013) submitted that standards and regulations could be enforced by government officials from government agencies, by third-party inspectors, and through a hybrid approach.

- **Government and her Agencies**

For example, **in Scotland**; the enforcement action of the government agent Scottish Border Council (SBC, UK) is through; the Municipal planning authority and the general public acting as the watch dog within the neighbourhood (SBC 2014). In which, Town and Country Planning (Scotland) Act 1997) argued that the power to issue an enforcement notice is available for use at the discretion of the user which requires various factors to ascertain that it is 'expedient' to issue a notice (SBC 2014, p.17-19). SBC (2014) advised that in serving notices for enforcement of planning and building standards, consideration must be given to their own policy and advice from Scottish Planning Policy Guidance (SPPG's), realistic decision and relevant facts of planning issues to see if a breach exists on public amenities or existing land use and buildings or any other regulations should all be considered. At the same time proper documented record of the case investigation of building projects without permit, unauthorised change of use from approved permit and change of approved plans during construction should be properly kept (SBC, 2014).

The SBC 2014 mandated the public as a watch dog over their environment where you can report incidents of breaches to the Council (Municipal authority) with the property details, including; address, suspected work with time and date, the informant details and confidentiality of the matter to the informant but if court is involved for statutory enforcement you may be called as witness. In which civil sanctions is adopted in the competent court for compliance in the UK through fixed monetary penalties, discretionary requirements (of variable monetary penalties, compliance notice and restoration notice), stop work notice and enforcement undertaking as the case maybe (Green Street B. 2010).

This study will like to pause and add a piece to the matter of confidentiality treatment of the public as watch dog, in the context of Nigeria environment where power intoxicates people, the populace maybe afraid to report such cases if they know that one day, they will be called upon as witness. This study suggests in such an environment that in-depth investigation of the case should be carried out by the enforcement department to take up the full responsibility while the information provider should remain anonymous.

In **South Africa**, Memeza, M. (2000) noted that various enforcement process and strategies adapted in cities to enforce general laws and building standards due to the inner city deterioration in the early 1990's. The government at Local, State level and national government undertake a major campaign of the inner city standard revival. (ibid) noted that Mayivuke city programme was launched in 1999 in partnership with a range of role players, including; various council departments,

Gauteng Housing department, the South Africa Police Service (SAPS) and the Central Johannesburg Partnership (CJP). The process was in two phases;

The first phase is called the 'streets group' and comprises of Traffic, Waste Management, Street Trading, and Gauteng Housing department. Their target is creating cleaner, safer streets, e.g. moving vehicle violations, parking violations, abandoned vehicles, littering, illegal dumping, illegal advertising, and Illegal street trading, and

The second phase is the 'Buildings group' and carries out inspection on buildings which have been designated as non-compliance to building regulations, structural defects or overcrowded. This group consists of fire, health, building control, land use enforcement, and Gauteng housing department (Memeza, M. 2000).

Other strategies adopted by South Africa government for enforcement through partnering, including; Operation Sekwanele - Scrap Yard Operation. According to Memeza (2000), this operation is a partnering effort of the council's Town Planning Control Unit, council enforcement agencies, and SAPS in conjunction with their own specialized units started in 1999, which ensure all provisions of town planning law, building regulations compliance are to be enforced by this group throughout Johannesburg metropolitan area and City Improvement Districts (CID's) approach based on the North American Business Improvement Districts, initiated to run parallel with the partnership strategies working closely with local in the inner city strategy whilst the above mentioned represent concerted attempts at ensuring that by-law infringements are prevented, their future depends largely on the establishment of the Metropolitan Police Service (MPS) (Memeza, M. 2000).

In Cape Town, there is a collaborative enforcement strategy similar to that of Johannesburg's despite their operation restricted to one municipal local council called Ad-Hoc (Responsive) Approach of Cape Town City Council (CTCC)

Memeza M. (2000) stresses further that, Cape Town has a strong standards enforcement records and as a result, their enforcement structure is responsive (ad hoc) to situations with several enforcement personnel as part of the officers for Civic Patrol or Community Patrol Officers Scheme with over 150 officers in a city for standards and regulations enforcement at the same time offering helping hands to town planning control unit.

In Kenya, government building standards and regulations enforcement strategies include; delegating power to Municipality (LGC) to enforce the BC standards in their own jurisdiction; creating public

awareness for public participation through freedom of information promulgation on Kenya Building Code (KS 1997) and established inspection offices to inspect approved plan within their jurisdiction and give stop work order notices where breaches of standard is noticed (KS 1997 edition, Kimani, M. and Musungu, T. 2010).

- **Third Party Approach**

Yu, S., Evans, M., Kumar, P., Wie, Van L., and Bhatt, V. (2013) describe how the programs and policies run by the government at both state and local governments influence the effectiveness of energy code enforcement in **India** by mandating codes incorporation into the General Development Control Regulations for the State and local governments building by-laws. The self-regulatory compliance of Indians is mostly done after training especially in the seismic training for earthquake construction process (Mumtaz and Ilyas 2008).

In most **U.S. States**, building codes standards and regulations is enforced through state or local governments. For example, in the U.S. State of California, building energy code is enforced by local building departments and/or fire districts (CBSC, 2010). Builders are required to submit building code standard compliance documentation to enforcement agencies and these agencies will review compliance information and inspect buildings in order to issue building permits (Yu, S. *et al.*, 2013).

In **China**, using third-party inspectors can also help code enforcement and improve code compliance. The extensive use of third-party professionals in inspection and compliance checks has significantly contributed to the rapid growth in compliance with energy codes in China (Evans, M., Shui, B., Halverson, M., & Delgado, A. 2010). Evans et al (2010) noted that the private third parties, in fact, play a major role in energy code enforcement in China. (ibid) stresses that, third party perform plan reviews and onsite inspections throughout the construction projects, and the government-funded organizations, local Quality Control and Testing Stations. Which made Construction Administration Departments do only limited compliance checks and heavily rely on the report and documentation provided by third parties. There are multiple checks and balances in the Chinese third-party system, The third-party inspectors are required to take trainings and obtain licences by passing a national examination. And third parties are at the risk of suspending or losing their licence for violations related to building codes. In the Chinese approach, the third-parties are hired and paid by building owners or developers, but regulated and monitored by local authorities (Evans, M., *et al*, 2010).

Third Party House Inspectors (UK)

In the UK Different Models is allowed for flexibility and easy compliance. The Third Party in this regards include agency like National Housing Building Council (NHBC) established in 1936. NHBC are home warranty & insurance cover and risk management in the event of building failures. For any new building development or newly converted, it must adhere with NHBC standard which is in line with general UK housing building standard. Thereafter, the building will be covered for ten (10) years starting from the third (3) years of your occupancy; where damages to roof, floor, staircase, windows/doors are fixed by NHBC and first to second year (1-2yr) of occupancy the builder covers any damage to house buildings (NHBC 2011, Nhbc.co.uk retrieved online 14 November, 2014).

- **Combine (Hybrid) Model of House Buildings Standard Enforcement**

Third-party inspectors could also be used to perform only certain inspections, and the code officials still need to conduct the majority of compliance checks. Compared to the Chinese system that heavily relies on third parties, this is more like a hybrid system.

For example, Fairfax County, Virginia, started a Certified (Third Party) Inspections Program for commercial buildings in 2012 (Fairfax County, 2012). Under the program, property owners and construction contractors have the option to hire certified third parties to conduct certain construction inspections (e.g. building shell, insulation, and energy conservation material). This also requires checks and balances as third parties need to be certified by the County's Commercial Inspections Division and are not allowed to have any financial or personal interest in the project (Evans et al., 2010; Fairfax County, 2012).

Similarly, the State of Washington has a voluntary program encouraging jurisdictions to use qualified individuals for plan review and inspections; voluntarily using third parties has helped Washington State increase code compliance rates from 55% to 94% (Makela, E., Meyers, J., & Elnecave, I. 2011).

In the traditional approach, building owners and developers pay the inspection fee to code officials as part of the fees for construction or occupancy permits; using third parties will shift part of this inspection fee from paying to code officials to paying to third parties for plan review and inspection and this will not necessarily increase the cost of construction. In addition, using qualified third-party inspectors to review plans and conduct inspections has several advantages (Makela et al., 2011). Table 4.3 compare in summary highlighting the strength and weakness of the approaches to standards enforcement of government, third party and combined models.

Table 4.3 compares different code enforcement approaches, highlighting the strengths and weaknesses of each

Table 1: Comparison of different enforcement approaches	Roles and Responsibilities	Strengths and Weakness
Enforcement Entities		
Government	Code officials review plan, inspect construction, and certify construction and occupancy permits.	Pros: rigorous; easy to enforce; Cons: overload capacity of code officials.
Third-party inspectors	Hired by developers, building owners, or the construction contractor, third-party inspectors review plan, inspect construction, and prepare documentation on compliance; code officials accept documentation and issue the occupancy permit. Third-party inspectors are the main entities to conduct plan review and inspection checks.	Pros: building code enforcement capacity rapidly; raising market awareness; reduced permitting time; Cons: requiring checks and balances; potential to increase the cost of construction by asking developers/contractors to hire third-parties.
Both	Construction contractors have the option of choosing third-party inspectors to perform certain inspections or the code officials could choose to contract part of the inspection work to third parties; the majority work of plan review, documentation, and complete inspection are still performed	Pros: reducing the workload of code officials by distributing the technical work to accredited third-party inspectors; Cons: requiring credentials for third-party inspectors.

	by code officials.	

Source: Yu, S., Evans, M., Kumar, P., Wie, Van L., and Bhatt, V. (2013)

This study can now map out models of standards/regulations enforcement against theories of regulations for clearer understanding of regulatory approach and regulatory theories.

4.2.3 Standards & regulations enforcement Approaches within typological regulatory framework

Different approaches to enforcement of regulations from various countries as reviewed from SBC (2014), Green Street Berman (2010), Yu et al (2013) and others was earlier presented by this study. Table 4.4 is the classification summary of regulatory theories with the elements of regulatory enforcement approach.

Table 4.4: Mapping different approaches to enforcement of regulations against a typological regulation theories

	Approaches to Standards & regulations enforcement	typological regulation theories
1	Government and her agencies	Public interest Theory
2	Government Partnership with Municipality and departments	Public interest theory
3	Civil Sanctions by Competent court	Public interest theory for government bureaucratic process and Regulatory Capture for Industry
4	Third Party Inspectors	Credible Commitment theory
5	Hybrid (Government & Third Party)	Credible Commitment theory and Public Interest Theory
6	CSR of Corporation	Regulatory Capture theory

Source: (Author construction 2015)

This study now with clear understanding of different typological framework of regulation theories and successfully classify approaches to regulation enforcement under each theory can now present the different types of regulation commonly in use.

Types of Regulation Commonly in Use

United Nations Industrial Development Organisation (UNIDO) (Module 5) in regulation types and options: sustainable energy regulation and policymaking for Africa regulation training classify regulations into four (4) distinct aspects. Table 5.5 summarised the distinct type of regulations commonly in use in developed and developing nations.

Table 4.5: Types of Regulation Commonly in Use

s/ no	Types of regulation	Strength	weakness	Applicable Typological regulatory theory
1	Command and control: Standards and rules are imposed with criminal sanctions if not followed.	-unacceptable standards are clearly stated -fixed prescriptive standards to follow -government can decide without interference	-standards to be accepted may be difficult to define - close relationship of executive and industry may lead to 'Capture' -compliance may be complex when emphasise	Public interest administrative regulation theory
2	Self-regulation: In this regulation, the industry set the regulations and enforces and monitor by members to avoid government delay.	-cheap for government -flexible for any situation -informed with commitment -set standards achievement to be realistic	-may serve personal interest, -emphasis will be at interest point, -weak enforcement possible	Private Interest theory or regulatory capture can be modify for modern credible commitment
3	Market Base: Influencing completion through market forces.	-application across sectors -flexible -firms responding to markets while bureaucrats relaxed -low enforcement cost	-transaction cost are uncertain -lack reliable information -barriers to market entry -need for healthy permit market	Public interest Theory
4	Incentive-based regulation:	-it allow low regulatory discretion	-the impact may not be predictable	Regulatory Capture theory

	This is when tax, subsidies or grants are used to encouraged compliance.	-low enforcement cost -allow choices control	-rewards might pollute the mind -assumes economic quality and facts	

Source: (Adapted and modified from UNIDO Regulation Training Module 5)

Table 4.5 shows types of regulation commonly in use with their merits and demerits with identified typological regulatory theory for each by this research. It shows that command and control present the elements of public interest theory while self-regulation, market-based and incentives where all identified with private interest, public interest and regulatory capture theory respectively with possibility of modifying self-regulation into modern commitment theory by third party as seen in India and UK (Yu, S et al 2012; Greenstreet B., 2010).

Other types of regulation mechanism described by UNIDO (Regulation Training Module 5) include:

Direct action: which can be long term plan and acceptable infrastructure but very costly and may need continuous subsidies,

Another mechanism is rights/liabilities law: which have low intervention and have a problem of cost to individuals with difficult legal and evidential argument. The last is the public compensation with strength of industry awareness of cost but difficult monitoring and performance (UNIDO Regulation Training Module 5)

4.2.4 Examples of regulatory theory in practice within Nigeria government sectors

Table 4.6 presented some Nigeria regulated sectors and typological regulatory framework in operation. The reason for this approach, which has never been done by any research, is to identify and establish the state of the sectors' strong links with the typological regulatory framework evidential claims argued by Jorgen, G. C. (2010).

Table 4: 6: Nigeria government sectors and typological regulatory theory in use

S/no	Nigeria government sectors	Typological regulatory theory	Regulatory Body
1	Power sector (Electricity)	Public interest and private interest theory by the EPSR Act of 2005	Nigeria Electricity Regulation Commission (NERC)
2	Education	Public interest & Private interest theory in operation	Higher Education. National University Commission(NUC), National Board for Technical Education (NBTE) and National Council for College of Education (NCCE)

3	Telecommunication industry	Regulatory capture and Credible commitment theory in 2001	Nigeria Communication Commission (NCC)
4	Housing & Building sector	Public interest theory and capture theory of recent introduction of the Public-private partnership (PPP)	Federal Ministry of Lands Housing & Urban development (FMLH&UD)
5	Oil & Gas (Energy)	Public interest theory	Nigeria National Petroleum Corporation (NNPC)
6	Agricultural	Public interest theory and Capture theory	Federal Ministry of agriculture
7	Manufacturing Industry	Public interest & private interest theory	Standard Organisation of Nigeria (SON)
8	Mining sector	Public interest theory	Federal Ministry of Solid Minerals Development
9	Water sector	Public interest theory	Water Development Board at every level of government
10	Tourism (Tour, Travels & hospitality)	Capture theory of regulation	Nigeria tourism and development Cooperation
11	Insurance sector	Public and private interest theory	National insurance commission (NAICOM) and
12	Health Sector	Public interest theory & private interest	Federal Ministry Health through Hospital Management Board & Medical & Dental Association of Nigeria
13	Security	Public Interest	Military & Fed. Ministry of Interior
14	Aviation & Aerospace	Public and private interest theory	NASA, Nigeria
15	Science & Technology	Public interest	Federal Ministry of science & Technology

Source: (Author construction 2015)

From Table 4.6 described above, only the telecommunication sector has some elements of modern credible commitment theory of an independent actor. Of which, most of the sectors are still battling with the theories that have been disqualified with empirical test (Jorgen, 2010; Johan, 1999). Even the telecommunication sector, Nigeria government never intended leaving the market entirely but her product M-Tel Nigeria could not compete favourable in the market and got faded out. In which, this study foresee management problem in future with Nigeria Communication Commission (NCC) as a results of non-expatriate at the affairs of the commission as suggested by modern credible commitment theory (Author professional experience).

Performance level of these sectors has not been assessed or proved empirically by this study but the known facts and experience of some of these sectors are epileptic. For example, education: thousands of Nigerians scattered abroad in search of quality education , power (electricity): the known fact is that there is no steady electricity all over Nigeria , water: no city can boast of clean water, in which, local communities drink from any available unclean sources and building industry: has no approved standards by legislation, agriculture: evidential with importation of can foods, rice and many more, health: can be argued by frequent flying of political officers to UK, US, Germany and India for treatment of minor health issues and security: failed with kidnapping, armed robbery on the street in broad day light (Author experience).

Now this study can present pictorial standards and regulations violations in Nigeria

4.2.5 Examples of standard and regulations violations in Nigeria

Building code standards violations ranges from illegal dumping of debris on private property to illegal conversion of land use and unauthorised vehicle parking. Others are excessive water run-off from broken pipes, stagnant water within and around buildings, unprotected swimming pool and stagnant green pool with substandard building projects, unsecured building or vacant site and illegal sewage connection, unapproved building plans, and non-compliance with permits (City of Victorville Code Enforcement, 2009).

Example of Code Violations in Pictures in Nigeria

Example of building code standards and regulations violations in pictures in Nigeria is shown from Figure 4.2 to Figure 4.11. In which, Figure 4.2 is an example of code violations of illegal dumping of debris on private property, Figure 4.3 is Illegal defacing of properties with posters, Figure 4.4 represent sub-standard building construction, Figure 4.5 is illegal conversion of balcony to generator store and Figure 4.6 represent illegal street parking .Others include: Figure 4.7, drainage blockage

and illegal conversion of access road to private property, Figure 4.8 street conversion to refused dump, Figure 4.9 is a non-compliance with structural column placement in building projects and Figure 4.10 is an unapproved building plan using for building project and Figure 4.11 is unprofessional practice of exposed reinforcement rod.



Figure 4.2: Refuse dump on private property/ drains blockage

Source: (Author field Survey 2014)



Figure 4.3: Illegal defacing of properties with posters

Source: (Author field Survey 2014)



Figure 4.4: Sub-standard housing building construction

Source: (Author field Survey 2014)



Figure 4.5: Conversion of balcony to generator house

Source: (Author field Survey 2014)



Figure 4.6 **Illegal street parking**

Source: (Author field Survey 2014)



Figure 4.7 **Access road/drainage blocking and conversion to personal property**

Source: (Author field Survey 2014)



Figure 4.8: Street conversions to refuse dump

Source: (Author field Survey 2014)



Figure 4.9: A display of non-compliance with structural design in column placement

Source: Field work survey (2015)

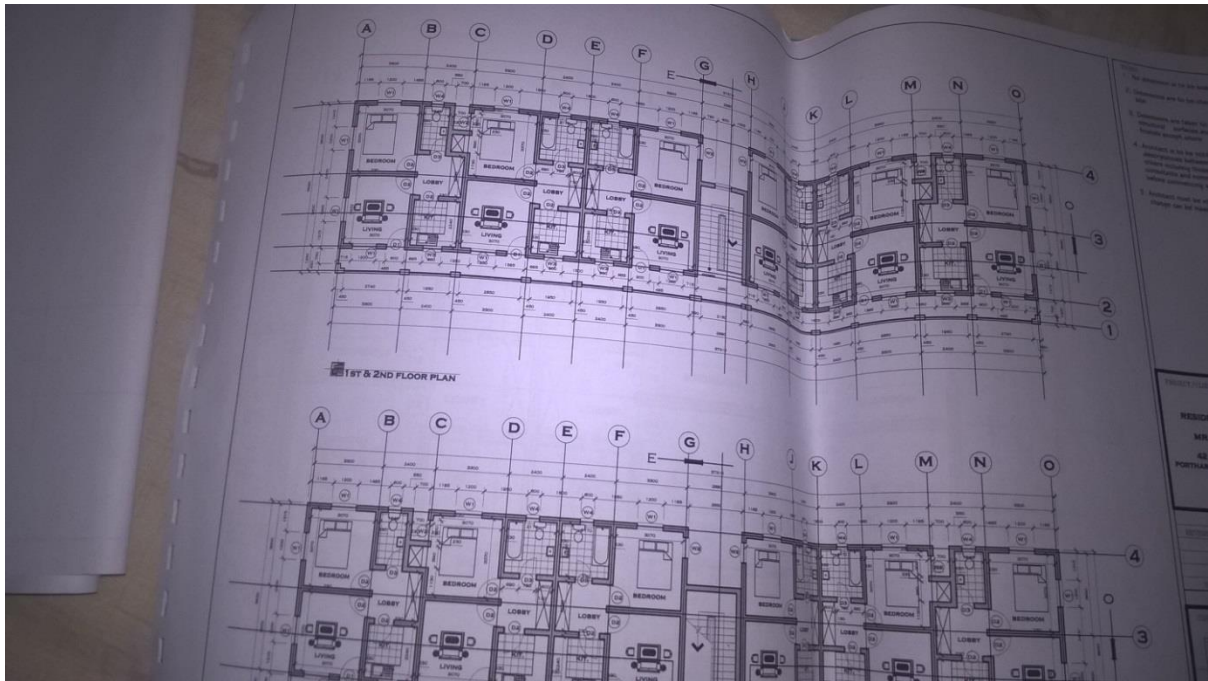


Figure 4.10: Unapproved building plans using for building projects

Source: Field work survey (2015)



Figure 4.11: Unprofessional practice of reinforcement rod exposed

Source: Field work survey (2015)

Now this study can present Determinants of Non-compliance with Structural BC Regulations within HRRB Development Projects in Nigeria

4.4 Standards and Regulations Innovative design for Easy compliance

Organisation for Economic Co-operation and Development (OECD) (2000) argued that for any enforcement innovation for compliance to be successful; clear understanding of factors affecting the target group(s) from regulatory compliance must be known. (ibid) notes that, lack of information or insufficient information greatly hinders regulatory compliance from the target group(s). OECD (2000), Jishnu et al, (2008), and Surya, (2008) describes various innovations to easy compliance to standards and regulations as first; self-regulation through adequate rewards and incentives and secondly; industry standards and internal management systems.

By **Self-regulation**: Allow individual or industry to voluntarily comply with standards as expected of them, while government or third party agent keep monitoring with good policies for encouragement (OECD 2000, Jishnu et al, 2008, Surya, 2008).

OECD (2000) stresses that such high voluntary compliance to standards and regulation should be rewarded through –

- Simplifying their licences and permits application for building projects;
- Reducing the burden of inspecting/monitoring such voluntary compliance work;
- Creating a name tag (label) as high compliance to building regulations for everyone to see;
- Involving them in any regulatory workshops and seminars in their municipality to boost their presence publicly. (Author professional practice);
- Promoting them as watchdog within their Municipality over shoddy house building construction (Fassin 2009; SBC,2014), and
- Reducing penalty for any minor-incidents of non-compliance to BC standards and regulations.

However, Incentives and rewards should not be acted alone in regulatory approach since not the best option but only for continuous complying firms while punitive measures should be targeting construction firms that are non-compliance with regulations as high risk to building industry for public recognition (OECD 200; Green Street, 2010).

Adoption of industry standards and internal management system: This is where standards of concern private industries, suppliers, professionals and manufacturers are incorporated into government own standards and certification, which can be through a third-party inspector who monitors both the private sectors and the government cooperation for enforcement of the standards (OECD 2000).

4.4.1 Innovative Enforcement Pyramid of Civil Sanctions for compliance

Greenstreet B. (2010) submitted a pyramid that guides enforcement of standards of civil sanctions within the regulatory compliance process as seen in Figure 4.12. (ibid) posits that the model was successfully used by the office of Fair Trading in 2008 as a mixture of various powers of penalties for failure to compliance. Which include, writing undertakings to make you scared for compliance, warnings of possible danger of failure, dialogue to see easy way you think compliance can be accomplished, then you are given permission to implement by yourself (self-regulation) while you are guided by implementing officers through coaching and advise site visit.

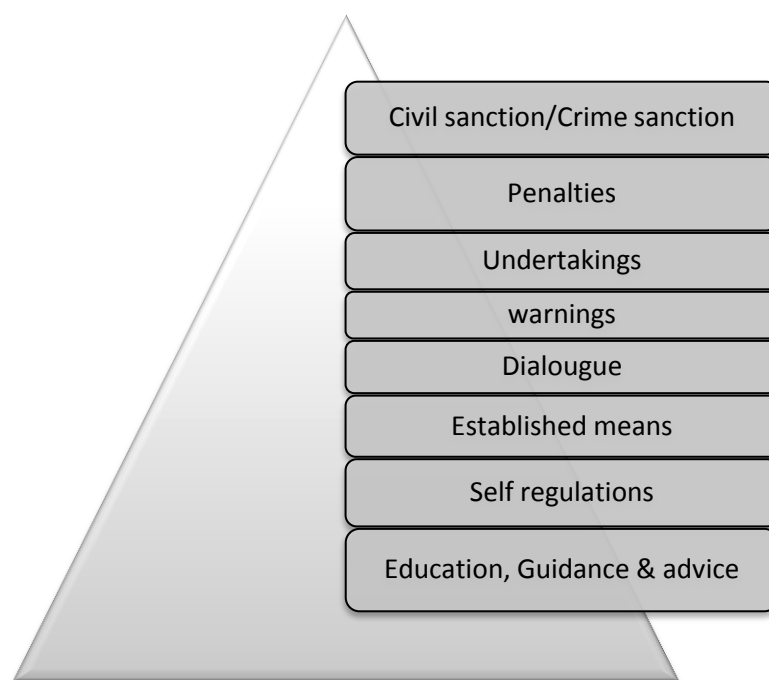


Figure 4.12: Enforcement pyramid, as used by the Office of Fair Trading (2008)

Source: Green street B. (2010, p.68-69)

4.4.2 Responsive Enforcement Approach to Compliance Failure

OECD (2000) argued that, responsive enforcement approach should be employed with punitive sanctions, if persuasion or restoration of failed compliance strategies was not complied with. This school of thought was agreed by Greenstreet (2010) with a pyramid that guides responsive enforcement of standards of civil sanctions in Figure 5.13.

Braithwaite (2005) cited in Greenstreet (2010) that the pyramid design can be creatively and deliberately applied to any regulatory developing sanctions because of its flexibility. The study noted

that responsive regulators are those who design different kinds of pyramids as a response to different problems associated with the industry or nation. Greenstreet stresses further that compliance could be achieved by revocation of practicing licence, suspension of license, making a criminal case out for the person or organisation, penalty, warning and persuasion for implementing regulations. However, Wright *et al.* (2006) cited in Greenstreet suggested that for responsive regulation to be effective; organisations and individuals must clearly understand the regulatory approach, the regulator must develop enforcement strategies that encourage individual and organisation to adopt self-compliance approaches at the same time the knowledge of the industry and its full operations must be part of the enforcement officers, and the industry responses to any of its regulatory requirements. Greenstreet (2010:67) further suggested that “A co-operative, persuasive enforcement strategy is appropriate for most organisations that are ordinarily inclined to comply, with punitive sanctions for those that are not”

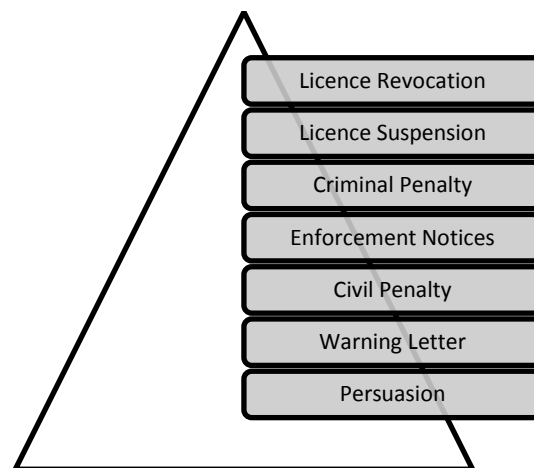


Figure 4.13 Responsive Regulatory pyramid for Non-compliance organisation

Source: Greenstreet Berman (2010, 67)

4.4.3 Effects of Regulatory Failure on Industry Economic Demand

From historical review of building design and construction practices in Nigeria, it has been established by this study that government at the National, State and Municipal levels made some attempts to regulate building development practices from the British rule to date. These concerted efforts yielded disappointing results of massive evidence of regulatory failure (OECD, 2000).

Stiglitz, J. E. (2008) affirm that, the issue of regulation has been greatly debated by experts with some positing that efficiency of industry economic demand depends on the effective design and enforcement of the regulatory policy which ensure productive outcomes of the industry market.

Stiglitz (2008) argued that, regulatory failure have direct bearing with industry failure, which the government and policy maker should be blamed for allowing the regulatory failure to have occurred in the first instance. OECD (2008) stresses on the regulatory failure that, industry services market is greatly affected by varieties of regulations such as building and product standards, restrictions on personnel's, regulations on types of buildings and established standards on construction services. OECD (2000) further suggested that, for effective regulatory enforcement and market sustainability; there should be a regulatory reform for efficiency, simplicity, and effectiveness of personal regulations in the following regulation categories, namely:

- "Economic regulations- the regulation that aims at price control, level ground for competition by reducing factors affecting competition and market innovation.
- Social regulations- the regulation that protect public interests such as health, safety, the environment and social integration of the people which aimed at regulatory design for market incentives and goal-oriented approaches, that are simple, flexible and effective with minimal cost value to the people.
- Administrative regulation- the paperwork and administrative bottleneck created by policies, the aim is to eliminate the unnecessary process, streamlining and simplifying even the needed process and making the application more transparent for trust"(OECD 2000:9)

Before any regulation could be sustained from failure in any industry market demand, the regulators and policy makers must demonstrate adequate knowledge of the industry behaviour, the structure of the organisation in terms of decision making and the constraints facing the industry for regulatory compliance (OECD 2000). (ibid) stressed further that regulatory failure are not only damaging to government but also to the industry, professionals and the consumers. Literally, society must understand the depth of regulation before it can work effectively or being complied to and not just by passing a law and then forcing people to accept. Stiglitz (2008) noted that any industry economic failures within a particular jurisdiction shows the in-effectiveness of regulatory design to maintain enforcement, competition, restrictions, information dissemination problems, and certification problems from the aspect of policy-makers and regulators.

Mabongunje (2004) stated with assurance that legislative failure inversely affects the house building economy; the study suggest that all legislative amendment must be put in place to make housing market economy free and interesting for as many that wants to participate.

Now this study can present Conceptual building control enforcement policy framework for the BC structural aspects within the HRRB projects in Nigeria

4.5 Conceptual building control enforcement policy framework for the BC structural aspects within the HRRB projects in Nigeria

4.5.1 Introduction

Standards and regulations enforcement is seen as an advisory visits to projects sites, routine inspections of progress and assisting with compliance as well as licensing and formal enforcement action (Greenstreet Berman, 2010; subedi, J. K, 2008).

The theories of regulation is centred on three philosophical concepts with positive and normative economics assumptions within the theories of public interest or public protection, theory of regulatory capture or private interest theory (economic regulatory theory called Chicago theory) and the modern theory of credible commitment (Stigler .J.G 1971). The principle of best enforcement practices adapts the modern credible commitment theory of regulation from contextual analysis and international experience. Stigler .J.G (1971) describes any regulation that inflicts injuries to the general public as not in the interest of the people. Nigeria Governments regulatory policies at all level control extensively the economic drive of the country which might not actually be in the interest of the public they are trying to protect because of the running and information cost to keep the sectors in operations (see Nigeria government sector and the typological regulatory theory in use within the thesis). Of which, the building construction industry has been neglected without political and legal backing, which inversely inflict pains and injuries to the public, professionals and investors.

Jorgen G. C (2010) suggest that, it is ideal for regulatory authority to be delegated to an agency (third party or independent agency) devoid of executive procedural for best enforcement practices rather than government controls, such as obtainable in the developing countries. The assumption of the theory effectiveness is that, the agency director general and staffs are to be experts who will use their professionalism in handling regulatory issues. The agents must also exercise their regulatory power in line with the given mandate from government or principal council which shall be independent.

The choice of entrusting regulation to an independent body from the government according to Jorgen (2010) and Johan (1999) is to improve technical and complex decision-making process that requires expatriate. This regulatory choice is also to create a long-lasting regulatory policy that is without political immortalises, and to create trust for investors that need guarantee and assurance for credible regulatory policies for their investment because of the short term of political actors.

Jorgen (2010) argued that private investors does not trust the inconsistency of adequate regulatory policies in the hands of the electoral interest, therefore requires an autonomous agencies or independent regulators to act as regulators who will decide on individual cases and dish out rules in

accordance with the mandate received, and this approach has been the benchmark of best practices globally for enforcement of standards, including UK, USA, Germany, Japan, and of recent Nepal adoption (Mauro 2009, Die Welt am Sonntag 2009 citing in Jorgen 2010).

Delegating Nigeria building construction sector regulatory power to an independent regulator, with new legislative policies, adequately staffed with professionals in the built environment without any vested professional interest will definitely enhance the industry to overcome the challenges of implementation of regulations. It will also enhance decision making process and economic revamp of the industry to the benefit of the public, the government and the private investors.

This building control enforcement policy framework is developed from the research findings as a comprehensive strategy to improve regulatory compliance within Mid-rise residential development projects in Nigeria, which encompass monitoring, continually review of compliance level, and training for capacity development highlights by this study. This conceptual statement for the approach to enforcement by the building control and regulations by this research is an anticipated outcome of the research statement to development a set of guidelines that provides simple conceptual model and strategy for effective Building Code enforcement framework that will ease compliance within the interests of relevant stakeholders through in-depth studies of international best practices and industry professional focus advisory inputs for the research.

This approach was adopted in the UK with the establishment of National Housing Building Council (NHBC) and replicated within County Council with adequate resources (reasonable skills, staffing, capacity building and continuous monitoring) under the Building Act 1984.

The Enforcement of performance standards of NHBC starts with consultation (early advise on statutory law, and consultation on design stage), then Plans assessment (area of non-compliance with building regulations, approval conditions, statutory views, available remedies for non-compliance) and the construction site inspection (experience of the builder, nature of work, structural engineers, detail of architectural design assessment process, high risk features identification, records of inspection for compliance or possible contraventions, notification of findings) and certificates of completion upon satisfactory completion (Local authority, client and government database), staff in-service training and continuous professional development (CPD), review of performance (Monitoring services for compliance or non-compliance, procedures in place to learn from its findings and continuous improvement process) and management systems (Quality management principles) and finally complaints procedure.

Policy framework design

The conceptual building control enforcement policy framework for this research adopts the modern credible commitment theory of regulation and the proposed development is from this research contextual analysis and international experience and at the same time the professionals and relevant stakeholders' inputs from the Nigeria building construction industry and the general public on the potential solutions to the problems of structural aspects of building standards and regulations from research questionnaire survey, interview and focus group discussions.

This research therefore identifies the need to establish an independent building regulation authority, to be called Independent Building Regulation Commission (IBRC), this should be enacted as Building regulation Acts. The commission should be equipped with adequate resources (materials and human) that will drive the credible process of consultations on building design and regulations requirements, assess the proposed plans for compliance, inspects construction sites at different critical stages as identified by this research findings and issue the certificate of compliance completion at stages again to client, local authority and state or federal authority responsible for that site records. Continuous capacity building for the established commission should be a priority, and monitoring and evaluation activities for performance assessment (Fidelity) should be clearly stated. This should be followed by the strategic plan for improvement from the findings of fidelity with consideration to quality management and complaints procedures. For this research, the violation, complaint and appeal procedures of the NBC 2006 (not enacted at the time of this research) is maintained as stated in section 13: control of building works at the same time, this proposed commission is independent rather than government owned agencies and departments of Code Enforcement Division/Sections/Units emphasised in section 13 of the NBC 2006.

4.5.2 Independent Building Regulation Commission (IBRC) Establishment policy

For successful development of the IBRC, the conceptual policy frameworks for the establishment shall include:

- ❖ As stated in the paragraph above, IBRC shall be established as an independent regulatory body with the responsibility of sole licencing authority for investors in the building construction industry,
- ❖ Prepare IBRC administrative instructions and procedures to the relevant authorities,
- ❖ IBRC Board membership shall be on professional expertise appointment that is not bias of professional interest, not politically motivated and will serve a maximum term (s) as stated in the legislation.

- In case of any Board member removal before the term expiration, legislation shall clearly state reasons and procedure for removal
- The Board shall have independent decision-making on the regulation according to the modern credible commitment theory supporting evidence (evidence-based decision making).
- ❖ For the IBRC funding; provision shall be made in the Acts for appropriation from the national budget through the National Assembly and revenue from licences to investors.
- ❖ Legal regulatory framework through the Building Acts enactment

After the establishment of the commission with clear legal regulatory framework through the Building Acts enactment the next important thing for policy framework is now:

4.5.3 Staff Selection policy

Recruitment and Staff selection is an implementation driver rarely mentioned and evaluated by scholars in human services for enforcement of regulations. However, it is the starting point for building a competent workforce that has the knowledge, skills, and abilities to carry out implementation at every level (Blasé et al 2013-2015; NIRN, 2015). Selection of effective practitioners, organisation staff excellent trainers, effective coaches, skilled evaluators, facilitative administrators and effective purveyors goes beyond academic qualifications or experience to required essential skills. Blasé et al (2013-2015); NIRN (2015) admits to difficulties in certain practitioner characteristics to teach in training sessions so consideration should be given as part of the selection criteria (e.g. basic professional skills, basic social skills, common sense, good judgment, knowledge of the field, ethics, social justice, willingness to intervene, willingness to learn) in specification of required skills and abilities within the pool of candidates, methods for recruiting likely candidates that possess these skills and abilities, and procedure for interviewing candidates. The skills required by the commission shall include:

- ❖ Consultations:
 - Building design and the introduction of E-one stop approval process (Submission, review, progress tracking and storage)
 - Regulations requirements,
 - Group affected by regulations (community or public engagement)
- ❖ Assessment of the proposed plans for compliance:
 - Area of non-compliance with building regulations,

- Approval conditions,
 - Statutory views, and
 - Available remedies for non-compliance
- ❖ Inspection of construction sites at different critical stages as identified by this research findings and report writing:
- Experience of the builder,
 - Nature of work,
 - Structural engineers experience
 - Detail of architectural design assessment process and experience,
 - High risk features identification, (if any)
 - Records of inspection for compliance or possible contraventions, and
 - Notification of findings to local authority, client and the other higher authority.
- ❖ Certificate of compliance completion at stages, local authority and state or federal authority responsible for that site records. This certification shall include;
- Stage 1 (Foundation certification)
 - Stage 2 (Foundation + Slab certification)
 - Stage 3 (Foundation + Slab + wall + Roof certification).

This certificate shall be different from those issued by any individual professional within the building construction projects.

After the selection of professional staff for the establishment of the commission the next important thing for policy framework is now:

4.5.4 Training and development for Continuous Capacity Building for the Established Commission

Staff training as a competence driver for enforcement requires innovations for behavioural change at the supervisory, practitioner, and administrative support levels. Innovation-based training helps practitioners (and others) in an organization learn when, where, how, and with whom to use or not the new skills (Blasé et al 2013-2015); NIRN (2015). NIRN (2015) describe training content as variable depending on the practice or program but the approaches and methods to imparting knowledge, skills and abilities to train practitioner seem common.

Quality skills shortages, persistent import of required skills from the neighbouring country, poor quality of finished buildings, structural failures and absolute collapse of structural aspects of building development projects, and the rise in demands of specialized skills in Nigeria among other factors

are direct pointers to the need of skills training and development in the construction industry. However, CITB (2014) describe new legislation or regulatory requirements, new technologies and the introduction of new construction practices as key drivers for the need of construction professionals and craft skills training. Agapiou et al, (1995) stresses that, the need of skills training was the existence of problems with traditional carpentry, joinery and glazing in the installation of new technology, these skills gap of new technologies gave rise to the need of training and development of traditional separate construction skills in the UK. Productivity and quality performance of construction workers and managers dependent on the training and retraining of workers for the new skills required for the new technologies or new policy direction (Muya M, Price A.D.F and Edum-Fotwe F.T, 2007).

The training programme for the building control enforcement Policy proposed by this research shall include:

- ❖ Training programme that will enhance building control regulatory knowledge of such established institution functions with respect to appropriate discharge of duties, strategic enforcement approach around the world for the executive chairman of the commission and all other staff periodically,
- ❖ The IBRC shall engage international experts as consultants:
 - On a short term contract from similar institutions in the developed world to help with licences requirement drafting for private investors,
 - Appropriate procedure for licences fees collection,
 - The licences can be temporarily and how to transfer to permanent licences or withdrawal on satisfactory or unsatisfactory performance respectively.
- ❖ Consultants engaged shall help:
 - In the development of the human resources management manual,
 - IBRC institution operational structure,
 - The personnel recruitment process and attractive salary structure to draw experts as staff members should be provided.
- ❖ The consultants will then train all recruited member of staff to be equipped with regulatory procedures and functions like the Board members in similar regulatory organisations around the world.
- ❖ Consultants to establish:
 - The relationship that will exist between the IBRC and the government at all levels,
 - This shall include using best practice around the world to define the role independent regulators play,

- The policy framework and the regulatory functions difference and
- How to make independent regulators accountable and credible design should also be formulate.

4.5.5 Monitoring and Evaluation Activities for fidelity (Performance assessment)

After establishing the IBRC and the legal regulatory framework achieved by enacting Building Regulatory Acts and the professional staff are selected and training policy for continuous capacity building in place, the next policy regulatory framework for this research is performance assessment process (Monitoring and evaluation activities). This activity is in two phases; the first is monitoring the building construction process for non-compliance, or impact of the compliance findings for improvement and the second phase is evaluating and reporting the performance process with reference to the impacts outcome.

In the first phase an inquiry process shall be carried out with the professionals and other relevant stakeholders in the building construction industry including the host community.

Purpose of inquiry process as part of monitoring is to enhance flexible decision making through feedback from the inquiry, it will improve public awareness of the regulation and how well it has been accepted and to help in controlling the impacts outcome of the regulation.

The inquiry process of monitoring and evaluation

The inquiry process shall have the design as follows:

- ❖ Extends of the inquiry and the necessity:
 - In this aspect provision shall be, clear guides on what is to be supervised,
 - design of performance indicators that will help the regulators to monitor the outcomes properly, and
 - Also for information & communication control.
- ❖ Establish exact methodology and methods for the inquiry process such as:
 - Interview of all stakeholders in the building construction industry,
 - Site visitation, or need for material laboratory test and keep clear plan of how often do you want to keep doing this as part of the inquiry process.
- ❖ All members of team should be assigned with a specific role and responsibilities to avoid overlapping that might cause problem to the commission.

Evaluation and reporting process

The second phase of the monitoring and evaluation activities is the evaluation and reporting.

❖ **Evaluation:**

Evaluate performance of the enforcement of the legislation with reference to compliance impacts of various construction sections to identify

- Context measures: refers to the necessary requirements that must be in place to the high-level of program performance (e.g., staffing qualifications or numbers, practitioner-consumer ratio, supervisor-practitioner ratio, location of service provision, prior completion of training),
- Compliance measures: this provide the extent to which the practitioner uses core intervention components for the program, and
- Competence measures determine the extent to which the core intervention components were delivered with skills learned and attention to craft knowledge for the consumers,
- Any lesson learned and
- Where further steps are needed (continuous improvement) to be taken in order to manage the impacts of the problem identified, and
- Where can be tagged high risk for non-compliance during evaluation

The usefulness of performance assessment (Measures of Fidelity) is important; Professional trainers can use the information to their professional development, Administrators can use the information to assess the quality of training and policy-practice, enforcement team can use it as a guide for implementation at the practice and program development levels and very useful to researchers as an outcome measures for some studies and as independent variables for exploratory research (NIRN 2015; Fixsen et al 2005; Subedi J. K (2008) used this similar approach for the evaluation of code implementation in Nepal.

- ### ❖ **Reporting:**
- The reporting process should be encouraged for information and communication control. This can be achieved by creating a clause in the licence requirements by regulators that will make investors report to them which shall keep compliance easier should in case of any problem, the licence can be revoked. In addition, penalties for contravening the building regulation act shall be responsive according to Greenstreet Berman (2010) to serve as

deterrents to others while provision of appeal, should any refused a licence or feel unhealthy behaviour of regulators shall be encouraged to make regulators accountable.

OECD (2000) stresses that high voluntary compliance to standards and regulation can be rewarded through –

- Simplifying their licences and permits application for building construction process,
- Reducing the burden of inspecting/monitoring such voluntary compliance work,
- Creating a name tag (label) as high compliance to building regulations for such company which shall be visible to everyone. This will increase credibility of such company for investment and also encourage others to emulate the good practices.

Information and Communication control as part of monitoring and evaluation reporting for enforcement improvement shall have Policy-Practice Communication Loops policy design to include:

- Required change and system transformation within the practice, the organisation and administrative systems at all level,
- what needs to change and how much change is required per time to achieve the desired outcomes by studying the structure, procedure and feedback towards successful practice and program implementation,
- Modifies the structure and design to reflect the learning process and experience.
- How much direct and frequent communication from the practice level to the policy makers and administrators' level is needed to hear success, data collection, descriptions of experiences, constraints to make full and effective enforcement at the practical stage should be stated.

(Blasé et al, 2013-2015; Fixsen, 2006; NIRN, 2015).

4.5.6 Insurance Policy within the building control enforcement framework

Of recent, a new Building Insurance Act has been promulgated in Nigeria to partially combat insurmountable and intractable problem of poor-implementation of structural aspects of building regulations. Under this act, owners of Mid-rise buildings under construction who fail to insure them with a registered insurance company now stand the risk of paying N250, 000 (480.76 GBP) fine or three years imprisonment [Vanguard, July 9, 2003]. However, Alfred O.U the columnist in Vanguard Newspaper (July 9, 2003) went around obtaining Nigerians reaction and was shocked about their

point of non-supporting view because the Nigerian government has become so corrupt that its actions tend to be viewed with suspicion even when the intent is sound.

However, the Insurance cover of this framework should be such to encourage investment as seen in developed and developing nations. For example UK, UAE, Malaysia and India, this shall include:

- ❖ Clear statements of building documents for insurance registration,
- ❖ Types of buildings/ Location to be covered,
- ❖ Insurance statement of who to put right defects for the first 2 years of the scheme
- ❖ Obligations of IBRC, Builders, and Insurance company,
- ❖ Insurance certificate and right to cancellation,
- ❖ Liability and non-liability cover by the insurance company
- ❖ Cost and financial limits for different buildings (new buildings, renovation,)and
- ❖ Claim procedure in the case of any incident.

4.5.7 Enforcement improvement process Enforcement

Dyke M. K (2015. P6) describes implementation improvement cycles as the hallmark of a 'Learning culture' which its continuous practice will lead to perfection. For this research every policy steps is designed to aid the building control enforcement improvement process. For example, training and development for capacity building, monitoring and evaluation which is in two phases of evaluation and reporting and policy-practice communication. However, this policy shall cap enforcement improvement process policy with PDSA by Shewhart 1939 for quality process improvement cycle cited in Moen R. 2015

❖ Plan-Do-Study-Act (PDSA)

- Plan – decide what to do (objective, questions and predictions, plan to answer the questions who, what, where, and when),
- Do – do it (be sure to carry out the plan, collect the data, begin analysis of the data),
- Study – Look at the results (complete the analysis of the data, compare data to predictions and summarise lessons learned), and
- Act – Make adjustments (what changes is required, good practice or repeat cycle?)

Cycle: Do over and over again until intended benefits is realised. The framework is as in figure 4.14 below.

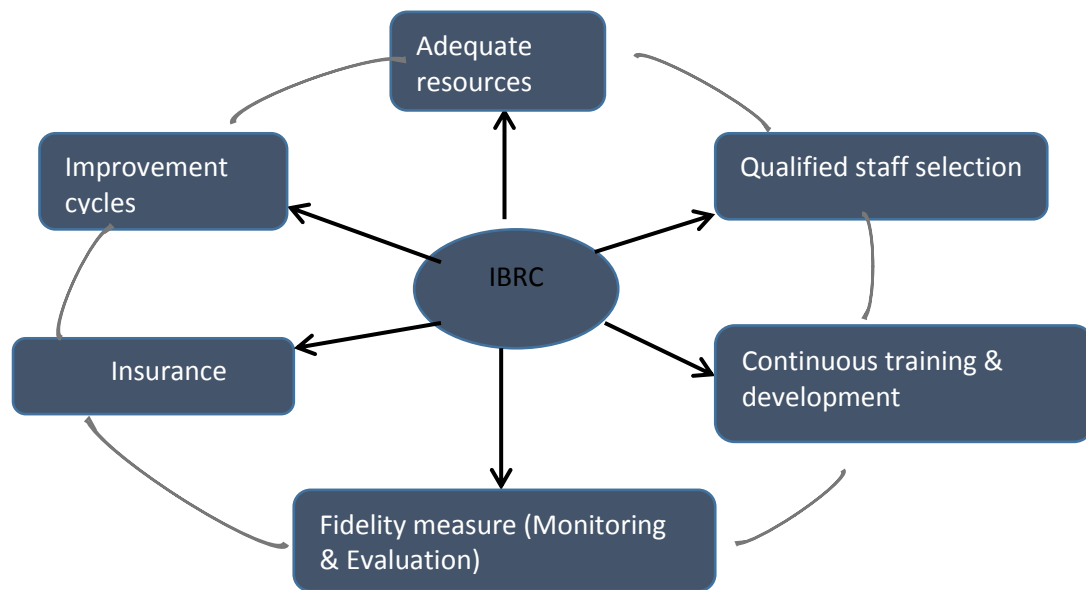


Figure 4:14 Conceptual Building Control Enforcement policy framework

Source: (Author construction 2016)

The framework is emphasising surrounding continuous sequence of stages in relationship to the central idea of IBRC rather than the connecting arrow within the circle.

4.6 Summary

This chapter defined regulation, enforcement and compliance from various authors and simplified the definition with such research models as: standards/regulations is a mandatory rule; implementation of standards is a specific set of activities put into practice; compliance is a complete obedience to rules and enforcement is a control of regulation for compliance through implementation.

To underpin the research theoretical base on regulations, this study investigate the competing three (3) theories regulations, namely; public interest, private or regulatory capture and modern credible regulatory theories with their criticism, their basic claims, organisation behaviour within each theory, supporting and disproving evidence.

It is clearly understood in this chapter that, every country adapt an enforcement models suitable for regulations compliance within the government agent, third party and the hybrid approaches to standards and regulations enforcement. For example, in the UK, government implement standards through the Municipal Council nearer to the people and also responding to individual or public calls to action of certain violation within their community. In which, a civil sanctions by a competent court

can be instituted against any violations and also third party inspection licenses. By Third Party house inspectors: agency like NHBC established in 1936 who serve as home warranty & insurance cover to manage home risk in the event of failure provides advice to people on how to meet council regulations from design to occupancy of their house buildings.

In another development, South Africa enforcement strategies shows positive result with partnership with some Municipal departments and local communities when inner cities were deteriorating in the 1990. Great revival was recorded on building violations such as illegal construction, illegal dumping of refuse, abandoned vehicles, overcrowding and street trading. Another approach of South Africa enforcement strategy is an Ad-hoc (responsive) by Cape Town City Council. In this case, the council respond to situations with several enforcement personnels.

Kenya uses the Municipal area and gave power to the public for free information to participate in the implementation of BC with their KS 1997.

It was also clear from this chapter that, USA though implement their house building regulations through local authorities also uses Third Party House Inspectors approach and self-regulation which increases the compliance rate from 55% to 94% in places like Washington due to introduction of voluntary programme. Indians promote self-compliance along with Third Party House inspectors. This approach was effective for compliance especially in implementing house building construction & retrofitting for seismic buildings while training people to be self-compliance.

In China, the use of Third Party Inspectors contributed significantly to rapid growth in compliance to energy codes with government providing trainings for the private third parties.

In this chapter, the enforcement approaches were successfully mapped against the typological framework of the regulatory theory, different types of regulations such as command & control, self-regulation and incentive based regulations were investigated. This study went further to present examples of regulatory theories in practice within some government sectors in Nigeria, at the same time pictorial examples of standards and regulations violations across Nigeria were presented. In which, this study investigated determinants of non-compliance with structural BC regulations within MRRB projects in Nigeria. Of which, innovative design for easy compliance with standards and regulations such as: enforcement pyramid, and responsive enforcement approach were investigated.

This study conceptual building control enforcement policy framework for BC structural aspects within the HRRB projects in Nigeria centered clear regulatory policy not bias of regulatory capture, credible and accountable, independent of political interruption which will ease the enforcement of regulations; with adequate resources, qualified staff selection, continuous training and development, fidelity measure, insurance cover and improvement cycles was finally presented in this chapter.

Now having established enforcement for compliance with standards and regulations, this research can now move to the next chapter of methodological approach for data collection.

CHAPTER 5:

RESEARCH METHODOLOGY

5.1 Introduction

This chapter presents the research design and methodology used in this study; the detailed procedures, methods and tools used for data collection and analysis were discussed. The research is divided into two phase with several activities within the different parts in other to achieve the objectives of the research within the chosen qualitative and quantitative research approach of this study. Research approaches, views and beliefs differ among various researchers, therefore conducting their studies differently. However, certain procedures, principles and guidelines for the actions and conducts of the research have been laid down as paradigm. In this chapter the research design and its objectives which covers this research questions, the aims of this study, this study originality statement, scope and objectives were discussed. The chapter gave details of the research strategy which include research paradigm framework while research methodology and methods are clearly presented in closing the phase one literature research. The beginning of the phase two of this research framework which deals with research process for data collection, processing, and analysis and research limitation were discussed.

5.2 Research Design & Objectives

Research questions

Creswell, John W. (2013) describes the research questions as the statements that identify facts to be studied and this study present the questions in four folds:

Reframing the research questions

This is necessary to ensure that no part of research questions is broken, misinformed or changed and that is the case reframing is appropriate to fix the questions within the required frame as argued by Creswell, John W. (2003).

The four folds of this research questions includes:

-  What is the enforcement level of BC standards and regulations structural aspects in the HRRB construction process in Nigeria?
-  What are the key factors that affect the implementation of the structural aspect of the BC standards and regulations, its enforcement and compliance among the stakeholders of building construction industry in Nigeria?
-  What are the acceptable implementation best practices principles?

- ✚ What are the causal factors that impede the implementation of the features of the BC structural aspects according to standards?
- ✚ What are the quantifying impact risks associated with the poor-implementation of the BC structural aspects on consumers, the development of the industry and professional practice in Nigeria?

Establish exactly this research Aim

The broad aim of this study is to identify and examine the factors that impede the development and implementation of High-rise residential building construction practice according to the Building code standard and regulations in Nigeria.

Certify specifically this research objective (s)

This broad study aim has been broken down into specific sections for easy verification through different terminologies to identify the type of study for the objective (s).

This study objectives as earlier presented include:

- a) This study shall conduct a historical development of BCs and the review of the provision of NBC 2006 which relates to structural aspect of high-rise residential building projects and implementation process.
- b) To install and appraise international best practices of standards and regulations implementation process.
- c) To establish and assess the key internal and external factors affecting the development and implementation of structural aspects of high-rise residential building construction practices in accordance to NBC (2006).
- d) To assess the level of enforcement and compliance to NBC 2006 provision in the current practices of structural aspects of high-rise residential building construction projects in Nigeria.
- e) To examine determinants of non-compliance with structural building code standards and regulations in high-rise residential development projects among the owners, contractors, building construction managers, artisans, professionals and the industry within the administrative, legal, technical and social features of the building code.

Verifying originality of this research subject

As earlier presented to justify the need for this research, Nigeria as a whole at the moment lack any PhD research or Master research in the subject matter of building code standards & regulations and

its implementation science for the country which therefore make this research unique and the first of its kind in Nigeria.

In other to establish the originality and uniqueness of this research, this researcher through desk-base review of some University repository and the review of other authors' work presented some existing PhD and Masters works on building codes standards as follows:

Laubscher, J. (2011) researched into "An Investigation of the National Building Regulations to Promote Uniformity and Sustainability" for Ph.D. award of University of Pretoria,

Kigunda, P. G (2011) studied "Factors Influencing Implementation of Current Building Codes and By-laws on Building and Construction in Nakuru Municipality-Kenya" for the award of M.A University of Nairobi Kenya,

Al-Mudhei (2009) submitted "Assessing the current practice of building authorities and design offices towards the enforcement of codes and regulations in Saudi Arabia" as M.Arch, at ... King Fahd University of Petroleum and Minerals Saudi Arabia,

Green Street R. (1983) studied on "Investigation and analysis of the structure of the building control process" for the award of Ph.D. at Council for National Academic Awards of Open University,

Roger Henley Harper (1987) number 4316 submitted "The evolution of the English building regulations, 1840-1914" as Ph.D studies at University of Sheffield.

Joachim E.W. (2012) studied "Evaluating Energy Efficiency in Building Control Regulations in Local Authorities in South Africa" as M.sc Witwatersrand SA.,

Salagoor, Jamaludden Yousef (1990) studied "The influence of building regulations on urban dwelling in Jeddah" for award of Ph.D by Newcastle University.

James Edward George (1998) studied "Public and private regulation: a socio-legal study of building control in England and Wales" for D.Phil. award at University Oxford.

Saleem R. Samo (1999) subject of study was "Energy conservation in UK housing, and the effect of building regulations" for Ph.D. award at University of Manchester Institute of Science and Technology,

Peter J Mumford (2010) studied on "Enhancing Performance-Based Regulations: Lessons from New Zealand's Building Control System" for PhD studies at Victoria University of Wellington.

Jasem Y. J. AL-Fahad (2012) studied "Reform of Building Codes, Regulations, Administration and Enforcement in Kuwait: Within the Legal, Administrative, Technical, & Social Framework" as Ph.D Loughborough University,

And others as cited in Al-Fahad (2012) include:

“Neeves (1991) work on the subject of “A pattern of local government growth: Sheffield and its building regulations 1840-1914.” As Ph.D., at Leicester,

Riba (1998) work on the subject of “Feasibility of representing selected elements of The 1985 Building Regulations in Prolog or other rule-based form (BL)” as Ph.D., at Open University,

Abdullah (1987) work on the subject of “Planning and building regulations in Saudi Arabia in relation to privacy and Islamic tradition” as M.Arch., at Glasgow.

Cowden (1990) work on the subject of “Listed building control - simply the control of development of listed buildings?” as M.Sc., at Strathclyde,

Goodier (1991) work on the subject of “Application of a distributed computer system to automate the commissioning of building control systems” ” as M.Sc., at Oxford,

Mackay (1970) work on the subject of “A comparative study of private house building in England and Scotland, with a particular reference to the differences in building costs caused by the differences in building regulations” as M.Sc., at Heriot-Watt”

5.3 Research Strategy

Research strategy chosen to guide the thesis determines the approach towards the research ethics (Creswell, J. W. and Plano Clark, V. L 2006). There are basic ethical principles of all research of doing what is good (i.e. beneficence) and also doing no harm (i.e. malfeasance) during the conduct of the research. However, those basic ethical principles do not translate to the same research approach by different researchers (Creswell, J. W. and Plano Clark, V. L 2006).

Research strategy comprises of major research components, which including; research paradigms, research design, research methods, sampling techniques, and data analysis techniques. Within which, there are different ethical implications to be considered before, during and after conducting the research (Creswell, J. W. and Plano Clark, V. L 2006).

5.3.1 Research Paradigm Framework

Research paradigm has been explained by many researchers as basic beliefs and assumption concerning concept, values and practices about the world and the methods and technique guiding the behaviour of the research when conducting it (McGregor, SLT and Murnane, J. A. 2010;

Wahyuni, D. 2012). McGregor and Murnane (2010), Wahyuni (2012) describes the research inquiries as being guided by principles which differentiate the methodologies along the dimensions of;

‘Ontology’-specifies the nature of the reality (knowable), feeling and existence to be studied and what can be known about the study.

‘Epistemology’-specifies what is the relationship between the researcher’s (inquirer) theory of knowledge and what can be known.

‘Methodology’ –described how the researcher (inquirer) go about finding out knowledge the study believes can be known (McGregor & Murnane 2010; Wahyuni 2012; Laubscher 2011).

The quest for in-depth clarification on paradigm added more two schools of thought to the fundamental beliefs.

‘Axiology’- what role does value (moral choices, ethics, and normative ideas) plays in the research inquiry process? (McGregor and Murnane 2010; Wahyuni 2012).

‘Rhetoric’- deals with the kind of language and communication skills that a researcher should use in research presentation (McGregor & Murnane 2010; Wahyuni 2012; Schoeborn, J. M 2012).

This study was dominantly informed with pragmatic research paradigm because it favours the approach of working with qualitative and quantitative data which enables researcher to understand better the social reality. Pragmatism believes research can start with questions to determine the framework and also believes that it is objectivist (Positivism/Post positivism) and subjectivist (interpretivism/constructivism) perspectives are not mutually exclusive hence adopted the mixture of ontology, epistemology and axiology approach for social understanding (McGregor & Murnane 2010). Table 6.1 is a summary of the assumption of research paradigm by various researchers as regards to pragmatic paradigm, quantitative and qualitative research approaches.

Table 5.1: The assumption of research paradigm

	Research Paradigms				
Assumption (Beliefs)	Question	Positivism/ (Naïve Realism)	Post-positivism (Critical Realism)	Interpretivism (Constructivism)	Pragmatism
Ontological assumption	What is the position on the nature of reality?	Reality is External, objective and independent of social actors	Reality is Objective. Exist independently of human thoughts and beliefs or knowledge of their existence, but is interpreted through social conditioning (critical realist)	Reality is Socially constructed, subjective, may change, multiple as view by different participants	External, multiple, view chosen to best achieve an answer to the research question
Epistemology assumption	What is the relationship of the research to the knowledge?	Researcher is independent from that being researched	Researcher interacts with that being researched instead of pure observation for data, facts	Subjective meanings and social phenomena. Focus upon the details of situation, the reality behind these details, subjective meanings and motivating actions	Independent and interacts research And subjective meanings can provide acceptable knowledge Dependent upon the research question. Focus on practical applied research, integrating different

					perspectives to help interpret the data
Axiological assumption	What roles do values play in research inquiry process?	Value free and biased. Research is undertaken in a value-free way, the researcher is independent of the data and maintains an objective stance	Value-laden and biased. Research is value laden; the researcher is biased by world views, cultural experiences and upbringing	Value-bond and unbiased. Research is value bond, the researcher is part of what is being researched, cannot be separated an	Value-bond and biased-unbiased. Values play a large role in interpreting the results, the researcher adopting both objective and subjective points of view
Rhetorical assumption	What is the language of the research?	Formal statistical report with correlations, comparisons of means and reports of statistical significance of findings	Formal/informal	Informal narrative writing with context description and direct citations from research participants	Formal statistical writing/informal narrative writing.
Research methodological assumption	What is the approach to research process?	Quantitative (confirmatory) The researcher tests hypotheses and theory with data	Quantitative or qualitative	Qualitative (exploratory) The researcher generates or constructs knowledge, hypotheses, and grounded theory from data collected from fieldwork.	Quantitative and qualitative (mixed or multi-method design) (confirmatory and exploratory)

	Researchers use deductive reasoning if hypotheses is true from empirical data or the theory is false for deductive conclusion and then move on to generate and test new ideas and new theories while inductive is used when we do not get conclusive proof from empirical research (McGregor & Murnane 2010)		
	Characteristics of research paradigms (Joachim, W., 2012, McGregor & Murnane 2010)		
	Positivism/Post-positivism - Causes probably produce determine outcomes - Intent on reducing ideas to variables that constitute hypotheses and research questions - Knowledge is developed after measurement of reality - Theory is tested empirically after data collection and reframing to retest.	Constructivism - everyone in the world interested in knowing the world they live and work in - researchers inductively develop a theory or pattern of meaning - Participants' view very much part of the research - Researcher is to make sense of the meanings of observations and role players	Pragmatism -Knowledge claims arise out of actions, situations and consequences -Concern should be on what works -Truth is what works at the time -Researchers have freedom of choice on research approaches

Source: (Adapted and Modified by author from McGregor & Murnane 2010; Wahyuni 2012; Joachim, 2012; Laubscher 2011)

5.3.2 Research Design Process

Many researchers agree that research process involves some basic steps which a researcher have to take to achieve the overall aim of study by identifying research problems or questions, answering the questions, the population and sampling size and data gathering or collection process and data analysis, findings, conclusion and recommendation. For example, Creswell and Plano (2006), Creswell (2003), Al-fahad (2012) all attest to the basic steps of the research process. Figure 5.1 summarise this study research process.

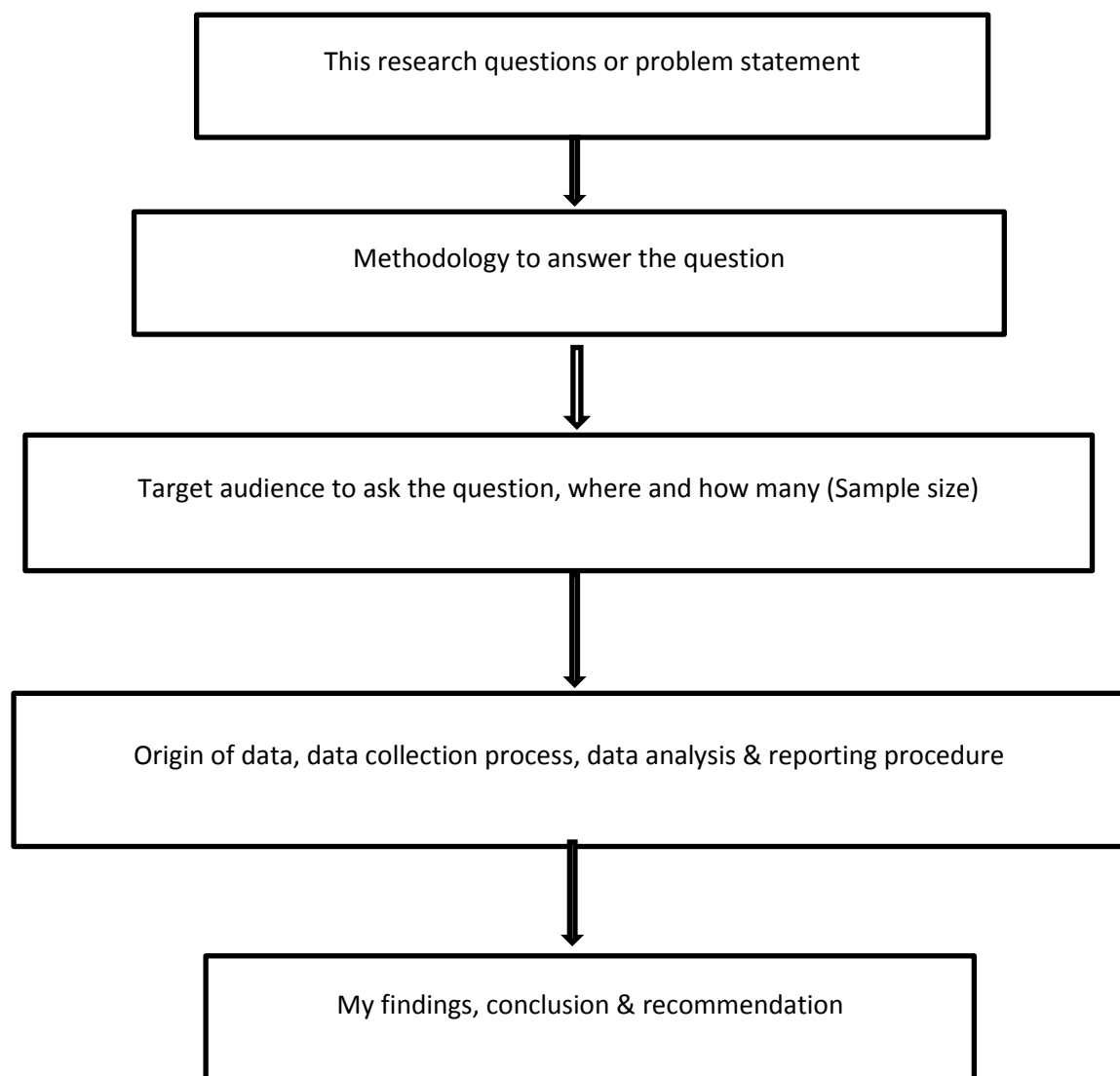


Figure 5.1: Research Process (Author Construction 2015)

Creswell (2003) describes researcher's conception and how it can be translated into practice about knowledge claims, strategies for inquiry and methods a researcher can adopt to approach research design processes in a format present in Figure 5.2.

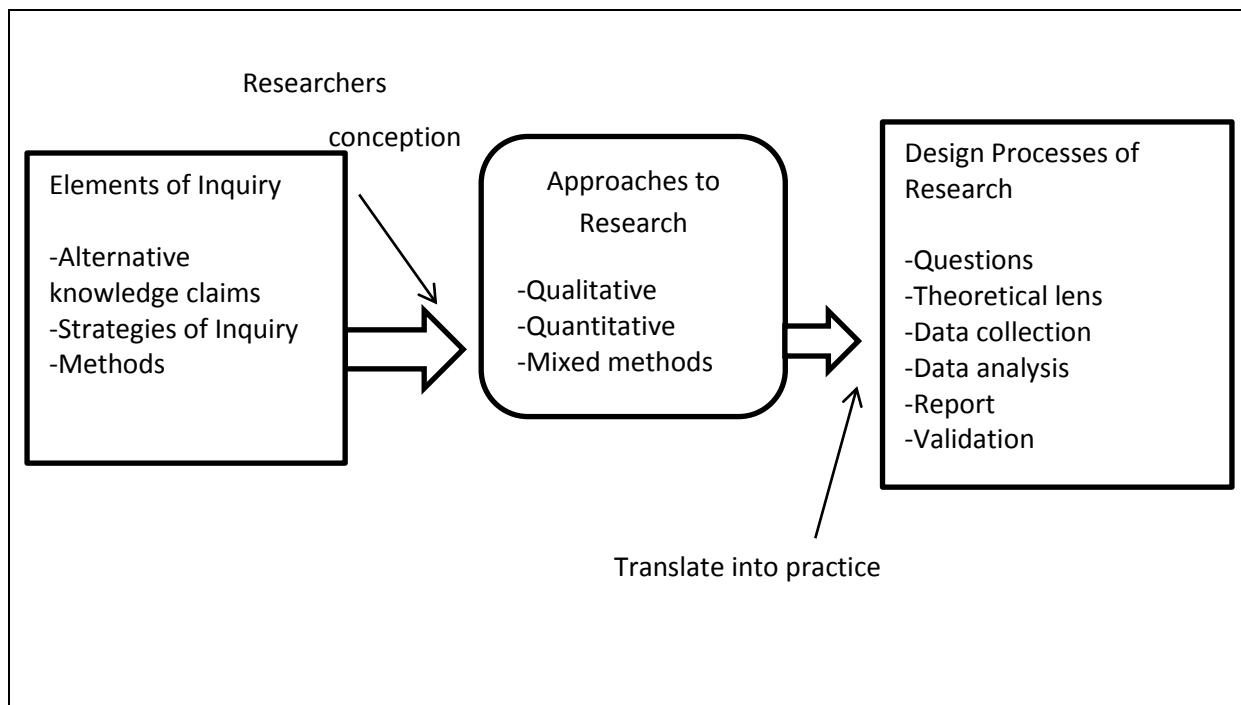


Figure 5.2: Researcher's conception and translation into practice

Source: (Adapted from Creswell (2003) also cited in Joachim W.E (2012)

A descriptive and inferential survey research design was adopted by this research to investigate the factors which affect the development and implementation of BC standards and regulations structural aspects in HRRB development projects. Multiple methods and approaches such as desk review, questionnaires, interviews, site visitation for measurement and focus group was employed in carrying out the research. This is to increase research triangulation (credibility and validity of result) to complement all data from various sources for better real overall data gathering for the research. Other researchers used and also advised the use of these approaches in investigating cases of this nature. These include: Laubscher, 2011; Creswell, J. W., Plano Clark, V. L., Gutmann, M., & Hanson, W., 2003; Creswell, John W. 2003.

This study used qualitative research which relies on the collection of qualitative data that are non-numeric data such as words through interviews, pictures, focus group discussion and observed all other characteristics of qualitative grounded theory (explanation of how and why something happens) to find out why standards and regulations is poorly implemented or non-complied to among the stakeholders and quantitative methods adopt empirical data (quantitative data acquired from questionnaire survey) the researcher tests hypothesis and theory with data collected to

support the hypothesis in agreement with other researchers on qualitative and quantitative research (McGregor and Murnane 2010; Wahyuni, 2012; Creswell, 2003).

5.4 Research Methodologies and Methods

The research methods are the techniques, procedures, tools a researcher adopted to conduct the research data collection, analysis and reporting. A methodology refers to a model (philosophy) each researcher adopted to create the diversity of research knowledge within the context of a particular paradigm (i.e. empirical, interpretive and critical) (Creswell *et al* 2003; Gary, M. 2013; McGregor & Murnane, 2010; Wahyuni 2012). For example, Figure 5.3 is graphical representation of this research methodological paradigm (quantitative and qualitative) and methods (Questionnaires, case studies, interview, focus group and grounded theory) used in the investigations of the research questions.

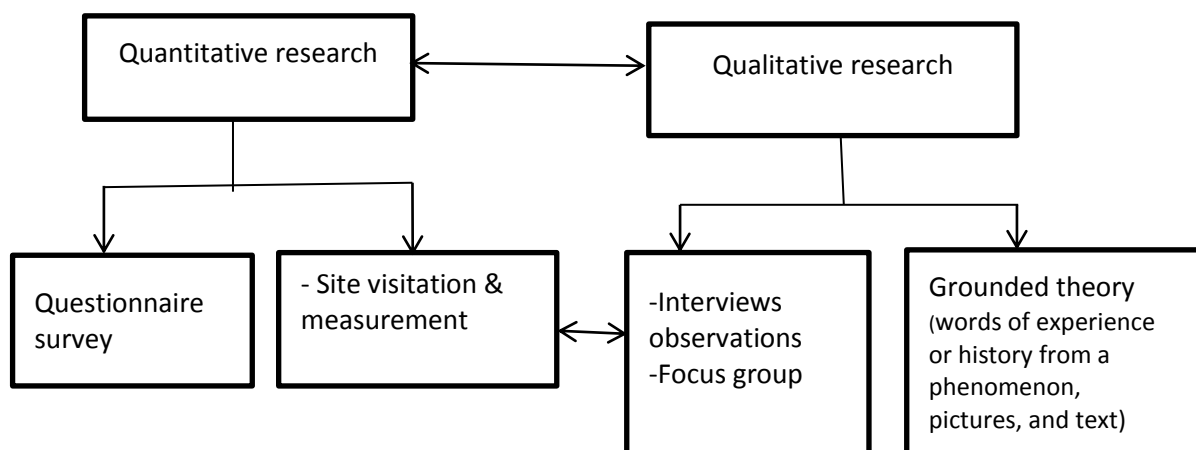


Figure 5.3 shows the Research classification as regards methodological paradigm and methods

Source: (Author construction 2016)

For enhancement of credibility, reliability and validity of this research informed the multiple methods (mixed research of quantitative and qualitative approach) of case measurement, questionnaires, industry interviews, desk-based review, focus group discussion, study of experiences of other countries and grounded theory to collaborate with each other's findings and to place more confidence in the findings of this research as argued by Creswell, John W (2013), Creswell *et al* (2003), McGregor & Murnane (2010), Wahyuni (2012).

The methods adopted for this research data gathering including;

- ❖ Desk-based review for documented evidence,
- ❖ Semi-structured face - to - face Interviews to support questionnaires for the industry,
- ❖ Questionnaires survey administration to professionals and other relevant stakeholders,
- ❖ Case site visitation for observations and measurement of building development projects
- ❖ Focus group discussion (Action Research) for general opinion and
- ❖ Comparative study of other countries experiences and models through reviews.

The research statistical tools used for the analysis are as follows:

- ❖ For descriptive statistics- Frequency, Percentage, Mean, Standard Deviation, Variance and Simple Tabulation, graphics such as Bar chart, Pie chart were all used for the analysis; and
- ❖ Advance statistics tools such as: Factor Analysis (both EFA and CFA), and Structural Equation modelling (SEM) Analysis, regression factor score analysis, weighted mean and relative Index for ranking, Pearson correlation coefficient, analysis of variance and simple ANOVA.
- ❖ Statistics Software used for the data analysis by this research include: IBM SPSS 23, and Nvivo 10

Validation of the research methods

This research conduct is based on recognised as reliable research methodologies adopted for data collection and analysis. The process of this research as outlined in the research process followed quality and standard research implementation from tested and proven published researches and textbooks of research methods, these including;

- a. How to do your research project: A guide for students in education and applied social sciences (Gary, 2013)
- b. Writing for academic journals (Murray, 2013)
- c. Designing and conducting mixed methods research (Creswell and Plano Clark, 2006)
- d. Research design: Qualitative, quantitative, and mixed method approaches (Creswell, 2003)
- e. Advanced mixed methods research designs (Creswell et al, 2003)
- f. The Essential Guide to Doing Research (O'Leary, 2004)
- g. Research paradigm, methodology and method (McGregor & Murnane, 2010)
- h. The research design maze: understanding paradigms, cases, methods and methodologies (Dina, W. 2012)
- i. Determining Sample Size for Research Activities (Krejcie and Morgan, 1970)
- j. Basic Statistics in Multivariate Analysis (Randolph and Myers, 2013)
- k. Introduction to statistics (Spiegel & Stephens, 2014)

- l. Exploratory factor analysis: A five-step guide for novices, Williams & Onsman, 2010)
- m. Using Factor Analysis on Survey Study (Hassan et al, 2012)
- n. The Quality of Factor Solutions in Exploratory Factor Analysis (Hogarty et al, 2005) and
- o. Best practices in Exploratory Factor Analysis (Costello and Osborne, 2005), and
- p. Ethical approach of consents for validation process from industry contributors, professionals' contributors, and other relevant stakeholders for the research findings and the proposed building enforcement control framework as outlined in standard research methods.

The professionals and other relevant stakeholders in the building construction industry were approached by this study using interviews, questionnaires, and focus group discussions and building development projects case measurement by the researcher as a method for data collection as it relates to BC standards and regulations structural provisions in the HRRB practices identified in the theoretical bases of the research through literature reviews to underpin the research questions posed by the study. In which, the statistical tools mentioned above were employed with the assistance of the statistics software to analysis the data.

5.5 Sampling Procedure and Sample size

Research 'sampling' means obtaining small portion or representative of the whole population for the research study (Raldolph & Myers, 2013, p.50; Gary, M. 2013, p.135). Every effort has been made by the author to obtain the sample which represents the wider population of the study to avoid 'biases in the selection process. Sample in this regards represents everything the researcher is interested in studying to obtain data, including; the people, the systems of government operation from Federal, State and Municipal level, organisations or industries, practices of professionalism, HRRB, building planning and approval procedure, the building regulations and control process, the construction process, the management process and enforcement while the emphasis centred on what affects the development & implementation of the regulatory standard of structural aspects for high-rise residential buildings as argued by Krejcie, R. V. and Morgan, D.W (1970).

The data for the research was collected using random sampling which involves selection of sample of study from the wider population and was simply stratified with facets of the entire population of the stakeholders involve in the building construction industry in Nigeria by professions, qualifications, years of experience, age and gender profiles.

The BCs structural failure as a result of non-regulatory implementation affects the entire country and has become a national embarrassment in Nigeria; therefore, this research attempts to gather data from the six geopolitical zones in Nigeria for the research.

Determine sample size requirements to reduce sampling error

The sample size requirements were investigated using the formula to determine the sample size under known and controlled population conditions adapted from Krejcie Robert, V. and Morgan D.W (1970) to generate random samples.

When the population size is known: $s = \frac{X^2 NP (1-P)}{d^2 (N-1) + X^2 P (1-P)}$

Where

s = required sample size.

X^2 = the table value for the desired confidence level or margin of error allowed by the researcher.

For this research is 0.05 and alpha t value for 0.05 margin error is 1.96 ($X^2=3.841$)

N = the population size.

P = the population proportion (assumed to be .50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (0.05)

Assuming this research get a valid professionals and other relevant stakeholders population as respondents to this research questionnaire within the building industry in Nigeria at 25,000 across all professions and other relevant stakeholders. To determine if the appropriate population for the sample size was selected by this research the above formula was used to determine as follows:

$$S = \frac{X^2 NP (1-P)}{d^2 (N-1) + X^2 P (1-P)}$$

$$S = \frac{1.96^2 \times 25,000 \times 0.5 (1-0.5)}{0.05^2 (25,000-1) + 1.96^2 \times 0.5 (1-0.5)}$$

$S= 378$ minimum selection for actual population representation

Krejcie Robert, V. and Morgan D.W (1970) describes table of relationship between sample size and population as: increase in population increases the sample size at a diminishing rate and remains relatively constant at population slightly more than 380 cases. For example, population N at 15,000

produce sample size S of 370, (N = 20,000, S = 377, N = 30,000, S = 379, N = 40,000, S = 380, N = 50,000, S = 381, N = 75,000, S = 382, N = 100,000, S = 384).

The sample size determined was stratified. Stratified Random sample can be proportional or disproportional (Gary, M. 2013). However, Proportional stratified sample is used in this study for the target population. This is where the size of each stratum in the sample is proportional to the size of stratum in the population.

Now proportional stratified sampling¹⁹ of 378 stakeholders selected for participation in the survey was done by this study by population size and by percentage population in each stratum for the building construction industry as shown in table 5.3.

Table5.3: Proportional stratified sampling

Stakeholder Study participant stratum	Pop. Size In Stratum	% pop.in study participant	Determined sample size S=378 to be stratified proportionally	Final sample size
Land/GI Surveyor	600	2.4 %	$600 \times (378/25000) = 9$ or	9
Architects	2000	8.0	$(8/100 \text{ of } 378) = 30.2$	30
Builders	2500	10.0	37.8	38
Engineers (structural & civil)	3000	12.0	45.4	46
Urban Planners	4000	16.0	60.5	61
Quantity surveyor	600	2.4	9	9
Academia	1550	6.2	23.5	24
Development control officials	3500	14.0	52.9	53
legislature	350	1.4	5.3	5

¹⁹ Proportional random stratification can be in either ways; by population size in each stratum and by percentage (%) population in the stratum of study to achieve the same result.

Contractors	2800	11.2	42.3	42
Industry	600	2.4	9	9
Artisans	600	2.4	9	9
Estate Valuers	600	2.4	9	9
Insurance brokers	350	1.4	5.3	5
Professionals regulatory body	600	2.4	9	9
Union and NGOs	350	1.4	5.3	5
Standard regulatory body (policy makers)	350	1.4	5.3	5
Const. Managers	350	1.4	5.3	5
Facility Managers	350	1.4	5.3	5
Total	25,000	100%	378	S = 378

Author Construction (2016)

5.5.2 Case Study

A case study involves in-depth studies into one case scenario or a small group of cases as the case may be through appropriate method(s). Case study research always “comprises of two parts (subject & object) with the subject ability to act as template for examining the object for analytical purpose or framework” (Gary 2013, p. 150-151). A case study can be descriptive or explanatory of an individual, action, process of practices, an event over time, social services or an organisation program using as many different methods and procedures for detailed understanding of the situation under examination (Gary, 2013; Schoenborn, J. 2012; O’ Leary 2004).

This research adopted several methods for case source data collection to uphold the high quality standard of the research case data triangulation; these including: interviews, national archival records, questionnaire survey, industry interview, focus group and site visitation for observation and measurement of HRRB development projects for validation of research findings, documentations and experiences over time as argued by O’ Leary, 2004.

5.5.3 Interviewing

Interview is a data-gathering tool mainly by engaging the interviewee in discussion by face-face with individual or group, or through telephone to obtain information which may be personal opinion, facts, attitudes or combination of any of these as regarding the research (Gary 2013).

Interview can be structured, unstructured and semi-structured interviews (Wahyuni 2012; Gary, 2013).

Structured interviews involves asking a predetermined questions with little or no chance to discuss at will or pursuing an interesting topics raise by respondents beyond the subject of the questions, un-structured interviews is without format, no structure, free conversation and discussion on the area of research. This helps respondents to determine the theme but you must be wise to bring them back when completely off the topics (Gary, 2013). The last type of interview is a semi-structured interview which was used in this research to obtain interview qualitative data. This study interviewed nine (9) industries with sixteen (17) stakeholders in participation with the adopted semi-structured interview which is the combination of structured interviews predetermined questions and an in-depth interview (open-ended). This approach allows flexibility with respondents to reply and talk freely about the topic raised from the discussion (Wahyuni, 2012; Gary, 2013).

The semi-structured interviews guidelines used as an instrument to gather information from respondents is shown in Appendix B which was outlined from four major areas of this research questions. All categories of industry respondents were interviewed with one guideline to concentrate a deep understanding of the entire research as agued by Rubbin and Rubbin (2005) cited in Wahyuni (2012).

5.5.4 Development of Questionnaires

Questionnaires are data gathering tools which can be open or closed ended in a written form. It is a versatile tool in the hand of a researcher that can be used in different ways, either by self-administered to respondents; they may be sent by mail or post or may be sent online (Gary, 2013). However, challenges of IT technical-know how, epileptic services by the network provider, exorbitant cost of data services and personal time factor facing developing country like Nigeria does not guarantee the format of online and mail or post. This research used self-administered paper-based structured questionnaire with an approach of drop-and-pick method were respondents were allowed a week to complete them at their space.

- **Research Questionnaire Distribution**

The researcher distributed the closed ended (restricted to the format of questionnaire) questionnaires chosen for this study directly to the building construction stakeholders in government ministries and private practitioner's, Directors and Head of Departments of ministries and agencies, their professional staff, professional practitioners and other relevant stakeholders in the building industry. Those relevant stakeholders who participated in the questionnaire survey and the proportional stratified sample distributed is shown in Table 5.4

Table 5.4: Questionnaire Participants and number distributed

Stakeholder Study participants	No. of questionnaire distributed
Land/GI Surveyor	15
Architects	55
Builders	65
Engineers (structural & civil)	60
Urban Planners	70
Quantity surveyor	20
Academia	35
Development control officials	75
legislature	10
Contractors	65
Industry	20
Artisans	25
Estate Valuers	20
Insurance brokers	10
Professionals regulatory body	20
Union and NGOs	10
Standard regulatory body (policy makers)	10
Const. Managers	15
Facility Managers	10
Total	600

Source: (Author field survey 2015)

From Table 5.4 above, a total of 600 questionnaires were distributed by the researcher among the various professionals and other relevant stakeholders study participants.

- **Received Questionnaire**

Table 5.5 summarises the number of questionnaire received from the distribution, the percentage of response for each participants and the valid and invalid response.

Table 5.5 Number of questionnaire received

Stakeholder Study participants	No. of ques. distributed	No. of Quest. received	% of quest. response	Invalid response	Useful response analysed
Land/GI Surveyor	15	12	80%	3	9
Architects	55	35	63.6	5	30
Builders	65	41	63	3	38
Engineers (structural & civil)	60	50	83	4	46
Urban Planners	70	63	90	2	61
Quantity surveyor	20	11	55	2	9
Academia	35	24	69	0	24
Development control officials	75	54	72	1	53
legislature	10	7	70	2	5
Contractors	65	45	69	3	42
Industry	20	10	50	1	9
Artisans	25	20	80	11	9
Estate Valuers	20	15	75%	6	9
Insurance brokers	10	6	60	1	5
Professionals regulatory body	20	9	45	0	9

Union and NGOs	10	6	60	1	5
Standard regulatory body (policy makers)	10	5	50	0	5
Const. Managers	15	5	33	0	5
Facility Managers	10	8	80	3	5
Total	600	426	71%	48	378

426 numbers of questionnaire were received, 48 were treated invalid because of incomplete information provided which brought the actual useful received questionnaire to 378 that was analysed.

Table 5.6 shows the percentage of the questionnaire received and the valid response percentage as well.

Table 5.6 Actual questionnaires responses percentage (%)

Questionnaire	number	Percentage (%)
Number distributed	600	100 %
Number received	426	71 %
Useful response	378	63 %

From Table 6.6 above the actual percentage of responses for the analysis of this research is 63% and this is reasonable good percentage responses for any research analysis for decision-making in the area of study.

- **Process of Questionnaires' Data Entry for analysis**

The data collected were entered into the designed Excel spread sheet by the author as raw data with some assistance from the statistics and mathematics expert in Living Stone tower within the University of Strathclyde. The data was thoroughly checked and then transferred to Statistical Package for Social Science (SPSS 23) software for analysis.

- **Questionnaires Designed**

The questionnaires designed were targeting the key areas of research questions, developed to answer the problem of this research focus as follows:

- ✚ What is the enforcement level of BC standards and regulations structural aspects in the HRRB construction process in Nigeria?
- ✚ What are the key factors that affect the implementation of the structural aspect of the BC standards and regulations, its enforcement and compliance among the stakeholders of building construction industry in Nigeria?
- ✚ What are the causal factors that impede the implementation of the features of the BC structural aspects according to standards?
- ✚ What are the quantifying impact risks associated with the poor-implementation of the BC structural aspects on consumers, the development of the industry and professional practice in Nigeria.

In addition; the questionnaires were also designed to capture the objectives of this research as presented below.

- a) This study shall conduct a historical development of BCs and the review of the provision of NBC 2006 which relates to structural aspect of high-rise residential building projects and implementation process.
- b) To install and appraise international best practices of standards and regulations implementation process.
- c) To establish and assess the key internal and external factors affecting the development and implementation of structural aspects of high-rise residential building construction practices in accordance to NBC (2006).
- d) To assess the level of enforcement and compliance to NBC 2006 provision in the current practices of structural aspects of high-rise residential building construction projects in Nigeria.
- e) To examine determinants of non-compliance with structural building code standards and regulations in high-rise residential development projects among the owners, contractors, building construction managers, artisans, professionals and the industry within the administrative, legal, technical and social features of the building code.

The questionnaires were classified to achieve the research focus of knowing;

- The extent of the enforcement of building regulation in the current practice in section 2,

- Section 3 deals with the key internal and external factors affecting the implementation of the building regulation while
- Section 4 addresses the causal factors which influences the key factors to impede the implementation and
- Section 5 focus on the impact risks of these factors to the consumers, the industry and the professional practice.

Section 1 is general demographic data of questionnaire respondents. See Appendix C for a copy of the questionnaires.

This research used one questionnaire for the whole stakeholders which were personally administered by the author.

- **Pilot test of questionnaire**

Six (6) professional experts in the building construction industry with 20 to 35 years' experience were chosen to pre-test the questionnaires in terms of effectiveness, the coverage in the aspect of the research, the questions wording to stakeholders as well as timing and general opinion.

The observations of experts were noted and the questions were reframed as final questionnaires used for this research. A summary of the pilot test experts' observation and the final amendment of the sections are as shown in Table 5.6 (see Appendix D)

- **Descriptive Graphics Analysis of the Pilot study questionnaire**

Pilot test survey participants observations and contributions are significant to this research because of their experience and knowledge of the industry better than the researcher. The pilot test data were collected and analysed using simple descriptive graphics statistics as shown from Figure 5.5 to Figure 5.8 sex distributions, age distributions, professional distributions and years of experience of respondents respectively.

The sex distribution of pilot study participants were 83% male and 17% female. The reason was difficulty in locating 20-31 years' experience and above practicing professional women in the industry.

Figure 5.5 present the pie chart of sex distribution of respondents.

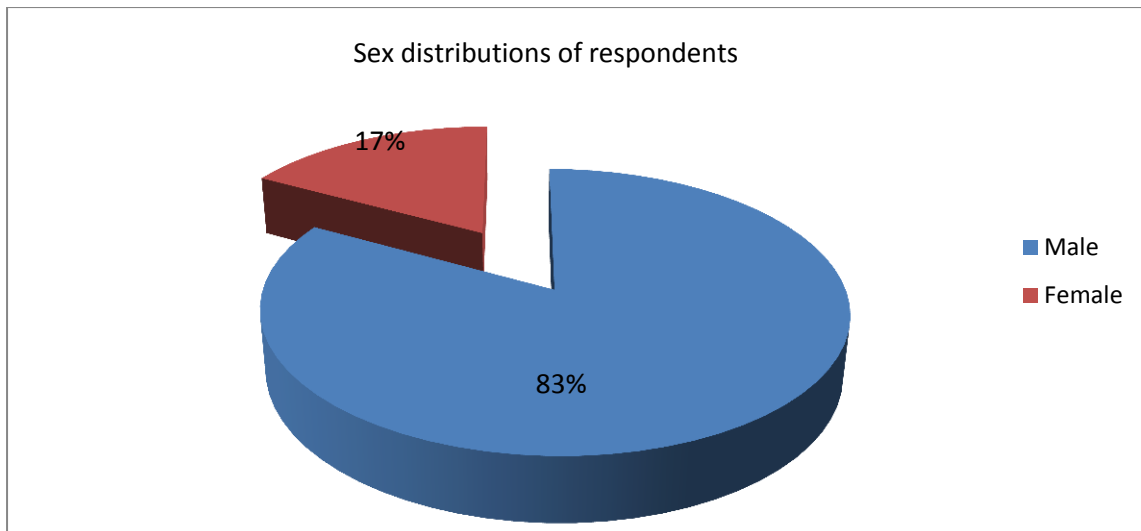


Figure 5.5 Sex distributions of respondents

Source: (Authors Administered Questionnaire 2015)

In terms of the participants: age; 50% were 60 years and above, 33 % were between 50-60 years and 17% were 40-50 years of age. See age distribution pie chart in figure 5.6

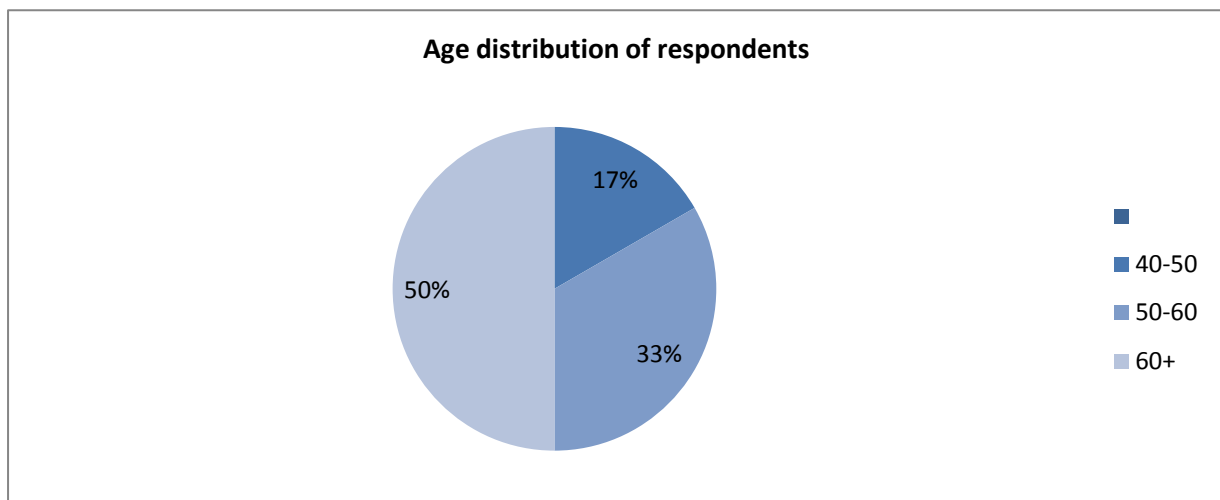


Figure 5.6 Age distribution of respondents

Source: (Authors Administered Questionnaire 2015)

Figure 6.7 below present the Professional respondents of the pilot study. 33% represent architects, another 33% are builders, urban planners are 17% and the contractors are 17% respectively for the pilot survey.

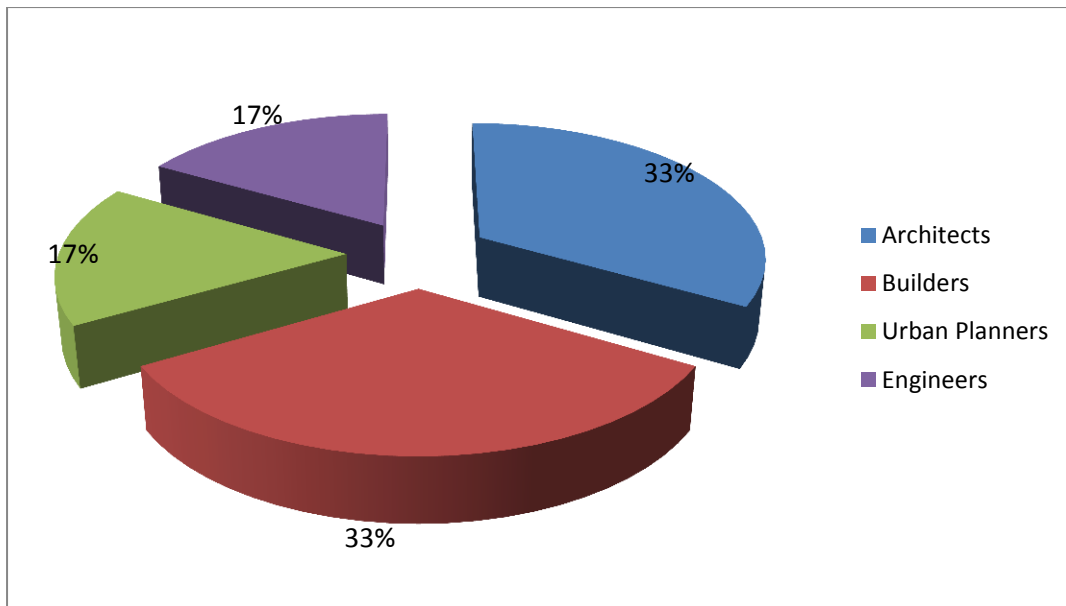


Figure 5.7 Professional distributions of respondents

Source: (Authors Administered Questionnaire 2015)

In Figure 5.8, Four (4) numbers of respondents' years of experience were 31 years and above and the remaining were 21-30 and 16-20 respectively.

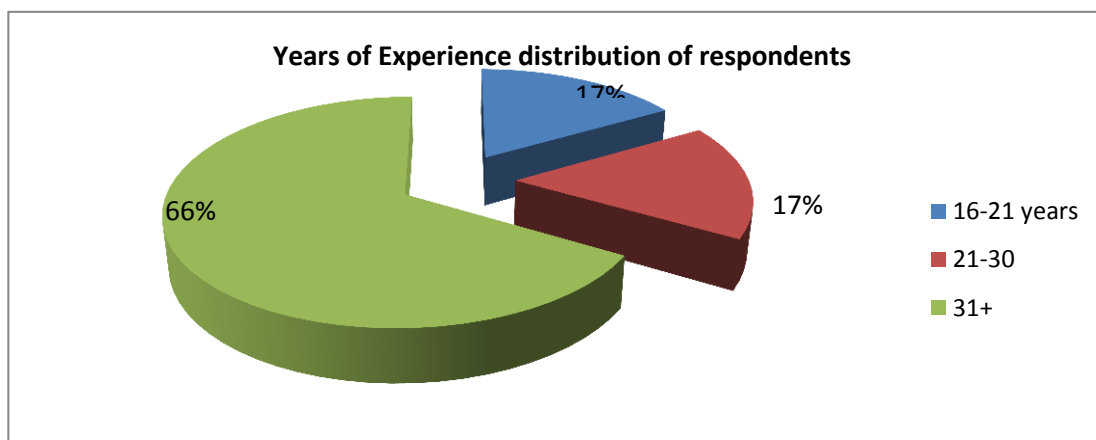


Figure 5.8 Experience distributions of respondents

Source: (Authors Administered Questionnaire 2015)

- **Questionnaires rating scale**

This study adapted 4 different rating scales for the questionnaire to help drive the respondents in chosen the exact weighty value for each question clearly. Table 5.7 presents the questionnaire rating scale for respondents and the weighty value on 5 point Likert-scale.

Table 5.7 Questionnaires rating scale

S/no	Response	Weighty (points)
1 rating scale	Strongly disagree	1
	Disagree	2
	Partially Agree	3
	Agree	4
	Strongly agree	5
2 rating scale	Least risk	1
	Low risk	2
	Partially low risk	3
	High risk	4
	Extremely high risk	5
3 rating scale	Least affecting	1
	Low affecting	2
	Medium affecting	3
	affecting	4
	Extremely affecting	5
4 rating scale	Very unsatisfactory	1
	Unsatisfactory	2
	Partially satisfactory	3
	Satisfactory	4
	Very satisfactory	5

Source: (Authors Administered Questionnaire 2015)

Table 6.8 shows the questionnaire coding variables for this research according to the sections. It also presents the percentage average mean of respondents for each section.

Table 5.8 Questionnaire coding variables

Part of questions	Coding variables	% average mean of each section respondents
Section 1. Demographic data	Q1D1, Q1D2, Q1D3, Q1D4 and Q1D5	86.1%
Section 2. Enforcement Level of structural aspect of BC	Q2EA, Q2EB,	75.0%
Section 3. Key internal & external factors	Q3FA, Q3FB	78.1%
Section 4. Causal factors	Q4CA, Q4CB,	77.03%
Section 5. Impact risks	Q5IRA, Q5IRB,	80.12%
Interview	QITV1, QITV2, QITV3, QITV4, QITV5, QITV6, QITV7, QITV8, QITV9, QITV10, QITV11, QITV12, QITV13	
Site Measurement for enforcement	Q2ESM	

Source: (Authors Administered Questionnaire 2015)

- **Capturing the participants for the questionnaire survey**

This research chooses experts and other stakeholders in the building construction industry in Nigeria both in government, private sector building development or industry in building development plan design, construction process, inspections, policy formulation and maintenance of house buildings as target participants for answering the questionnaire.

- **General Participant Information Sheet (PIS) and Consent Form**

The University of Strathclyde is registered with the information Commissioner's Office who implements Data Protection Act 1998. This implies that as part of research Ethics, this research provided an information sheet as covering letter with the name of the research student, the

Department, the research topic with clear introduction of what the research aimed to achieve. The PIS detailed why they were chosen to participate and what happens to the information they are providing thereafter. The researcher provided his email and phone contacts for clarification when in doubt.

To confirm the voluntary participation of the participants the Consent Form were given to append signatures and their right to withdraw data at any time of the study progress but anonymised data once included in the study cannot be withdrawn.

5.5.5 Data Collection Tactic and Data Recording Procedures

Data for this research was collected from both primary and secondary sources. The primary data collection tactic were through the questionnaire survey, semi-structured interview, focus group discussions from the experts in the industry under investigation and observation development projects site measurement by the researcher personally to better understand current state of the real world industry practices as suggested by Dina (2012). The secondary data collection tactics was through desk-based review for documented evidence and published research relevant to the research topic. Collecting data from multiple sources is termed data triangulation which helps to enhance research findings credibility and usefulness (Creswell, 2013; Creswell et al, 2003; McGregor & Murnane, 2010; Dina, 2012).

The interview process gathered large amount of multiple inter-locking data from note taken and conversation recording using 8GB stereo recorder and mobile phones which were transcripts as quotes. To record and manage such data requires coding of those quotes (raw data) and creating sub-themes with constant comparison to reduce the “chunks of data” to sub-themes and major themes or key words in line with my research questions (Creswell, 2003; Gary, 2013, p.235). This research recorded the questionnaire survey data using appropriate Microsoft Excel spread sheets to capture and record information for analysis.

5.5.6 Validity and Reliability Assurance

To limit potential research biases, the questionnaire were standardised and administered with interview by the researcher personally. The researcher also emphasis his readiness to answer whatever concerns for any question when in doubt. In addition, multiple methods (mixed research of quantitative and qualitative approach) and case studies (questionnaires, interviews), desk-based review, study of experiences and grounded theory to collaborate with each other’s findings and to

place more confidence in the findings of the research was to enhance the credibility, reliability and validity of this research (Creswell, 2013; Creswell et al, 2003; McGregor & Murnane, 2010; Dina, 2012).

5.5.7 Data Analysis Procedures and Presentation of Results

The procedure for analysing data starts with preparation as stated above from proper storage of raw data for easier search and retrieval especially where different data collection tactics were used (Dina , 2012). In agreement to ethical approval of the research, all hard copies of data collected were locked up in a filling drawer or cabinet and the electronic recording were stored on researcher personal password laptop only accessible by the researcher.

- **Transcribe of Interviews:**

The audio recorded interviews from 8GB stereo recorder and the researcher mobile phones was uploaded into Nvivo 10 software for transcribing with the help of IT services experts of Strathclyde University tutorial and it was a real challenging tasks to transcribe as quotes (raw data). At first, transcript was left with so many drawn lines (gaps) indicating absolute difficulties in language barriers. These empty spaces were filled up by the researcher after listening to the audio recorded again. After which, it was re-uploaded into the software for comparison, and this process was constantly repeated many times to reduce the chunks of data to sub-themes and major themes or key words in line with this research questions. This is more of exploratory perspective analysis, through thematic network analysis by coding of data and allowing for new theme to emerge in support of Gary, 2013. These were done as a process of cleaning the data to delete all information that were not relevant like laughter, personal story and interest on PhD degree as advised by Dina (2012) and Creswell (2003). The data from semi-structured interview is analysed and presented using descriptive narratives and the frequency tables and charts.

- **Questionnaire analysis**

This research recorded the questionnaire survey data using appropriate Microsoft Excel spread sheets to capture and record information and IBM SPSS software and other statistical tools was used for empirical or quantitative analysis of the research. The raw data were first recorded into Microsoft Excel spread sheet and was later imported into IBM SPSS 23 Software for analysis. First, the Frequencies statistics and histogram of the data results were obtained using IBM SPSS 23, after which, reliability statistics of scale validation using Cronbach's Coefficient Alpha was employed. In which, factor analysis was conducted by Principal Component Analysis (PCA) Extraction method and

Varimax with Kaiser Normalisation Rotation method twice to reduce the large sixty variables (60) to seventeen (17) after first rotation and the second PCA rotation reduced the variable factors to eight (8) significant factors as indicated by the scree plots and scatter graph before correlation, regression and one-way ANOVA analysis were employed to analyse and investigate the data.

5.5.8 Ethical Considerations

The author presented application for Ethical considerations for research that involve the participation of people to the Department of Architecture, Faculty of Engineering, University of Strathclyde Ethic Committee for approval for the field survey for Data collection and this was duly approved. As stated above the PIS and Consent Form was sent to all participants for the questionnaire and interview guidelines reassuring the confidentiality of their information.

In voluntary agreement, written consent was obtained from each of the participants via appending signature on the Consent Form for questionnaire or interview. See attached copy of PIS, Consent form and University of Strathclyde, department of Architecture Ethic Committee approval Form in Appendix D.

5.5.9 Analysis of the Findings

In this research structure or triangulation framework for analysis in Figure 7.1, presents the research quantitative (questionnaire survey) and qualitative (interview and focus group) data analysis process. The data were separately collected and analysed separately using different tools and then the different results were converged which was done by comparing and contrasting the results from both qualitative findings and quantitative exploratory results during the interpretation as advised by Creswell et al (2003), Creswell and Plano (2006). This further strengthen with the concept of Creswell et al (2003) that data triangulation research approach helps researchers to directly compare and contrast results from quantitative statistical results with qualitative findings or to validate or expand quantitative results with qualitative data, whichever way the researcher choses to adopt.

In line with Creswell et al (2003) argument, this study went further in the structure to validate the results by using site case measurement done by the researcher for the same research topic. Creswell et al (2003) confirmed that researchers use this kind of structure for comparison of results, validation, confirmation or corroboration of quantitative results with qualitative findings. Creswell et al (2003) argued that well-articulated procedures of this approach will conclude substantially at a

single fact with a valid point as used by Anderson, Newell, and Kilcoyne (1999) cited in Creswell et al (2003) in converging quantitative survey and qualitative focus group finding for better in-depth motivation knowledge.

5.5.10 Limitations of the Research Data

- The fact that Implementation science is a new innovative research area begging for exploration as a results of gap between research and practice made the theoretical perspective of this research challenging although the researcher was able to attend a Massive Online Open Course (MOOC) on Global Implementation Science with one of the University and Research Centres in the world offering Implementation Science at the moment, National Implementation Research Network FPG Child Development Institute University of North Carolina at Chapel Hill ,
- There was no reliable documented database for building code standards and regulations in Nigeria constitute some challenges to the research but exploring Developed countries and other African countries assisted to establish some theoretical base for the research
- Bureaucratic process of some States and Municipalities Building Development Control Departments and unwillingness of some officials to disseminate information.
- Some Industries (Companies) who were not ready to give appropriate information for fear of exposing non-professional practices despite the assurance of information confidentiality although other method (e.g. Interview) was designed targeting the industry to extract the much needed information,
- In Nigeria, academic papers and research articles with respect to Building code standards and regulations implementation science, enforcement and compliance are very scarce and was a big challenge ; therefore, exploring many possibilities for this research topic South Africa, Kenya, Ghana, Uk, USA, Malaysia, China and others was explored for implementation science process and enforcement for compliance,
- The case measurement of this research did not measure the quality of materials but only the standards and regulations requirements for the mid-rise structural provisions of building construction process,
- Inability of some questionnaire participants to answer online due to limited tech-knowledge was a challenge although drop-and-picked method was universally adopted by this research to overcome the challenge,

- There have not been any recorded cases of offenders in the court by building development control in Nigeria as a reference point apart from the stop work order and report to offices notices issued against building development projects files.
- Nvivo 10 Challenges of understanding accents in transcribing the interview was a big challenge although filling of spaces left, mis-interpreting of words and local jargons and re-running the transcript severally was the only option to achieve it,
- Primary data sources, like questionnaire survey, interview, focus group discussion, and case measurement were relied on for data from the Nigeria industry, professionals and other relevant stakeholders,
- Funding is one of the biggest challenges in research; this research was not an exception. Travelling within major cities in Nigeria, living expenses in the UK, conference registrations and journal articles publication were all financial burden on the researcher, and
- Efforts were made to de-limit the scope of this research by excluding commercial and industrial buildings, the only buildings considered were mid-rise residential buildings in Nigeria.

I want to quickly add from experience at this point to assist anyone thinking for this type of research-

- a. I can authoritatively state that, this type of research is challenging to accomplish. It requires vast knowledge and diversity in academic qualifications of both the researcher and the supervisors. The researcher must have industry experience for several years to justify the technical problems, the legislative aspects of the building standards and legislations requires some basic legal background, the administrative aspects requires administrative management issues which are far beyond some professionals who only stick to sites management and the social aspects requires public engagement, feeling the public pain and having hand information of poor regulations and standards implemented environment. For this research, it was timely for the researcher with the 1st supervisor as an architect, urban planner, practicing construction Lawyer, practicing Negotiator and Mediator, and administrator and research Director of the Department.
- b. Any advance research into these areas will not succeed without government ministries and agencies (urban planning, building development control, professional regulatory bodies and relevant regulatory agencies) support and politicians; therefore the researcher needs some basic skills in negotiations and effective communication to handle offensive debate about what you are aiming at to get the legislatures to answer

your questions, ministries, directors and agencies and industries to respond to the research for the fear that, the research justify government or industry good practices or exposes non-professionals and ugly practices within the systems.

5.6 Summary

In this chapter, an attempt has been made in discussing research population and the sampling size, the research design, the methodological and methods employed in this study for data collection, data analysis and adequate ethical considerations in ensuring research credibility, validity and reliability.

This research philosophy can be described as being pragmatic which favours qualitative, quantitative and mixed methods research approach. This research adopts the following methods and tools for data collection, including; questionnaires, case measurement, interviews, focus group discussion and contextual analysis reviews. The limitations of the data collection and delimiting the research scope in Nigeria were also presented within the chapter.

This study can now present the data, process it and analysis in the next chapter.

CHAPTER 6:

DATA PRESENTATION, PROCESSING

And

STATISTICAL ANALYSIS

6.1 Introduction

This chapter presents process and analyse the data that was gathered in the field survey from different research methods (Mixed methods), namely; site case measurement, structured questionnaire, semi-structured interviews, and focus group discussion in tables and graphics for quick reference in the analysis. The interviewees were mainly industries (Companies) and participants of the questionnaires survey were key professionals and other relevant stakeholders responsible for the building development industry, namely; building development control, and legislature, insurance brokers, standard organisation and NGOs.

Each tables and graphics illustrate measured variables and questionnaire responses accordingly, under the questionnaire headings in demographic data and research focuses as presented below.

6.2 Data Presentation Framework of Analysis

Tashakkori and Teddlie (1998) cited in Creswell, J. W., Plano Clark, V. L., Gutmann, M., & Hanson, W. (2003) presented advance research mixed model designs for education research, which including the mixed research design adopted by this research for data triangulation as Exploratory, Quantitative, Qualitative and inference. Creswell et al (2003) describe various methods of mixed design into different research triangulation for design, conduction and validation of research process. The study stresses that, the purpose of research data triangulation design is “to obtain different but complementary data on the same topic” Morse, (1991, p. 122) cited in Creswell et al (2003) which will aid in the in-depth knowledge of the research problem. Wahyuni (2012) noted that data triangulation approach increases research validity, strength/weakness of different approaches adapted for both qualitative and quantitative methods. This is further strengthened with the concept of Creswell et al (2003) that data triangulation research approach helps researchers to directly compare and contrast results from quantitative statistical results with qualitative findings or to validate or expand quantitative results with qualitative data, whichever way the researcher choses to adopt.

In this research structure or triangulation framework for analysis, Figure 6.1, the researcher quantitative (questionnaire survey) and qualitative (interview and focus group) data were separately collected and analysed separately using different tools and then the different results were converged which was done by comparing and contrasting the results from both qualitative findings and quantitative exploratory results during the interpretation. This study went further in the

structure to validate the results by using site case measurement done by the researcher for the same research topic. Creswell et al (2003) confirmed that researchers use this kind of structure for comparison of results, validation, confirmation or corroboration of quantitative results with qualitative findings. Creswell et al (2003) argued that well-articulated procedures of this approach will conclude substantially at a single fact with a valid point as used by Anderson, Newell, and Kilcoyne (1999) cited in Creswell et al (2003) in converging quantitative survey and qualitative focus group finding for better in-depth motivation knowledge.

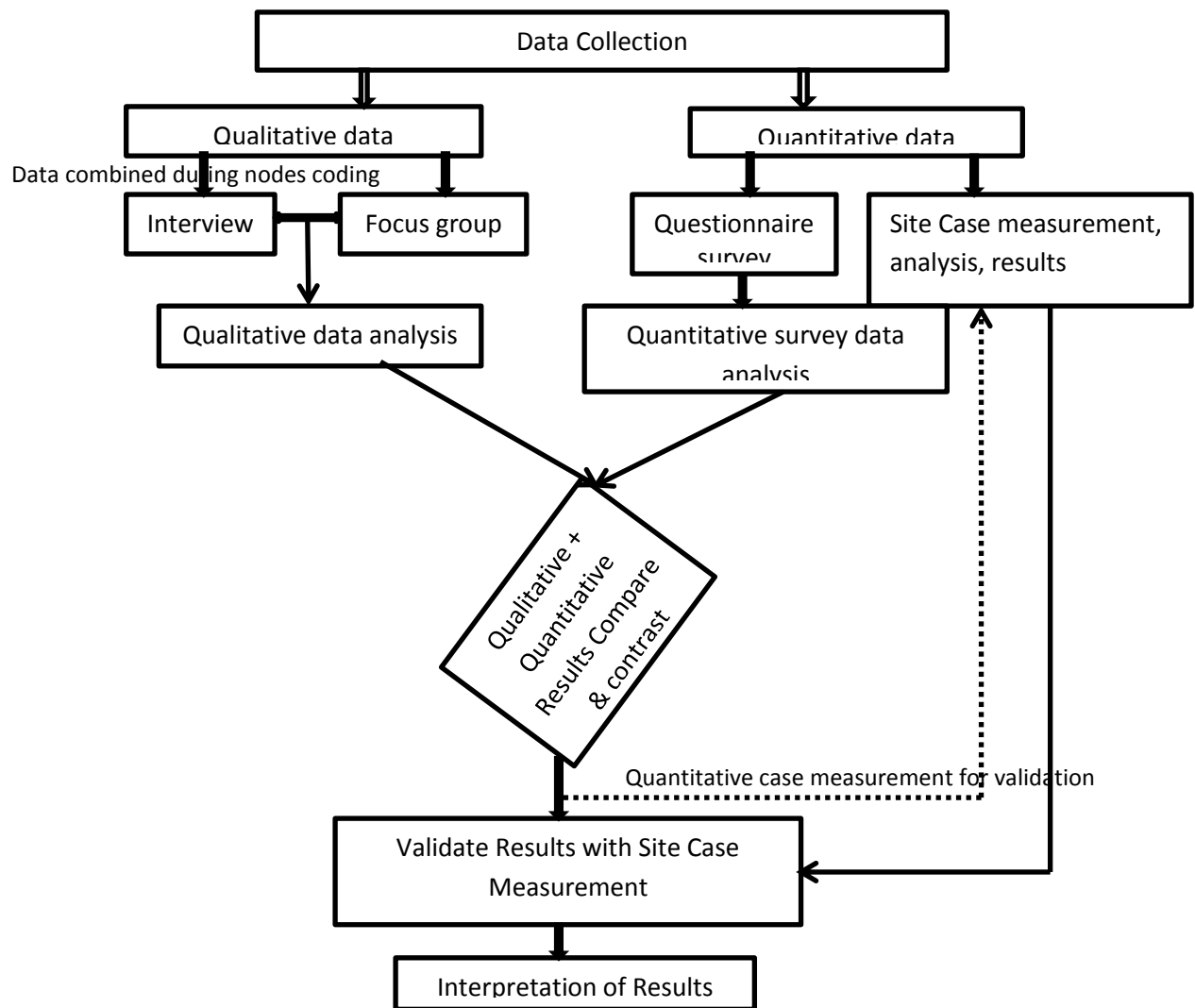


Figure 6.1: Data Presentation structure of Analysis

6.3 Qualitative data presentation and analysis

Qualitative research relies on the collection of qualitative data that are non-numeric data such as words through interviews, pictures, focus group discussion all other characteristics of qualitative grounded theory (explanation of how and why something happens) (Gary 2013; McGregor and Murnane 2010). Previous studies argued that qualitative research provides the basis or insights for potential quantitative research hypotheses because it helps in identifying the main research problem, opinion on the problem and also to develop ideas on how to go about solving the problem. (Dina, 2012; Joachim, 2012; Laubscher 2011; Joseph 2012). The two qualitative approaches (interview and focus group discussion) used by this study to find out why building standards and regulations is poorly implemented or not complied with among professionals and other relevant stakeholders in the development of HRRB projects in Nigeria is now presented.

6.3.1 Interview qualitative design

Interview is a data-gathering tool mainly by engaging the interviewee in discussion by face-face with individual or group, or through telephone to obtain information which may be personal opinion, facts, attitudes or combination of any of these as regarding the research (Gary Thomas 2013). Interview can be structured, unstructured and semi-structured interviews (Dina 2012, Gary, 2013). Structured interviews involves asking a predetermined questions with little or no chance to discuss at will or pursuing an interesting topics raised by respondent beyond the subject of the questions, unstructured interviews is without format, no structure, free conversation and discussion on the area of research. This helps respondents to determine the theme but you must be wise to bring them back when completely off the topics. (Gary 2013). The last type of interview is a semi-structured interview which was used in this research to obtain interview qualitative data.

A semi-structured interview is the combination of structured interviews predetermined questions and an in-depth interview (open-ended). This approach allows flexibility with respondents to reply and talk freely about the topic raised from the discussion (Dina 2012; Gary, 2013). The semi-structured interviews guidelines used as an instrument to gather information from industry respondents is shown in Appendix B which was outlined from four major areas of this research questions. All categories of industry practitioner (Large, Medium and small firm) were interviewed with one guideline and same questions but with different technicalities as regarding the fields of discipline to concentrate a deep understanding of the entire research as argued by Rubbin & Rubbin 2005 cited in Dina (2012).

The interview process gathered large amount of multiple inter-locking data from note taken and conversation to be transcribed as quotes. To record and manage such data requires coding of those quotes (raw data) and creating sub-themes with constant comparison to reduce the “chunks of data” to sub-themes and major themes or key words in line with this research questions (Creswell, 2003; Gary, 2013).

This research interview was designed with coding of questions to assist the researcher in identifying and managing the chunk of data during analysis as advised by Creswell and Gary. These include; QITV1 and QITV2 in section 1 for recording individual interviewee data of age, sex, education work experience within the industry (i.e. all the characteristics of the demographic section of the questionnaire survey).

The questions were divided into sections 2 to 5 and the section 6 gives the interviewee an opportunity to suggest any possible solution to the issues raised by the questions or the interviewee within the industry. The questions focus on the four core aspects of this research questions, which include; Level of enforcement of structural aspects of BC in section 2, key Factors Affecting the development and Implementation of structural aspect of NBC in section 3, causal factors which impede the implementation in section 4 and section 5 deals with the Impact risks associated with non-compliance to the industry, Consumer & professional Practices (QITV3-QITV11).

Process of Industries selection for the interview

The selections of the industries interviewee for this research were purposive sampling research approach within Nigeria. The research questionnaire survey indicates voluntary response interest for industry and individual for further interview on the subject matter. Of which, many industries and individual indicated interest with their contact details and company addresses. The researcher therefore filtered the industries’ names into large, medium and small respectively. This was followed by selection of the well-known large to medium and one (1) small practicing industries that were involved heavily in high-rise residential building projects, government developmental projects and privates developmental projects in the Nigeria construction industry. This study went further to streamline the scope of the interview with the selected industries by sticking to some cities where high-rise projects is on the increase to gain from their wealth of experience; in Abuja, Lagos, Port-Harcourt and Lokoja were selected to meet the various industries. The Companies were categorised as Company A to Company I, in which, nine (9) industries were identified and interviewed with Fifteen (15) key staff of the companies participating, which encompasses differences in professional discipline as company structural engineers, heads of building departments, site managers, architects, quantity surveyors, builders and project site supervisors as the case maybe in various companies.

The interview questions derivation

The guidelines for the interview for the Industry were targeting the key areas of research questions, developed to answer the problem of this research focus and also the objectives guiding the research drawn for contextual analysis and international experience as follows:

- Section 2: Level of enforcement of structural aspects of BC,
- Section 3: Factors Affecting the Implementation of structural aspect of NBC,
- Section 4: Causal Factors Which Impede the implementation, and
- Section 5: Impact risks of poor implementation to industry, Consumer & professional Practices

Section 1 is the demographic data of the interviewee and section 6 provide suggestions for improvement of implementation from interviewee experience.

Conducting the interview

In conducting the semi-structured interview, the researcher visited some companies to book an appointment and some were contacted on telephone for the same purpose. However, the process of conducting the interview were Face-to-Face with the industry representatives with differences in professional discipline as company structural engineers, head building departments, site managers, architects, quantity surveyors, builders and project site supervisors as the case maybe in various companies, within the premises of the company or at the project site. These face-to-face interviews normally start with introduction of the researcher and the reason behind the choice of the company which is based on their experience and stake in the building construction industry. The numbers of representatives of the company were between 1 and 2 with 3 at most in all the companies visited for the interview. The approach adopted in conducting the interview was the question and answer approach where the researcher asked the guiding questions and allow the interviewee to respond whilst the researcher recorded with stereo recorder 8GB with the knowledge of the interviewee. A semi-structured interview is the combination of structured interviews predetermined questions and an in-depth interview (open-ended). This approach allows flexibility with respondents to reply and

talk freely about the topic raised from the discussion although must be guided back on track when going too far from the predetermined questions (Dina 2012; Gary, 2013).

6.3.2 Transcribing of interviews for analysis

The audio recorded interviews from 8GB stereo recorder and the researcher mobile phones was uploaded into Nvivo 10 software for transcribing with the help of IT services experts training of Strathclyde University and it was a real challenging tasks to transcribed as quotes (raw data). At first, transcript was left with so many drawn lines (gaps) indicating absolute difficulties in language barriers. These empty spaces were filled up by the researcher after listening to the audio recorded again. After which, it was re-uploaded into the software for comparison, and this process was constantly repeated many times to reduce the chunks of data to subthemes and major themes or key words in line with this research questions. This is more of exploratory perspective analysis, through thematic network analysis by coding of data and allowing for new theme to emerge in support of Gary, 2013. These were done as a process of cleaning the data to delete all information that were not relevant like laughter, personal story and interest on PhD degree as advise by Dina (2012) and Creswell (2003). The data from semi-structured interview is analysed and presented using descriptive narratives and the frequency tables and charts.

6.3.3 Focus group discussion

Participant selection

This research focuses on a limited number of respondents for focus group discussion, eight (8) was the maximum selection apart from the conference discussion of the research. Identifying participants for the focus group have been purposively selected to participate after their voluntary indication to participate because this research believes in their in-depth knowledge of the issue of the industry the researcher know little about. They have the Nigeria building industry expertise knowledge for several years and also the building industry first-hand practicing experience on the issue affecting the industry structural problems. The focus group discussion was conducted in 5 cities, including; Lagos, Abuja, Port-Harcourt, Lokoja and Enugu in Nigeria with industry professionals and government officials and private practitioner's establishment which focus on four research aspects and possible suggestions using questionnaire as a guide for introduction. The challenge of hiring a venue, providing refreshment constrains more of the focus group discussion. Majority of the participants voluntarily indicated interest to participate having responded to the research

questionnaire. However, this research made an attempt to stratified population sample by professions and experience.

Discussion process

The process of conducting the focus group in 5 cities was similar to that of interview, which involves securing an appointment, hiring a venue and send details back to participant. The group discussions normally start with the introduction of the researcher followed by the introduction of the research questionnaire and plead for genuine contribution towards the progress of the Nigeria industry. Each participant was given the research questionnaire but it was discovered that majority have seen and responded to the questions. Each section had a moderator selected by the researcher to aid in pointing and authorising who to speak next whilst the researcher listen and take notes of key issues raised as suggestions and action required by the research. Clarifications were provided by the researcher were necessary or when heated argument arises especially the issue of who to represent the industry in many viable suggestion raised by the forum. Various suggestions put forward were collated using common ground by the research especially from interview and the matrix of comments were presented into issues as research four aspects of BC problems (Administrative, technical, legal and social issues) as attached in appendix E.

6.3.4 Process of Interview/focus group Data Analysis Using Nvivo 10

Many research agreed that there is no standard procedure to qualitative data analysis; researchers adopt different approaches & context in analysing qualitative data. Creswell (2003) described Interview analysis into 3 categories as content analysis to identify keywords or paragraph or themes, discourse analysis to identify the main themes, examine the way there are expressed or examine actual words used for the interview, and relational analysis to identify concept of the interview, to explore any existing relationships between the concepts of the interview.

Gary (2013) argued (3) basic procedures for common conclusion of interview data analysis; by noticing concepts, collecting examples of these concepts and critically analysing of these concepts in order to find the common ground. Creswell (2003), Gary (2013) and Dina (2012) all note that, semi-structured interview analysis can be through the combination of deductive/inductive approach, which normally starts with research theoretical or specific theme framework, this can be tested by making observations for possible acceptance or there is a ground for rejection.

These approaches guided this research into the analysis of interview and focus group as follows:

First a set of themes derived from literature theoretical concept was created manually by the researcher in-line with research and semi-structured interview questions. The researcher then import the interview transcript and focus group matrix of comments into Nvivo 10 as internal sources. Nodes were created for coding using the manual research based theme created as guides for the nodes. This involves using inductive approach to break up the interview into useful chunks of data words, phrases, sentences or paragraph as argued by Cresswell (2003); Gary (2013). The researcher then make lists of all codes by looking for similar codes to reduce long list of enforcement issues, key factors, causal factors, associated risks and suggestions to a manageable number. At this point the researcher compare codes for interview and codes for focus group discussion through Constant comparison to match all codes were done and then generate a single list of node graph as in figure6.2.

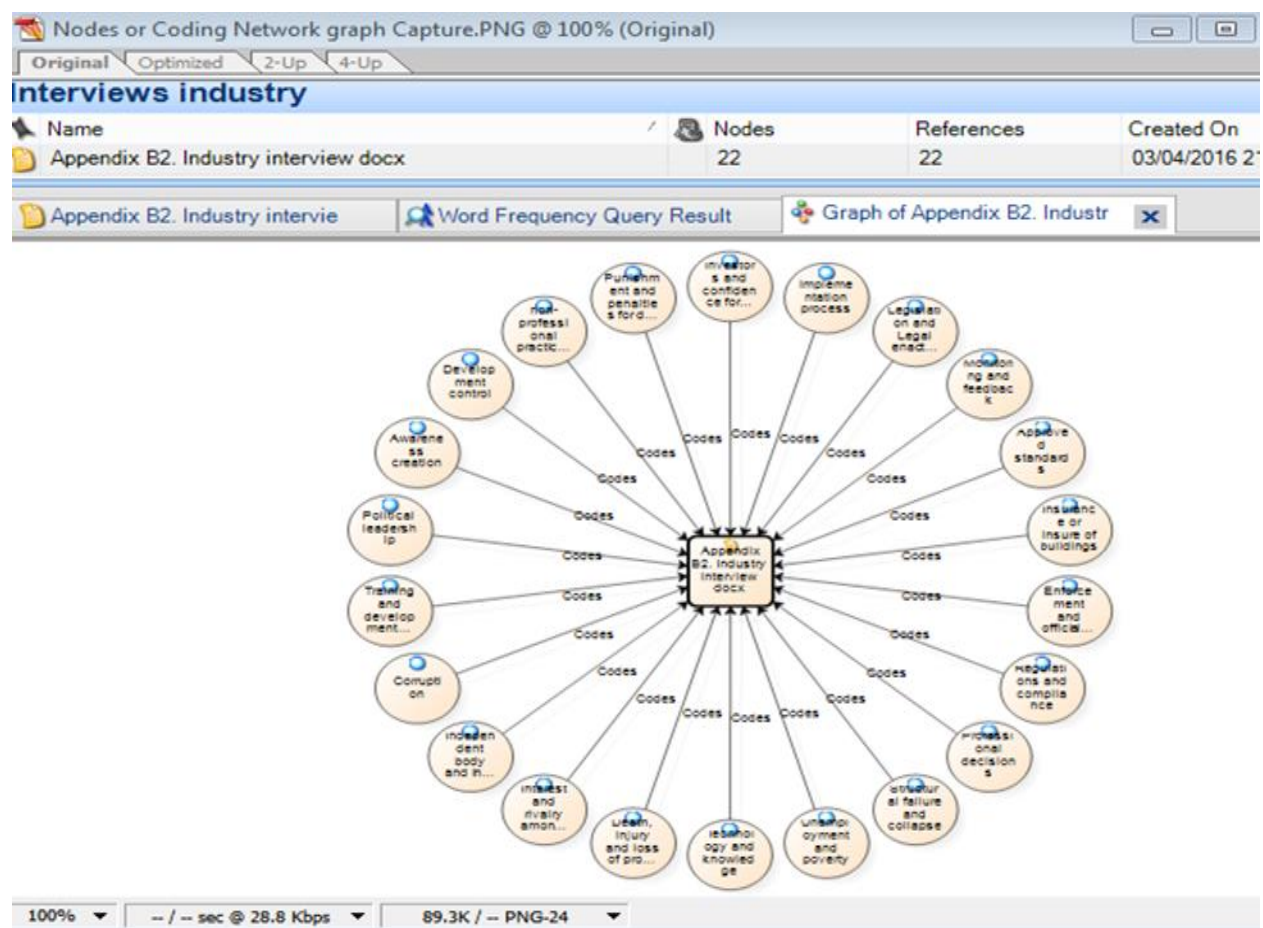


Figure 6.2 : Qualitative Nodes Graph

Nvivo 10 allow self confidence during analysis, and this approach was also adopted by the researcher by running queries of the sources by words frequency in figure6.3. The process of that analysis yielded results which guides the researcher in removing words without much words frequency in the text or interview transcript and focus group source.

Figure 6.3: Queries for Nodes Frequency

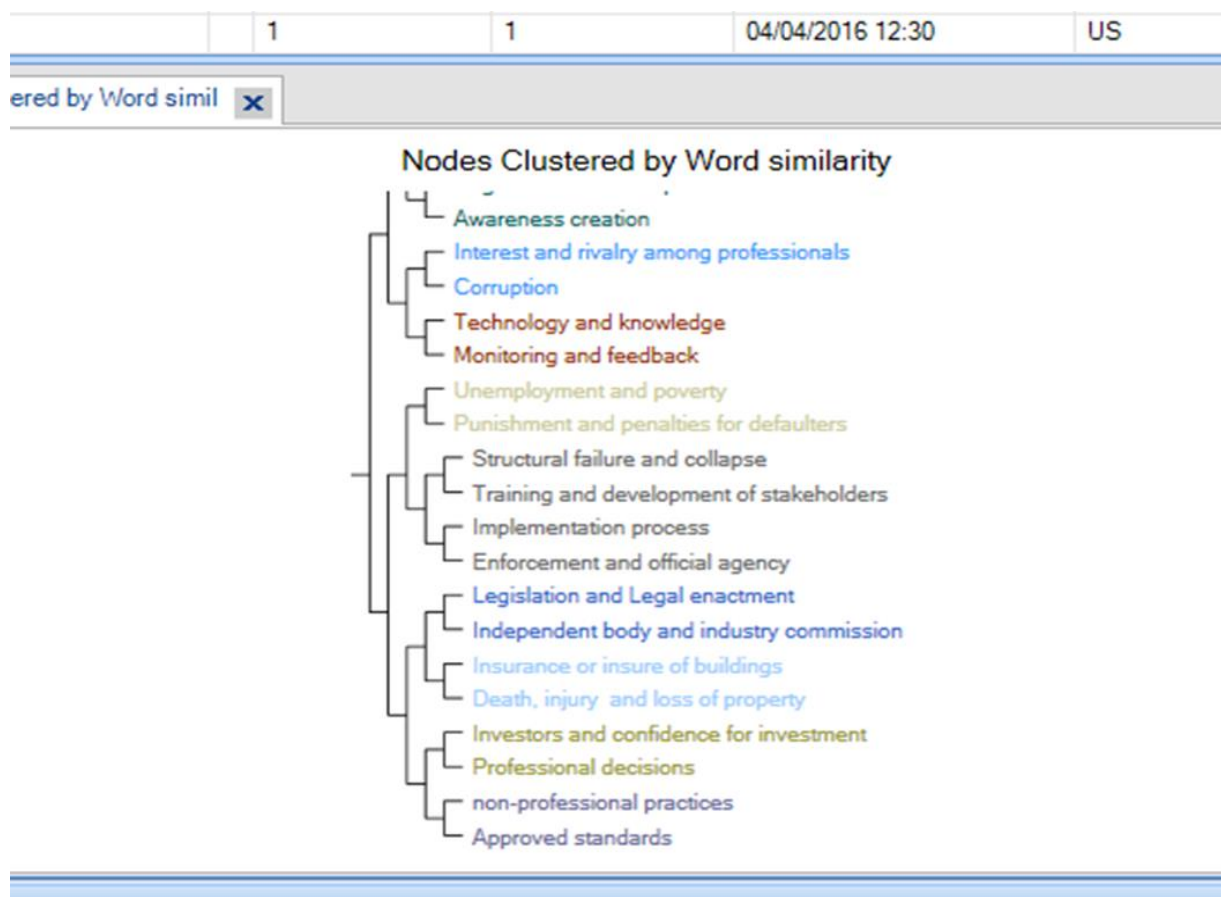


Figure 6.4: Nodes cluster analysis and classification

There are some new concept from the analysis worthy of exploration and even some hard to classify themes, and ordinary themes which Creswell (2003) described as expected for every advance research of this kind.

The researcher examined the classification of the themes to see how they interact with each other by constant comparison to find similar evidence of any relationships from the theory and the quantitative analysis. The whole process was repeated with the transcribed interview and matrix of focus group comments to see if any thing differently could emerge before the results were finally accepted as advised by (Creswell, 2013). Figure 6.5 represent a summary of the major theme classification developed from interviews conducted which were used in generating nodes, in which, the nodes cluster themes, new themes as concepts from the analysis for comparison and final acceptance.

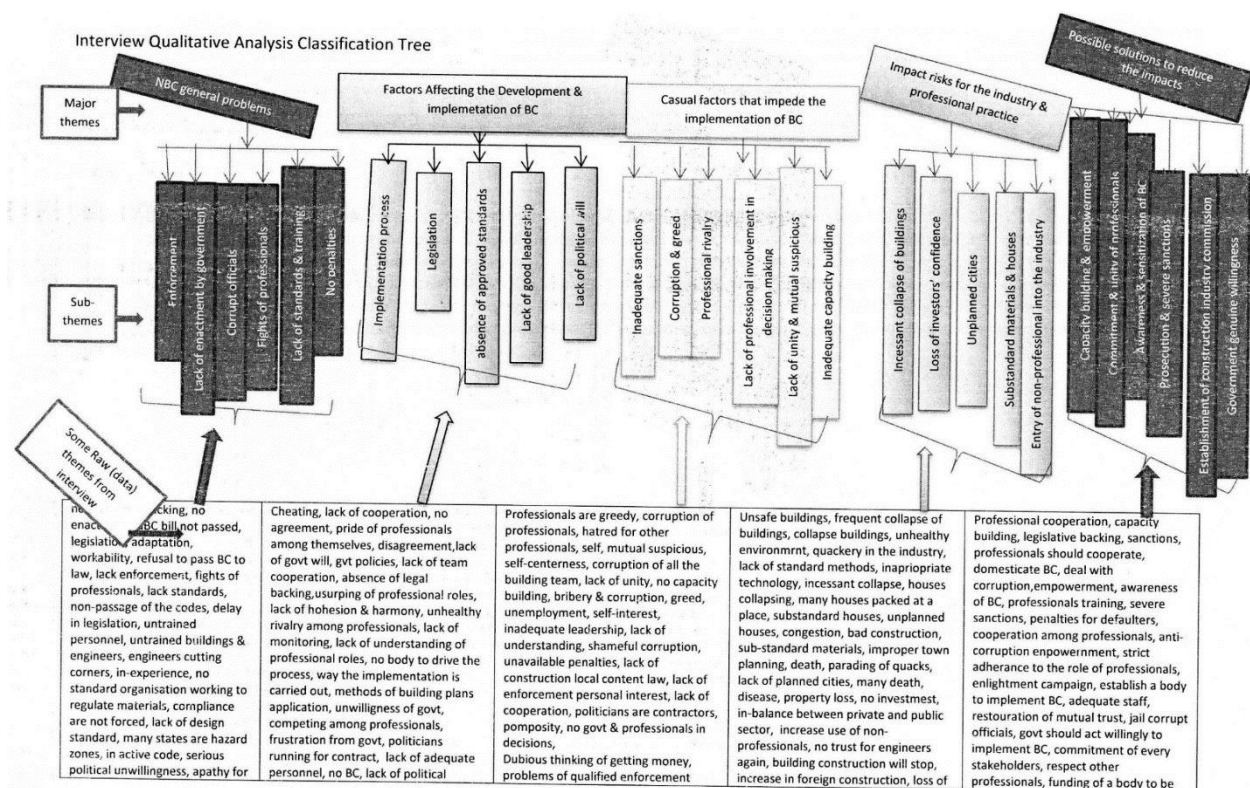


Figure 6.5: Major themes classification tree

Qualitative cluster analysis as related to contextual theory

Major themes classification in figure 6.5, namely; factors affecting the development and implementation of BC structural provisions, causal factors impeding the implementation, impact risks to industry and professional and possible solutions suggested by interviewee that were used in the formulation of nodes for further analysis yielded some results relating to administrative issues context and technical issues context theory of BC structural implementation and enforcement and a new concept or theme of (Economic value) label by researcher from the analysis worthy of exploration for further studies. This new qualitative concept clustered insurance, independent supervisory commission, legislation, and property loss, death and injuries.

The new concepts and themes from interview cluster analysis as related to contextual theory is summarised graphically in Figure 6.6

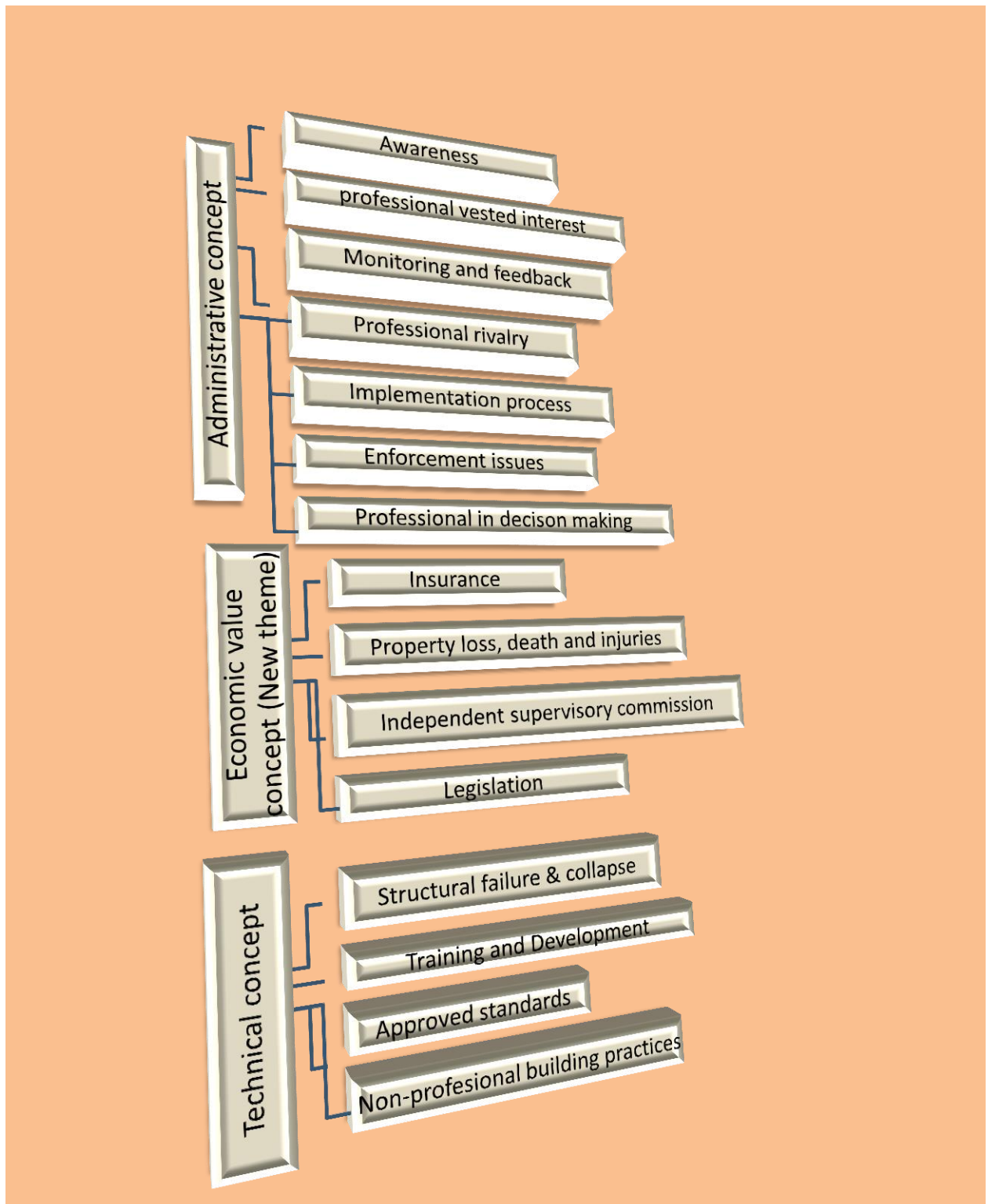


Figure 6.6 cluster analysis as related to contextual theory

6.3.5 Qualitative analysis findings

This research interview guidelines and the pattern of questionnaires were the same, grouped into four focus areas as listed above and the fifth allow for suggestions. However, the industry interviewee's were allowed more freedom on the pattern of answering questions because of their expertise knowledge as industries in the development of high-rise residential building projects and regulations. This was primarily for data triangulation with other research findings from questionnaires and case measurement in the subject matter of standard and regulations within mid-rise residential buildings in Nigeria. The emerged sub-themes significantly related to the major theme results from questionnaire survey. For example, the classification analysis indicates rivalry among professional, profesional vested interest and corruption in a single cluster tree.

It is worthy of note that, corruption, vested interest, decision -making and rivalry also loaded in the exploratory factor analysis after rotation which is related to administrative aspect of the building standards and regulations. The results also suggests that training is significant in the analysis by clustering training and development of stakeholders with structural failure and collapse. This means that, with adequate training of professionals and skilled relevant stakeholders, structural building failures will be avoided which relate to technical aspect of the BC standards/regulations which was second in most affecting aspects of BC standards in the quantitative exploratory research analysis.

Critical examination of the four aspects of building code standards and regulations, namely; administrative aspect, technical aspects, social aspects and legal aspects provided a clearer focus through which implementation and enforcement of the strctural provision of the BC standards and regulations for the mid-rise residential buildings in Nigeria can be established. Two major aspects which influences the implementation and enforcement of BC structural provisions are administrtrative aspect and followed by technical aspect and to a lesser extent the socio-logical aspect. The direct impact of these two aspects of BC to implementation and enforcement is the resultant structural building failures and collapse as a result of non-compliance to standards and regulations.

This findings is in line with other studies and then discuss together with quantitative analysis. See appendix D and E for the full interview transcripts and focus group discussion matrix of comments.

6.4 Quantitative research data presentation & analysis

Quantitative methods adopt empirical data (quantitative data acquired from questionnaire survey and case study) which assists researcher in testing their hypotheses with statistical tools through results from analysis to support or disagree with other researcher's findings on similar quantitative research methods (Dina, 2012; Wafula, 2012; Laubscher 2011). This research adopts both site case measurement and questionnaire survey quantitative research approach as presented and described below.

6.4.1 Site case measurement Data Presentation

This study made site visitation to measure some level of compliance with standards and regulations of some high-rise residential building (HRRB) development projects within Nigerian cities and the data is presented in table 6.1

Data collection process

This research case measurement study, targets construction projects sites for case measurement and inspections. This type of method is adopted to actually describe the existing current professionals and craft skills practices with respect to standards and regulations skill compliance. This inspection and case measurement approach was chosen to measure and inspects based on the standards and regulations compliance conformity form for the structural aspects of buildings to establish professionals and craft skills compliance with standards and regulations skills. This approach was also used by Baiche, B., Walliman N. and Ogden, R. (2006) for rigorous inspection procedure of non-compliance checklist of regulations survey in Oxfordshire and Gloucestershire during the construction of housing projects for visual observation. A purposive sampling technique was used in the selection of six states in Nigeria for data collection, in which, 104 high-rise residential building development projects were identified and investigated. This consists of, Abuja (31), Lagos (20), Port-Harcourt (22), Enugu (10), Kaduna (6) and Lokoja (15). This study made site visitation to measure some level of compliance with standards and regulations of development projects within Nigerian cities and the data is presented in table 6.1

The total number of MRRB developmental projects measured by the researcher within six cities and is summarised in Table 6.1

Table 6.1 Distribution of measured buildings in Nigeria cities

Cities	Number of buildings measured	Percentage representation %
Abuja	31	30
Lagos	20	19
Port-Harcourt	22	21
Kaduna	6	6
Enugu	10	10
Lokoja	15	14
Total	104	100

Source: Author's site measurement (2015)

Table 6. 1 above shows that 30% of total buildings measured were in Abuja the Federal Capital Territory (FCT) of Nigeria. Lagos is 19% from South West, Port-Harcourt is 21% from South-South, kaduna from North is 6%, Enugu from South East is 10% and Lokoja from North Central is 14%.

Case measurement criteria

The objectives criteria for the measurement as the main instrument for data collection for case site investigations were the compliance form requirements for the structural provisions of the Nigeria building regulations 2006 (Not enacted at the time of this research). This consists of foundation compliance requirements, floor slab requirements, walls requirements and finally the roof compliance requirements. The investigative parameters by this study were the required activities of professionals and craft skills workers in the construction of structural aspects of building (Foundation, floor slab, walls and roof), including; soil strata analysis report, depth/width of foundation, treatment, thickness of the footings, foundation base, columns/ground beams were applicable, earth filling materials, depth and compartments methods of earth fill, type of foundation application for the soil, hard-core materials and sizes, DPC/DPM provision, reinforcement placement and sizes for the slab, thickness of the slab, concrete mix design, concrete placement methods, allowable time before placing of concrete, curing process and allowable time to next work start-up and supervision. Others measured were the room area, staircase requirements provision in the construction, height of wall, sizes of external and internal walls, length of walls before columns are provided, the lintel materials and thickness, ceiling height of rooms/hall ways, roof pitch, roof frames materials and physical strength observations, and wall plate/roof beam provision. The researcher subdivided the whole measured buildings into four developmental stages as shown in

Table 7.2; Foundation as stage 1, Foundation + Slab²⁰ as stage 2, Foundation + Slab + Wall as 3 stage and Foundation + Slab + Wall + Roof (Whole structural building) as the 4th stage.

²⁰ Slab in this case measurement means floor slab at ground and upper floor.

Table 6.2 Case measurement of building projects stages

Variables	Stages of Case Measurement												
	Foundation			Foundation + Slab			Foundation + Slab + Wall			Foundation + Slab + Wall + Roof			Total
	Non-compliance	Partial Compliance	Full Compliance	Non-compliance	Partial Compliance	Full Compliance	Non-compliance	Partial Compliance	Full Compliance	Non-compliance	Partial Compliance	Full Compliance	
Abuja	8	2	1	3	4	1	2	3	3	0	2	2	31
Lagos	3	2	0	4	2	0	1	3	0	0	3	2	20
Port-Harcourt	5	4	0	3	2	0	1	1	3	1	0	2	22
Kaduna	2	0	0	1	1	0	0	0	1	0	0	1	6
Enugu	2	1	0	2	2	0	1	0	1	0	1	0	10
Lokoja	4	0	0	2	1	0	2	2	2	0	1	1	15
Total	24	9	1	15	12	1	7	9	10	1	7	8	104

Source: (Author site measurement survey 2015)

Colour Key:

Red = Non-compliance

Yellow = Partial compliance

Green = Full compliance

6.4.2 Case measurement data analysis and results

Sample

This section presents the description of number of buildings measured in each cities and the percentage representation within the sample variables to aid in the analysis of the results. A total of 104 high-rise residential buildings in six cities were identified and investigated with 29 indicators of standards & regulations compliance requirements for the professionals and craft skills men. The highest number was in Abuja with 31 buildings representing 30% and the lowest was 6 buildings in Kaduna representing 6% as shown in Table 6.1.

Data Analysis

The record of compliance measurement was by numerical from 0 to 100% using the percentage of compliance with the existing compliance requirements form of the Nigeria building standards & regulations for the structural aspects of buildings. The 29 indices were classified for compliance using the following criteria for the grading systems to examine compliance and implementation process among professionals and craft skills on standards & regulations structural provisions; 0-49% = Non-compliance, 50-69% = Partial compliance and 70-100% = Full compliance. Tables, percentages, graphics for large data compliance measurement were employed to analyse and investigate the data. The researcher subdivided the whole building into four sections developmental stages as follows; Foundation as stage 1, Foundation + Slab as stage 2, Foundation + Slab + Wall as 3 stage and Foundation + Slab + Wall + Roof (Whole structural building) as the 4th stage to establish the BC structural provisions or aspects of standards and regulations that mostly affecting compliance and requires urgent attention for training and development within the Nigeria construction industry.

Degree of compliance from each city

Table6.3 presents the degree of compliance for the measured buildings to establish the effects of BC standards and regulations structural provisions gaps among the professionals and relevant stakeholders within the Nigeria building construction industry. In which, the measurement indicates 45% non-compliance, 36% partial compliance and 19% full compliance across the six geo-political zones of Nigeria.

Table6. 3: Degree of Compliance

Variables	Non-compliance	Partial compliance	Full compliance	Total
Abuja	13	11	7	31
Lagos	8	10	2	20
Port-Harcourt	10	7	5	22
Kaduna	3	1	2	6
Enugu	5	4	1	10
Lokoja	8	4	3	15
Total	47	37	20	104
% Of compliance	45%	35.5% (36%)	19%	100

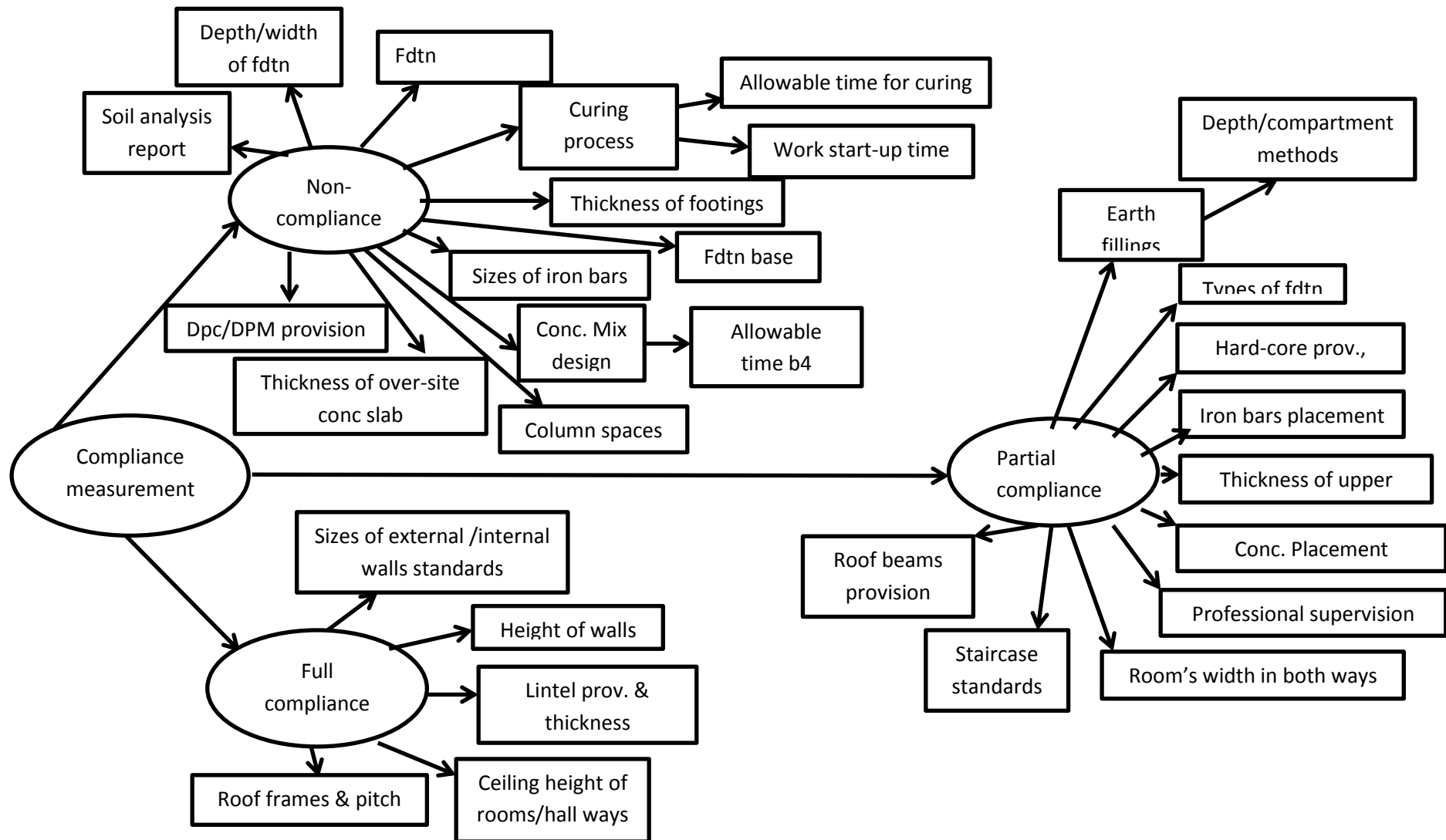
Source: (Author case measurement 2015)

6.4.3 Case Analysis results using graph

Building developmental stages that mostly affecting compliance

To establish the aspects of structural building development stages that mostly affecting compliance and requires urgent attention for training and development within the Nigeria construction industry, this research subdivided the whole building into four developmental stages as follows; Foundation as stage 1, Foundation + Slab as stage 2, Foundation + Slab + Wall as 3 stage and Foundation + Slab + Wall + Roof (Whole structural building) as the 4th stage. The summary of the results is shown in Figure 6.7.

Case Analysis results using graph Figure6.7: Graphics for standards/regulations skills compliance measurement



Determination of the compliance levels threshold of grading systems:

All the buildings will fall into one of the three levels of buildings grading category (full compliance, partial and non-compliance) based on indicators over a 6 months' measurement period. The measurement data % volume is based on the aggregate number of buildings measurement 29 indicators in each state (inclusive of methods, process and supervision) from building development sites.

To validate the percentage of compliance levels (full compliance, partial and non-compliance), measurements data were aggregated on multiple buildings within the four case measurement stages (foundation, foundation + slab, foundation + slab + wall, and foundation + slab + wall + roof) and where data is not aggregated on multiple buildings, each building case measurement data were treated individually to determine the validation of compliance grading level.

Compliance Level Description of the aggregation of the 29 compliance indicators between 0% and 100%

Non-compliance — In spite of any prevailing circumstance within the building projects over a 6 months' measurement period of this research. Any building within the states measured, at the discretion of the professionals and enforcement agencies, which aggregate indicators percentage falls within 0% and 49% are considered risky and non-compliance to building standards and regulations.

Partial compliance — regardless of circumstance: involves buildings with aggregate indicators percentage of between 50% and 69% within the 6 months period of this case measurement

Full compliance indicates buildings with aggregate indicators percentage of between 70% and 100% within the 6 months' period of this case measurement.

6.4.4 Case study research findings

The results of this case study reveal that out of the 29 building measurement indicators investigated by this study; 14 aggregated indicators percentage identified falls within 0% and 49% (non-compliance) were core activities for the structural provisions of buildings standards and regulations within foundation stage, including; Depth/width of foundation, thickness of footing, foundation treatment, soil analysis report before foundation, concrete mix-design for foundation work and allowable time of placement, foundation column spaces, sizes of iron bars, curing process, allowable

time of curing and work-start up time, provision of damp-proof course and damp-proof membrane, and thickness of over-site slab. From critical study of the results, and 11 aggregated indicators percentage investigated and identified indicators were between 50% and 69% indicating partial compliance, these include; types of foundation selection, earth fillings, hardcore provision and sizes, iron bars placement, thickness of upper floor slab, concrete placement methods, professional supervision, rooms area, roof beams provision and staircase constructions requirements.

A total of 47 buildings indicate non-compliance representing 45% and 37 partial compliance representing 35.5% and 20 full compliance representing 19% of compliance.

Table 6.2 analysis shows that majority of non-compliance were in stage 1 & 2 (Foundation and Foundation + slab) and majority of partial compliance were non-core activities within the whole stages exception of few and full compliance were in stages 3 & 4 activities of walls and roof. This analysis should give a directional approach to both industry practitioners, policy makers and professional's regulatory bodies on the next steps to building construction skills training and development and at the same time helping to strategies inspections at different stages of building construction.

6.5 Questionnaire results data Presentation and analysis

This section presents questionnaire findings. The introduction part of the questionnaires asked the participants about their sex, age, discipline, educational qualification and experience. Subsequently, the participants were asked questions grouped into the core four areas of this research exploration interest. The research questions which guided the data obtained for the analysis were focusing in the following areas:

- The enforcement and compliance level of NBC in the structural provisions in the current mid-rise residential building development projects in Nigeria,
- The key internal and external factors which affect the development and implementation of the structural aspect of the BC, its enforcement and compliance among the professionals & other relevant stakeholders in the building construction industry,
- The causal factors that impede the implementation and enforcement of the features of the Nigeria BC structural provisions, and
- The impact risks associated with the poor implementation and enforcement of the BC structural aspects on consumers, the development of the building industry & professional practice.

6.5.1 Questionnaire Design

The questionnaire used for data collection consists of respondent's demographic data, which includes their age, sex, educational qualifications, professional discipline, and the number of years they have worked in the building construction industry in Nigeria. Section 2 of the questionnaire presented two (2) questions on rating the enforcement level of NBC standards and regulations structural provisions for mid-rise residential building projects. Ten (10) key internal and external variable factors were assessed, including; legislation, implementation process, awareness, leadership, professional fees, approved standards, poverty level and public dialogue with nine (9) primary variables of causal factors were also assessed, namely corruption, technological expertise, capacity building, professional vested interest and professional rivalry, together with other factors including professional participation in industry decision making, employment and financial strength, human rights and respect for public opinion, and eleven (11) associated impact risks, including; incessant collapse of structural aspects of buildings, unplanned cities, loss of investors' confidence, substandard materials and structural buildings, non-professionals entry to the industry, death and injuries due to structural failures, environmental fire and disease hazards among others; all of which were presented twice for in-depth investigation of the problems differently and were rated on a five-point frequency (Likert) scale ranging from 1 (strongly disagree) to 5 (strongly agree) or from 1 (least risk) to 5 most high risk. Each of the frequency scale measures these variables as they impede implementation, enforcement and compliance with structural aspects of BC standards and regulations within the MRRB development projects. An additional section was added where respondents were asked to suggest potential solutions to these problems. The approach to structuring the self-administered questionnaires was a drop-and-pick method, where respondents were allowed a week to complete it at their own pace. According to Gary (2013), the use of questionnaires as a data-gathering tool is a versatile technique and can be utilised in many different ways in research, either through a self-administered approach to respondents or otherwise.

Questionnaire Pilot Test

This study pilot-tested the questionnaire among six professionals, aged 50-60, and with more than 30 years' practical experience. The pilot test allowed the researcher to assess the questionnaire's effectiveness, the coverage of the research themes, the wording of the questions, and to collect general feedback. See Figures 6.5, 6.6, 6.7 & 6.8 summary of the pilot test sex, age, years of experience and professional disciplines distribution of respondents respectively. The expert's

observations were noted, and where required, the questions were re-framed to produce the final version of the questionnaire which was used in this research for validity.

6.5.2 Demographic characteristics of respondents & Preliminary data Statistics

This section asked the participants about their sex, age, discipline, educational qualification, and experience to know the valid percentage response from each category, indicating as Q1D1, Q1D2, Q1D3, Q1D4 and Q1D5 respectively. The results are summarised in Table 6.4

Data Analysis

The data were processed into numerical codes and entered into a pre-designed data entry spreadsheet, in SPSS 23. The missing values were managed by excluded cases pairwise. The data analysis, also carried out using SPSS 23, generated descriptive statistics such as frequencies for categorical variables to know how many people gave each response e.g. (how many male or female) and mean, median and standard deviation for continuous variables which provides basic summary of descriptive statistics. Exploratory factor analysis was then employed to extract the most influential factors after rotation and removal of redundant variables by looking for groups among the inter-correlations of a set of variables. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy recommends a value of 0.5 and above in order for a data set to be suitable for factor analysis and the Bartlett's Test of Sphericity value to be significant at 0.05 or less for suitability (Williams et al., 2010; Pallant, 2013, cited in Kaiser, 1970, 1974; Bartlett, 1954). The factors were reduced using maximum likelihood extraction (MLE) method with an initial eigenvalue of 1 and more. Many checks were employed for the reduction in addition to the eigenvalues including total variance explained table, a scree plot, a correlation matrix (structure) for coefficients of 0.3 and more, and factor matrix table for the un-rotated loadings of each of the items reduced. The rotation method for the extracted variables was Maximum Likelihood with Oblimin rotation. The correlation matrix was generated through factor analysis to determine the strength and associations of the causal factors, and regression factor score analysis was employed to determine the relative cause and effects across other factors, assuming a constant variance regression line and an underlying linear relationship between the observed and unobserved (latent trait) variable factors. After which a confirmatory factor analysis (CFA) was employed to predict the conceptual theoretical model developed by this study.

This study is based on the null-hypothesis, which can be stated as:

The research hypothesis=H₀

H₀: The enforcement of the Nigeria Building Code Structural Provisions fails because of failures in legislative system.

Sample

This section describes the characteristics of the sample before presenting the results of the analysis.

A sample of 600 paper-based structured questionnaires was self-administered in the study, targeting stakeholders in the development of MRRB development projects in Nigeria. The data set of respondents include architects (55), builders²¹ (65), engineers (structural & civil) (60), urban planners (70), quantity surveyors (20), land/GI surveyors (15), academics (35), development control professionals (75), legislatures²² (10), contractors²³ (65), industry participants (20), artisans (25), estate valuers (20), insurance brokers (10), professional bodies (20), members of standard organisations of Nigeria (10), union/NGOs (10) and facility/construction managers (25). Of the 600 questionnaires distributed, 426 were returned, representing 70% response rate, 48 were deemed to be invalid for not providing complete information for appropriate categorisation into professional discipline, and age some did not select academic qualification, years of experience, and gender categorisation in some, which brought this study valid responses for the analysis to 378, representing a response rate of 63%. Table 7.4 shows the demographic characteristics of sample respondents. The highest response rate (Modal age) age group is 41-50 at 36.5% with a standard deviation of 1.05 shown in Table 7.5 for the descriptive statistics of the sample data, followed by the 31-40 age group with a response rate of 28.6%, while a response rate of 17.7% was recorded for the 51-60 age group and 1.6% response rate of age group 18-20²⁴ years; the cumulative age response is 97.4%. This indicates the concern of the active and vibrant professionals' modal age group for non-compliance with structural aspects of BCs within the industry. The building construction industry in Nigeria is seen as a male dominated profession and this is reflected in the sex distribution of respondents, with 77% male and 23% female from the valid survey responses. The modal educational qualification is a Bachelor's degree with a 48.1% response rate and a standard deviation of 1.39, followed by a HND at 20.8% and a Master's degree at 19.3%. This examination of the

²¹ Academically trained and professionally certified person (s) responsible for the erection, execution and supervises the work of artisans and tradesmen in the construction of building in accordance to building drawings in Nigeria.

²² Responsible for the enactment of BC standards and regulations in Nigeria

²³ An individual or company that provides materials or labour to government, an individual or another company as a contract in building construction practice in Nigeria

²⁴ Graduating to practice building construction at the age of 18-20 is rarely possible in Nigeria. Observation of the 6 frequency respondents indicates persons serving some contractors.

responses was to facilitate identifying influential factors in the analysis leading to non-compliance. Industry professionals and other relevant stakeholders are interested in solving the problem of non-compliance within the industry, shown by their response rate of 68.8%.

Table 6.4: Demographic characteristics of the respondents

	Frequency	%	Valid %	Cumulative %
Age				
18-20	6	1.6	1.6	1.6
21-30	49	13.0	13.0	14.6
31-40	108	28.6	28.6	43.1
41-50	138	36.5	36.5	79.6
51-60	67	17.7	17.7	97.4
60+	10	2.6	2.6	100.0
<i>Total</i>	<i>378</i>	<i>100.0</i>	<i>100.0</i>	
Sex				
Male	291	77.0	77.0	77.0
Female	87	23.0	23.0	100.0
<i>Total</i>	<i>378</i>	<i>100.0</i>	<i>100.0</i>	
Educational Qualifications				
WASSC/SSCE/NECO/Trade Test	12	3.2	3.2	3.2
ND/NCETech	23	6.1	6.1	9.3
HND	78	20.8	20.8	29.9
PGD	2	0.5	0.5	30.4
Bachelor degree	182	48.1	48.1	78.6
Master Degree	73	19.3	19.3	97.9
PhD	8	2.1	2.1	100.0
<i>Total</i>	<i>378</i>	<i>100.0</i>	<i>100.0</i>	
Profession (Occupation)				
Industry practitioners	260	68.8	68.8	68.8
Regulators	118	31.2	31.2	100.0
<i>Total</i>	<i>278</i>	<i>100.0</i>	<i>100.0</i>	
Years of experience				
1-4	38	10.1	10.1	10.1
4-10	101	26.7	26.7	36.8
10-16	61	16.1	16.1	52.9
16-21	87	23.0	23.0	75.9
21-30	75	19.8	19.8	95.8
31 & above	16	4.2	4.2	100.0
<i>Total</i>	<i>378</i>	<i>100.0</i>	<i>100.0</i>	

Table 6.5: Descriptive statistics analysis of demographic data

Descriptive Statistics										
	N	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Age	378	1.00	6.00	3.6243	.98887	.978	-.084	.125	-.091	.250
Sex	378	1.00	2.00	1.2275	.41978	.176	1.305	.125	-.298	.250
Educational qualification	378	1.00	7.00	4.5238	1.37454	1.889	-.768	.125	-.229	.250
Years of Experience	378	1.00	6.00	3.3095	1.37116	1.880	.006	.125	-1.045	.250
Valid N (listwise)	378									

Source: Author's administered questionnaire (2015)

6.5.3 Level of Enforcement and Compliance data and analysis

Question Q2EA:

This asked the respondents to indicate the level of enforcement of building code (BC) standards and regulations structural provisions in mid-rise residential building (MRRB) projects on a five point Likert scale of (very unsatisfactory as 1 and very satisfactory as 5). The results of the data are summarised graphically as presented in figure 6.8

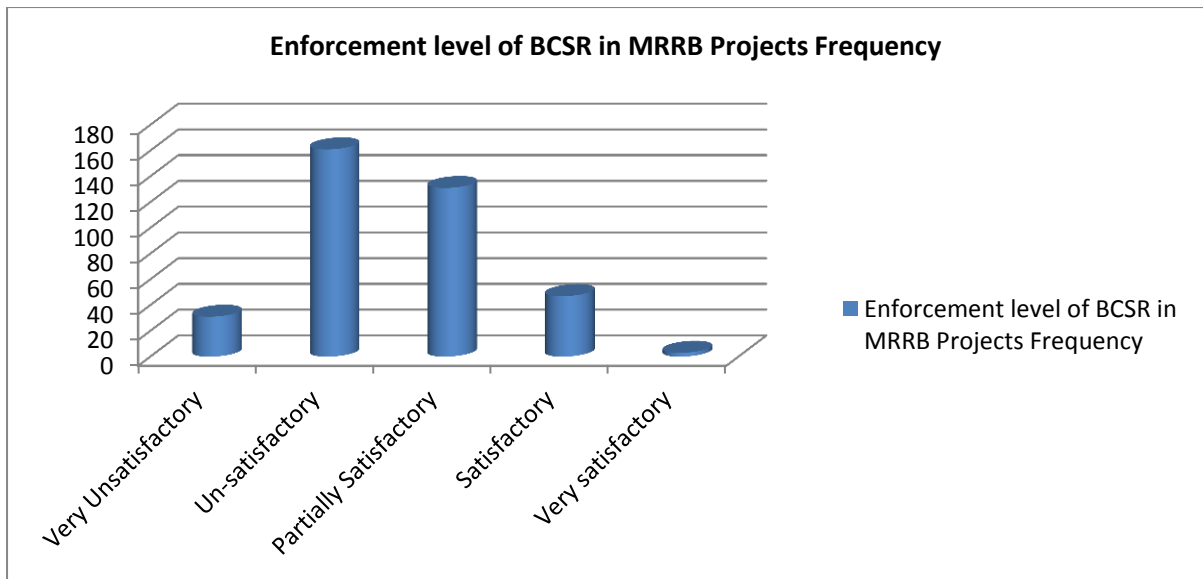


Figure 6.8 Enforcement levels of BC standards/regulations in MRRB projects

Source: Author's administered questionnaire (2015)

Question Q2EB:

In this question, respondents were asked to indicate their agreement to the degree of compliance to approval, construction and inspections of MRRB development projects. Figure 7.9 summarised the results.

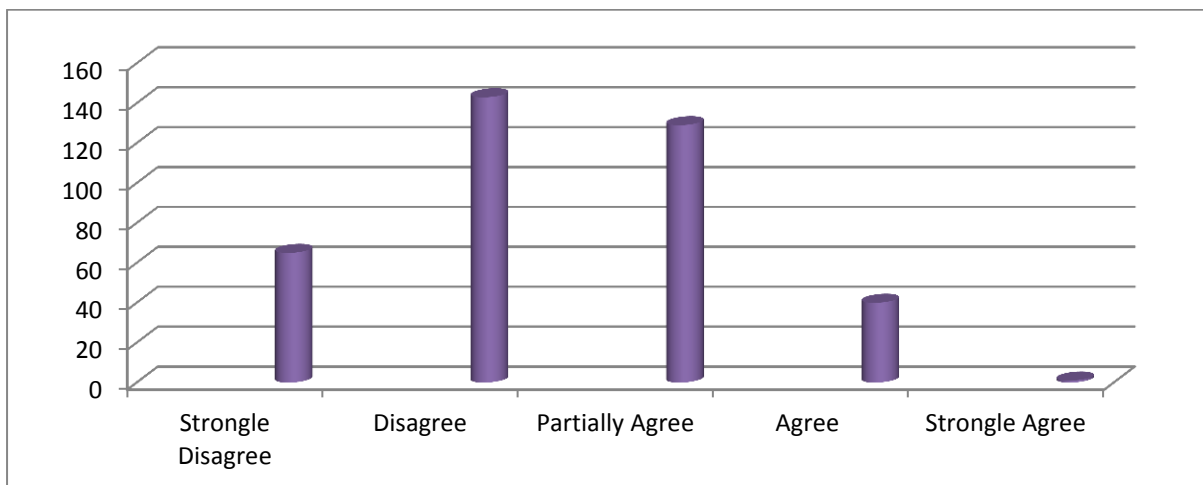


Figure 6.9 Degree of compliance to BC standards for Approval, construction and inspection.

Source: Author's administered questionnaire (2015)

Analysis of the level of enforcement and degree of compliance results

Figure 6.8 presented above indicates 33 strongly disagree respondents representing 8.7% enforcement level, 49.7% respondents disagreed to the level of enforcement and 29.6% partially agreed, 11.1% agree that the level of enforcement of the BC standards and regulations is workable and 0.8% indicate strongly agree on the Likert scale respectively. The results show that 50% of respondents indicate disagree on the MRRB projects level of enforcement for BC standards structural provisions. Table 7.6 is a summary response of level of enforcement and the degree of compliance.

Similarly, Figure 7.9 agreement to the degree of compliance in MRRB projects to BC standards and regulations indicates 60.8% disagree to compliance with approval process, construction and inspections process and 23.5% partially agree and 8.2% agree on the 5-Likert scale respectively. A summary response of level of enforcement and the degree of compliance is shown in Table 7.6.

Table 6.6: A summary response of level of enforcement and the degree of compliance

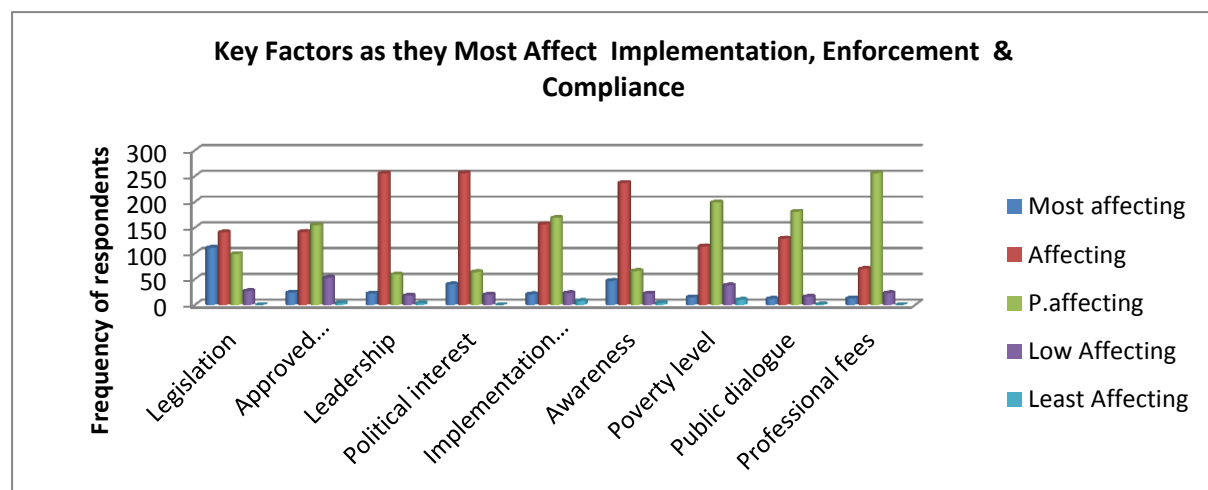
Enforcement level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	33	8.7	8.7	8.7
	Disagree	188	49.7	49.7	58.5
	Partially agree	112	29.6	29.6	88.1
	Agree	42	11.1	11.1	99.2
	Strongly Agree	3	.8	.8	100.0
	Total	378	100.0	100.0	
Degree of Compliance					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	27	7.1	7.1	7.1
	Disagree	230	60.8	60.8	68.0
	Partially agree	89	23.5	23.5	91.5
	Agree	31	8.2	8.2	99.7
	Strongly Agree	1	.3	.3	100.0
	Total	378	100.0	100.0	

Source: (Author's administered questionnaire 2015)

6.5.4 Data & analysis on Key Factors which affect the implementation, enforcement and compliance to BC structural provisions

Question Q3FA:

The respondents were asked to indicate how the key factors affect the implementation, enforcement and compliance with BC standards & regulations structural provisions within MRRB projects on a five point Likert scale of (1 being least affecting and 5 most affecting). The results of the data are summarised graphically as presented in figure 6.10



Source: (Author's administered

Figure 6.10 Factors as they most affect implementation, enforcement and compliance

Source: (Author's administered questionnaire 2015)

Question Q3FB:

The researcher asked the respondents to indicate how the key factors affect development control enforcement process of BC standards provisions for MRRB projects and the following data were gathered as presented graphically in figure 6.11.

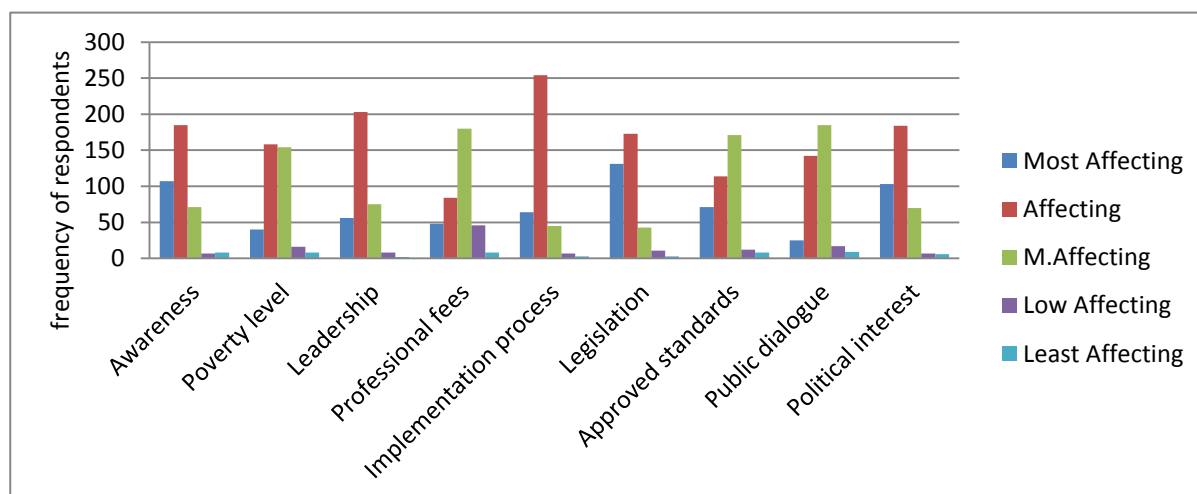


Figure 6.11: Rate of key factors affecting development control enforcement process

Source: (Author's administered questionnaire 2015)

Analysis of the graphical results in Figure 6.8 and Figure 6.9 above

Figure 6.10 presented above indicates response rate of 48.9% affecting 28.3%, most affecting 18.8% medium affecting and 1.9 and 2.1 % least & low affecting respectively for awareness as a factor which affect implementation, enforcement and compliance of BC structural provisions for MRRB projects. Implementation process key factor shows the following response percentages; 68.1% affecting, 17.2% most affecting, 12.1 medium affecting and 0.8 and 1.9% least & low affecting. Legislation indicates 47.9% affecting, 36.3% most affecting, 11.9% medium affecting and leadership factors response shows 59% affecting, 21.8% medium affecting, 16.3% most affecting and 0.6 and 2.3% least & low affecting respectively. Others include, approved standards showing 45.5% medium affecting, 30.3% affecting and 18.9% most affecting and political interest indicates 48.7% affecting, 27.2% most affecting and 18.5% medium affecting and poverty level factor response rate indicates 42% affecting and 41% medium affecting.

In the same manner, Figure 6.11 rate of key factors affecting development control enforcement process response indicates that 63% awareness affects development control enforcement process, 17.6% medium affecting and 12.5% most affecting. Implementation process factor affect development control enforcement process at 44.7% medium affecting, and 41.5% affecting and Legislation indicates 37.3% affecting, 29.4% most affecting, 26% medium affecting and 7.1% low affecting. Approved standard response rate shows 41% medium affecting, 37.6% affecting, 14% low

affecting and 6.3% most affecting. Leadership factor response indicates 68% affecting, 15.9% medium affecting and 9.5% most affecting; political interest shows 66.5% affecting, 10.8% most affecting and 17.3% medium affecting and poverty level indicates 52.9% and 30.3% affecting development control enforcement process for BC standards and regulations structural provisions for MRRB projects in Nigeria.

6.5.5 Data & analysis on the causal factors which impede the implementation, enforcement and compliance of the BC standards structural provisions for MRRB

Question Q4CA:

Respondents were asked in this section to indicate on 5 points Likert scale of (1= strongly disagree and 5= strongly agree) to the causal factors constrains to implementation enforcement and compliance to BC standards and regulations structural provisions for MRRB projects. Figure 6.12 present the data findings graphics.

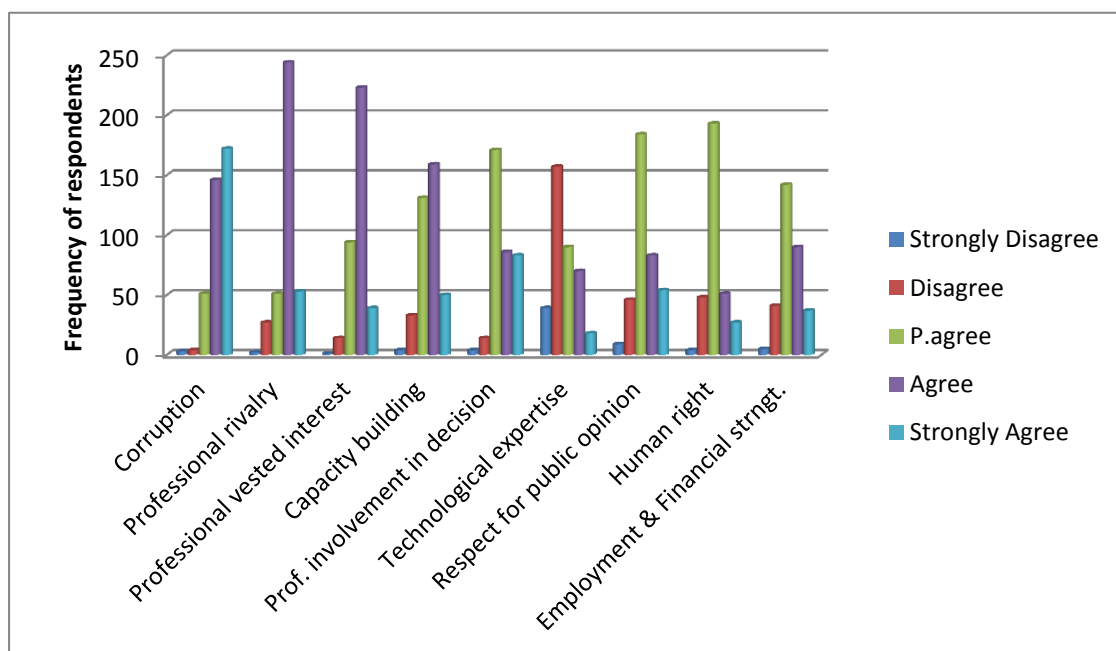


Figure 6.12 Causal factors Constrains to implementation, enforcement and Compliance

Source: (Author's administered questionnaire 2015)

Question Q4CB:

This question asked respondents to indicate their agreement to the causal factors as they lead to non-compliance, poor implementation and enforcement to the structural provisions of the BC standards for MRRB projects and the results is graphically presented in figure 6.13

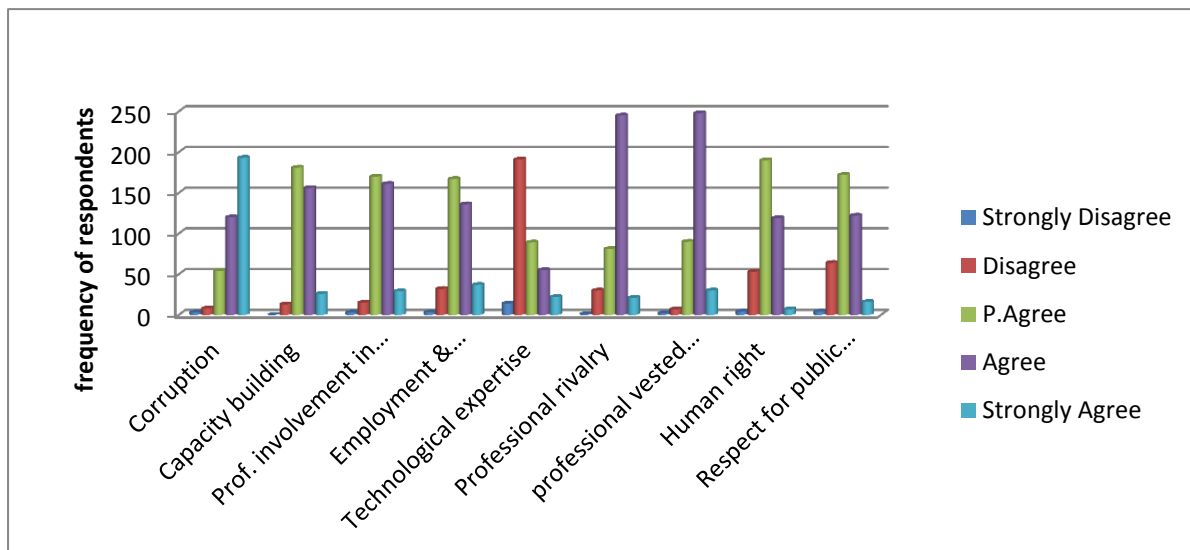


Figure 6.13: Respondents agreement to causal constraints leading to non-compliance, poor implementation and enforcement

Source: (Author's administered questionnaire 2015)

Analysis of the causal graphical results in Figure 6.12 and Figure 6.13 above

From Figure 6.12 shown above 45.7% respondents strongly agree (SA) that corruption as a causal factor affects implementation, enforcement and compliance to BC standards structural provisions for MRRB projects in Nigeria, and 38.8% response indicates agree, 13.5% shows partially agree and 1.1% disagree to corruption affecting. Professional rivalry response rate indicates 64.9% agree, 14.1% strongly agree, 13.3% partially agree, 7.2% disagree to professional rivalry affecting implementation, enforcement and compliance to standards and regulations. Capacity building indicates 42.2% agree, 34.7% partially agree, 13.3% strongly agree and 8.8% disagree and Professional vested interest response indicates 60% agree, 25.3% partially agree, 10.5% strongly agree and 3.8% disagree respectively. Others are; professional involvement in decision making response rate indicates 24% agree, 23.1% strongly agree, 46% partially agree and 3.9% disagree. Technological expertise response rate shows that 42% disagree, 24.1% partially agree, 18.7% agree 10.4% strongly agree on expertise knowledge as the cause of implementation, enforcement and compliance failure and public opinion response indicates 48.9% partially agree, 22.1% agree, 14.4%

strongly agree and 12.2% disagree. Human rights response indicates 59.8% partially agree, 15.8% agree, 8.4 % strongly agree and 14.9% disagree and employment and financial strength response shows 45.4% partially agree, 28.6% agree, 11.7% strongly agree and 12.7% disagree to affecting implementation, enforcement and compliance with BC standards and regulations for MRRB projects respectively.

Similarly, Figure 6.13 agreement to causal constraints leading to non-compliance, poor implementation and enforcement response indicates 51.1% strongly agree, 31.7 agree, 14.3% partially agree and 2.1% disagree respectively for corruption. Capacity building response indicates 48.1% partially agree, 41.5% agree, 7% strongly agree and 3.5% disagree and professional rivalry response shows 64.8% agree, 21.4% partially agree, 7.9% disagree and 5.6% strongly agree. Professional involvement in decision making indicates 42.6% agree, 7.7% strongly agree, 45% partially agree and 4% disagree. For technological expertise, 51% disagree, 24% partially agree, 14.8% strongly agree and 3.8% strongly disagree and professional vested interest shows 66.3% agree, 23.3% partially agree, 8% strongly agree and 2% disagree. Response rate for public opinion indicates 45.5% partially agree, 32.3% agree, 16.9% disagree and 4.2% strongly agree to causal constraints leading to non-compliance, poor implementation and enforcement.

6.5.6 Data & analysis on the impact risks associated with poor-implementation, enforcement and compliance of BC standards structural provisions for MRRB on professional practice, industry development and the end-users.

Question Q5IRA:

In this question the respondents were asked to indicate the impact risks associated with poor implementation, enforcement and non-compliance on professional practice on a 5 point Likert scale of (1 being least risk and 5 most high risks) and the data gathered is presented in figure 6.14.

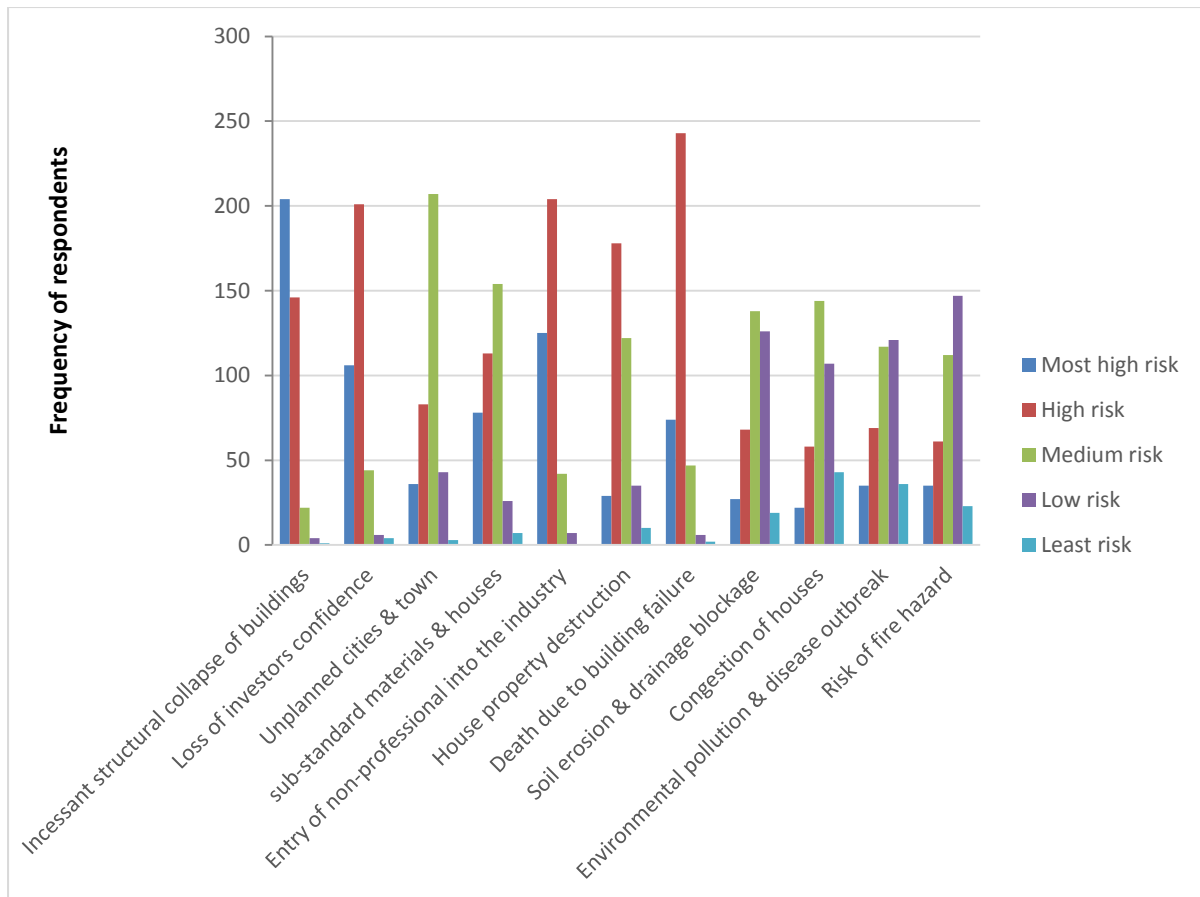


Figure 6.14 Impact risks associated with poor implementation, enforcement & non-compliance

Source: (Author's Administered questionnaire 2015)

Question Q5IRB:

In this question the respondents were asked to indicate their agreement on how the associated impact risks with poor implementation, enforcement and non-compliance affects the industry development, professional practice and end-users on a 5 point Likert scale of (1being strongly disagree and 5 strongly agree) and the data gathered is as presented in figure 6.15

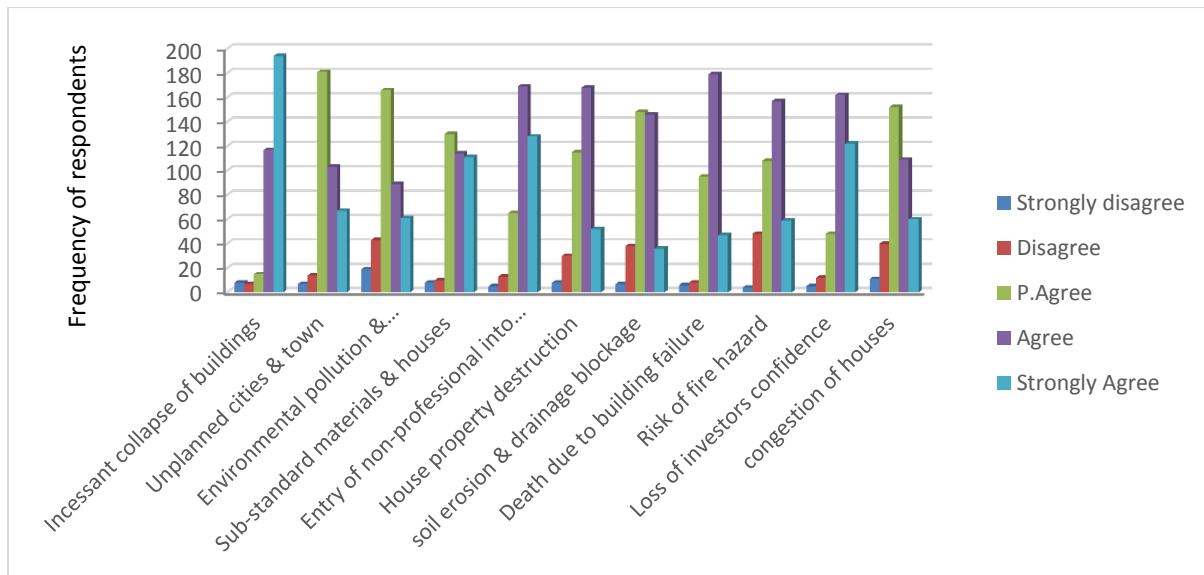


Figure 6.15: Respondents agreement to the associated impact risks on industry development, professional practice and end-users

Source: Author's Administered questionnaire (2015)

Analysis of the associated impact risks results in Figure 6.14 and 6.15

Figure 6.14 presented above for the impact risks associated with poor-implementation, enforcement and compliance of BC standards structural provisions for mid-rise residential buildings (MRRB) on professional practice, industry development and the end-users indicates response rate of 54% most high risk, 38.6% high risk and 6.1% medium risks to profession, industry and end-user for incessant collapse of buildings. Loss of investors' confidence investigated indicates response rate 55% high risk, 30.6% most high risk and 11.7% medium risks and unplanned cities response shows 55.6% medium risks, 22.3% high risks and 11.6% low risks. Entry of non-professionals into the building industry response indicates 54% high risks, 33.1% most high risk and 11.1% medium risk and death as a result of building collapse response indicates 64.5% high risk, 21% most high risk and 12.5% medium risk. Other impact risks percentage response to poor-implementation, enforcement and compliance of BC standards structural provisions for mid-rise residential buildings (MRRB) on professional practice, industry development and the end-users can be seen from figure 6.12 above.

Figure 6.15 respondent's agreement to the associated impact risks on industry development, professional practice and end-users indicates 58.4% strongly agree, 33.7% agree and 4% partially agree on incessant collapse of buildings. Response agreement on the loss of investors' confidence indicates 44% agree, 33.5% strongly agree, 12.8% partially agree and 8% disagree and entry of non-professionals into the industry agreement response shows 44.7% agree, 33.3% strongly agree and

17.2% partially agree. Respondent's agreements on death due to building collapse risk indicate 50% agree, 25.1% partially agree, 21.2% strongly agree and 2.1 disagree and unplanned cities response indicate 50% partially agree, 27% agree, 17.5% strongly agree and 3.7 disagree. Other agreement response percentage to the associated impact risks on industry development, professional practice and end-users can be view from figure 6.13.

6.6 Measures of dispersion (Non-parametric descriptive statistics of dispersion)

Table 6.5 descriptive statistics presented above; provided 378 respondents used to describe the characteristic of the sample mean, standard deviation, variance, Skewness and Kurtosis. The skewness value indicates symmetry of the distribution and kurtosis provides information on the 'peakedness', with perfectly normal distribution; skewness and kurtosis value will be zero (0), but very difficult to obtain in statistic social sciences (Pallant, J. 2013: 59). We obtain positive skew (scores to the left at low values) and negative skew of scores to the right side end. Similarly, positive kurtosis indicates that the distribution is clustered in the centre (peaked) and negative kurtosis indicates a distribution that is relatively flats (too many cases in the extreme) (Pallant 2013:59).

Tabachnick and Fidell, (2013:80-81) cited in Pallant (2013:59) argued that skewness and kurtosis are too sensitive with large samples (200 + cases) of not making substantial difference in the analysis and but possibly reduced the risk of kurtosis and recommended the use of histogram to inspect the shape of the distribution. See appendix... for sample histogram.

Pallant (2013) advised the use of non-parametric descriptive statistics (median) for the indication of the spread or dispersion of the scores using Inter-Quartile range (IQR) which do not assume a normal distribution to report 25th percentile and the 75th percentile values and the percentile 50 as actual median (Md) when you have skewed data. For example, Table 6.7 is a summary of non-parametric descriptive statistics for this study. In which age variable indicate Md = 4.0 (IQR:3, 4), sex indicate Md = 1 (IQR:1, 1), educational qualification shows Md = 5 (IQR:3,5), professional discipline indicate Md = 1 (IQR:1,2) and years of experience indicate Md = 3 (IQR:2,3) sample characteristics respectively.

Table6.7: Non-parametric descriptive statistics of dispersion

		Age	Sex	Educational qualification	Profession (Occupation)	Years of Experience
N	Valid	378	378	378	378	378
	Missing					
Median		4.0000	1.0000	5.0000	1.0000	3.0000
Range		5.00	1.00	6.00	1.00	5.00
Sum		1375.00	465.00	1704.00	496.00	1242.00
Percentiles	25	3.0000	1.0000	3.0000	1.0000	2.0000
	50	4.0000	1.0000	5.0000	1.0000	3.0000
	75	4.0000	1.0000	5.0000	2.0000	4.0000

Source: (Author's Administered questionnaire 2015)

6.6.1 Data ranking by mean score (Mean weighted rating, RII)

The indices used for data collection by this research are now ranked using means score index, severity index or relative importance index for ranking adapted for use by the author from Spiegel, M. R and Stephens, L. J (2014:62-63); Mbamali and Okotie (2012:146); Al-fahad (2012:0-1 Appendix I) weighted arithmetic mean variables data analysis procedure for similar scale of 1-5 (See appendix... for the computation procedure). A summary of the Mean Average Weighted Rating for ranking results are shown in Table 6.8.

Table 6.8: Mean Average Weighted Rating for Ranking

S/no	Variable Factors				Rank	Overall Ranking of Variables
		$\sum f$	$\bar{X}$	RII		
Key Factors Ranking						
1	Legislation	378	3.923	0.704	5 th	15
2	Approved standard	378	3.512	0.702	6 th	16
3	Leadership	378	3.889	0.778	3 rd	10
4	Political interest	378	3.918	0.784	2 nd	9
5	Implementation process	378	4.021	0.804	1 st	7
6	Awareness	378	3.815	0.763	4 th	11
7	Poverty level	378	3.355	0.671	7 th	23
8	Public dialogue	378	3.064	0.613	8 th	24

9	Professional fees	378	2.899	0.579	9 th	26
Causal Factors ranking						
10	Corruption	378	4.616	0.932	1 st	1
11	Professional rivalry	378	3.931	0.786	3 rd	8
12	Professional vested interest	378	4.058	0.812	2 nd	6
13	Capacity building	378	3.706	0.741	4 th	13
14	Professional involvement in decision making	378	3.667	0.733	5 th	14
15	Technological expertise	378	2.611	0.522	9 th	28
16	Respect public opinion	378	3.032	0.606	8 th	25
17	Human right	378	3.064	0.613	7 th	24
18	Employment and financial strength	378	3.368	0.674	6 th	22
Impact Risks Ranking						
19	Incessant Collapse of buildings	378	4.661	0.923	1 st	2
20	Unplanned cities	378	3.442	0.688	7 th	18
21	Loss of investors' confidence	378	4.228	0.846	2 nd	3
22	Sub-standard materials and houses in the industry	378	3.786	0.757	5 th	12
23	Entry of non-professionals into the industry	378	4.135	0.827	4 th	5 th
24	House property and investment destruction	378	3.415	0.683	8 th	19 th
25	Death due to building collapse	378	4.217	0.843	3 rd	4 th
26	Soil erosion and drainage blockage	378	3.479	0.696	6 th	17 th
27	Congestions of houses	378	3.402	0.680	9 th	20 th
28	Fire Hazard	378	3.389	0.678	10 th	21 st
29	Environmental pollution and disease outbreak as a result of waste disposal	378	2..786	0.557	11 th	27 th

Source: Author field survey (July 2015- January 2016)

Analysis of Mean weighted rating, RII

Table 6.8 variable factors ranking using weighted mean score and Relative Importance Index (RII) indicates Implementation process of the standard and regulations as being ranked first with RII of 0.804, political interest 2nd with RII of 0.784 and leadership 3rd with RII values of 0.778 amongst the key factors affecting the development and implementation of the structural aspects of the BC standard and regulations for high-rise residential development project. Of which, within the causal variable factors; corruption is the 1st with RII values of 0.932, professional vested interested with RII = 0.812 is 2nd and professional rivalry is ranked 3rd with RII values of 0.786. Others were capacity building= 4th, professional involvement in decision making is 5th on queue within the causal factors. The first (1st) ranked within impact risk is the Incessant collapse of buildings with RII = 0.923, loss of investors' confidence is the 2nd ranked with RII = 0.846 and Death due to building collapse is 3rd with RII of 0.843, entry of non-professional into the industry with RII values of 0.827 is the 4th ranked.

The overall ranking column of the twenty nine (29) variables presented for ranking indicates corruption as first (1st) with RII = 0.932, Incessant collapse of buildings is second (2nd) with RII = 0.923, loss of investors' confidence is the third (3rd) ranked with RII = 0.846, Death due to building collapse is the overall fourth (4th) ranked with RII of 0.843 and entry of non-professional into the building industry is the overall fifth (5th) ranked with RII values of 0.827. Professional vested interest, implementation process and professional rivalry overall ranking is 6, 7, 8 and RII values of 0.812, 0.804 and 0.786 respectively.

6.6.2 Data Scale Reliability Analysis and validation

Reliability analysis of research scale is to indicate freedom of sampling procedure from random error within the construct or variable and also to check if items within the same scale measure the same construct. This is achieved by using indicators of scale reliability in two ways, namely; test-retest which involves administering the scale to the same people on two different scenario and secondly, by internal consistency to show if the items are measuring the same 'underlying attribute or hang together' (Pallant, 2013:6).

Scale validity means how accurate the scale measures exact intent to be measured and it goes with empirical testing of hypotheses developed from theory concerning the scale used (Pallant, 2013). Scale validity comes in three dimensions, including; content validity which indicate adequacy of scale samples from the intended population, Criterion validity which involve the relationship between

scores on scale and specified measurable criterion and construct validity which involve testing the scale against criteria (not criterion) from theoretical and test of research hypothesis (Pallant, 2013). Construct validity is the type of validity for this research by investigating its relationship with other variables or construct using two approaches (Cronbach's Alpha & KMO and Bartlett's Test of Sphericity) for the test by IBM SPSS 23.

Reliability of scale using CRONBACH'S COEFFICIENT ALPHA

Using Cronbach's Alpha, a minimum of 0.7 Alpha values is recommended and the larger the number of items on the scale the better since fewer items indicates small Cronbach's Alpha value. Low reliability scale means that low correlation within the items and therefore, low construct from the same region. In such cases correlation values are 0.2 to 0.4 which amount of shared values is $0.2 \times 0.2 = 0.04$ (4%), if 0.5 meaning 25% shared values (Nunnally 1978; Briggs & Cheek, 1986 cited in Pallant, 2013). For this research the Cronbach's Alpha indicate 0.843 above the minimum requirement as in Table 7.9.

Table 7.9: Cronbach's Alpha Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.843	.157	21

Source: (Author's Administered questionnaire 2015)

6.7 Exploratory Factor Analysis Results

They are basically two types of factor analysis, including; Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) (Williams, B., Brown, T., & Onsman, A.2010). This research used Exploratory Factor Analysis to investigate, CFA to confirm factor loadings of variables, and the research developed theoretical model for future Structural Equation Model SEM analysis.

Why the use of factor analysis?

Williams *et al* (2010:3) described 'factor analysis as intimately involved with questions of validity at the heart of the measurement of psychological constructs in psychology and education'.

Factor analysis is a multivariate statistical procedure that has many uses, for example, it reduces a large number of variables into a smaller set of variables called factors. It also provides a construct validity evidence of self-reporting questionnaire scales (examine construct validity of scale test) and it establishes underline dimensions between measured variables and the latent construct, used to develop theoretical constructs for decision-making, and used to prove or disprove proposed theories (Williams *et al*, 2010). Hogarty, K. Y., Hines, C.V., Kromrey, J.D., Ferron, J.M and Mumford, K.R (2005) stress that exploratory factor analysis investigates the relationship between sample size and at the same time determine the quality of factor solutions obtained from the analysis.

6.7.1 Guides to understanding exploratory factor analysis (EFA)

Exploratory Factor Analysis (EFA) was employed to remove data redundancy and revealing the underlining pattern of variables. Factor Correlation Matrix, Structure Matrix and Pattern Matrix were employed to examine the research hypothesis because of its general revelation of dependent and independent variables association. Basically, this research exploratory factor analysis is conducted through an extraction method called Maximum Likelihood (MLE) and the rotation method for this research is by Oblimin with Kaiser Normalisation.

For the purpose of the readers of this thesis, brief description of EFA criterion and steps for factor analysis is presented.

Pallant (2013:189-192) argued that there are three main steps in conducting factor analysis, namely; **Step 1:** 'Assessment of the suitability of the data for factor analysis'; this consider sample size and strength of relationships among the variables or items.

Step 2: 'Factor extraction'; this involves using different approaches such as Principal components extraction, image factoring, maximum likelihood factoring, alpha factoring, un-weighted least squares and general least squares to determine the smallest of factors that can be used to best represent the interrelationships among the variables. Techniques for decisions on factors to retain as argued by pallant (2013) are Kaiser's criterion for eigenvalue; scree test for plotting each of the eigenvalues of the factors and parallel analysis of comparing the size of eigenvalues with those randomly generated data set of the same size, and

Step 3: 'Factor rotation and interpretation'; this involves rotating the factors to present the pattern of loadings in for easier interpretation. It can be 'orthogonal (uncorrelated) or oblique (correlate)' (Pallant, 2013:192).

However, Williams *et al*, (2010) argued out the five-Step exploratory factor Analysis Protocol as shown in Figure6.16

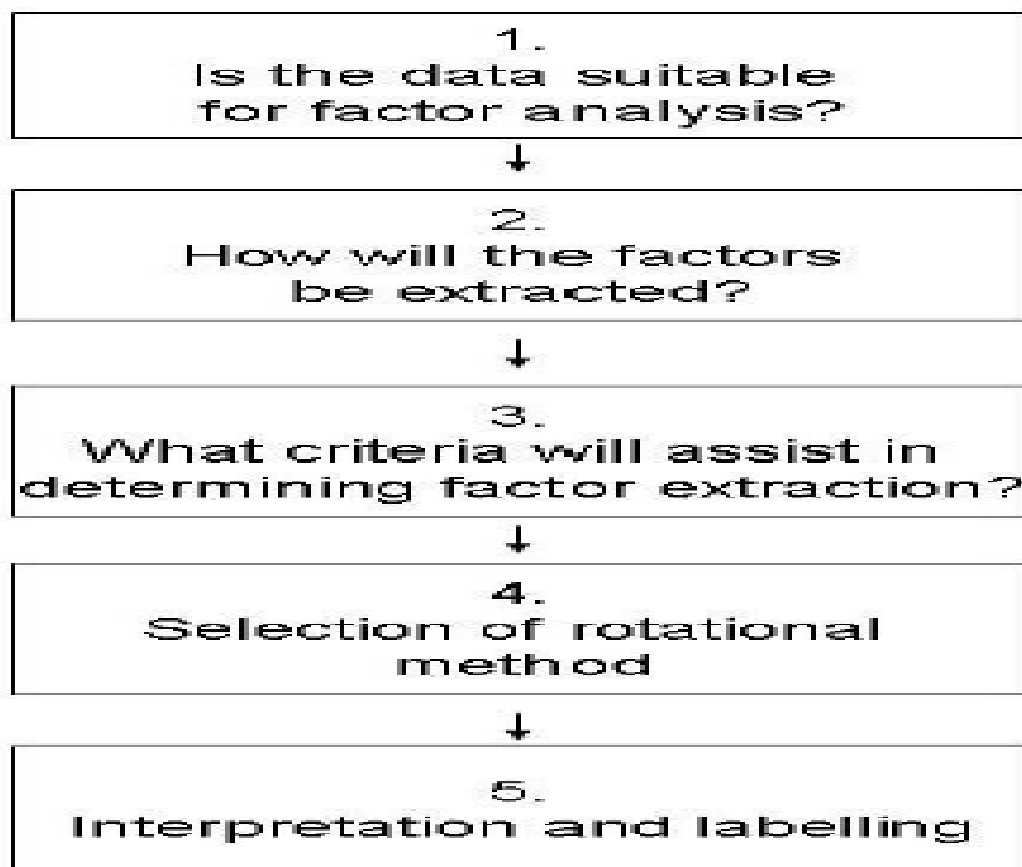


Figure6. 16: The 5-step Exploratory Factor Analysis Protocol

Source: (Adapted from Williams, B., Brown, T., & Onsman, A.2010:5)

Figure6. 16: The 5-step exploratory factor analysis Protocol according to Williams et al (2010) is briefly explained as follows:

Step 1: Is the data suitable for factor analysis?

Previous research concerning the sample size accurate guide or principle varies in their opinions. For example, Hogarty, K. Y., Hines, C.V., Kromrey, J.D., Ferron, J.M and Mumford, K.R (2005:203) noted that the disagreement among researchers on recommendation of 100 to 250 adequate sample size and others on “100 = poor, 200 = fair, 300 = good, 500 = very good, and 1000 = excellent with others on 10: 1 and 20:1 have not served researchers well”.

Costello, A. B and Osborne, J. W (2005) within the confusion of adequacy of the sample size and item ratio conducted an investigation and the findings of the percentage current practice in factor analysis adherence to the rule of thumb shown in Table 7.10

Table6:10 Current practices in factor analysis

Subject to item ratio	% of studies	Cumulative %
2:1 or less	14.7%	14.7%
>2:1, ≤ 5:1	25.8%	40.5%
>5:1, ≤ 10:1	22.7%	63.2%
>10:1, ≤ 20:1	15.4%	78.6%
20:1, ≤ 100:1	18.4%	97.0%
>100:1	3.0%	100.0%

Source: Adapted by Author from (Costello, A. B and Osborne, J. W 2005:4)

In which, Velicer and Fara, (1998) cited in Costello and Osborne (2005) argued that variable samples extraction of 0.8 or greater is high communalities, 0.40 to 0.70 is low to moderate and predominant in social sciences and communalities 0.4 or less variables may not be related to others. Williams view 0.6 communalities of factor loadings as high and achieving correlation coefficients >.80 to require small sample size in 50 cases can be adequate in such cases. Tabachnick and Fidell, (2001) cited Costello and Osborne cite 0.32 as a good rule of thumb for the minimum loading of items and 2 or more items loading on a factor to give exact notation and 5 or more items is a strong loading factors.

Step 2: How will the factors be extracted?

Williams et al (2010) approaches to variable factor extraction is the same as that of Pallant (2013) to simplify the factor structure of group of items using rotation to separate high loading factors to one component and smaller loading factors on other components.

Step 3: What will assist in determining factor extraction?

Williams argued that the aim of factor extraction is to reduce large number of items or variables in factors and this is guided by various rules. For example Kaiser's criteria for eigenvalue (> 1 rule); cumulative percent of variance, according to Williams *et al* (2010) this have no fixed threshold and many research suggest 95% variance in natural science and 50-60% in humanities; scree test for plotting each of the eigenvalues of the factors and this requires 2 steps for inspecting and interpretation, including; drawing a straight line through the small eigenvalue and any departure indicates a break of much contributing factors; secondly, the point above the break indicates the number of factors to be retained as a rule (Williams et al, 2010). Parallel analysis of comparing the

size of actual eigenvalues with those random order eigenvalues generated data set of the same size from parallel analysis is another determinant for factor extraction suggested by Williams.

Step 4: Selection of rotational method

Factor rotation maximise high items loading and minimise low items loading for more and easy interpretable solutions (Williams *et al*, 2010). The present Orthogonal and Oblique rotation as the two common techniques used by researchers and importantly stated that items that do not load or assign to a factor can be discarded in factor rotation.

Step 5: Interpretation and labelling

This involves examination of the results in attributing variables to a factor and label or give that factor a name or theme relating to their common area. For example, if those factor loading are related to failure, they can be labelled as failure factor or failure design. Williams *et al* (2010) noted that by tradition, at least two (2) or three (3) variables must load a factor to have a meaningful interpretation of the output. Williams *et al* (2010:7) argued that factor labelling is a “subjective, theoretical and inductive process” and Henson and Robert (2006) cited in Williams *et al* note that the meaningfulness of latent factors is ultimately dependent on researcher definition or label. Williams stressed that when factors are thoroughly and systematically isolated with variables loading in pattern matrices it has explained the majority of responses, which should be put into use and descriptively labelled by researcher to reflect the construct of the theoretical and conceptual intent of the research.

Now this research can present the exploratory factor analysis in the next section

6.7.2 Exploratory factor analysis (EFA) first variables extraction results

Suitability of the sampling data using KAISER-MEYER-OLKIN (KMO) AND BARTLETT'S TEST OF SPHERICITY

Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity was first observed to test the sampling adequacy and probability of correlation that exist in some variables and the results are significant. It is worthy of note that factor analysis exploration technique interpretation and the use it is put to, is

up to the researchers judgement of research intent and extractions and not any hard and fast statistical rules (Pallant, 2013).

Kaiser-Meyer-Olkin Measure of sampling adequacy value suitable at 0.5 Williams et al (2010) and 0.6 (Pallant 2013), Hassan, S., Ismail, N., Jaafar, W.Y., Ghazali, K., Budin, K., Gabda, D and Samad, A. S. A (2012) and above for the data set to be suitable for factor analysis and that of Bartlett's Test of Sphericity value is significant at 0.05 or less for suitability. For this research data first extraction the KMO value is 0.695 and the Bartlets test is significant ($P=0.000$) which means factor analysis is appropriate as shown in Table6.11

Table6.11: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.			.695
Bartlett's	Test	of Approx. Chi-Square	20359.782
Sphericity		df	1770
		Sig.	.000

Source: (Author's Administered questionnaire 2015)

Factor extraction and the determining criteria

This research data communalities indicates seven (7) variables > 0.6 , thirty-one variables (31) variables > 0.7 and twenty two (22) variables or items > 0.8 .

Total variance explained

Seventeen (17) indicators meet the Kaiser Criterion with initial eigenvalues of 1 or more and were extracted as explained with total variance shown in Table 6.12. Before rotation 100% is explored using sixty (60) indicators, after rotation, 75.3% is explored by 17 factors in the first extraction.

Table 6.12: Total variance explained

Factor	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.688	12.814	12.814	7.688	12.814	12.814	6.568	10.946	10.946
2	7.212	12.020	24.834	7.212	12.020	24.834	5.150	8.583	19.529
3	4.632	7.719	32.553	4.632	7.719	32.553	3.607	6.011	25.540
4	3.498	5.830	38.384	3.498	5.830	38.384	3.297	5.495	31.034
5	3.049	5.082	43.465	3.049	5.082	43.465	3.018	5.029	36.064
6	2.581	4.302	47.768	2.581	4.302	47.768	2.871	4.785	40.848
7	2.449	4.082	51.850	2.449	4.082	51.850	2.462	4.104	44.952
8	2.002	3.337	55.187	2.002	3.337	55.187	2.345	3.909	48.861
9	1.942	3.237	58.423	1.942	3.237	58.423	2.176	3.627	52.488
10	1.674	2.790	61.214	1.674	2.790	61.214	2.002	3.336	55.824
11	1.477	2.462	63.676	1.477	2.462	63.676	1.980	3.300	59.124
12	1.321	2.202	65.878	1.321	2.202	65.878	1.867	3.111	62.235
13	1.239	2.065	67.944	1.239	2.065	67.944	1.828	3.047	65.282
14	1.158	1.930	69.873	1.158	1.930	69.873	1.740	2.900	68.182
15	1.123	1.872	71.745	1.123	1.872	71.745	1.630	2.717	70.900
16	1.119	1.866	73.611	1.119	1.866	73.611	1.411	2.352	73.252
17	1.003	1.672	75.283	1.003	1.672	75.283	1.219	2.031	75.283
18	.923	1.538	76.821						
19	.891	1.485	78.306						
20	.810	1.351	79.656						
21	.775	1.291	80.947						
22	.772	1.287	82.234						
23	.757	1.262	83.496						
24	.731	1.218	84.714						
25	.645	1.075	85.789						
26	.623	1.038	86.827						
27	.557	.929	87.756						
28	.538	.897	88.653						
29	.527	.878	89.531						
30	.495	.825	90.355						

31	.459	.765	91.120						
32	.401	.668	91.789						
33	.370	.617	92.406						
34	.359	.598	93.004						
35	.345	.575	93.578						
36	.322	.536	94.114						
37	.317	.528	94.643						
38	.290	.484	95.126						
39	.278	.464	95.590						
40	.265	.442	96.032						
41	.247	.411	96.443						
42	.217	.361	96.805						
43	.209	.348	97.152						
44	.199	.331	97.483						
45	.182	.303	97.787						
46	.170	.283	98.069						
47	.162	.269	98.339						
48	.134	.223	98.562						
49	.127	.211	98.773						
50	.114	.190	98.963						
51	.101	.168	99.132						
52	.086	.143	99.274						
53	.079	.132	99.407						
54	.073	.122	99.529						
55	.067	.111	99.640						
56	.060	.100	99.740						
57	.049	.081	99.821						
58	.046	.076	99.898						
59	.034	.056	99.954						
60	.028	.046	100.000						

Extraction Method: Maximum Likelihood.

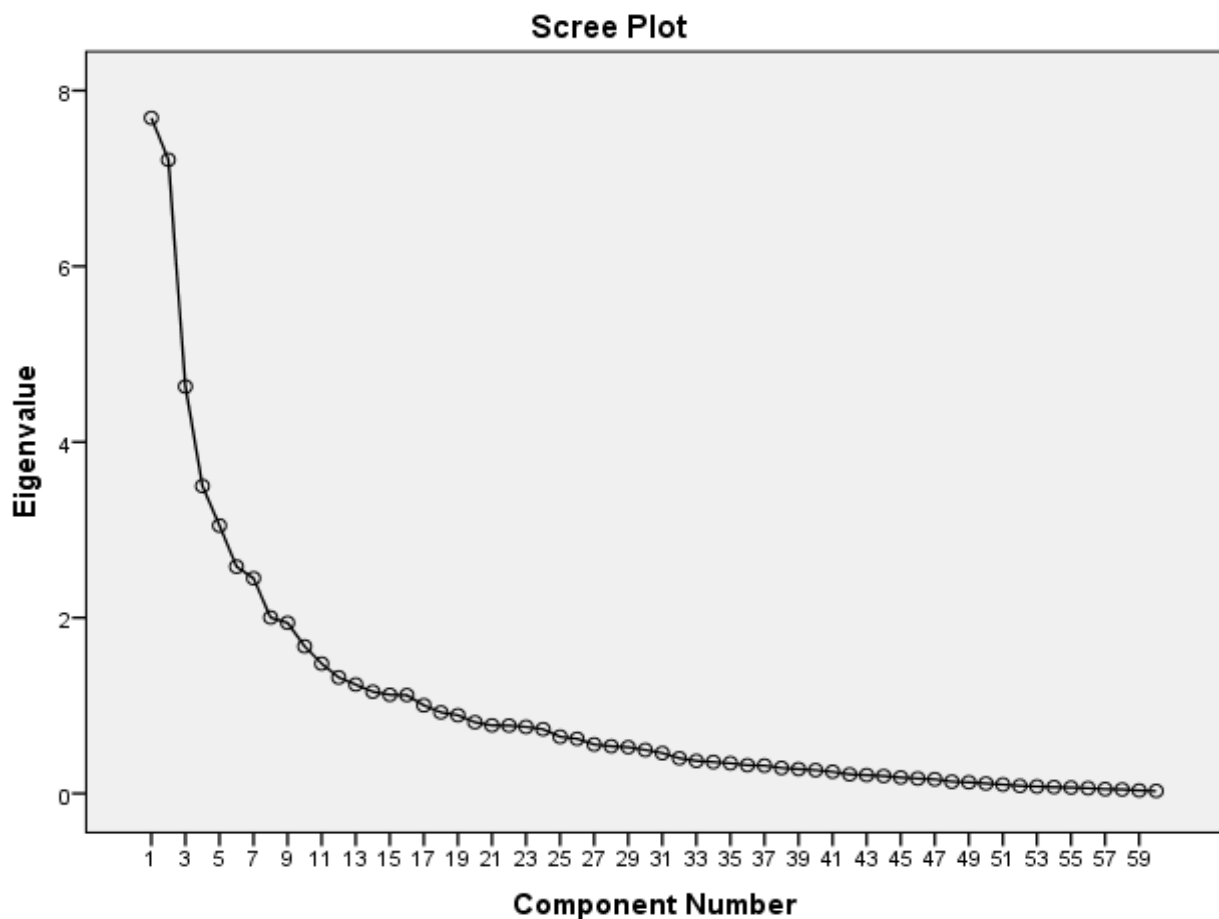
a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Source: (Author's Administered questionnaire 2015)

Scree plot test

In the inspection of scree plot test and eigenvalue criterion shown in Figure 7.17 indicates linear departure and several breaking points capturing data for analysis. This departure indicates more exploration, for example; there is a departure at point 6 to 7 as factors suitable for analysis, another suggestion at point 8 to 9, 16 to 17, 25 and 32 points indicating suitability for analysis through more exploration. However, eigenvalues >1 captured 17 variables or items suitable for analysis and further inspection of the eigenvalues shows some items standing alone violating the rule of thumb of two or more items must load on a factor to be given a meaningful label. The presentation and labels of the first extraction of the 17 items is done before second (2) exploratory factor was conducted after manipulating the variables which was used for final analysis by this research.

Figure 6.17: Scree test factor extraction criterion



Source: (Author's Administered questionnaire 2015)

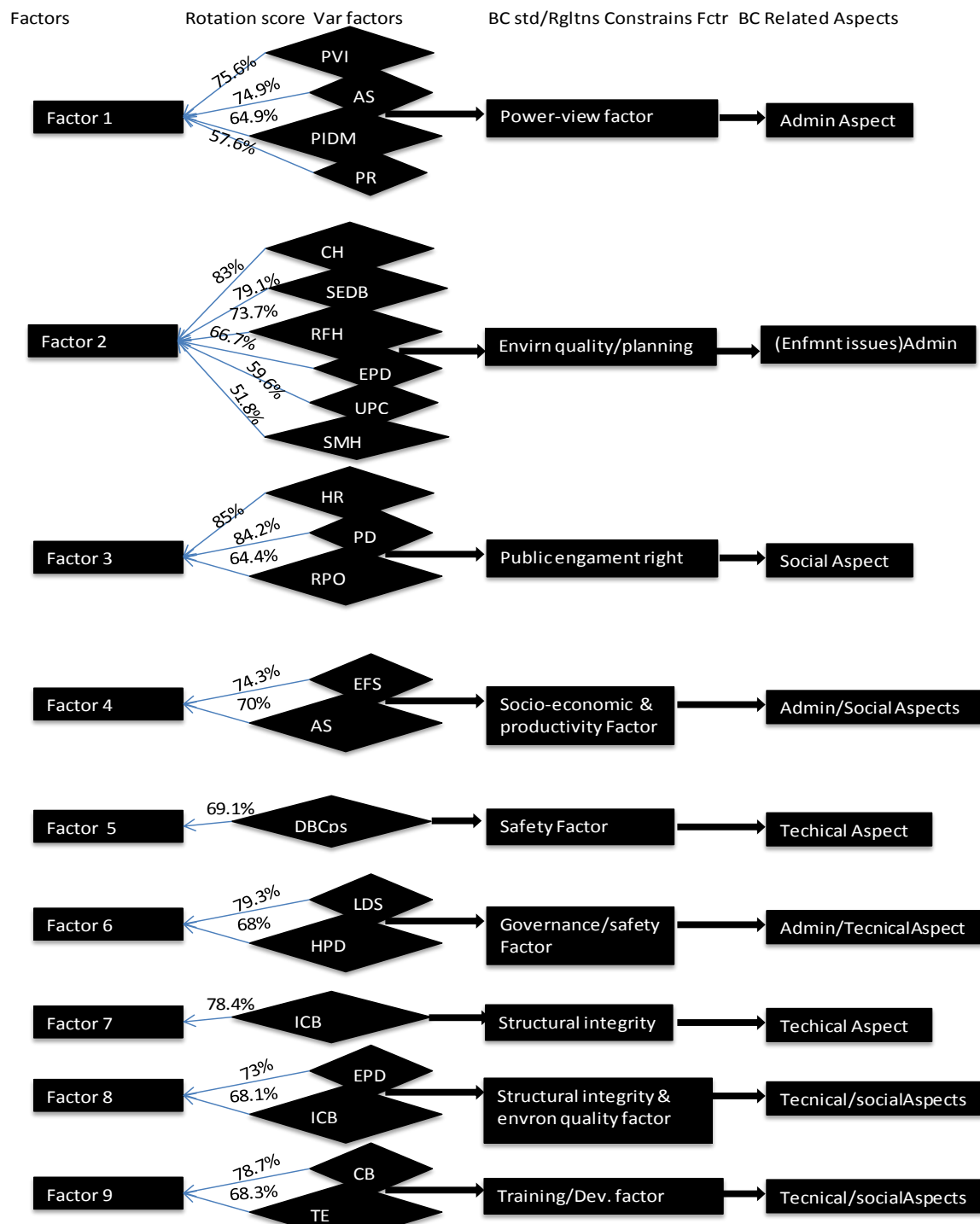
Table 6.13: Factor rotation and labelling

Component (factor)	Component (factor) attributes name	Rotation component score	Factor labelling by researcher	BCs Related Aspects
1	- Professional vested interest - Approved standard - Professional involvement in decision making - Professional rivalry	0.756 0.749 0.649 0.576	Power-view	Administrative aspect
2	- Congestion of houses - Soil erosion and drainage blockage - Risk of fire hazard - Environmental pollution and disease - Unplanned cities - Substandard materials & house	0.830 0.791 0.737 0.667 0.596 0.518	Environmental quality planning factor	(enforcement issues) (Administrative Aspect)
3	- Human right - Public dialogue - Respect for public opinion	0.850 0.842 0.644	Public engagement right	sociological Aspect
4	- Employment & financial strength - Approved standard	0.743 0.700	Socio-economic & productivity factor	Admin/social Aspects
5	Death due to collapse of building	0.691	Safety factor	Technical aspect
6	- Leadership - House property destruction	0.793 0.680	Governance and safety factor	Administrative/Technical Aspect

7	• Incessant collapse of buildings	0.784	Structural integrity of buildings factor	Technical Aspect
8	• Environmental pollution and disease • Incessant collapse of buildings	0.725 0.681	Structural integrity & environment-quality factor	Technical impact on environment (Technical/social Aspects)
9	• Capacity building • Technological expertise	0.787 0.683	Training and development factor	(Technical Aspect)
10	• Professional fees • substandard materials & houses	0.763 0.637	Poverty factor	Social Aspect
11	• House property destruction	0.768	Safety factor	Technical/social aspect
12	• legislation	0.737	Legal factor	Legislative backing (Legal Aspect)
13	• implementation process	0.647	Installation Experience factor	Technical Aspect
14	• loss of investors' confidence	0.742	Economic value factor	Economic aspect
15	• Awareness • political interest	0.794 0.669	Governance factor	Administrative Aspect
16	• enforcement level	0.723	Monitoring factor	Administrative Aspect
17	• corruption	0.810	Petty & Grand corruption factor in Governance	Administrative Aspect

Source: (Author construction 2016)

Figure 6.18 is a summary of factor loading of the first EFA variables extraction



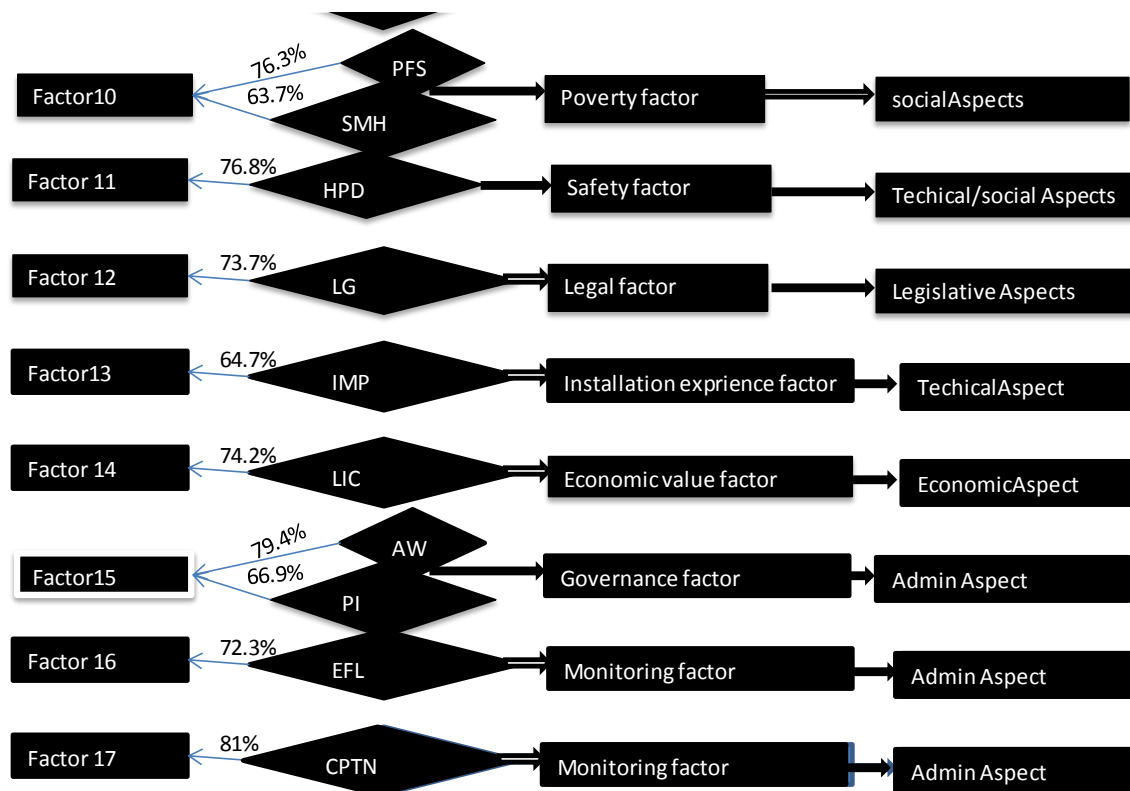


Figure 6.18: Factor loading and research labels for 1st extraction

Figure 6. 18 above violated some rule of thumb in step 5 for EFA. For example, two or three variable factors must load on a factor to have meaningful labels (Williams et al, 2010). For this research first extraction the following variables refused to load to form a factor with others, factor 5 (Death due to building collapse), factor 7 (Incessant collapse of buildings), factor 11 (house property destruction), factor 12 (Legislation), 13 (implementation process), factor 14 (loss of investors' confidence), factor 16 (enforcement level) and factor 17 (corruption). This has necessitated further exploration for reduction of variables and to form more meaningful factors for analysis.

6.7.3 EFA second variables extraction results

Table 6. 14 shows KMO and Bartlett's test for the second reduction EFA suitability and sampling adequacy with KMO of 0.923 and the Bartlett's test is significant ($P < 0.01$)

Table 6.14: KMO and Bartlett's Test second reduction suitability test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.923
Bartlett's Test of Sphericity	Approx. Chi-Square	8251.838
	df	55
	Sig.	.000

Source: (Author's Administered questionnaire 2015)

The variables data communalities for second data reduction process explore 21 variables which indicates variables > 0.6, other variables > 0.7 and some items >0.8. The items (variables) were reduced from sixty (60) to twenty (21) after manipulating the items and removal of items that shows communalities of < 0.6. See variables communalities in appendix: 7A

Total variance explained

Eight (8) items meet the Kaiser Criterion with initial eigenvalues of 1 or more and were extracted as explained with total variance shown in Table 7.15. Before rotation 100% is explored using twenty one (21) items, after rotation, 67% is explored by eight (8) items in the second extraction using Maximum Likelihood extraction method.

Table 6.15: Total Variance Explained for second variable reduction

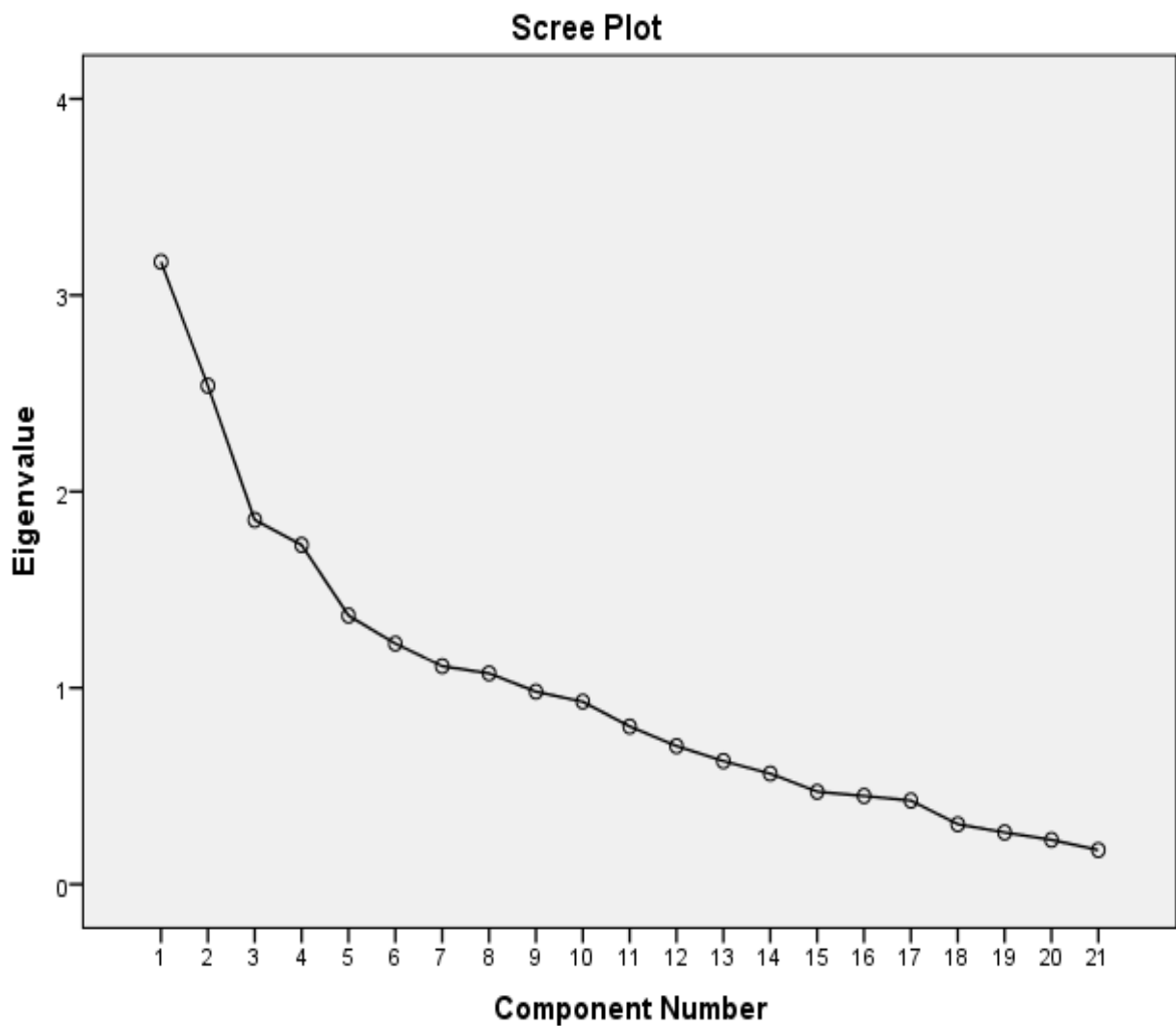
Factor	Total Variance Explained								
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.170	15.095	15.095	3.170	15.095	15.095	2.313	11.015	11.015
2	2.539	12.091	27.186	2.539	12.091	27.186	2.026	9.646	20.660
3	1.855	8.835	36.021	1.855	8.835	36.021	1.983	9.444	30.104
4	1.728	8.231	44.252	1.728	8.231	44.252	1.935	9.212	39.316
5	1.369	6.517	50.768	1.369	6.517	50.768	1.801	8.577	47.893
6	1.226	5.837	56.605	1.226	5.837	56.605	1.462	6.961	54.855
7	1.111	5.290	61.895	1.111	5.290	61.895	1.388	6.611	61.466
8	1.074	5.115	67.010	1.074	5.115	67.010	1.164	5.544	67.010
9	.981	4.671	71.681						
10	.930	4.429	76.110						
11	.804	3.827	79.937						
12	.704	3.351	83.288						
13	.628	2.989	86.277						
14	.564	2.684	88.961						
15	.471	2.245	91.206						
16	.450	2.142	93.347						
17	.427	2.031	95.379						
18	.306	1.457	96.836						
19	.264	1.257	98.093						
20	.226	1.076	99.169						
21	.174	.831	100.000						
Extraction Method: Maximum Likelihood.									
a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.									

Source: (Author's Administered questionnaire 2015)

Scree plot test for the second items extraction

In the inspection of scree plot test and eigenvalue criterion shown in Figure 6.19 indicates linear departure and breaking points capturing data for analysis. This departure indicates more exploration, for example; there is a departure at point 3 to 4 as factors suitable for analysis and breaking suggestion at point 8 indicating suitability for analysis.

Figure 6.19: Scree test factor extraction for the second items extraction



7.7.4 Tables of factor loadings of each of the variables (items) for the second extraction

Direct Oblimin rotation of the items provides two tables of loadings. Table 6.16 is the Pattern Matrix which shows the rotated factor loadings of each of the variables to be labelled and Table 6.17 is the Structure Matrix table which shows the correlation between the variables and the factors. See the appendix 7B for un-rotated loadings of variables. Item(s) loadings indicates professional rivalry (PR) at 0.72, professional involvement in decision making (PIDM) at 0.81, and professional vested interest (PVI) at 0.66 on component one (1). Other items loadings is as shown in table 6.16 and also as indicated in factors labels for identification in table 6.18

Table 6.18 present the summary of the factor labels for the eight (8) variables (items) which meet Kaiser Criterion and were extracted by Maximum Likelihood and rotation method by Oblimin with Kaiser Normalisation. Factor 1 indicates the following items (PR, PIDM, PVI) and were label power-view factor which relates to administrative aspect of the building code (BC) standards and regulations, factor 2 indicates approved standards (AS) and employment and financial strength (EFS) and factor 3 indicates technological expertise (TE), capacity building (CB), and substandard materials and houses (SMH) and were label training and development related to technical aspects of the building code standards and regulations. Other factor labels and related BC aspects is as shown in table 6.18.

Table 6.18: Factor extraction labels

Factor	Variable names	Factor research ID (Labels)	BC Related aspects
1	- Professional rivalry (PR) - Professional involvement in decision making (PIDM) - Professional vested interest (PVI)	Power-view factor	Administrative aspect
2	- Approved standard (AS) - Employment and financial (EFS) strength	Socio-economic & empowerment factor	Admin/social aspect
3	- Technological expertise (TE) - Capacity building (CB) - Substandard materials and houses (SMH)	Training & development factor	Technical aspect
4	- Leadership - House property destruction	Governance & safety factor	Admin/technical aspect
5	- Respect for public opinion - Human right - Public dialogue	Public right	Social Aspect
6	- Legislation - Loss of investors' confidence	economic value and legal factor	Admin/economic value aspect
7	- Environmental pollution & disease - Incessant collapse of buildings	Environ/structural quality factor	Admin/technical aspect
8	- corruption - Political interest	Petty & Grand corruption effect	Admin aspect

Figure6.20 depicts a summary of the pattern matrix factor loadings, factor research labels and related aspects of the building code standards and regulations.

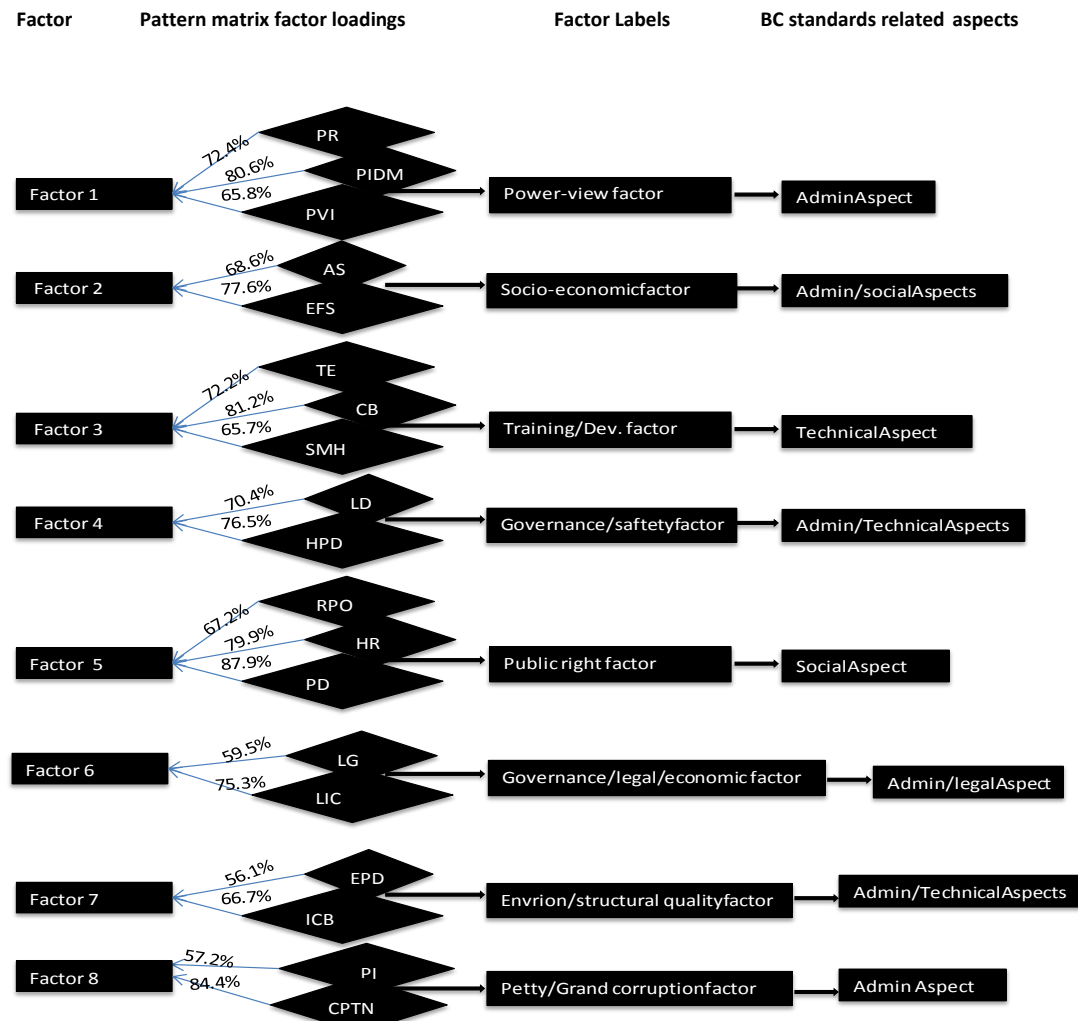


Figure6.20: Factor loadings and research labels for 2nd extraction

Source: (Author administered questionnaire 2015)

One factor measurement model CFA from EFA results

A dependent variable implementation and enforcement for compliance to structural building code standards in mid-rise residential building (MRRB) projects is manifested (predicted) by nineteen (19) directly observed variables. Figure 6.21 indicates a one factor model of confirmatory factor analysis (CFA) with standardised high factor loading as the best indicator values and poor factor loading as a suggestion indicating other factors within the group. capacity building (CB) indicates the best loading at 0.96, professional involvement in decision making (PIDM) 0.92, professional rivalry (PR) standardised factor loading at 0.86, and respect for public opinion (RPO), human right (HR), and

public dialogue indicates factor loading of 0.79, 0.92 and 0.86 respectively, and environmental pollution and disease (EPD) as the lowest factor loading of 0.48 in the one factor confirmatory analysis suggesting different group effects to implementation and enforcement for compliance to structural building code standards in mid-rise residential building (MRRB) projects in Nigeria.

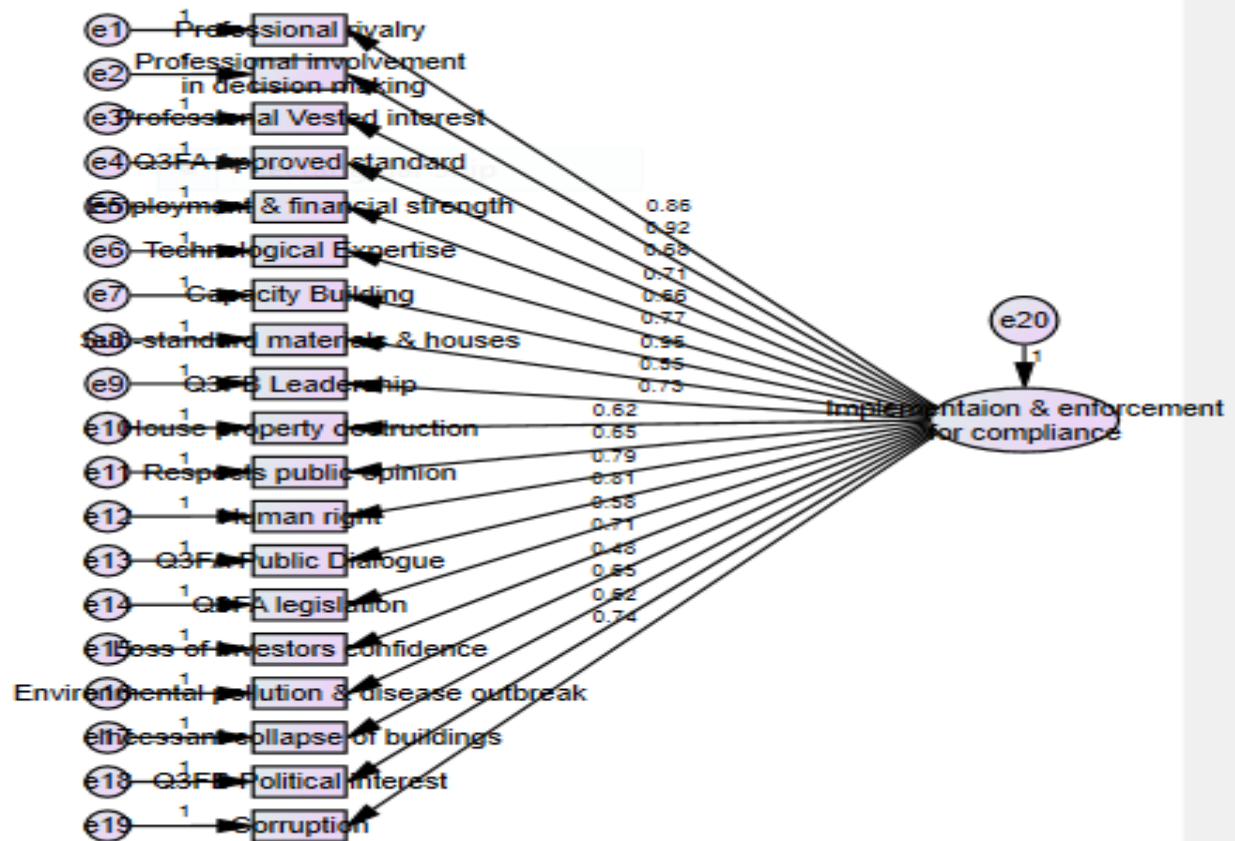


Figure6. 21: One factor model of CFA

6.8 Exploratory factor analysis (EFA) for Key factors (Q3F), causal factors (Q4C) and the impact risks (Q5IR)

6.8.1 EFA results on key factors affecting implementation and enforcement (Q3F)

Key factors affecting implementation KMO and Bartlett's test indicates (.92 sampling adequacy and sig. at 0.000). Variables communalities were high between 0.84 and 0.96 for all variables by maximum likelihood extraction methods.

Factor one meet Kaiser Criterion for extraction with initial eigenvalues of 1 or more. However, two factors were forced into the extraction to aid in the rotation of factors. Before rotation 100% variable indicators is explored using nine (9) items, after rotation 93% is explored by 3 factors as shown in table 6.19 total variance explained.

Table 6.19: Total variance key factors affecting implementation explained

Total Variance Explained						
Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Total
1	7.571	84.125	84.125	7.571	84.125	6.987
2	0.558	6.195	90.321	0.558	6.195	6.652
3	0.269	2.991	93.312	0.269	2.991	5.766
4	0.199	2.215	95.526			
5	0.172	1.911	97.437			
6	0.092	1.02	98.457			
7	0.063	0.695	99.152			
8	0.05	0.55	99.702			
9	0.027	0.298	100			

Extraction Method: Maximum likelihood.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Source: (Author administered questionnaire 2015)

Table 6.20 indicates pattern matrix of variables loadings as factors by MLE and Oblimin with Kaiser Normalisation rotation methods. In which, all items record high loadings of 0.8 to 0.9 and more on factor 1 and three (3) other factors which loaded high on factor 1 also indicating low loadings on factor 2, including; awareness (AW), political interest (PI) and leadership (LD) suggesting possible relationship and labels.

Table 6.20: Patter matrix of Key factors affecting implementation

Pattern Matrix ^a			
	Factor		
	1	2	3
Awareness	.932	-.307	
Implementation process	.930		
Approved standard	.929		
Poverty level	.927		
Political interest	.921	-.360	
Leadership	.913	-.366	
legislation	.912		
Public Dialogue	.902		
Professional fees	.889		.408

Extraction Method: Maximum likelihood.

Rotation method: oblimin with Kaiser normalisation

a. Rotation converged in 9 iterations.

Figure 6.22 is a summary of the pattern matrix formation and research labels for the key factors affecting implementation of BC standards and regulations

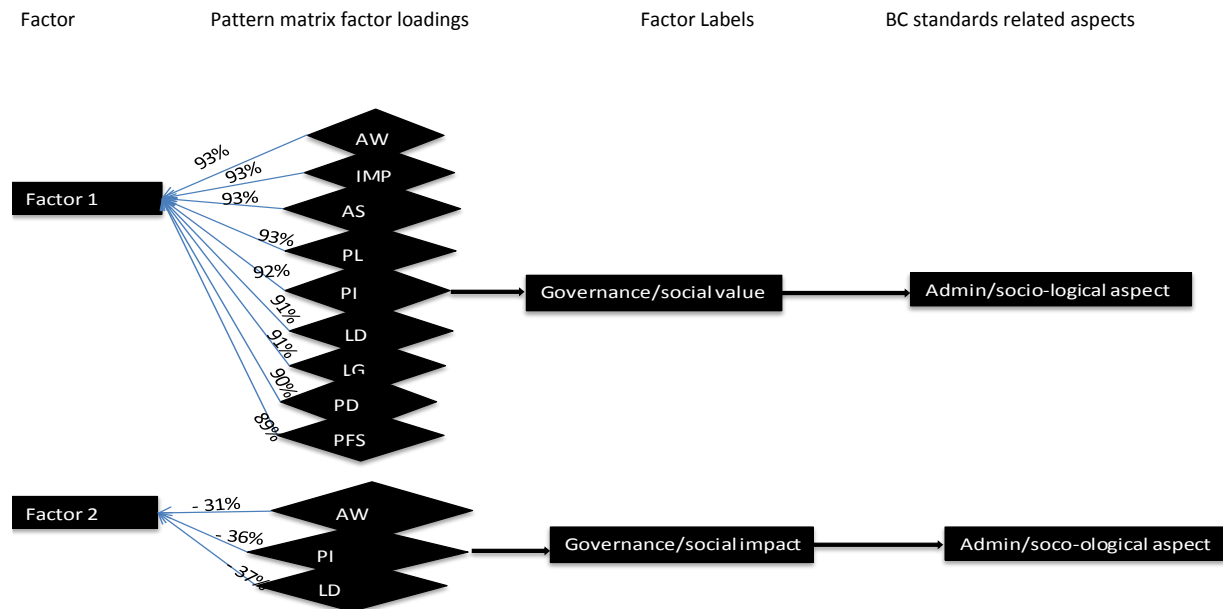


Figure 6.22 Summary of pattern matrix formation and research labels for key factors

Figure 6.22 shows formation within the contextual analysis of administrative, technical, social and legal aspects of structural BC provisions for mid-rise residential projects indicates governance (administration) was major influence of the key factors affecting implementation and this impact on the socio-logical aspects of public social awareness and finances.

The structure matrix presented in Table 6.21 shows the correlation between items and factors. The item of implementation process indicates the highest factor correlation of .95 in factor 1, followed by Leadership at (-.73) and approved standards at (.72), .57 for legislation and (.50) awareness in factor 1, while factor 2 indicates -.35 for both leadership and political interest and professional fees indicates highest correlation in factor 3 followed by poverty level at (.85 and .45) respectively.

Table 6.21: Structure matrix for research key factors affecting implementation

Structure Matrix			
	Factor		
	1	2	3
legislation	.571	-.052	.087
Approved standard	.722	-.006	-.110
Leadership	-.732	-.351	-.017
Political interest	-.010	-.351	-.068
implementation process	.952	.037	.022
Awareness	.500	-.317	-.026
Poverty level	.102	.028	.439
Public Dialogue	.329	.001	-.208
Professional fees	-.093	-.002	.847

Extraction Method: Maximum likelihood.

Rotation Method: Oblimin with Kaiser Normalization.

6.8.2 EFA results on causal factors leading to poor-implementation and non-compliance (Research question 4)

One factor indicators meet the Kaiser criterion with initial eigenvalues of 1 or more and other two indicators were force in assisting for rotation as explained with the total variance shown in Table 6.22 Before rotation 100% is explored using 9 factors, after rotation, 91.31% is explored by 3 factors.

Table 6:22 Total variance explained for research causal factors

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	7.532	83.694	83.694	7.359	81.763	81.763	6.784
2	0.565	6.278	89.972	0.391	4.340	86.102	6.272
3	0.347	3.851	93.823	0.469	5.211	91.313	5.890
4	0.208	2.313	96.136				
5	0.125	1.389	97.525				
6	0.083	0.923	98.449				
7	0.063	0.700	99.149				
8	0.044	0.488	99.636				
9	0.033	0.364	100.000				

Extraction method: maximum likelihood.

a. When factors are correlated, the sums of squared loadings cannot be added to obtain the total variance.

Further checks for factor indicator extraction, as required in exploratory factor analysis to determine the most influential factors leading to non-compliance, included the use of a scree plot. The scree plot indicates a clear break from the extracted components 1 to 3, indicating that these components capture much more information than the remainder.

Another check leading to the determination of the most influential factor indicators of non-compliance was factor loading of the pattern matrix by MLE methods and oblimin with Kaiser Normalisation rotation method as shown in Table 7.23. The factor loadings of each variable indicates strong (highest) loading of the following items: factor 1, capacity building at 1.01, technological expertise at 0.88, and employment and financial strength at 0.66; factor 2, human rights at -0.96 and respect for public opinion at 0.73; and factor 3, professional rivalry at 0.92, professional involvement in decision-making building at professional vested interest at 0.88, 0.75, and corruption at 0.72. Referring to the items for each factor, factor 1 can be labelled as the technical factor of building code standards, factor 2 as the socio-logical factor, and factor 3 as the administrative governance factor.

Table 6.23: Pattern matrix^a for causal factors

	Factor		
	1	2	3
Corruption	0.306		0.715
Capacity building	1.006		
Professional involvement in decision making			0.880
Employment & financial strength	0.657		
Technological expertise	0.867		
Professional rivalry			0.916
Professional vested interest			0.752
Human rights		-0.956	
Respect for public opinion		-0.734	

Extraction method: maximum likelihood.

Rotation method: oblimin with Kaiser normalisation.

a. Rotation converged in 9 iterations.

Summary of the pattern matrix factor loadings and labels identification as related to BC aspects of the building code standards and regulations for the causal research factor is shown in figure 6. 23.

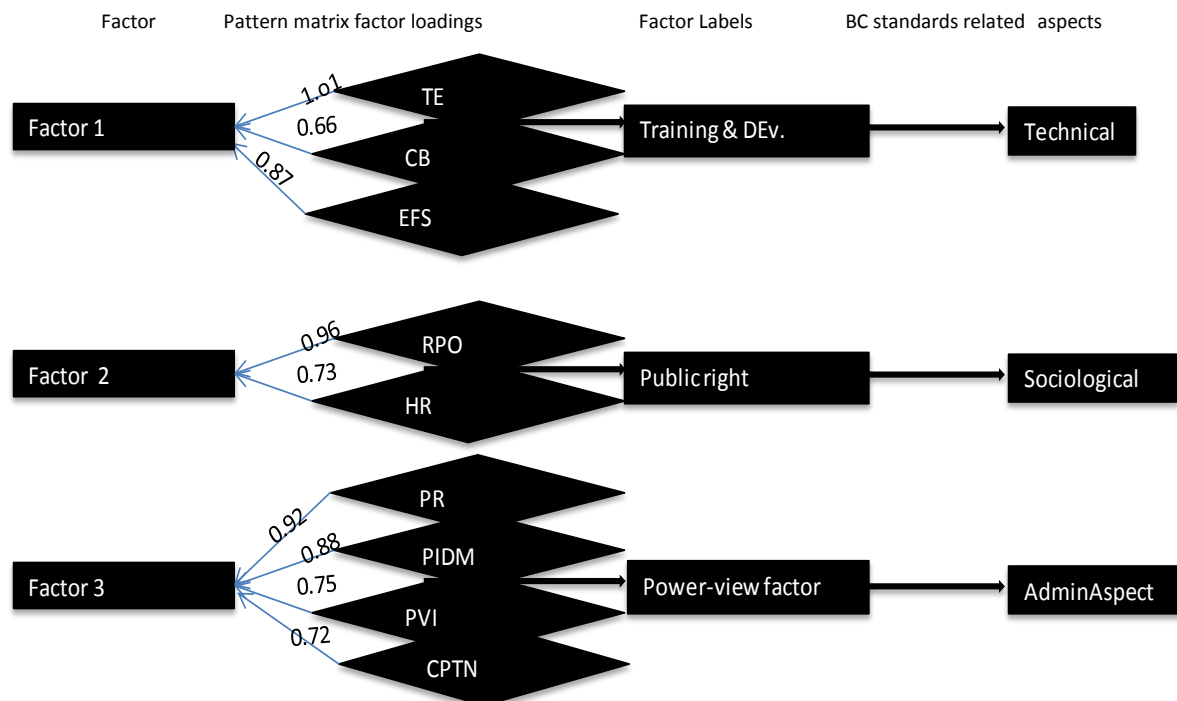


Figure 6.23: Factor loadings and labels for causal research factors

Clearer focus of implementation and enforcement through the eye lens of administrative, technical, social and legal aspects of structural BC provisions for mid-rise residential projects from contextual theory is established from EFA results as shown in figure 6.23. In which, administrative aspects was major influence followed by technical aspects to the context of implementation and enforcement of BC structural provisions and to a lesser extent the socio-logical aspect.

The structure matrix presented in Table 6.24 shows the correlation between variables and factors. The variable item of capacity building indicates the highest component 1 factor correlation of 0.99, followed by professional involvement in decision making at 0.97, while the component 3 factor indicates 0.96 for professional rivalry followed by professional vested interest at 0.91. Both factor component 1 (technical factor) and factor component 3 (administrative factor) show a negative correlation impact on all variables for factor component 2 (socio-logical factor).

Table 6.24: Structure matrix for research causal factors

	Factor		
	1	2	3
Corruption	0.831	-0.825	0.841
Capacity building	0.986	-0.782	0.744
Professional involvement in decision making	0.970	-0.791	0.797
Employment & financial strength	0.930	-0.842	0.788
Technological expertise	0.926	-0.805	0.642
Professional rivalry	0.722	-0.746	0.961
Professional vested interest	0.757	-0.738	0.908
Human rights	0.813	-0.993	0.757
Respect for public opinion	0.838	-0.954	0.799

Extraction method: maximum likelihood.

Rotation method: oblimin with Kaiser normalisation.

One factor measurement model confirmatory analysis for the research causal factors

Dependent variable non-compliance to structural building code standards in MRRB projects is manifested (predicted) by nine directly observed variables. Figure 7.24 indicates a one factor model of confirmatory factor analysis (CFA) with standardised high factor loading as the best indicator values and poor factor loading as a suggestion indicating other factors within the group. Professional rivalry

indicates the best loading at of 0.94, professional involvement in decision making 0.93, and corruption as the lowest factor loading of 0.83 in the one factor confirmatory analysis, together with capacity building at 0.92 and technological expertise at 0.89.

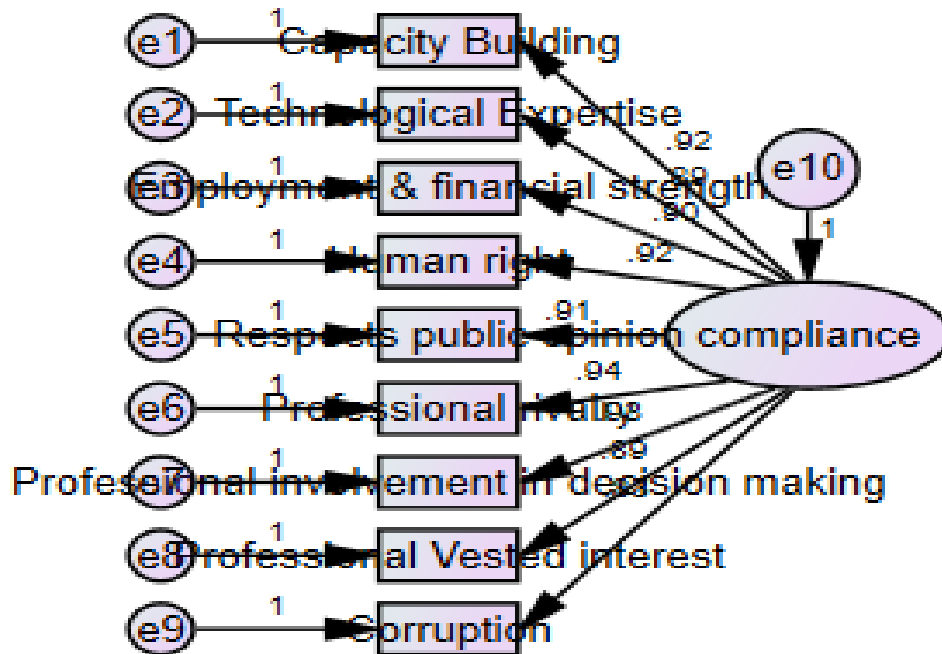


Figure 6.24: One factor model of confirmatory factor analysis for research causal factors

Underlying pattern and the strength and association of most influential factors relationship

To address the research aim, the pattern of the most influential factor indicator relationships leading to non-compliance after rotation was investigated and Table 6.25 summarises the strength of the relationships between the three factors. This is positively and negatively high, at $r = -0.74$ or $r = 0.74$ between the technical, socio-logical and administrative aspects of the structural BC standards, revealing a strong positive and negative correlation relationship between the three factors. The relationship between these factors is strong enough to exclude the possibility of sampling error. Therefore this study concludes with the finding that there is a significant linear relationship between many of the factors of non-compliance with structural BC standards and regulations in HRRB in Nigeria.

Table 6.25: Factor Correlation Matrix

Factor	1	2	3
1	1.000	-0.811	0.741
2	-0.811	1.000	-0.742
3	0.741	-0.742	1.000

Extraction method: maximum likelihood.

Rotation method: oblimin with Kaiser normalisation.

Development of a theoretical Model for the SEM analysis

To test the hypothesis, a model was developed from theory and is shown in Figure 6.25. The test is to establish consistency with the observed data for direct and indirect predictions.

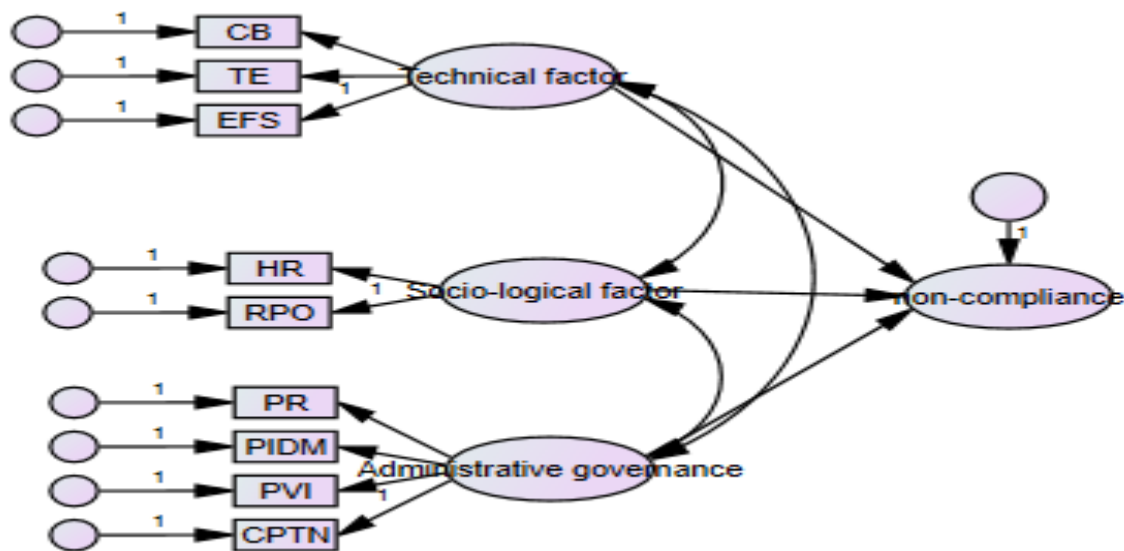


Figure 6.25: Theoretical model for SEM hypothesis testing

CB – capacity building, TE – technological expertise, EFS – employment/financial strength, HR – human rights, RPO – respect for public opinion, CPTN - corruption, PR – professional rivalry, PIDM – professional involvement in decision making, PVI – professional vested interest

6.8.3 One factors CFA Model analysis for research causal factors

The model in Figure 6.26 indicates the standardised regression coefficients and factor loading (SR) estimates of capacity building at 0.81, squared multiple correlations (SMC) at 0.772 and technological expertise (SR=0.70, SMC=0.652), although employment/financial strength is low (SR=0.43, SMC=0.38), suggesting an unreliable indicator of the technical factor. The socio-logical factor indicates (SR=0.67, SMC=0.501) for human rights and respect for public opinion (SR=0.58, SMC=0.467) and while for the administrative governance factor the results are professional rivalry (SR=0.90, SMC=0.671), professional involvement in decision-making (SR=0.76, SMC=0.601), professional vested interest (SR=0.80, SMC=0.731) and corruption (SR=0.63, SMC=0.468). The correlation between the technical and socio-logical factors indicates 4.75 and – 1.30 between the administrative governance factor and the socio-logical factor and the covariance is significant at (1.68 $p < 0.05$).

The square multiple correlations provide information about how much variance of an observed variable the factor can account for. Similarly, the unobserved variable technical factor standardised weight is 0.64 in relation to non-compliance, and for the socio-logical factor (SR=0.45) and the administrative governance factor (SR=0.80), with the overall effects of a 0.63 weighting for the three unobserved factors to non-compliance.

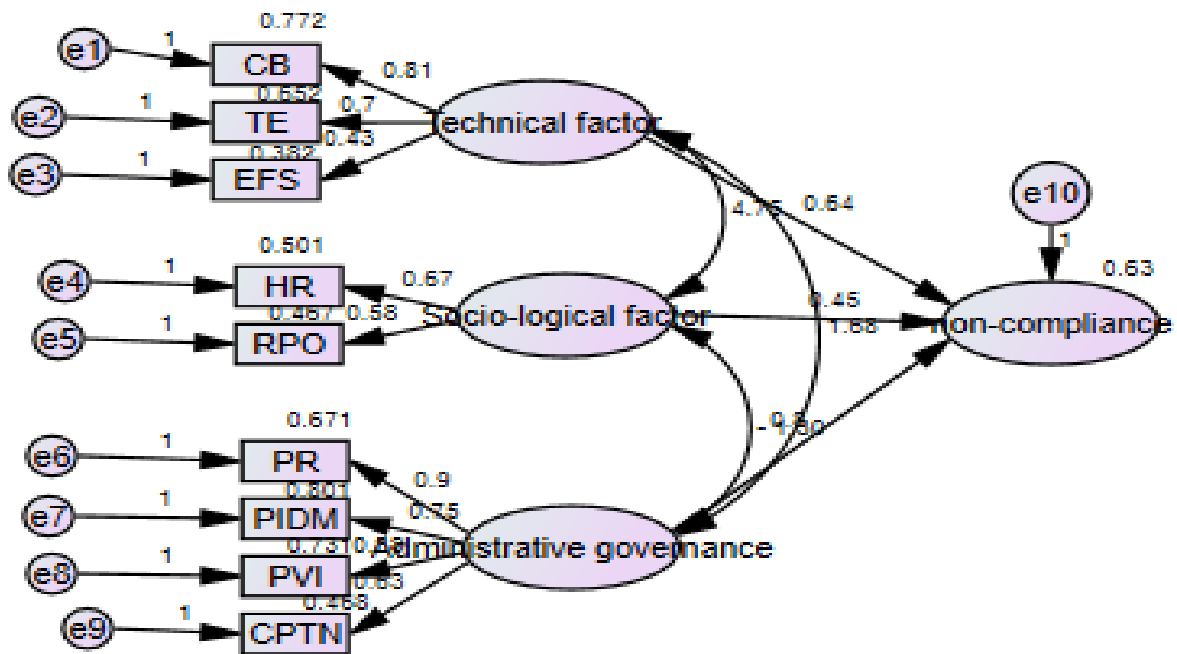


Figure 6.26: CFA SEM with standardised estimates-non-compliance

CPTN - corruption, PR – professional rivalry, PIDM – professional involvement in decision making, PVI – professional vested interest, HR – human rights, RPO – respect for public opinion, CB – capacity building, TE – technological expertise, EFS – employment/financial strength

The overall model test for goodness appears to fit with the Chi-square X^2 test and yields statistics of 10.616 and $df = 11$ and a corresponding P-value of 0.564. The hypothesis that the current model is correct can be accepted since the p-value is too high to reject the model, as shown in the text output below.

Computation of degree of freedom (Default model)

Number of distinct sample moments: 38
Number of distinct parameters to be estimated: 27
Degree of freedom (38-27): 11

Results (Default model)

Minimum was achieved
Chi-square = 10.616
Degree of freedom = 11
Probability level = .564

6.8.4 EFA results on the impact risks associated with poor-Implementation of standards to the industry development and professional practice.

One factor indicator meet the Kaiser criterion with initial eigenvalues of 1 or more and two others were forced to assist in the extraction and rotation as explained with the total variance shown in Table 6.26 Before rotation 100% is explored using 11 factors, after rotation, 94.31 is explored by 3 factors. KMO and Bartlett's test indicates (.922 sampling adequacy and Sig at .000. Items communalities were high between 0.8 or more and 0.9 for all variables (Items).

Table 6.26: Impact risks total variance explained table

Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings ^a
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	9.712	88.288	88.288	9.712	88.288	88.288	9.365
2	0.37	3.364	91.651	0.37	3.364	91.651	2.45
3	0.288	2.62	94.272	0.288	2.62	94.272	8.839
4	0.167	1.514	95.786				
5	0.147	1.336	97.122				
6	0.103	0.938	98.06				
7	0.084	0.76	98.82				
8	0.048	0.436	99.256				
9	0.04	0.365	99.621				
10	0.027	0.249	99.87				
11	0.014	0.13	100				

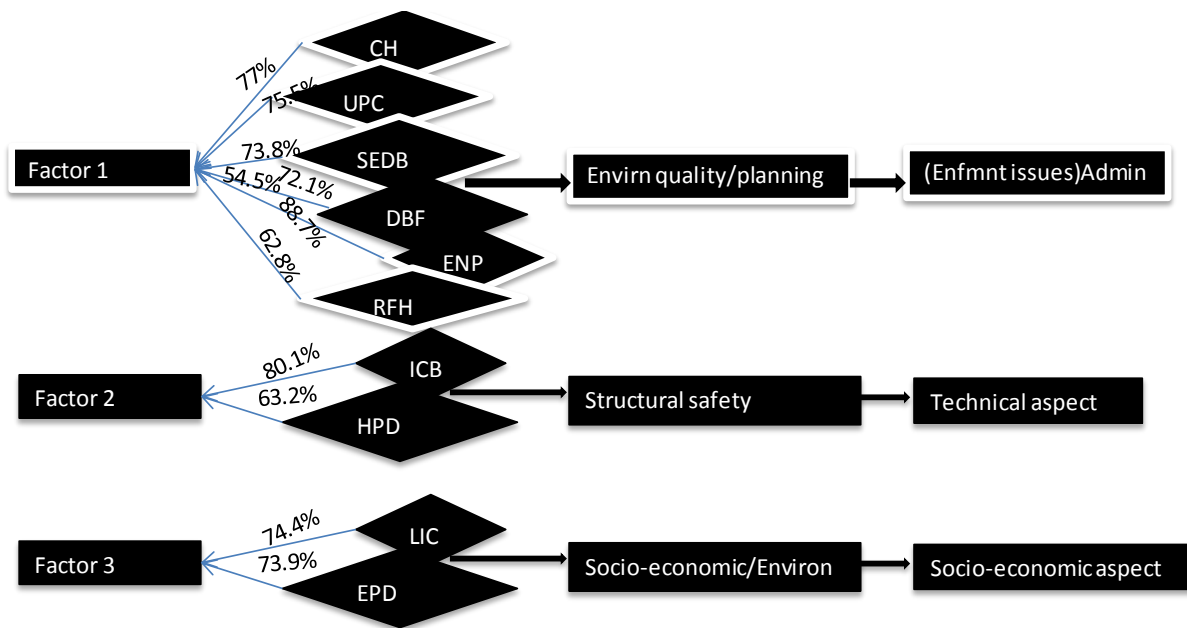
Extraction Method: Maximum likelihood.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Source: (Author administered questionnaire 2015)

Factor one (1) factor contribution indicates 88.3% as shown in Table 7.26. This is further reflected in the scree plot exploration indication significant break at point 1 and factor rotation loadings of six items (variables), including; unplanned cities and towns (UPC), congestion of houses (CH), death due to building failure (DBF), entry of non-professional to the industry (ENP), and risk of fire hazard (RFH) loading at factor 1 and factor 2 loadings indicate incessant collapse of buildings (ICB) and house property destruction (HPD) and factor 3 loadings are loss of investors' confidence (LIC) and environment pollution and disease outbreak (EPD). Figure 7.27 is a summary of the loadings and research labels for the impact risks.

Entry of non-professionals (ENP) into the industry indicates high loadings of 0.89, followed by incessant collapse of buildings (ICB) loading at 0.80. From research context of implementation and enforcement of building code, it was ascertained that, administrative, technical, socio-logical and legal aspects of BC are the structural provisions for BC standards and regulations. In which, this results indicate administrative issues of enforcement for building and environmental quality with six (6) items on factor 1, followed by the technical issues of structural safety and economic value aspect of the BC standards and regulations as the 3 influencing impact areas of implementation and enforcement of BC standards within mid-rise residential building projects.



Figures 6.27: Labels and loading for impact risks
Source: (Author administered questionnaire 2015)

6.9 Correlation and Regression analysis

7.9.1 Correlation of the factors of implementation and enforcement (Pearson results)

Table 6.27 show the correlation matrix with the general overview of the strength and association between the variable factors as dependent and independent factors. The association between the components were mostly positive in relation to variables (items) observed.

The correlation results indicate strong and moderate results across many factors at the 0.01 level (2-tailed) and 0.05 levels (2-tailed). Capacity building (CB) has the strongest relation at (-.720) and corruption next in line at (.702) among all other relations in comparison with the rest of the components. Table 6.27 shows the summary of the weak and strong associations of the components in appendix 7C.

6.9.2 Regression factor score analysis results

Contribution of factors to the issue of poor implementation and enforcement with structural building standards and regulations within MRRB in Nigeria

Multiple regression analysis was conducted assuming the factor score 1 to 8 as predictors (constant) to examine the independent variables relative effects of group contributions to poor implementation and enforcement of standards and regulations.

Using the following factor scores, factor score 1 (power-view factor), factor score 2 (socio-economic factor), factor score 3 (Training and development), factor score 4 (Governance & safety), and factor score 5 (Public right). Others include factor score 6 (Economic value & legal factor), factor score 7 (Environ/structural quality), and factor score 8 (Petty & grand corruption effect) to establish the most influential factors leading to poor implementation and enforcement with structural building standards and regulations within MRRB in Nigeria

Professional vested interest (PVI) relative effects contribution to poor implementation and enforcement

This independent variables show the highest $R^2 = 0.83$ variance, ($F = 2253$, $p < 0.01$), standardised coefficients with (Beta value $B = 0.66$ from socio-economic value factor, 0.45 from power-view and -0.36 from training and development respectively, other factor score B values are below 0.2 unique contribution.

Human right relative effects contribution to poor implementation and enforcement

The results indicates $R^2 = 0.81$, ($F = 1910$, $p < 0.01$), ($B = 0.88$) from public right factor and other factor score B values are below 0.2 .

Professional involvement in decision-making (PIDM) relative effects

Using the factor score, the results indicate a $R^2 = 0.75$ variance, ($F = 1351$, $p < 0.01$), the standardised coefficients results indicate power-view factor as the highest unique contributor to poor implementation and enforcement at (Beta value, $B = 0.81$), while all other factor scores B values are below 0.2 .

Capacity building relative effects contribution to poor implementation and enforcement

The result shows capacity building accounts for $R^2=0.73$ (73%) variation in poor-implementation and enforcement with BC standard and regulations. The model is ($F = 1231$, $p < 0.01$, standardised coefficients (Beta value (B) = 0.812 from factor score 1 (power -view) and (B=0.66 from petty & grand corruption (factor score 8)

Corruption relative effects contribution

Corruption was predicted with the factor scores and the results in Table 7.28 show that corruption has an $R^2=0.76$, ($F=1510$, $p < 0.01$), B value = 0.84 from petty and grand corruption factor and B=0.17 from governance and safety, B values for other are below 0.2 contributions.

Table 6.28 present the variance (R^2), F values and standardised coefficients Beta values (B) of other independent variables prediction by research factor scores. These including; professional rivalry (PR), leadership (LD), political interest (PI), incessant collapse of buildings (ICB), loss of investor's confidence (LIC) and technological expertise (TE). Others are legislation (LG), and public dialogue (PD) as shown in table 6.28.

Table 6:28 Summary of the regression analysis of the contribution of factors to the issue of poor implementation and enforcement with structural building standards and regulations

Independent Variables	Standardized Beta coefficients								R Square change	F Value	P Value
	Factor score 1 (Power-view factor)	Factor score 2 (Socio economic factor)	Factor score 3 (Training & Dev)	Factor score 4 (Governance & safety)	Factor score 5 (Public Right)	Factor score 6 (Gov. legal & economic Value)	Factor score 7 (Environ & structural quality)	Factor score 8 (Petty & grand Cptn)			
PIDM	0.806	-0.135	-0.059	-0.162	0.124	0.064	-0.078	0.149	74.5%	135.07	0.000
PR	0.166	0.436	-0.165	0.162	0.051	0.300	0.564	-0.178	71.4%	115.391	0.000
PVI	0.448	0.658	-.355	-0.008	0.096	-0.037	0.184	-0.091	83.3%	225.271	0.000
CB	0.812	-0.25	0.089	0.129	0.127	-0.117	0.90	0.660	72.7%	123.051	0.000
LD	-0.246	0.086	0.210	0.704	-0.067	0.169	-0.103	0.139	67.1	93.968	0.000
PI	-0.170	0.185	0.180	-0.211	0.146	-0.391	0.228	0.408	53.3%	52.560	0.000
ICB	-0.230	-0.029	0.169	-0.162	-0.278	0.085	0.667	0.433	64%	82.154	0.000
LIC	-0.069	0.108	0.011	0.212	0.035	-0.753	0.078	-0.178	66.7%	92.556	0.000
HR	-0.068	-0.073	0.155	-0.047	0.879	-0.043	-0.124	-0.055	81%	199.997	0.000
TE	-0.045	-0.370	0.722	-0.099	0.173	0.058	0.074	0.065	71.3%	114.383	0.000
LG	0.062	0.074	0.595	-0.159	-0.042	-0.106	0.261	0.046	47.1%	41.121	0.000
PD	-0.063	-0.169	-0.207	0.672	-0.103	0.000	0.354	0.117	66.9%	96.279	0.000
CPTN	0.084	0.058	-0.072	0.168	0.025	0.096	0.020	0.844	76.1%	151.017	0.000

Source: (Author administered questionnaire 2015)

6.10 Comparison of Multiple Mean (Results of One-Way Analysis of variance, ANOVA)

One-way analysis of variance (ANOVA) is used by this research because we are interested in comparing the mean scores of more than two groups of one independent variable (factor) with a number of different levels, whether differences exist in the mean scores on the dependent variables. This approach is to test the hypothesis and determine, if null hypothesis or alternative hypothesis is correct and to be accepted.

The research hypothesis= H_0

H_0 = The enforcement of the Nigeria Building Code Structural Provisions fails because of failures in legislative system.

Alternative hypothesis

H_1 = The enforcement of the Nigeria Building Code Structural Provisions within Mid-Rise Residential Development failures is by the systemic failure of technical, administrative governance, and social failures.

Post Hoc Tests

This test is used to find out any difference in variance in scores or is the same for each of the three groups. Levene's tests indicates violation in the assumption of Homogeneity of variances if the significance value ($\text{Sig} < 0.05$), but if greater than 0.05 the research has not violated any assumption.

For this research, the sig. value is 0.215 as shown in Table 6.29

Table 6.29: Test of Homogeneity of Variances

VAR00001

Levene Statistic	df1	df2	Sig.
64.401	3	1508	.215

Source: (Author administered questionnaire 2015)

Table 6.30 Anova indicate there is a significant difference somewhere among the mean scores on the dependent variables for the groups, since (p value < 0.01).

Table 6.30: ANOVA Significant difference among mean scores

VAR00001

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	389.623	3	129.874	749.452	.000
Within Groups	261.325	1508	.173		
Total	650.948	1511			

Source: (Author administered questionnaire 2015)

Table 6.31 show mean difference between the groups compared. The three groups compared are significantly different from one another at the ($p < 0.05$) level.

Table 6.31: Multiple mean Comparisons

Dependent Variable: VAR00001

			Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
	(I)	(J)				Lower Bound	Upper Bound
LSD	VAR00002 1.00	VAR00002 2.00	-.56706*	.03028	.000	-.6265	-.5077
		3.00	-1.09406*	.03028	.000	-1.1535	-1.0347
		4.00	-1.31265*	.03028	.000	-1.3720	-1.2533
	2.00	1.00	.56706*	.03028	.000	.5077	.6265
		3.00	-.52700*	.03028	.000	-.5864	-.4676
		4.00	-.74559*	.03028	.000	-.8050	-.6862
	3.00	1.00	1.09406*	.03028	.000	1.0347	1.1535
		2.00	.52700*	.03028	.000	.4676	.5864
		4.00	-.21859*	.03028	.000	-.2780	-.1592
	4.00	1.00	1.31265*	.03028	.000	1.2533	1.3720
		2.00	.74559*	.03028	.000	.6862	.8050
		3.00	.21859*	.03028	.000	.1592	.2780
Tamhane	1.00	2.00	-.56706*	.03318	.000	-.6547	-.4794
		3.00	-1.09406*	.03476	.000	-1.1858	-1.0023
		4.00	-1.31265*	.03579	.000	-1.4071	-1.2182

2.00	1.00	.56706*	.03318	.000	.4794	.6547
	3.00	-.52700*	.02352	.000	-.5890	-.4650
	4.00	-.74559*	.02501	.000	-.8116	-.6796
3.00	1.00	1.09406*	.03476	.000	1.0023	1.1858
	2.00	.52700*	.02352	.000	.4650	.5890
	4.00	-.21859*	.02707	.000	-.2900	-.1472
4.00	1.00	1.31265*	.03579	.000	1.2182	1.4071
	2.00	.74559*	.02501	.000	.6796	.8116
	3.00	.21859*	.02707	.000	.1472	.2900

*. The mean difference is significant at the 0.05 level.

The actual difference in the mean score of the groups was very large using Eta squared to calculate the effect size statistically.

$$\text{Eta squared} = \frac{\text{sum of squares between groups}}{\text{Total sum of squares}} = \frac{389.623}{650.948} = 0.60$$

Cohen's (1988:284-7) cited in Pallant (2013) classifies 0.01 Eta squared value as a small effect, 0.06 as a medium effect and 0.14 as a large effect. This research Eta squared effect size calculated was 0.60, which is a large effect.

This mean comparison results indicate that there was no significant difference between the null hypothesis mean scores ($\mu_1 = \mu_2 = \mu_3 = \mu_4$, they have equal mean)

H₀: $\mu_1 = \mu_2 = \mu_3 = \mu_4$ and the alternative hypothesis mean scores between groups (μ_1 , μ_2 , μ_3 , and μ_4) was significantly different.

H₁: μ_1 , μ_2 , μ_3 , and μ_4 (do not have equal mean) or

Variables (Var)

H₀: Var1 = Var2 = Var3 = Var4

H₁: Var1, Var2, Var3, Var4.

Conclusion: $\mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4$ (mean score of Var 1 is not equal to mean score of Var 2, not equal to mean score of Var3 and not equal to mean score of Var 4) . The implication is that, the test indicates rejecting the null hypothesis.

H₁: $\mu \neq \mu_0$ (μ_0 mean null value), where a difference is hypothesized and this is called a two-tailed test.

Comparison of the factors of poor implementation and enforcement of standards and regulations

Figure 6.28 show the interaction effect between the values of factors responsible for poor implementation and enforcement and the degree of compliance (independent variables) trend over time using multiple line graphs.

The data sets results indicate there was a rise in the number of factors in power-view between partially agrees period to strongly agree on poor enforcement and compliance level. Similarly, training and development, public right, socio-economic & empowerment, and petty & grand corruption had a rise within the same period. However, there was a major continuous drop in the number of poor implementation and enforcement in environ/structural quality compliance between disagree period to strongly agree. In like manner, between agree period and strongly agree, governance and safety factor had a drop from poor compliance as seen in figure 6.28.

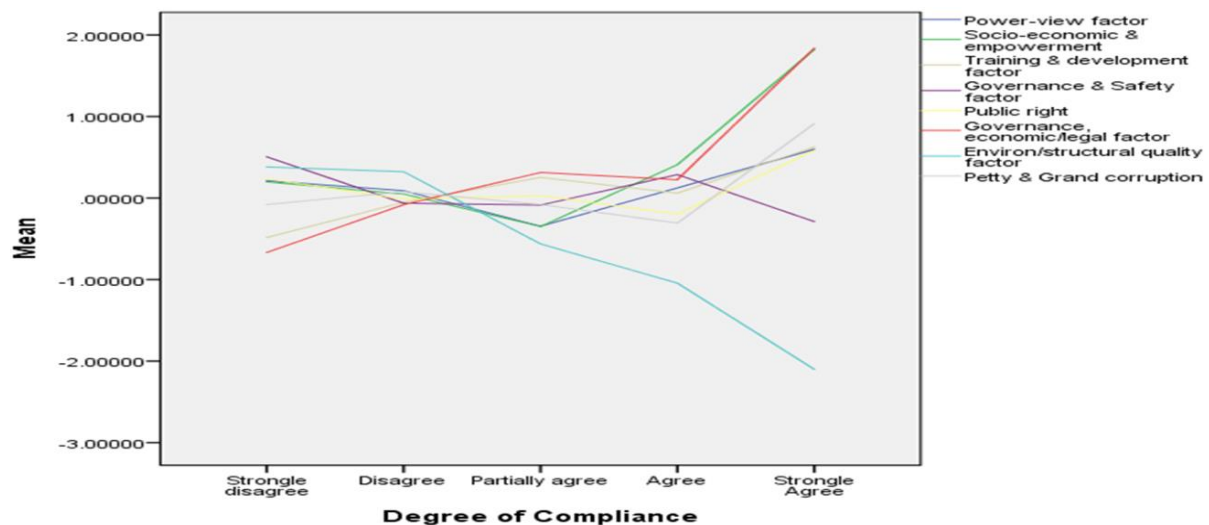


Figure 6.28: Comparison of relationship effect (factors responsible for poor implementation and enforcement and the degree of compliance)

Source: (Author administered questionnaire 2015)

6.11 Development of theoretical model for further testing (SEM analysis)

This research interest in comparing different hypothesis prompted further development of model from EFA results for SEM analysis. This test will establish data consistency for direct and indirect factor effects on implementation and enforcement of building standards (I&EBS). Figure 6.29 summarise the theoretical model for further testing.

Observed variables $X_1, \dots, X_{19}$
variable Y

Latent-trait with $x_1, \dots, x_8$ hidden path

Dependent

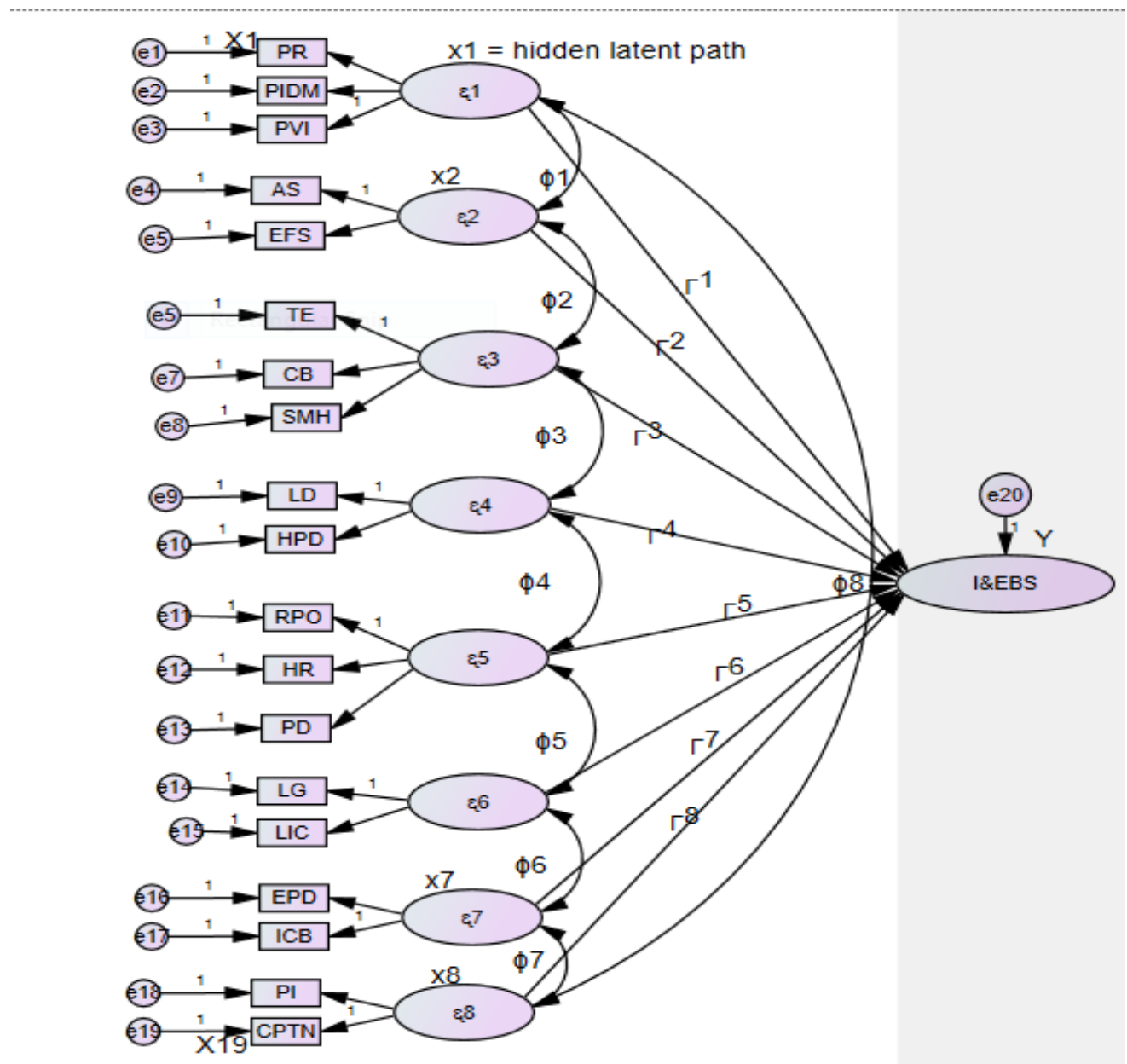


Figure 6.29: Research theoretical model for further testing (SEM)

Where: Y = independent variables (Implementation & enforcement of building standards, I&EBS)

X = Observed variables

ξ = Latent-trait

X = hidden latent path

ϕ =covariance

Γ = Direct effect (D.E) of X on Y

e = error

Y = results

Causal effect = D.E + I. E effect

$$D.E = X_1 * \Gamma_1 * Y$$

$$I.E = X_1 * \phi_1 * \Gamma_2 * Y$$

$$\text{Total causal effect} = X_1 * \Gamma_1 * Y + X_1 * \phi_1 * \Gamma_2 * Y$$

6.12 Quantitative analysis findings

A finding from the questionnaire indicates valid responses of 378 for analysis representing 63% valid response. In which the sample characteristics of non-parametric statistics revealed age variable indicate Md = 4.0 (IQR:3, 4), sex indicate Md = 1 (IQR:1, 1), educational qualification shows Md = 5 (IQR:3,5), professional discipline indicate Md = 1 (IQR:1,2) and years of experience indicate Md = 3 (IQR:2,3) respectively of the spread or dispersion of the scores using Inter-Quartile range (IQR) which do not assume a normal distribution to report 25th percentile and the 75th percentile values and the percentile 50 as actual median (Md) when you have skewed data.

The results also revealed that 50% respondents disagreed to the satisfactory level of enforcement of building standards and regulations. Similarly, 61% disagreed to the satisfactory compliance process of building approval, construction and inspection.

On key factors research questions, it was discovered that the following factors were identified as key factors affecting implementation and enforcement of standards and regulations by respondents. In which, implementation process responses were 68%, awareness (63%), Leadership, 59% and political interest all within the context of administrative aspects of this research.

For the causal factors research questions, 46% respondents strongly agree and 39% agree that corruption affects implementation and enforcement of building code standards and regulations (BCSR). In like manner, professional rivalry (PR) indicates 60% agreement, 60% also agree that professional vested interest (PVI) affects implementation and enforcement (IE) of BCSR and professional involvement in decision-making (PIDM) revealed 23% strongly agreed, 24% agreed and 46% partially agreed affecting IE and BCSR. Critical observations of this result indicate construct of the administrative aspects of this research contextualised theory.

Observed variables ranking by the weighted rating (RII) revealed the following overall results. 1st overall ranked is corruption at 0.93, next overall is incessant collapse of buildings at 0.92 and loss of investors' confidence = 3rd at 0.85, death due to building failure = 4th, entry of non-professional =5, professional vested interest = 6th overall ranked, and implementation process = 7th, professional rivalry = 8th, political interest = 9th, and leadership = 10th ranked. These results are within the construct of the administrative, technical and socio-economic value aspects context of the IE of the BCSR.

Observed variables ranking within each group of the research question indicates implementation process (IMP) = 1st ranked among the key factors, political interest (PI) = 2nd, leadership = 3rd, and awareness = 4th. All relating to the contextualised theory of administrative and socio-logical aspects of the implementation and enforcement (IE) of the building code standards and regulations (BCSR) within the mid-rise residential building (MRRB) projects. Within the causal factors ranking corruption (CPTN) is ranked 1st and professional vested interest =2nd, professional rivalry = 3rd and capacity building = 4th. This reflects the construct of administrative and technical aspects of this research contextual theory. Similarly, the impact risks ranking has incessant collapse of buildings (ICB) ranked 1st, loss of investor's confidence (LIC) =2nd, death due to building failure (DBF) = 3rd, and entry of non-professionals into the building industry = 4th. This result reflects the construct of technical and socio-economic value aspects of the research context.

Exploratory factor analysis (EFA) findings reflection of the construct of the theory

The eye through which the concept of implementation and enforcement (IE) of the structural provisions of the BCSR in the mid-rise residential building (MRRB) projects in Nigeria is contextualised is in four different aspects by this research (administrative aspects, socio-logical aspects, technical aspects and the legal aspects) of the BCSR.

The finding is that EFA research label (power-view), which is an administrative theoretical context majorly influences building code implementation and enforcement (BCIE). This is followed by EFA

results research label (training and development) which is the technical aspect of the BCSR contextualised by this research and to a lesser extent public right research label which is the context socio-logical aspect of the BCIE.

This view was upheld with one factor Confirmatory factor analysis (CFA) measurement model. In which, professional involvement in decision-making (PIDM) indicates best loadings of 0.92, professional rivalry (PR) loaded 0.86 (administrative aspect context), capacity building (CB) loading was 0.96 (technical aspects context), and 0.79, 0.86 and 0.92 were for socio-logical aspects of research context indicating three (3) contextualised aspects of the research and consistency of data.

The Key factors construct of the theory from EFA suggest possible relationship among the following factors, awareness (AW), implementation process (IMP), poverty level (PL), political interest (PI), leadership (LD), Legislation (LG), public dialogue (PD), and professional fees (PF). This research label the relationship (governance and social value) which reflect the context of administration and socio-logical aspects of the contextual theory. This finding also suggests that administration majorly influences IE of BCSR within the mid-rise residential building development projects in Nigeria.

Reflection of the construct of the theory from causal factors EFA leading to poor-implementation and non-compliance. The findings reflected three major influences. In which, power-view research label as an administrative related context is identified as the major influence with (PR, PIDM, PVI and CPTN) forming a factor. This is followed by training and development research label, a technical related context with (TE, CB and EFS) as a factor and the third reflection of the construct is public right research label, a socio-logical context which clustered RPO and HR as a factor for meaningful labels.

SEM analysis of the causal factor reveals the overall effects of 63% with technical aspects contributing 64% standardised weight, socio-logical factor 45% and administrative aspect context contribution 80% standardised weight to the overall poor-implementation and non-compliance at 63% total effects.

Reflection of the construct of the theory from impact risks revealed 88% contribution from research label environmental quality and planning which relates to administration and enforcement issues context as the major impact risks, followed by structural safety label at 3.4% which is technical aspects of BCRS context and lesser extent of 2.6% contribution from research label socio-economic factor which relates to social aspects of the BCSR.

The strength and associations between the variables factor reveals capacity building CB (training or technical contextualised theory) has the strongest relations at (-.72) followed by corruption, an administrative context at (.70) others are moderate and weakly correlated on a 2-tailed sig. test.

Direct prediction of outcome (regression factor score) indicates the following percentage contribution within the administrative aspect contextualised theory. PVR ($R^2=88.3\%$, PR =71%, PIDM = 75%, and CPTN = 76). Socio-logical contextualised theory has HR and PD ($R^2= 81\%$ and 66% respectively) and technical aspects context has CB ($R^2= 73\%$, TE = 71%, and ICB =64%) to the poor-implementation and enforcement of BCSR.

Comparison of multiple means (One-Way ANOVA) revealed that the actual difference in the mean score of the group has very large effect size of 0.6 calculated using Eta squared. In addition, the findings indicates that null hypothesis H_0 mean scores have equal values and not significantly different ($\mu_1= \mu_2 =\mu_3 =\mu_4$, they have equal mean) H_0 : $\mu_1= \mu_2 =\mu_3 =\mu_4$ and the alternative hypothesis mean scores between groups (μ_1 , μ_2 , μ_3 , and μ_4) was significantly different.

H1: μ_1 , μ_2 , μ_3 , and μ_4 (do not have equal mean), the test indicates rejecting the null hypothesis and accepting H1.

Possible different hypotheses for further advance research within the framework of IE of BCSR are also revealed by the theoretical development for SEM analysis from EFA results. For example, H_0 : (PR, PIDM & PVI) impact on (TE, CB & SMH) in the enforcement of standards and regulations and many more from model.

6.13 Summary

This chapter started by presenting the framework for the analysis of data in which, qualitative data were presented and analysed first and it is clearly understood that three major aspects of the context theory manifested in influencing the IE of BCSR. These include, administration and technical aspects and the third impact area is economic value (new concept or theme) worthy of further exploration.

The quantitative approach started with the site case measurement for research validity and reliability and it was revealed that majority of non-compliance were in stage 1 & 2 (Foundation and Foundation + slab) and majority of partial compliance were non-core activities within the whole stages exception of few and full compliance were in stages 3 & 4 activities of walls and roof.

The questionnaire quantitative data analysis employed various techniques in the analysis and hypotheses testing using, data raking, EFA, CFA, SEM, correlation factor, regression factor score analysis comparison of multiple mean. The findings from all these reflect construct of the theory context within administrative aspect, technical aspect and socio-logical aspect of the building code implementation and enforcement (BCIE) for BCSR. In addition, the hypotheses testing indicate rejection of H_0 and acceptance of H_1 for the research conclusions.

Discussion of findings within the context theory can now commence in the next chapter

Chapter 7:

DISCUSSION OF RESEARCH FINDINGS

7.1 Introduction

This chapter discusses the main findings of this research within the framework of context analysis. The discussion combined the findings from questionnaire survey, interviews, case site measurement, and literature review of documents analysis in order to produce comprehensive answers to the research questions.

This research principal aims were to identify and examine the key and causal factors that impede the implementation and enforcement (IE), and the impact risks associated with mid-rise residential building (MRRB) construction practice within the framework of NBC 2006 standards and regulation's technical, administrative, legal, and socio-logical aspects in Nigeria. In the previous chapters, this research discussed key factors and causal factors with the associated impact risks for professionals and other relevant stakeholders' views.

The original intent of the BC standards and regulations were to ensure building development projects were built to standards and specification for public health and safety. Additionally, the literature review section of this study also identify the BC standards and regulations as a tool to promoting implementation, enforcement and compliance in the construction of building development projects (Labuscher, 2011; Dahiru, et al 2012; Dodo, M. 2014; OECD, 2000; Imrie, R. 2004). Implementation Enforcement and compliance efforts among the professionals and relevant stakeholders for the mid-rise residential building projects will exceedingly triumph with clear Building Code Standards and Regulations (BCSR) in place within the framework of administrative, technical, socio-logical and legal aspects (Al-fahad, 2012).

This research discussion of findings focuses on four key areas of investigation presented in chapter 7 above and the possible framework for building enforcement control, which includes:

(1) The enforcement and compliance of the Building Code Standards and Regulations (BCSR) for the structural provisions in the current Mid-rise residential building (MRRB) development projects. This section discusses the subject of the level of control by enforcement agencies and cooperation with BCSR in the current building development projects in Nigeria among the professionals and relevant stakeholders.

(2) The key factors which affect the implementation and enforcement of the structural provisions of BCSR within the administrative, legal, socio-logical and technical. This discusses the constraints faced by building development control agencies, the professionals, clients and other relevant professionals in the process of implementing or trying to implement BCSR structural provisions in MRRB development projects in Nigeria.

(3) The causal factors that impede implementation and enforcement of the structural provisions of BCSR. This section discusses what makes something happen, an action or situation that causes the effect. In this study, a cause is the structural failure of BCSR and the effect is the associated problems of BCSR which is as a result of the causal factors restraining the implementation and enforcement of the structural provisions of BCSR.

(4) The impact risks associated with the poor-implementation and enforcement of the BCSR structural provisions within (administrative, legal, socio-logical and technical). In this section, this research discusses the effect or influence of poor-implementation and enforcement of BCSR structural provisions on professional practice, building industry development and consumers of mid-rise building projects.

The survey responses in this research were analysed by employing Maximum Likelihood Extraction (MLE) method with Oblimin with Kaiser Normalization rotation method for the key factor, causal factor and the impact risks to meaningful groupings relating to BCSR structural aspects of legal, technical, administrative and socio-logical effects cluster research labels. MLE provides goodness of model fit, statistical significance of factor loadings and at the same time the correlation among the factors, therefore; a best choice for initial analysis to cluster most influential factors affecting implementation and enforcement of BCSR structural provisions for mid-rise residential building projects in Nigeria. It reduces the large sixty variables (60) to seventeen (17) after first rotation which violated some EFA rules and therefore prompted second Oblimin rotation that reduced the variable factors to eight (8) significant factors with an initial eigenvalue of 1 and more which was used for the analysis.

The empirical results from each research question are further interpreted in meaningful terms which are related to the framework of Building Code Standards and Regulations (BCSR) (Technical, Administrative, legal and Socio-logical aspects) contextualized analysis.

7.2 Research survey responses of EFA with MLE and Oblimin with Kaiser Normalisation rotation method

This research survey response of EFA with Maximum Likelihood Extraction (MLE) and Oblimin with Kaiser Normalisation rotation of method to determine the most influential statistical meaningful grouping of factor clusters within the context framework of legal, administrative, technical and socio-logical aspects of the Implementation and Enforcement (IE) of BCSR structural provisions is detailed in this area.

The study analysis identified the reflection of the aspects of BC (Technical, administrative, legal and socio-logical) which causes and impedes the implementation and enforcement of structural provisions of the building code standards and regulations (BCSR) in the development of mid-rise residential building projects in Nigeria.

The findings identified eight (8) clusters of 20 components factors of both key, causal and impact risks which impede and associates with implementation and enforcement of BCSR. These are:

- 1) Cluster 1: Professional rivalry, professional involvement in decision-making and professional vested interest. The findings indicates an aspect of BC administration,
- 2) Cluster 2: Approved standards and employment and financial strength. An administrative and socio-logical aspect of the BCSR,
- 3) Cluster 3: Technological expertise, capacity building, and sub-standard materials and houses. This relates to technical provisions of BCSR,
- 4) Cluster 4: Leadership and house property destruction, indicates administrative/technical aspects of the BCSR,
- 5) Cluster 5: Respect for public opinion, human right, and public dialogue revealed the socio-logical aspect of the building code,
- 6) Cluster 6: Legislation and loss of investor's confidence. This indicates an aspect of legal/economic value,
- 7) Cluster 7: Environmental pollution & disease and incessant collapse of buildings indicates administrative/technical aspects and
- 8) Cluster 8: Corruption and political leadership relates with administrative aspect of the BCSR.

The findings revealed that there is a technical failure, the administrative failure and the socio-logical failure parts for the IE of the structural provisions of the BCSR. The failure of the structural provisions of the BCSR in the development of mid-rise residential building projects is clearly identified as the failure at the administrative system part, the failure at the technical part and the social part failure to a lesser extent. This finding indicates that administrative, technical and socio-logical services provisions for the BCSR are inadequate. This is further confirmed by CFA measurement model which indicates the technical part with a standardized best factor loading followed by administrative cluster and the social part in the third position. Earlier literature reviews presented similar findings of social, technical and administrative aspects of BC framework having the cause and impact in Kuwait by Al-Fahad (2012) and Baiche et al (2006) reported similar surveys for the underlying causes of Canada Mortgage Houses Corporation building failures between 1990 and 2000.

7.3 The subject of enforcement and compliance level of the Building Code Standards and Regulations (BCSR)

The main finding from the field study here is that professionals and other relevant stakeholders were not satisfied and virtually disagreed to any significant progress in the structural provisions of the BCSR enforcement and compliance in the Nigeria development projects. Earlier contextual analysis revealed similar results of the non-compliance practices and lack of enforcement drive among the government agencies responsible for building control in development projects and willingness of professionals to cooperate with BCSR in Nigeria (Arimah and Adeagbo, 2000; Windapo and Rotimi, 2012).

In Nigeria, this unsatisfactory situation persisted for so long, even after the prominence of Okpala research in 1984 which revealed from literature review that there was no regards for standards and regulations among the elites. In which, the same problem is confronting us daily without appropriate solutions after 32 years and the reproduction of NBC 2006 standards and regulations for development projects in Nigeria. The reason for this could be the lack of organized policy framework which hampers building control agencies and professionals with relevant stakeholders to identify the sources of the enforcement and non-compliance problems. This has the ability of drawing back innovations of building standards and regulations implementation and enforcement for structural buildings development projects. This has put enforcement control official, the professionals and other stakeholders in a difficult situation, knowing that unsatisfactory compliance and enforcement practices exists but couldn't track the sources were discouraging and challenging, and does not

augur well with any government or industry with broader interest of best practices as obtainable in the world.

This research basis of organizing the context of NBC 2006 standards and regulation's structural provisions within the framework of technical, administrative, legal, and socio-logical aspects are logical principles that are acceptable world-wide in identifying Building Code Standards and Regulations (BCSR) activities. It enhances placement of any cause and effects with the context of that parts within the BCSR framework. In another development, professionals of building design and construction and building enforcement official should own up to who is responsible for that cause and effects on the other parts. For example, Jambol (2012), Obiegbu (2008), Windopa and Rotimi (2012) identified legal part and technical part problem of the NBC 2006 easily. This approach was used by Al-fahad (2012) in identifying the problem of Kuwait BC insufficiencies and infringement.

Similarly, field case measurement to establish the degree of compliance and enforcement of BCSR provides great unsatisfactory gaps within the building construction industry in six major cities (Abuja, Port-Harcourt, Lagos, Kaduna, Lokoja and Enugu) for MRRB projects in Nigeria. The majority of non-compliance and enforcement indicators were core activities of foundation works, and reinforcement slabs which requires special skill training and development to implement the designs for structural building projects.

It was established from literature reviews that mid-rise residential building developments projects in Nigeria are parading non-professionals who lack the knowledge and expertise to implement professional's work therefore resulting in subsequent collapse of buildings all over the Nation (Olusola et al., 2011; Omeife and Windapo, 2013).

7.4 The key factors which affect the implementation and enforcement of the structural provisions of BCSR

The key findings from this study analysis in this area is that there are possible two cluster of 12 components of the likelihood of factors which affect implementation and enforcement (IE) within the context theory of administration, legal, technical and socio-logical aspects as identified by MLE and Oblimin rotation of factors. These include:

- 1) Awareness, implementation process, approved standards, poverty level, political interest, leadership, public dialogue, and professional fees (Cluster 1 with high loadings). This indicates administrative/socio-logical aspects of BCSR from research labels.
- 2) Cluster 2; group of 3 factors indicates low loadings (leadership, awareness and political interest). Related context is also administrative/ socio-logical aspects

The literature earlier reviewed mentioned in broader sense some key factors affecting the implementation and enforcement (IE) of the structural provisions of BCSR without any ready to use cluster (s) of factors as it relates to aspects of BCSR. IE of structural aspects of BCSR is considerable made easy if awareness of the BCSR is publicized and given all the necessary legal backing it requires from the legislatures (Dahiru et al, 2012). From the literature reviews, we also note that unclear implementation process, inadequate funding, and shortage of staff, lack of approved standards, political interest, and professional fees have been the challenges facing the BCSR implementation and enforcement (IE) (Berrisford, 2010; Nyangweso, 2007). These challenges are BC administrative aspect related, which will impact on the socio-logical interaction of the people with the standards public awareness creation, and poverty level.

The questionnaire survey demonstrates similar results for implementation process, political interest, leadership and awareness as key factors affecting implementation and enforcement of BCSR structural provisions in Nigeria with the highest response rate of above 50%. This is surprising and not a mere coincidence considering mixed research methods adopted to triangulate the data. This finding may be worrying considering the chunk of responsibilities for the appropriate implementation and enforcement of BC is central to the concept of administrative aspect, followed by technical aspect and to a lesser extent social aspects of BCSR. In which, Nigeria at the moment may not be boasting of effective administrations for implementing government policies and adequate framework for training and development of staff for global best practices in all sectors of the economy especially, in architecture, building engineering and construction (AEC).

7.5 Causal factors leading to poor- implementation and non-compliance of the structural provisions of BCSR

This study MLE with Oblimin and Kaiser Normalisation analysis indicates, this study area identified and suggests 3 clusters with 9 components for the causal factors. These include:

- 1) Cluster 1: Technological expertise, capacity building, and employment and financial strength. The related context is technical aspect of BCSR.

- 2) Cluster 2: Respect for public opinion, and human right. This is a socio-logical aspect issues of the BCSR provisions and
- 3) Cluster 3: Provisional rivalry, professional involvement in decision-making, professional vested interest and corruption were clustered on factor 3. This indicates administrative related aspect of the Building Code Standards and Regulations (BCSR).

This finding from EFA through MLE suggest administrative aspect was major influence leading to poor-implementation and compliance followed by technical aspect (training and development) which impact negatively on the socio-logical aspect of the BCSR structural provisions in the development of mid-rise residential building construction projects in Nigeria. CFA confirm the findings and uphold a highest loading of administrative aspect of BCSR at 90 to 94% empirically and the model test of goodness appears fit. The study tells us that administrative issues, technical issues and socio-logical issues of the BCSR structural provisions in the building development projects in Nigeria should be given a required urgent attention if the problem of implementation and enforcement relating to structural failures and collapse of building should be stopped. From contextualize analysis, Watts, G. Dainty, A., and Fernie, S. (2016) argued that public sector can influence private industries like construction through direct regulations, economic policies and voluntary compliance. In line with this argument, government administrative regulations which will encompass training and development for positive impact on the economic and social life of the people in MRRB projects in Nigeria should be encouraged for effective implementation and enforcement of standards. This will account for a compressive framework of administrative formation through the context of the BCSR aspects.

From the survey in the causal agreement to implementation and compliance constraints, this research found that majority of responses to questions strongly agree and agree that systemic corruption, professional rivalry, professional vested interest, professional involvement in industry decision-making, and capacity building were the major constrains which cause BCSR structural provisions poor-implementation and compliance in projects development in Nigeria. This is supported by previous findings from the literature search. Of which, Ayedun et al (2012) and Oyinola (2011) noted that corruption at different levels of administrations, inadequate capacity building of construction industry personnel, shutting out of building industry professionals in decision-making, professional rivalry and mutual suspicious impedes the implementation and enforcement of standards in Nigeria (Agapiou et al 1998; Omeife and Windapo, 2013). This survey shows that majority of professionals and relevant stakeholders in the building construction sector in Nigeria feel efforts need to be stepped up among the government administrative systems to develop framework that will reduce systemic corruption, enhance training and increase collaboration among

professionals and the relevant stakeholders in the implementation of BCSR for structural provisions in building development projects in Nigeria.

7.6 The impact risks associated with the poor-implementation, enforcement and compliance of standards to the industry development and professional practice

The findings in this study area suggest 3 clusters with 10 components using MLE and Kaiser Normalisation rotation method. In which, research label (environmental quality/planning) cluster 6 factors and the rest 2 clusters each. The clusters are:

- 1) Cluster 1: congestion of houses, unplanned cities, death due to structural failure, risk of fire hazards, and non-professionals entry into construction, and sub-standards buildings and materials. This is an enforcement issues relating to administrative/technical aspect of the BCSR
- 2) Cluster 2: incessant collapse of buildings and house property destruction. An aspect of technical issues.
- 3) Cluster 3: loss of investors' confidence and environmental pollution and disease. This indicates an aspect of socio-economic aspect of the BCSR.

Similarly, the survey response findings indicate that technical aspects of the building code standards and regulations indicates most high and high risk of 65%, 54% and 55% for death due to structural failure, incessant collapse of buildings and entry of non-professionals into the industry respectively. This indicates inadequate technical coverage of BCSR structural provisions in the context of technical aspect of the building code for the risks impact. The findings show the vulnerability of the MRRB construction industry to dangers of structural collapse, death, loss of properties and influx of unsafe buildings and cities as a result of shortage skills for technical construction for safe mid-rise residential buildings. It shows that perhaps, urgent training is required to stop the ugly trend of building failures and structural collapse of BC provisions in Nigeria. Fundamentally, this finding is supported by earlier literature review, where it was revealed that incessant collapse of structural buildings, several deaths, loss of investors into the industry, influx of substandard materials leading to unsafe buildings and many unprofessionalism by non-professional activities in the industry were all acknowledged as the impact risks associated with poor-implementation, enforcement and non-compliance to BCSR in MRRB projects in Nigeria (Ayeni, 2014; Olusola et al, 2011; Olagunju et al, 2013).

From the industry practitioner it was found that administrative related issues; awareness, professional vested interest, monitoring and feedback, implementation process, corruption,

enforcement issues, and professional involvement in decision-making were clustered in a single tree. The finding indicates lack of proactive and system supportive administrative decisions in the implementation and enforcement process of structural provisions of building code standards and regulations (BCSR). This finding is in line with earlier literature review in which, NIRN (2015) noted that supportive and proactive administrative systems will create enthusiasm which reduces barriers, create administrative enabling structures for administrators, and encourage satisfaction by regularly asking for feedback for fidelity measurement.

The interviews also clustered for the technical context; structural failure & collapse, training and development, approved standards, and non-professional practices suggesting the significant of training for the IE of technical aspect of the BCSR. The findings indicate that potential increase in training of professionals and skilled relevant stakeholders will results in avoidance of non-professional practices currently exhibiting in the MRRB projects in Nigeria. This interview findings further reinforced the findings by Fixsen et al 2013; Meyers et al 2012; Blasé et al (2013-2015); NIRN (2015) that, good training provide ample opportunities for demonstrations and rehearsal to practice the skills received. Lack of training of building professionals in it-self can hinder best practices and innovations that could have helped in the development of the sector.

It can be seen that, hard to classify findings emerged as the third cluster from the interview analysis. The finding indicates insurance, property loss, death and injuries, legislation, and independent supervisory commission on a single tree. These are not easily related to the context framework of (technical, legal, administrative and socio-logical) aspects. A critical examination of all other results from data triangulated analysis does not also cluster such findings. However, this study went ahead to name it economic value as a new theme. The findings suggest the necessity of insurance policy or framework to reduce the impact of property loss, death and injuries as a result of administrative and technical failure of BCSR structural provisions in the development of MRRB projects in Nigeria. This may be within the framework of building construction independent supervisory commission which can be enacted through legislation to reduce structural failures and collapse of MRRB projects. From context, Jorgen (2010) argued that it is proper for regulatory power to be delegated to the third party (independent body) in which, Johan (1999) also noted that such practices will improve technical and complex administrative decision-making that requires experts as heads of the affairs. Previous literature reviews further highlights the importance of third party or hybrid approaches to effective regulatory implementation and enforcement (Yu, S. *et al* 2013; Evans *et al* 2010; Makela *et al* 2011). This finding from literature reviews have boosted the interview findings of this study although hard to classify, Creswell advised it is expected in any interview research of this nature.

In view of the findings that the independent supervisory commission is credible, acceptable best practices in the UK, USA, SA, India, China, and Australia among others, which improve administrative and technical failure aspects of the BCSR of this study findings from all major findings; this study advocate for the establishment of independent building regulation commission (IBRC) for building control enforcement policy framework as a comprehensive strategy to improve regulatory compliance within mid-rise residential development projects in Nigeria, which encompass monitoring, continually review of compliance level, and training for capacity development. This proposed building control enforcement policy framework was developed by this study from interview and focus group suggestions by industry practices, professionals and academia. It was shown to the industry practices, professionals and academia along with the interview transcript and analysis and was authorized to be part of this work as a contribution to the industry development in Nigeria after little adjustment of some sentences. A feedback comment is attached (Appendix 8 A)

Generally, this study findings shed more light on the aspects of BCSR that is mostly influencing implementation and enforcement of structural provisions, this findings will guide professionals and other relevant stakeholders in the building construction industry not only in Nigeria but also in developing countries as well, to view BCSR implementation and enforcement constraints within the framework of the most affected aspects of administrative system, technical aspect and less reported socio-logical aspect identified by this study. The findings will also help professionals and other relevant stakeholders to quickly identify the aspects of technical skills shortage which requires urgent skills gaps training and development outcry of the Federal government for the building construction sector in Nigeria. This research findings will assists MRRB policy makers in the development of credible commitment practices policy for better buildings enforcement control. The findings of this research have also opened up new hypothesis and debates for advance research in the implementation and enforcement BCSR within:

1. Building construction industry administrative (systemic) failure,
2. Skills shortage in the building construction sector in Nigeria as a result of technical failure of BCSR structural provisions, and
3. Socio-logical failure of standards and regulations: A case of Industry CSR in Nigeria.

In view of this, this research believes to have made some significant contribution to the body of knowledge in the debate of implementation science, enforcement and compliance to standards and regulations and the development of mid-rise residential buildings projects in Nigeria. Table 8.1 is the summary of this research quantitative and qualitative finding for discussion.

Table 7.1 Quantitative/Qualitative research results

Quantitative results	Related research context framework	Qualitative cluster analysis results	Related research context framework
1) Cluster 1: Professional rivalry, professional involvement in decision-making and professional vested interest.	Administrative aspect	1) Cluster 1: Professional vested interest, awareness, monitoring and feedback, profesional rivalry, implementation issues, professional involvement in decision-making, and enforcement issues	Administrative concept
2) Cluster 2: Approved standards and employment and financial strength,	Admin/socio-logical aspects of the BCSR	2) Cluster 2: insurance, property loss, death and injuries, independent supervisory commission, and legislation	Reserch label Economic value (New theme)
3) Cluster 3: Technological expertise, capacity building, and sub-standard materials and houses,	Technical aspect		
4) Cluster 4: Leadership and house property destruction,	Technical/admin		
5) Cluster 5: Respect for public opinion, human right, and public dialogue,	Socio-logical aspect		
6) Cluster 6: Legal/economic value	Legal/economic value	3) Cluster 3: Technical aspect	Technical aspect

Legislation and loss of investor's confidence,		structural failure, training & development, approved standards, and non-professional practices	
7) Cluster 7: Environmental pollution & disease and incessant collapse of buildings indicates administrative/technical aspects and	Admin/technical related aspects		
8) Cluster 8: Corruption and political leadership	Administrative aspect		
Influential factors affecting compliance within the research related framework (Legal, technical, administrative, and social aspects of BC standards and regulations) for discussion from findings are:			
• Main influence : Administrative aspect failure (affecting many items)			
• Second affecting: Technical aspect failure			
• Lesser affecting: Socio-logical failure and			
• New theme (Economic value)			

7.7 Issues of administrative, technical (Training & development), and the socio-logical failures

7.7.1 Administrative failure Issues

The findings identified contributing factors of both key, causal and impact risks which impede and associate with implementation and enforcement of BCSR. Of which, 8 factors of administrative framework failures, including; corruption, Professional rivalry, leadership, professional involvement in decision-making, professional vested interest, political interest/will, and implementation process provided a stronger view of administrative factors contributing to the failures of structural provisions of BCSR for MRRB.

From literature reviews, it was revealed by Civil Society of Nigeria (2008) and Transparency International (2013) that corruption is the cause of systemic disorder and insincerity of government

institutions in Nigeria. In which, UNCAC (2004) advised periodic evaluation of administrative systems with a focus to determining adequate performance to prevent failures that can breed petty and grand corruption types which are capable of destroying an organization through leadership compromise, personal/professional interest or rivalry, and through a lack of political will to drive accountable policy measures to regulate practices. It was also revealed from literature reviews by Oyinola (2011), Ayendun et al (2012) that governance failures at all levels in Nigeria is as a result of corruption which has eating deep to every sectors. Of which, UNDP (2008) advocate integration of accountability policy measures into national development plans and establishment and coordinated anti-corruption laws and regulations and public disclosure to help in reducing governance system failures. This findings indicate that systemic disorder and governance failures which are the main problem of structural provisions of standards and regulations failure can be prevented by observing relevant indicators of corruption (perception-based/experienced-based, proxy indicators, indicators based on single data source and composite and objectives indicators) in ensuring adequate administrative procedures for those in public offices deemed prone to corruption as advised by UNCAC (2004). Similarly, this study finding of non-involvement of professionals and professional interest/rivalry in the building industry decision-making create conflict and ineffective administrative system. And this is supported from literature review research by Arimah and Adeagbo (2000), Omeife and Windapo (2013) that non-compliance and ineffective implementation of BC is as a result of lack of professional participation in industry policy-making and lack of inter-agency coordination of enforcement officials.

Earlier Literature reviews have shown how to reduce the impact of professionals and stakeholders conflict through constructive negotiation, mapping of interest, and prioritization of stakeholders interest (Freemen, 1984; Blattberg, 2004; Bourne, 2010, 2006; Boatright; 1994, Scott *et al*, 2006). This research findings that leadership factor contribute to administrative failures of structural provisions of BCSR indicates incompetency, non-accountability and ineffective practices and procedures of those in public offices. From literature reviews, Fagbenle and Oluwunmi (2010) noted that unaccountability of leaders made professionals and other stakeholders to undermine the importance of standards and regulations in the building construction industry in Nigeria.

This findings show that administrative failure aspect are the most influential factors leading to non-compliance with BC standards in MRRB projects in Nigeria. This finding indicates that administrative aspect of BC services provisions is inadequate to enhance proper compliance. The finding also indicates lack of proactive and system supportive administrative decisions in the implementation and enforcement process of structural provisions of building code standards and regulations (BCSR).

The reason for this can be traced to the study by Nijssen *et al.* (2009) on the concept of compliance to standards and regulations by Adam Smith (Smith, 1966), to support this findings, which is the administrative burden problem created and imposed in the industry or on practitioners. Administrative decisions in the regulatory implementation process should be supportive, proactive, vigorous, and enthusiastic, with attention to reducing barriers and creating administrative enabling environments for practitioners (National Implementation Research Network (NIRN), 2015).

Effective administration requires change and system transformation within the practice, the organisation and systems at all level. This can be achieved through administrative practice communication loop, which can study system structure, procedure and feedback for successful practice that will not fail (Fixsen 2006).

Administrative system that wish to overcome failure should be quick to adopt a learning culture from their own experience and modifies the structure and design to reflect the learning process, this should include direct and frequent communication from the practice level (Bottom) to the policy makers and administrators level (Top), it should be frequent to hear success, collect necessary data for improvement, describe all experiences, and constrains to make full and effective implementation at the practical stage with the help of implementation teams who have the skills, and abilities to help practitioners and staff make full and effective use of the innovations and enabled policy (NIRN, 2015; Fixsen and Blasé 2012).

The MRRB projects in Nigeria lack the characteristics of support, proactive and vigour. For example, the BC standards for the industry have not been enacted since they were drafted in 2006, and the continual collapse of buildings over the past 15 years and many on-going building projects are ignored by the government and enforcement agencies, resulting in no arrests of those who are responsible or the issuing of severe sanctions from administrative agencies to serve as a deterrent to others. This is exemplified by the results of this study where administration is the leading cause of non-compliance with standards and regulations in the development of MRRB projects.

Nijssen *et al.* (2009) stressed that policy makers and regulatory inspectors should clearly illustrate how administrative systems can be responsible for promoting quality and compliance. The study further stressed that reporting and monitoring of compliance make the administrative process easier and more efficient for both professionals and the industry, and consequently should be introduced.

7.7.2 Technical failure (Training & development) Issues

Second most influential factors affecting compliance after administrative findings is the technical failures relating to the context framework of technical aspect of the BCSR. 5 factors, including;

technological expertise, capacity building, sub-standard materials and houses, incessant collapse of buildings, structural failures/property destruction which are issues of training and development were identified and examined as technical framework related failures. This result shows a significant effect of technical factor failure on non-compliance. The findings of capacity building, technological expertise, and structural failures/building collapse, and house property destruction is an issue of training and development of professionals and relevant stakeholders related to technical aspects of the building code standards and regulations (BCSR). This finding indicates that the technical framework of structural building code provisions for MRRB development projects in Nigeria is not being implemented and enforced as expected to reduce the structural failures. To overcome this challenges, training and re-training of professionals, artisans and other relevant stakeholders should be the priority, for the more capacity building of the industry professionals and relevant stakeholders acquire through training and development; the more professionals and other relevant stakeholders are better technically equipped to implement and enforce standards and the less non-compliance, less structural failures and building collapse and less property loss. Similarly, the more professionals and industry practitioners are well trained as specialist in modern technology and construction methods, the less technical provisions of the BCSR failures. In general, more training and development indicates better technical factor and less non-compliance to structural BC standards and regulations in mid-rise residential building projects in Nigeria.

This result supports the advocacy of building construction skills training in developing countries, where advanced technology for the production process is scarce (Muya, Mulenga, Bwalya, Edum-Fotwe, and Price, 2004). The construction industry in this digital age is characterised by advanced technology, modern construction methodology, and high-tech materials that require consistent improvements to training and development in order to meet the appropriate industry needs (Agapiou, Price, and McCaffer, 1995). The findings indicate that potential increase in training of professionals and skilled relevant stakeholders will result in avoidance of non-professional practices currently exhibiting in the MRRB projects in Nigeria. This reinforces the literature review findings by Fixsen *et al* 2013; Meyers *et al* 2012; Blasé *et al* (2013-2015); NIRN (2015) that, good training provide ample opportunities for demonstrations and rehearsal to practice the skills received. Lack of training of building professionals in it-self can hinder best practices and innovations that could have helped in the development of the sector.

Skills training and development differs with possibility of confusing the term and intent of the word, therefore this study skills focus is within the activities that influences employment and earning in the

structural aspects of building projects for both the professionals and the artisans (Agapiou, A., Price, A.D.F and McCaffer, 1995).

Productivity and quality performance of construction workers and managers is dependent on the training and retraining of workers for the new skills required for the new technologies (Muya M, Price A.D.F and Edum-Fotwe F.T, 2007). Muya M. *et al* (2003) advocated alternative construction employer's recruitment strategies to avoid skills shortages in the future by first upgrading the existing workforce and investment in training to address the persistent problem of skills shortage in the construction industry (Jayawardane and Gunawardena 1998, cited in Muya et al, 2007). Professionals tend to shy away from the truth of not been trained for some aspects of projects especially in developing countries therefore taking up construction projects they lack basic skill for effective execution; this affects regulatory compliance in such projects, the study stresses further that, training and awareness of existing specialize skill relating to technical and regulatory compliance skills are important and should be provided continuously in the building construction industry (Baiche *et al* 2006).

7.7.3 Socio-logical failure issues

This research finding also revealed 4 socio-logical factors contributing to the building code standards and regulations and implementation, enforcement and compliance failures, including; human right, public dialogue, respect for public opinion, and employment/financial strength which revealed the socio-logical aspect of the building code failure for MRRB projects in Nigeria.

The findings indicate that human right, respect for public opinion, and public dialogue (socio-logical framework) to a lesser extent have direct relative cause and effects on poor-implementation, enforcement and non-compliance. From literature reviews, it was revealed that the more the social positive impact (e.g. scholarship for the vibrant youth who act as a force for change in every society, skills training acquisition, health care provisions, and infrastructural development) felt by the people of the society from the government or industry, the more willing to comply with government or industry standards and regulations voluntarily. This is expressed through CSR social impact concept proposed by Carroll (1979) with subsequent revision in 1983 and 1991 cited in (Watts, G. Dainty, A., and Fernie, S. 2016; Manuel C.B & Lucia L.R., 2007; Gupta A.D., 2012) as an acceptable global practices of many companies within four categories of social responsibilities as follows in a pyramid: Economic responsibilities, Legal responsibilities, Ethical responsibilities, and Philanthropic responsibilities as follows in a pyramid:

- Economic responsibilities: be profitable for shareholders, provide good jobs for employees, and produce quality products for customers (The foundation in which all rest);
- Legal responsibilities: be compliance with the laws and obey all rules/regulations (society codification to do right or wrong);
- Ethical responsibilities: carry out business with respect to morals, doing what is right, just be fair in dealings, and avoid harm to anyone, and
- Philanthropic responsibilities: make voluntary contributions to society; given time and money to good works (be good corporate citizen).

The pyramid reveals a linkage between the industry and the society (people or community), the different types of obligations, whom industry should be responsible and be responsive. Lantos (2002) as cited in Manuel & Lucia (2007) stated that CSR is a mandatory ethical responsibilities of companies to society and fulfilment of companies, philanthropic responsibilities go beyond preventing possible harm to help in alleviating public suffering without considering business benefiting from the work first. However, this will immensely benefit the company through positive publicity of the people for Protecting public interests such as health, safety, the environment and social integration of the people which aimed at regulatory design for market incentives and goal-oriented approaches, which are simple, flexible and effective (OECD, 2000). For the society to comply with rules and regulations as desired, their human rights and respective responsibilities should not be ignored in any managerial decision-making process by organization and government. From literature reviews it was revealed that the planning process must consider the values of the public, those values held by them should be upheld in policy formulation and implementation strategies planning (Bitchta, 2003). Therefore confirming CSR actual positive impacts in the society as a channel through which structural provisions of building code standards and regulations can easily be implemented and enforced within the mid-rise residential building projects in Nigeria for both employers, consumers, investors and suppliers within the community (Papasolomou *et al.*, 2005 cited in Dima, J., 2008). Despite the limited impact of CSR progress in the industry as revealed, they is hope, if industry and government will accept to focus on achieving the legal and economic obligations as advised by Carroll's pyramid with high philanthropic opportunities within each public area, compliance with standards and regulations will increase over time.

7.7.4 New Theme (Economic value)

From the analysis it can be seen that, hard to classify finding emerged which suggest the necessity of insurance policy or framework to reduce the impact of property loss, death and injuries as a results

of administrative, technical failure , and socio-logical failure of the BCSR structural provisions in the development of MRRB projects in Nigeria. This may be within the framework of building construction independent supervisory commission which can be enacted through legislation and awareness creation which Dahiru et al (2012), Arimah and Adeagbo (2000) from literature noted that extent of public awareness through campaign determine the extent of compliance with standards and regulations to reduce structural failures and collapse of MRRB projects. From contextual analysis, Jorgen (2010) argued that it is proper for regulatory power to be delegated to the third party (independent body). In which, Johan (1999) also noted that such practices will improve technical and complex administrative decision-making that requires experts as heads of the affairs. Previous literature reviews further highlighted the importance of third part or hybrid approaches to effective regulatory implementation and compliance (Yu, S. et al 2013; Evans et al 2010; Makela et al 2011). This finding from literature reviews have boosted the finding of this study although hard to classify, Creswell advised it is expected in exploratory research of this nature.

In view of this finding that the independent supervisory commission is credible, acceptable and best practices already operational in the UK, USA, SA, India, China, and Australia among others, which improve administrative and technical failure of standards and regulations for economic value by promoting investment through credible regulations for investors, this study therefore advocates for the establishment of independent building regulation commission (IBRC) for building control enforcement policy framework as a comprehensive strategy to improve regulatory compliance within MRRB projects in Nigeria, which encompass monitoring, continually review of compliance level, and training for capacity development.

7. 8 Implications for research

As mentioned earlier, this current research's, principal aim was to identify and examine the key and the causal factors that impede the successful implementation and enforcement of BC standards and regulations, and to also investigate the impact risks associated with poor-implementation and enforcement of BCSR to the professional practice, clients, consumers, and the development of the industry within the research framework (technical, legal, administrative and socio-logical) for the mid-rise residential building projects in Nigeria. From literature reviews, detailed and organized frameworks (technical, legal, administrative and socio-logical) of causal effects of key factors responsible for the poor-implementation, enforcement and compliance to standards within the MRRB developmental projects in Nigeria was lacking. However, previous researches had organized work on challenges based on code violations (Sanuwe et al, 2009), barriers from administrative

requirements technical provisions of BC (Al-Fahad, 2012), faced by the implementation, enforcement and compliance of building code and strategies to adopt by professionals and government agencies for effective implementation to prevent failures leading to structural collapse of buildings (Windapo and Owolabi, 2008; Alnsour and Meaton, 2009; Baiche et al, 2006; OECD, 2008; Arimah and Adeagbo, 2000).

This research achieved the set goal through organization of various tasks into various research context framework of technical, legal, administrative, and socio-logical framework, which is the first of such research detailed organization in identifying aspects of BCSR failures leading to implementation, enforcement and compliance failure in Nigeria. In which, corruption, Professional rivalry, leadership, professional involvement in decision-making, professional vested interest, political interest/will, and implementation process (administrative framework) were identified and examined as the main factors leading to poor-implementation, enforcement and compliance with structural provisions of the BCSR and the causal effects to the profession, clients, users, and to the industry development. Followed by technological expertise, capacity building, sub-standard materials and houses, incessant collapse of buildings, structural failures/property destruction which are issues of training and development (technical failure), and to a lesser extent human rights, public dialogue, respect for public opinion, and employment/financial strength (socio-logical framework). This research findings and conclusions should help building code officials, government enforcement agencies (inspectors), building industry professionals, and other relevant stakeholders make well-informed decisions about the future building implementation strategies, enforcement and compliance nature of further research to minimize the effects of the findings.

This research organization clearly shows current evidence of Building Code Standards and Regulations (BCSR) failures within the administrative failure framework as the most influential factors leading to poor-implementation, enforcement and non-compliance with BCSR in MRRB projects in Nigeria, which previous researches do not categorise the failures as such. This findings show that administrative aspect of BCSR provisions is inadequate to enhance proper compliance in the structural provisions for MRRB development projects. The implication of this findings is the resultant effects of corruption within the administrative system, unaccountability, personal/immediate professional interest without proactive and supportive administrative policies for better strategies in the implementation and enforcement process of structural provisions of BCSR as shown in the literature review by(NIRN, 2015; Oyedun et al, 2012).

The findings revealed second most influential factors leading to poor-implementation, enforcement and non-compliance as technological expertise, capacity building, sub-standard materials and

houses, incessant collapse of buildings, structural failures and building property destruction which are issues of training and development evidentially related to technical provisions of the BCSR. Previous researches rarely report such findings as factors contributing to the technical failure of the structural provisions of the BCSR for proper investigation and decision-making, therefore; increases the risks and impact of technical failures in the construction of building projects, leading to death, incessant collapse, and loss of investors' confidence. The finding indicates the neglect of the importance and opportunities which exist by training of professionals and skilled relevant stakeholders to avoid cutting-corners and non-professional practices within the MRRB projects (Agapiou, Price, and McCaffer, 1995; Muya, Mulenga, Bwalya, Edum-Fotwe, and Price, 2004; Dixit, 2008; Fixsen et al 2013; Meyers et al 2012).

The investigation by this research adopted mixed research methods (questionnaire survey, industry interview, site case measurement, and focus group discussion process), which mainly consists of building development control officials (inspectors), academia, architects, builders, engineers, quantity surveyors, town and urban planners, legislatures, contractors, artisans, regulatory bodies, and standards organisation. Others include; building construction/facilities managers, contractors, and owners/end-users as samples of study to investigate the case of structural failure of BCSR provisions for MRRB development projects in the six geo-political zones and Federal capital Territory (FCT) of Nigeria.

From literature reviews, previous researches adopted a single instrument or a combination of two or three at most of this hybrid research approach for data collection in investigating similar cases using professionals such as architects, builders, engineers, land surveyors, quantity surveyors, urban planners, contractors, and houses as sample of study (Baiche et al, 2006; Arimah, and Adeagbo, 2000; Windapo and Owolabi, 2008).

This research findings were considered in recommendations of the study and for further studies that would best suits the needs of the building development industry and minimize the future effects in chapter 9 of this thesis.

7.9 Summary

This chapter presents the findings from the research field survey (Mixed Methods) and documents reviews and findings from related similar researches. The chapter has described the various means or group of dimensions in which structural provisions of building code standards and regulations is poorly-implemented, enforced and complied to. The chapter has explained the key factors, the

causal factors that impede adequate implementation and enforcement of BCSR structural provisions for mid-rise residential building projects in Nigeria within this research framework of administrative, legal, technical and socio-logical aspects of the BCSR.

It also explained the impact risks associations to industry development, professional practice and consumers. This approach is to assist this research in clearly understanding the framework of key factors impeding structural provisions of BCSR implementation and enforcement, which were identified as administrative/social research framework. The approach also identified the causal factors leading to poor-implementation and enforcement of BCSR as technical, socio-logical and administrative framework, as impact risks associations framework were revealed as socio-logical, administrative and technical aspects framework. It has explained clearly how, level of enforcement and compliance with structural provisions of mid-rise residential buildings projects was not satisfactory by the respondents, interviews, and research case measurement, and literature documents review.

The discussion have shown that clear understanding of the implementation and enforcement problems of the structural provisions of building code standards and regulations for mid-rise residential building projects in Nigeria would help to develop comprehensive strategic building enforcement control framework, it will assist building code enforcement officials and professionals to develop certification of MRRB projects at different stages with focus on identified skills shortages areas, which results in technical failures of the structural provisions of the BCSR. It also discussed implementation and enforcement failures of the aspects of framework identified with each research questions including the CSR as a vehicle that can lead to mass compliance with structural provisions of BCSR in mid-rise residential building projects in Nigeria.

This research can now draw-up conclusions and recommendations in the next chapter.

Chapter 8:

CONCLUSIONS AND RECOMMENDATIONS

8.1 introduction

This research focused on the theoretical argument that the implementation and enforcement (IE) of the Nigeria building code structural provisions within Mid-rise residential building developmental projects is partially constrained by the systemic failure of technical, sociological, legal, and administrative governance. The aim was to identify and examine the key and the causal factors that impede the successful implementation and enforcement of BC standards and regulations. At the same time investigates the impact risks associated with poor-implementation and enforcement of BCSR to the professional practice, clients, consumers, and the development of the industry. The investigation was to identify and examine the main influential factors within the research framework leading to IE failure with structural BC standards and regulations for MRRB projects in Nigeria. Also to examine the relative effects of the main influential factors of BC standards research framework (administrative, technical, socio-logical and legal) on the professional practice and industry development (Al-Fahad, 2012). Specifically, this study aimed to determine whether there is a relationship between the determinant factors and their influences on poor-implementation, enforcement, and non-compliance with standards and regulations. This research also investigates the skills and knowledge gap among the professionals, craftsmen, and relevant stakeholders within Building Code Standards and Regulations (BCSR) skills practices on the overall degree of enforcement and compliance with structural provisions of the BCSR, which requires immediate attention that will help to stop the incessant collapse of mid-rise residential building developmental projects in Nigeria.

Different approaches were deployed for the investigations of the research questions and in achieving the research objectives for the extraction of full information on several areas related to the implementation and enforcement of BCSR for mid-rise residential buildings. These include information on level of enforcement and compliance of BCSR (Windapo and Owolabi, 2008), key/causal barriers to implementation and enforcement and impact risks associated with poor-implementation, enforcement and compliance (Dahiru et al, 2012; Bersifort, 2010; Olangunju et al 2013) and possible efforts to improve implementation, enforcement and compliance of BCSR among others (May, 2007; NIRN, 2015). Previous chapters have discussed several answers to these questions. This chapter provides the general research conclusions and makes recommendations and

research contributions to broad knowledge of BCSR implementation, enforcement and compliance for mid-rise residential building developmental projects.

8.2 Conclusions

Levels of implementation, enforcement and compliance with BCSR

Adequate implementation, enforcement and compliance with BCSR have been in use in many developed countries for several years. For example, in UK, Trombly (2006), Allen, J. (2008) confirm the strong control of building regulations in 1189 even before the London fire in 1666 AD which gave an opportunity for a review of the building regulations. In Nigeria, several attempts were made over time in regulating lands and building development. For instance, in 1861 British Colony under treaty of cession was adopted to control development, in 1863, Lagos Town improvement Ordinance to control building development and sanitation was in place. Similarly, 1928 to 1930 Lagos Executive Development Board (LEDB) was established to improve slum condition of Lagos, and building development plan and policies were between 1946 and 1991, and 1992 was Urban and regional Planning Law and now the NBC 2006 (not enacted at the time of this research) for the purpose of regulating and controlling building development projects in Nigeria (Kayode and Bayo, 2012; Olufemi, O., Ayangbile O. and Abiodun, O. 2015, Act 1992.N0.88). Despite all these efforts, BCSR publicity is at its lowest point and implementation, enforcement and compliance is so scarce and adheres to by professionals, enforcement agencies (inspectors) and relevant stakeholders as revealed by this research findings.

Key factors and causal factors failures within the context framework which impede effective implementation of BCSR

It was observed that the structural provisions of the BCSR were not being implemented as a result of administrative related factors failures (Professional rivalry, leadership, professional involvement in decision-making, monitoring and feedback process, professional vested interest, unplanned cities, corruption, political interest/will, implementation process, and environmental pollution management), technical related failures (technological expertise, capacity building, sub-standard materials and houses, incessant collapse of buildings, house property destruction, death due to building failures, structural failures, training and development) and socio-logical failures (respect for public opinion, human rights, public dialogue, and employment/financial strength) of the research context framework at all levels of implementation, enforcement and compliance. These failures

adversely affected the adequate implementation of the technical features by the various professionals involved in the building construction process and therefore, created lapses in the publicity of the BCSR.

Impact of the failures to the industry development and professionals practice

Of which, structural collapse of mid-rise buildings is the resultant effects that significantly increased risks of death, loss of investors and investments, sub-standards buildings and entry of non-professionals into building development over time in Nigeria. It can be stated that policies from administrative framework of the BCSR is critically important to the implementation and enforcement of BCs, and impact significantly on government enforcement agencies (Town planning board, development control), professionals implementing the technical provisions in their practices and others complying with the standards.

Main influential framework failures leading to poor-implementation and enforcement (IE) of BCSR

The findings suggest stronger influence of administrative aspect (framework) followed by technical aspect and to a lesser extent socio-logical aspect. When examining the broad research framework of building standards and regulations, it is worth noting that administrative failure effect impact negatively on technical and social aspects of BC for compliance issues. The technical aspect of the regulations was identified after administrative aspect and shows a stronger influence on socio-logical aspects. This means that enhancing technical aspects may create social empowerment interest. The implication is that if compliance is to be achieved, then the public must be engaged and empowered, professionals and relevant stakeholders have to be technically trained in new technological developments, and the greatest influence of administration must be re-designed, in order to reduce the negative impact on technical and socio-logical factors of structural provisions of BC standards and regulations for compliance within mid-rise residential building (MRRB) projects.

This indicates that the theoretical model developed for this research are consistent with the observed data for factors of poor-implementation, enforcement and non-compliance with structural provisions of BC standards in MRRB through the systemic failure of technical, socio-logical and administrative aspects as argued by Migosi et al. (2013) for such findings.

Determinants of non-compliance of professionals and craftsmen with BCSR

The findings also suggest that inadequate technical foundation skills and standards and regulations skills among the professionals and craftsmen impact significantly on the overall compliance with

Building Code Standards and Regulations (BCSR) in the MRRB projects in Nigeria. It was revealed that the majority of core structural building development project technical activities were found at the first stage (Foundation) and second stage (Foundation + Slab) of non-compliance study measurement. This indicates that, the first stage (Foundation) and second stage (Foundation + Slab) of the building development projects in Nigeria requires urgent attention for training and development of skills to enhance implementation and compliance and help building development inspectorate, policy makers and relevant professional bodies in addressing the issue of enforcement and monitoring process within the MRRB projects in Nigeria.

Summary conclusions

In conclusion, the findings of administrative (systemic) failure, technical failure, and socio-logical failure of this as aspects of BC framework affecting implementation and enforcement of BCSR structural provisions in Mid-rise residential buildings are in line with previous researches and buttress the claim that the administrative system, technical process and social effects are among the major causes of non-compliance with building standards and regulations. For example, the administrative factor causes (Al-Fahad, 2012), public financial strength (poverty) cause factor (Sarhhelyli et al., 2012), political-cultural factor (Alsour and Meaton, 2009), institutional context, administrative machinery, public poverty and illiteracy (Arimah and Adeagbo, 2000). However, in this study analysis indicates another factor for non-compliance to structural building standards and regulations in the Nigerian context as training and development for the implementation process and the exploratory approach to enhance compliance.

If the key factors that affect the implementation and enforcement of BCs must be fully eliminated, an effective policy design framework must be put in place to uproot and break the causal factor's shark-like teeth that grip the key factors. This research suggested strongly that, taken into account the identified key and causal factors, an effective building enforcement control policy development and detailed implementation framework design showing what to do, who to do it, when it has to be done, how it should be done and time taken among the stakeholders will drastically reduce the impact risks on the industry and help solve the problem of poor-implementation and enforcement of the BCs and incessant collapse of mid-rise residential buildings and improve regulatory compliance within residential development projects in Nigeria, which should encompass monitoring, continually review of compliance level, and training for capacity development.

8.3 Recommendations based on the study and for further studies

Strategic steps to overcome enormous challenges of poor-implementation, enforcement and in ensuring compliance to BCSR in Nigeria by this research are as follows:

Recommendations based on previous studies

- Early identification/reporting of corruption indicators at every level of governance should be encouraged within the administrative system of MRRB, at the same time introduce basic disclosure in all government participatory system to encourage collaboration and partnership among professionals to build robust mutual trust and relationship.
- Introduction of Building Code Standards and Regulations into our engineering & built environment tertiary institutions curriculum from 100 level to final year professional practice will go a long way in creating awareness, equip younger professionals with skills of implementation, enforcement and compliance, and at the same time handy information on sanctions in the event of violations.
- There should be one-stop shop for building development projects approvals to promote effective implementation, enforcement and compliance for mutual professional trust and respect.
- Campaign for self-regulation and voluntary compliance should be encouraged among clients to promote compliance

Recommendations based on International best practices

- The Executive (administrative) arms of government should create an enabling implementation context for effective policy and regulatory implementation in Nigeria.
- Straight jacket regulations implementation in Nigeria should be stopped while embrace driving implementation through different stages as it is enshrine in the best practices.
- Priority should be at attitudinal change of all people affecting by the implementation using behaviour change wheel and assessment tools recommended in the best practices principles.
- Expertise and team work should not be undermined-implementation scientist should be be engaged to drive the process and in dealing with expected resistance professionally.

Recommendations based on the findings

Immediate or short term recommendations

- Professional regulatory bodies to assist building control officers to act as inspectors in every State and FCT to reduce the rate of non-compliance in the construction process.
- Incentives such as free consultancy and waivers of some approval fees awareness should be created to encourage voluntary compliance in the approval process.
- Immediate increment in the technical capacity of all qualified professionals and control officials is required to assist in the implementation of the minimum requirements.
- Qualified personal should act as clerk of works for clients in the building construction process

Long term recommendations

- Skills training and development for specialised skills shortages such as foundation skills and standards/regulations policy framework implementation skills should be introduced within the government enforcement agencies and industry professional systems for BCSR. This should include the introduction of compliance certification award at critical stages of foundation and slab developmental projects.
- This research recommend compulsory CSR policy framework for companies within the building construction sectors in Nigeria for social respect and promotion of human rights to encourage public compliance with standards and regulations.
- Independent pressure group that can demand policy implementation and enforcement should be introduced and empowered to enhance investors' confidence
- Government should delegate building inspections to independent body and act as regulating the regulators as it is enshrined in the modern credible regulatory theory for proper monitoring, evaluation and reporting of practices within the formal and informal sector.

- NBC 2006 should be reviewed from prescriptive to performance code in some aspects to accommodate sustainable features and innovations to design, construction and materials production and installations.
- They should be and advocacy for the introduction of insurance policy to encourage investors into the building industry

Recommendations for further studies

This current study investigated the problems associated with the Building Code structural provisions within the administrative, legal, technical and socio-logical framework to identify the various factors and barriers that impede the implementation, enforcement, and compliance of BCs structural provisions for mid-rise residential building (MRRB) development projects in Nigeria. This study focuses on the key/causal factors and impact risks affecting the implementation, enforcement and compliance with the existing NBC 2006 structural provisions within MRRB in Nigeria building construction industry.

In future, this research expects a potential research in measuring the quality of building materials and how it causes structural provisions of building developmental projects failure in Nigeria. Other potential advance research in the implementation and enforcement for compliance of building code standards and regulations is by looking at the impact of petty/grand corruption within the administrative (systemic) feature of the building construction industry. Further research investigation can also focus on the skills shortages in the building construction sector to guide building code officials and code writers for proper enforcement and compliance provisions. An investigation can also be directed at the cause factor of socio-logical failure of standards and regulations within the six geo-political zones in Nigeria.

8.4 Research Contributions

This research evidential findings for the principal aim in identifying and examine the key/causal factors leading to poor-implementation, enforcement and compliance and the impact risks associated with them to the building industry development, professional practice and the consumers within the proposed research context framework (Technical, Legal, Administrative and socio-logical) is designed to contribute in addressing the failures of structural provisions of BCSR for mid-rise residential building projects in Nigeria.

This research substantial evidence of the administrative related factors failures, technical related and socio-logical failures of the research context framework identified causes which impede the implementation and enforcement of structural provisions of the building code standards and regulations (BCSR) in the development of mid-rise residential building projects in Nigeria.

The findings identified contributing factors of both key factors, causal factors and impact risks which impede and associate with implementation and enforcement of BCSR, of which, 12 factors of administrative framework failures, including; Professional rivalry, leadership, professional involvement in decision-making, monitoring and feedback process, professional vested interest, unplanned cities, corruption, political interest/will, implementation process, and environmental pollution management provided a stronger view of factors contributing to failures of structural provisions of BCSR for MRRB. This finding indicates an aspect of BC administrative failures as contribution from this research.

Other contribution is the extraction of evidence technical failures relating to the context framework of technical aspect of the BCSR. 8 factors, including; technological expertise, capacity building, sub-standard materials and houses, incessant collapse of buildings, house property destruction, death due to building failures, structural failures, training and development were identified and examine as technical framework related failures.

This research also contributed in the extraction of 4 socio-logical factors contributing to the building code standards and regulations implementation, enforcement and compliance failures. These included: respect for public opinion, human rights, public dialogue, and employment/financial strength which revealed the socio-logical aspect of the building code failure for MRRB projects in Nigeria.

This study findings shed more light on the aspects of BCSR that is mostly influencing implementation, enforcement and compliance of structural provisions, this findings will guide professionals and other relevant stakeholders in the building construction industry in Nigeria to view BCSR compliance constraints within the framework of the most affected aspects of administrative system, technical aspect and less reported socio-logical aspect identified by this study. The findings will also help professionals, building officials and code writers and other relevant stakeholders to quickly identify the aspects of technical skills shortage which requires urgent skills gaps training and development outcry of the Federal government for the building construction sector in Nigeria. This research findings will assists MRRB policy makers in the development of credible commitment practices policy for better buildings enforcement control.

The findings of this research have also contributed in opening up new hypothesis and debates for advance research in the implementation and enforcement of BCSR within:

1. Building construction industry administrative (systemic) failure,
2. Skills shortage in the building construction sector in Nigeria as a results of technical failure of BCSR structural provisions, and
3. Socio-logical failure of standards and regulations: A case of Industry CSR in Nigeria.

In view of this, this research believes to have made some significant contributions to the body of knowledge in providing and demonstrating the solution's effectiveness to a known problem of poor-implementation, enforcement and compliance to standards and regulations in the development of mid-rise residential buildings projects in Nigeria.

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APPENDICES

Appendix A: Questionnaire Survey

Research Questionnaire

Section 1:

Instructions: Tick the options in the box as they relate to your opinion on the objective criteria provider by the researcher.

General Demographic Data

Q1D1. Age:

18-20yrs	20-30yrs	30-40yrs	40-50yrs	50-60yrs	60+

Q1D2. Sex: Male ☐ Female ☐

Q1D3. Educational Qualification

WAEC/SSCE /NECO Trade Test	ND/NCE Tech	HND	PGD	Bachelor Degree	Master Degree	PhD

Q1D4. Profession: Kindly tick as applicable to you;

Land/GI Surveyor	Architects	Builders	Engineers	Urban Planners
Contractors	Academia	Dev. Control officers	Legislatures	Quantity Surveyor
Industry	Estate Valuers		Insurance brokers	Building const. managers
Union/NGOs	Standard regulatory body (policy makers)	Artisans	Professional regulatory body	Facility managers

Q1D5. Years of experience:

1-4yrs	4-10yrs	10-16yrs	16-21yrs	21-30yrs	31 +

Q1D6. Job title:

Q1D7 Organisation:

Section 2:

This section focuses on the level of enforcement of the Nigeria Building Code Structural provisions for mid-rise residential buildings.

Instructions: Tick the options in the box as they relate to your opinion

Q2EA: Rate the enforcement level to Building Code Structural aspects for mid-rise residential building development projects on 5 point scale.

(Where; very un-satisfactory=1, unsatisfactory=2, partially satisfactory=3, satisfactory=4 and very satisfactory =5)

Very Unsatisfactory	un-satisfactory	partially satisfactory	satisfactory	Very satisfactory

Q2EB: Do you agree that there is a high-level of compliance to the building development application; approval; construction and inspection process for National Building Code Structural provisions among stakeholders within the Nigerian Construction Industry?

Strongly disagree	Disagree	Partially agree	Agree	Strongly Agree

Section 3:

This section focuses on the key factors which affect the implementation of & compliance to Building Code Structural Design Criteria amongst the stakeholders in Nigeria Construction Industry.

Q3FA: Rate the following key factors as they satisfactory affect the implementation, enforcement and compliance with the Building Code Structural provisions amongst the stakeholders within the construction industry according to the following 5-point scale.

(Where; Very unsatisfactory =1, Unsatisfactory =2, partially satisfactory=3, satisfactory=4, very satisfactory=5)

<u>Internal Factors</u>	Very unsatisfactory	Unsatisfactory	partially satisfactory	satisfactory	very satisfactory
Legislation					
Approved standard					
Leadership					
Political interest					
Implementation Process					
<u>External factors</u>					
Awareness					
Poverty level					
Public dialogue					
Professional fees					

Q3FB: Rate how the following factors affect the enforcement of the Building Code Structural Aspects for mid-rise Residential Building Development projects.

Factors	Most affecting	Affecting	Medium affecting	Low affecting	Least affecting
Awareness					
Poverty level					
Leadership					
Professional fees					
Implementation Process					
Legislation					
Approved standard					
Public dialogue					
Political interest					
Professional fees					

(Where; Most affecting = 5, Affecting=4, medium affecting=3, Low affecting=2, Least affecting=1)

Section 4:

Section 4 focuses on the causal factors which impede the implementation of the Structural Design Criteria of the Building Code for mid-rise Residential building Development projects.

Q4CA: Rate the following casual factors as they impede the implementation of Structural Design Criteria of Building Code for mid-rise residential buildings according to the following 5-point scale

(Where; strongly disagree=1, disagree = 2, partially agree =3, agree = 4, and strongly agree= 5)

<u>Internal Factors</u>	Strongly	Disagree	Partially	agree	Strongly

	disagree		agree		agree
Corruption					
Professional rivalry					
Professional vested interest					
Capacity building					
Professional involvement in decision making for the building industry					
Technological expertise					
<u>External factors</u>					
Respects for public opinion & the poor masses					
Human right					
Employment & financial strength					

Q4CB: Rate your level of agreement to the following causal factors as they impede the compliance of Structural Design provisions of Building Code according to the following 5-point scale

<u>Causal Factors</u>	Strongly disagree	Disagree	Partially agree	agree	Strongly agree
Corruption					
Capacity building					
Professional involvement in decision making for the building industry					
Employment & financial strength					
Technological expertise					
Professional rivalry					
Professional vested interest					
Human right					
Respects for public opinion					

& the poor masses					

Section 5:

The final section focuses on the impact risks associated with the non-implementation of the Code on end-users, the development of industry & professional practice.

Q5IRA: Rate the following impact risks associated with the non -implementation of the Building Code structural provisions on professional practice according to the 5-point scale

(Where No risk =1, low risk=2, medium risk=3, High risk=4, Most high risk=5)

<u>Associated impact risks</u>	Most high risk	High risk	Medium risk	Low risk	Least risk
Incessant structural collapse of buildings					
Loss of investors' confidence					
Unplanned cities & town					
Sub-standard materials & houses					
Entry of non-professional into the industry					
House property destruction					
Death due to building failure					
Soil Erosion & drainage blockage					
Congestion of houses					
Environmental pollution and disease outbreak					
Risk of fire hazard					

Q5IRB: Rate your level of agreement to the following risks associated with the non -implementation of the Building Code Structural provisions on end-users and the development of the industry according to 5-point scale

(Where; strongly disagree=1, disagree = 2, partially agree =3, agree = 4, and strongly agree= 5)

<u>Associated impact risks</u>	Strongly Disagree	Disagree	Partially agree	Agree	Strongly Agree
Incessant structural collapse of buildings					
Unplanned cities & town					
Environmental pollution and disease outbreak					
Sub-standard materials & houses					
Entry of non-professional into the industry					
House property destruction					
Soil Erosion & drainage blockage					

Death due to building failure					
Risk of fire hazard					
Loss of investors' confidence					
Congestion of houses					

Please state any additional comments regarding the questionnaire, the structural aspects of the building code and the implementation process for mid-rise residential building development projects in Nigeria.

Kindly write down your phone number for the researcher to contact you if interested to participate in further interview. Thank you.

APPENDIX B1: Interview Guidelines for the Industry:

Structured around the research questions

QITV1. Refer to section 1 of questionnaire.

QITV2. No of years you are working with the Industry

1-4yrs ☐ 5-10yrs ☐ 10-15yrs ☐ 15-20yrs ☐ 20yrs +

Section 1: Level of enforcement of structural aspects of BC

QITV3. Can you list what your industry considered as key principles and most important during implementation and enforcement of structural provisions for mid-rise residential building projects from approval through construction?

QITV4. To what extent is the implementation, enforcement, and compliance to the structural provisions of the Nigeria building code for mid-rise residential building development projects by your industry since you started working with them?

Section 2: Factors Affecting the Implementation of structural aspect of NBC

QITV5. In your industry, are there constraints which affect you from implementing and complying with structural design criteria of the Nigeria building code?

QITV6. If yes, do you have strategies in place as an industry in overcoming some of those barriers affecting the implementation and enforcement of the structural provisions of the building code for mid-rise residential building development projects?

QITV7. How are you implementing the structural provisions of the Nigeria building code for mid-rise residential building projects within your firm?

Section 3: Causal Factors Which Impede the implementation

QITV8. What do you consider as the causal factors that impede the implementation process of the structural aspect of NBC in your industry?

QITV9. From your lists of causal factors in QITV8 above, which of these factors are daily occurrences within your industry or from government agencies that affects the development of building projects?

Section 4: Impact risks to industry, Consumer & professional Practices

QITV10. What do you consider as the impact risks of those causal factors to the industry, consumer and professional practice?

QITV11. Rate the following associated risks with the non -implementation of code on consumers and the development of the industry & professional practice on 5-point Likert scale where 1= Least risk, 2= low risk, 3= Medium risk, 4= High risk, 5= Most high risk

Section 5: Suggestions for improvement

QITV12. Do you have any suggestions on the improvement to the structural aspect of the building code for effective implementation, enforcement, and compliance of mid-rise residential buildings within the industry?

QITV13. Any general comments on the questionnaire, the structural design criteria for the building code and the implementation process for mid-rise residential building projects for this research?

Thanking you in advance.

Sunday

Appendix B2: INDUSTRY INTERVIEW TRANSCRIPT.

No of Company Interviewed: 9

No of Industry Professional Interviewee: 15

COMPANY A MEETING TRANSCRIPT

No of stakeholders: 1

Type of Interview: Face-to-Face

A1: Age: 56 years

Sex: Male

Qualification: BSc

Discipline: Civil Engineering

Experience with Coy: 17 years

Position: National Building projects coordinator

A: Our Company is very large and known with quality, you can testify to that. However, we cannot turn blind eyes to the situation of structural collapse in Nigeria. We, build residential houses, schools, churches and roads with our signature everywhere. I can tell you we remain one of the best in this country. Our buildings stands decades without any structural failure but others cut corners for more gain.

Q: Cut in; for how long have you been working with this company now?

A: 17 productive years. What I mean by productive years is that I have been in the forefront of building construction for this number of years travelling all over the country for supervision.

Q: Don't you think your subordinates could compromise with standards implementation?

A: Yes, they do. Some of them try to be smarter when senior supervisors are away from site. For example, a young man was caught and sacked trying to do that last time.

Q: With the size of your company, do you go through building approval?

If yes, any structural considerations for the approval process

A: Thank you for that question, I can tell you authoritatively that all drawings from government ministries & Agencies do not go through any other approval process. They are competent professionals from architects, builders, engineers, quantity surveyor and the rest as staff of the ministry. They are the government and the government owns the job so who will approve it again. But consideration are given to structural stability and design quality of our building construction, and that is why quality of product is our number one priority in this company. If building collapse must stop, there shouldn't be an exception from approval. If every company is treated equally, we will not be having some small companies skipping the process in the name of construction companies. The problems of structural collapse at the moment will stop if the BC is fully operational and adapted for use and some companies are made an escape goat in penalties for defaulting. Operational in the sense that it should be given the needed legislative backing .All companies knows the law and they are

tax payers, how can you penalise on what is not even a law?

Q: Hmmm tell me.

A: continue; who is that agency paddled with the enforcing responsibility without considering the legal implication to their actions. That is why their actions I think are restricted to private developers and not companies. If you hear of any demolition of estate then, it should be wrong allocation of plots and not construction implementation process.

Q: In your industry, are they constraints which affect you from implementing and complying with structural design criteria of the BC?

A: I can say yes to some extent. When there is no consistency with government policy, it will affect us. When some politicians play politics with procurement of project materials what do you expect? What about different professional interest? A lot of things can make the implementation difficult. I can keep saying that but to me is what we know already in Nigeria, leadership is a great problem in policy implementation.

Q: How do you overcome some of these barriers you just mentioned as a company?

A: wao! The same politics by trying to balance the project interest with the interest of the client and that of our able politician. Different strategies are in place as an industry. Subcontracting, little percentage even employment offer sometimes.

Q: You don't think all these could lead to compromising quality which your company claim to stand for?

A: No; No; we don't compromise quality but us all play politics to be in business. Or do you want our company to fold? I know you don't want that. So try every possible not to offend

1. The government ministry directors who sit as board members for the contracts,

2. The political class who don't know much about quality of projects but claiming to know because they are in those position today.

Q: What do you consider as the causal factors to this ugly development despite structural aspect of BC collapse in the industry?

A: Prolong laughter; you know it young man. Are you not watching NTA news? Corruption has taken over the land, no longer in stolen millions but in billions of naira sharing for procurement, hospital treatment abroad. What prevent government to send people for training and then bring them back to impact the desired changes? You are talking about the structural collapse of buildings. Democracy started in 1999, that is 16 years ago, agreed that we have deficiencies in the BC we are talking about. The bill is there in both chambers and nothing happens, no senator or rep member ever raises the motion as they call it. Something is definitely wrong somewhere and it will take young professionals like you with international experience to inject a revolution into the industry.

Q: A revolution?

A: Caught in; not what you think. I mean new ideas to curb these excesses from our political office holders and demand for the industry right. I am quite sure you could advice way out of

this mess we created in the industry from the way you talk if given the chances.

Q: Yes, I could, I have studied some countries models for implementation process.

A: Then write to the head of industry construction, minister of housing and urban development or all professional bodies for audience.

Q: Thank you. Please can you tell me the impact risks of these causal factors to the industry, consumer and professional practice?

A: What else do you want to know? The industry has lost investors, lost people to the cold hand of death. All these could have been simply avoided through proper implementation. Non-professionals now build houses even the multi-storey buildings without consulting experts for advice.

Q: Do you have any suggestion on the improvement of the structural aspect of BC implementation?

A: Government cannot control the industry, it is very complex. We need independent building industry regulators. If that can be done everything will be good.

COMPANY B MEETING TRANSCRIPT

No of stakeholders: 3

Type of Interview: Face-to-Face

B1: Age: 61 years

Sex: Male

Qualification: Msc

Discipline: Building/structural engineering

Experience with Coy: 26 years

Position: Director of Projects

B2: Age: 48 years

Sex: Female

Qualification: BTech

Discipline: Building engineering

Experience with Coy: 15 years

Position: construction manager

B3: Age: 54 years

Sex: Male

Qualification: Bsc

Discipline: Quantity surveying

Experience with Coy: 22 years

Position: Cost control manager

Q: Industry stakeholders complaining about having a meeting in the next 30 minutes, but I did brief introduction of myself so each followed suite in the introduction to set the scene.

Q: Sirs/ma, can you tell me when you all join this Company?

A: *15 years, 22 years and 26 years of experience respectively.*

Q: With those number of years what are the problems of BC structural aspects implementation this company usually face?

A: Unprofessional practices by workers is a problem, government refusal to enact the code is also a problem. Incompetence of enforcement officials, Undue delay in Legislation action by both chambers affects the implementation of the structural aspects of MSRB. Some officials of development control are not well groomed for the kind of construction we are talking about. The experience professionals who know what to do left the field supervision to the younger ones. You see them coming to ask us for money instead of coming to do their job.

Q: You mean development control do come for supervision even in your company?

A: As a company we work for both government and private individuals who could pay for our services. When they know the project is for

government nobody branches for anything but they play funny when we are developing private properties.

Q: How do go process both buildings either government or private for approval before construction starts?

A: Hahahaha 2nd person cut in, that is where we pass ourselves in this country. Somebody will register a company and operate from bedroom and then bearing Construction Company. They are the ones that go through all those stress. Look at this place, what does it tell you now? 3rd stakeholders cut-in, we mean business. Our name is our standard, one or two sharp practices exist but 70% of all projects are to our own quality standard. We don't even have the BC as a document in this company but we build to 70-80% standard quality of construction. We have never been part of any building collapse since 33years of our existence in Nigeria.

Q: What do you consider as factors affecting the implementation of BC structural aspects among the 3 managers on site in this company?

A: Laughter; to be realistic young man, we suspect each other. One is angry because the other is considering higher in the project. For example I am a builder; my colleague here is a quantity surveyor and there is Land surveyor with new name now. We cannot work if we don't trust each other or keep on fighting one another. Organisation structure can affect the implementation process. For example, if tasks are not clearly defined for

workers nobody will do correct things but once it is divided you know who to hold responsible for any breach of quality standard.

Q: In that regards what do you consider as casual factors to the implementation within your company and the entire industry?

A: In our company inadequate finance can affect the implementation, then some of our staff are corrupt, they cut corners in one way or the other for more profit by all means, when right people are not placed in the rightful position it affects structural implementation of buildings. In this company tasks are allocated to the rightful professionals therefore there are minimal problems of implementation within our own company. That does not mean some companies are not doing it, they do. Where you have non-technical and business men as directors and CEO of building construction companies there shall be problem and that is what we are experiencing in the industry in Nigeria. To come out of it, the leadership must be corrected to effect those changes.

Q: Can you tell me the impact risks of these factors to the building construction industry?

A: Yes we can tell, structural collapse is an impact risks, substandard buildings is a risk because it will kill and continue to kill until we realise our positions and stand for it. The non-professionals in the industry every today is because there was a great gap created by the industry. Let me suggest some recommendation for your studies.

- Government should leave enforcement of regulations they cannot do it.
- Professionals should re-introduce professional task force to force implementation on members
- CPD (Continuous Professional Development) should be mandatory for members
- Practicing Member card should be checked by enforcement agencies as a key factor to be on site then
- Do not spare anybody. If you send even you friend to prison over this issue then the problem will be completely eliminated. `

COMPANY C MEETING TRANSCRIPT

No of stakeholders: 2

Type of Interview: Face-to-Face

C1: Age: 57 years

Sex: Male

Qualification: Msc

Discipline: Architecture

Experience with Coy: 16 years

Position: Manager architectural services

C2: Age: 42 years

Sex: Male

Qualification: HND

Discipline: Building

Experience with Coy: 8 years

Position: Site supervisor

A: I got a mail to meet with you by 3:30pm today; you must be a rich man for the administration to have said unfailingly. The mail was characterised with must and unfailingly.

Q: Laughter.

A: Well, I was briefed on your research focus. But something is missing here; professionals out there are the problems and not the industry itself. The structural collapse happens to the

construction of those professionals. Don't get me wrong, I am a professional; I do some private jobs outside this company. Those jobs are done with my rules and not the company rules. I set standards, give mixing ratio, procure materials and pay workers. From the explanation you can see where the problem of structural collapse lies now. One person does everything and the man might be in need of some kind of money for upgrade. He/she will now procure fake (substandard) products, hire cheap labour and eliminate some construction procedures to maximise profit. All these are the problems associated with the structural implementation of BC presently in Nigeria. The government are not helping the industry to solve the problem. Absolute refusal of the legislators to pass the BC bills for the industry is also rubbing mud on the industry. How could any building construction industry in Nigeria go to another country and bid for building contract when buildings are collapsing in our country.

Q: Do you have any written standard for your industry practice or the National BC is your own standard specification for the industry?

A: We should not be deceiving ourselves with this lip service of the BC. Which standard are you talking about, ordinary people and young professionals cannot understand that code secondly the code is not even available. I don't have it, this company does not have. I have worked here now for about 16 years. The only standard here is the design specification. We suggest through writing to appropriate authority for an amendment if we notice any error from the design

sometimes corrected but most of the time you will be asked to ignore them.

Q: What do you think is responsible for this structural problem in the industry?

A: Like I said earlier legislation is a problem, complex BC, if the code is available it will also help a lot, then our leaders helping themselves and not the nation. In some countries, if they want to make any change in the next 5 years, the jingles on television, radio, social media and billboards will create necessary awareness to the general public but reverse is the case here in Nigeria. The government should not be afraid of what the people will say, let people's reaction be heard and necessary amendment made to suit public view and the whole mess will be sorted out.

Q: What is the causal factor to these problems you just mentioned which affects implementation process?

A: Wealth amassing. People are insatiable with wealth that they start amassing it and leave the government dry. Those in private sectors like us now will now resign and travel abroad before they notice the loot. We are so corrupt that companies are now involved in helping government officials to transfer looted fund abroad. Another causal factor I want to talk about how it affects implementation is the issue of different profession in the building industry. Some professionals don't like another person or got intimidated by the presence of another professional. It is a very bad habit if we cannot co-habit as professionals for the common interest of the company or the nation and the industry at large. There

are some decisions government take un-behalf of the industry and we will start calling other industry players if they were part of such decision and they will tell you not all. Government should be bold enough to involve professionals when deciding on the building industry matter.

Q: Do you think their behaviour have any impact risks on the building industry and professional practice?

A: Definitely, we have no investors in building sector. Building residential and commercial houses is lucrative like oil and gas but we have no investors because they don't trust the industry policies and the professionals to invest in it. You see buildings collapsing here and there creating loss of properties, innocent people through death in any of this collapse. Many practitioners today in the industry are non-professionals with little or no knowledge at all to build high-rise buildings. I can say another responsible causal factor is great un-employment in Nigeria. Professions became bastardised with un-employment when banks started employing all graduates into the banking sector. Engineers left site to the comfort of banks and bankers and administrators who were left outside went to do their own jobs for them. The results are vis-visa; collapse of structural buildings and looting of money via the banks to abroad.

Q: Ok, what do you suggest we should do through this research to improve implementation in the industry?

A: The Company should train people, government should develop friendly policy like insurance to encourage

investors and train ministry professionals in the latest technology, building approval should be simplified without those rigorous and too much money to pay to encourage people. Then the enforcement should be empowered by making a ministry like EFCC to supervise their activities. Even though some EFCC officials are corrupt at least it is one of the best commissions fighting corruption now in Nigeria. The companies representing industry should all be place under a higher body devoid of professional war to oversee the company's activities in the implementation process. The professional bodies should be charged with heavy penalties for any of their member found in the breach of the BC.

COMPANY D MEETING TRANSCRIPT

No of stakeholders: 1

Type of Interview: Mobile Phone

D1: Age: 55 years

Sex: Male

Qualification: HND/Bsc

Discipline: HND Arch/Bsc Building

Experience with Coy: 11 years

Position: General construction manager

Q: Good evening sir, I am Sunday the interview man you asked to call you.

A: Hmmm; you were talking about BC structural collapse the last time you came. I know about the issue of BC in the industry but we don't use it in this company. I doubt if anybody knows what is written inside. But the problem starts with not passing the bills. Some factions said the BC is just adapted without review to our local needs. Whichever way, the BC has some technical and legal problems as it stands now.

Q: What are your years of experience with the company?

A: I joined this company in 2005, which is about 11 years now. I came from another construction company and my experience there was like 8 years. I have 20 years' experience working with construction industry.

Q: With your experience in both companies; how do you process your building plan approval before you get t site?

A: The only approval is permit for construction. If the land is free from any government problem like green area, serving lines in the case of private development we have no other problems. The government officials knows once it is own company we ask for the necessary thing to be done but that is just a formality. In the case of government, design comes from the board of directors so we do not go for any other approval. So I don't know much about that.

Q: Thank you sir; have you had any structural collapse in your years of experience?

A: We have never had such bad experience. It is caused by non-professional people in the industry. Non-professional could be professionals who engage in non-professional practices and those with no training to conduct the practice of building construction.

Q: What do you think is responsible for the poor-implementation of BC structural aspects causing collapse in the industry?

A: The law. Without law no offender and no sanctions for defaulters. Problem of our leaders and our politicians are not helping us. We the

professionals are not united. We cannot speak in one voice for the industry; instead we speak as a group interest about engineers versus architect versus builders etc. that will never help the industry.

Q: Why do you think all these happen amongst professional in the industry?

A: Simple; personal interest and corruption because they don't want any other person to be like them.

Q: Any impact risks of these factors to the building industry & professional practice?

A: Loss of international industry recognition and Collapse of buildings, rising death.

Q: Thank you sir. Any suggestion in solve the BC implementation problems?

A: Yeah, I think professional knowledge base upgrade will be of help, firm laws should be made for the industry and any breach should be severely sanctioned and finally the industry needs a check apart from enforcement agencies. Does that help?

Q: Yes sir; thank very much for your time.

COMPANY E MEETING TRANSCRIPT

No of stakeholders: 1

Type of Interview: Face-to-Face

E1: Age: 37 years

Sex: Male

Qualification: BEng

Discipline: Civil engineering

Experience with Coy: 8 years

Position: Site supervisor

Q: Introduction

Q: How long have you been with this company?

A: About 8 years ago. I actually did my National Youth Service (NYSC) here and I was retained because the engineer that was my supervisor had better offer to leave this particular company. He facilitated my appointment.

Q: In your 8 years; how do your process building approval for your company?

A: if we get an invitation, we first look at the condition of contract and the contract sum. Within the condition of contract, the company will know exactly what the client want. If it will require us going for approval, settle community and the security officials we will go. But most of our jobs are approved from the ministry who in turns control the approval process, so it just an instruction to those agencies to do everything necessary for us to move to site.

Q: But do you go for building approval before mobilising to site?

A: Occasionally we go for approval. Approval is to checkmate excesses of companies and professionals. I strongly support it should be taking seriously in the building industry.

Q: Why do we have structural collapse of buildings in Nigeria?

A: See; we have the expertise knowledge of how these things worked. But the industries have not been given a Conducive environment to work with. A workable compromise has not been achieved by all professionals in the private and public sector to solve the problem of structural collapse of building. The legislators, government, industries and majorly professionals are the reason BC structure aspects are not been

implemented in Nigeria. The role of professionals are not followed, the implementation procedures is not define for the people and the government and their political ally are not ready to shift their political ground to better the country.

Q: What are the causal factors to these problems you mentioned that impede implementation of BC MRSB structural aspects Nigeria?

A: Briefly we have inadequate experience, isolation of different professionals, hunger for bribe and training and lack of training of the skilled and unskilled professionals. Professionals work in isolation but the building project is complex with many experts contribution; one person doing everything like we do experience with private development will have severe consequences on the industry.

Q: What are these severe consequences these factors will have on the industry and professional practice?

A: Building collapsing is no longer shocking news and our government and professionals have that. Another consequence is the industry is running over the non-professionals.

Q: How do we eliminate these consequences from the building industry?

A: Competent government, excellent legislation, training of the people.

COMPANY F MEETING TRANSCRIPT

No of stakeholders: 4

Type of Interview: Face-to-Face

F1: Age: 59 years

Sex: Male

Qualification: Bsc

Discipline: Building

Experience with Coy: 17 years

Position: Construction Manager

F2: Age: 45years

Sex: Male

Qualification: BEng

Discipline: Civil engineering

Experience with Coy: 9 years

Position: Structural engineer

F3: Age: 36years

Sex: Female

Qualification: MTech

Discipline: Architecture

Experience with Coy: 12 years

Position: Project Architect

F4: Age: years

Sex: Male

Qualification: BEng

Discipline: Civil engineering

Experience with Coy: 5 years

Position: Supervisor

Q: Can I know your years of experience in this company

A: I am 17, she is 12, 9 and the other should be up to 5 years.

Q: Do you normally have any difficulties in you building construction approval?

A: For us the approval process is not difficult. There are some drawings in that office for 6 months and some a year; that is not encouraging. Sometimes I don't blame the private client who goes on with their buildings construction without approval. It is so frustrating coming to that office. The staff in the approval office should be overhaul with fresh and committed

ones if we need positive change in the implementation of BC you said from your introduction.

Q: To what extent of structural aspects of the BC do you implement in your company?

A: I may say 100% company standard policy but I don't know the BC statement concerning that. And don't be deceived in this country we all compromise quality for gains. We create easy way out to solve some problems within the building industry. So accepting to implement 100% will be sure deception. For instance, we were all cautioned severally about you researchers coming for interview, questionnaire and even following us to site to see what we do. The company may not like that because you can report and tarnish their image. What I will simply tell you is that accept everything at 50% implementation and 50% non-implementation then your questionnaire I advise you treat it well because we use our mind in answering it since no body monitored us for that.

Q: What are the factors responsible for the non-implementation of BC structural aspects for MRSB?

A: Now; we have no code, all people are saying is just an assumption. It has not been legislated, nobody saw the said code. The problem is compounded with that singular act of political class because of their interest. If we have responsible leaders in place the BC should have been legislated by now. We in the industry complaints about non-professionals in the industry; how many are professionally trained to construct high-rise buildings in this country? We are all non-professionals, without a law to tell who is

professional and who is not and what should be done to those who kick against the rules. Every industry have rules, in this company there is a rule, a standing order of organisational structure which is the company standard. Any employee will be taking through the structure and he/she abides by it. Professional should jettison self-defence and come together as one to create the rule of the industry game and not the rule of their various professions.

Q: What are the causal factors constraints the implementation of BC structural aspects?

A: We can say professional self-interest, corruption, lack of training for expatriate area. If we are differently trained there will be no fear of job snatching or surcharge in the industry.

Q: What are the current impact risks of these causal factors to the industry and the professional practice?

A: So many impacts here and there. We have no investors, buildings are collapsing, people are dying, investments are loss, and cities are been devalued without planning.

Q5: How can we stop these great impact risks?

A: Regenerate confidence by sanitising the industry through legislation, insuring buildings & owners, capacity building appropriate sanctions and monitoring the monitors. I mean enforcement agency of government should also be monitored.

COMPANY G MEETING TRANSCRIPT

No of stakeholders: 2

Type of Interview: Face-to-Face

G1: Age: 55 years
Sex: Male
Qualification: Bsc
Discipline: Building
Experience with Coy: 23 years
Position: HOD building construction/services

G2: Age: 42 years
Sex: Male
Qualification: 1st degree
Discipline: Building
Experience with Coy: 12 years
Position: Asst. supervisor building

A: We have agreed to meet with you again because of the importance this company attached to your research. We understood every facet of your questionnaire and we responded accordingly. Interview to me on this daring issue may be bias; people may tend to shift their opinion because of higher authority even though you talk of information confidentiality. We are yet to get to that level where confidence assurance is guaranteed. However, we will respond to your questions unbiased in Sha-Allah.

Q: Thank you sir; how many years have you worked in the company?

A: 23 years and 12 years respectively. I was transferred from another country to Nigeria about 9 years ago but altogether I have worked 23 years with the company.

Q: What are you known with as a company?

A: Construction of roads and buildings in this country. In other country we do railway, Dam and bridges. We are head of building construction that is why you were directed to meet with us and book and appointment.

Q: Sirs, can you tell me how you obtained building approvals for your company?

A: It sound strange but interesting; government does all those things before the award of contract. We only pay some fees to communities as levies and we mobilise to site. Nobody has harassed us to come for any building approval in this country. I heard about building construction bills in the house of assembly without approval. That is very bad for a large country like Nigeria not to have a law in guiding the building construction industry. You hear of one building collapse and another and so on. 90% of building construction in Nigeria is owned by private individual and these people need a law to guide their activities while some set of people are sitting there breaching on the right of those individual that there should not be given that law? Hmmm, there should be sacked out of those political seats. In Lagos, Abuja, Kano, etc. we have a population of 9million, 3 million and 9 million respectively while government buildings in those areas cannot account to 2% of those buildings; should there not be a law to save the people from building anything that could turn around to kill them? Second person; I think they do.

Q: Do you consider all these as problems which affect the implementation of the structural aspect of BC (Law) for construction of HRRB?

A: Yes, when there is no law the BC you called it is a big problem. I also consider professionals as a problem because there are not united in the industry. The government are not willing; either because they don't know what to do or there is no importance attached to it. Individual states can create their own local regulation on

building construction instead of this revenue called sanitation from construction site. There are organisations in this country that supposed to regulate both material standard and construction standard for buildings. What is Standard Organisation (SON), National Building & Road Research Institute (NBRRI) doing? SON supposed to regulate standards of materials inflow to the country, with their presence in all 36 states & FCT we are still having substandard materials in the building industry.

Q: Ok, can we say that is the root cause of these problems of structural collapse in the industry?

A: No standard design for implementation, no law being legislated, our professional not united, and people not having adequate knowledge to build such HRRB. If I may add, I think we need to deal with corruption as the root cause because we have organisations but not working, people to enforce and professionals all are not working but trying to make money through all means contribute significantly to the problem.

Q: Any impact risks of these factors to the building industry?

A: yes, building collapse, death, investment opportunity lost insecurity of the industry and chaos city arrangement.

Q: What can we do to prevent or reduced the impact risks on people, professional practice and the building industry?

A: Professional should collaborate with one another; government should drive the implementation process by

willingness to develop the law. The professionals should look at the law again for possible review for acceptance by government and skill development should be given a priority in the industry.

COMPANY H MEETING TRANSCRIPT

No of stakeholders: 4

Type of Interview: Face-to-Face

H1: Age: 63 years

Sex: Male

Qualification: BEng civil/Bsc Civil

Discipline: Civil/Building engineering

Experience with Coy: 9years

Position: Building projects Head

H2: Age: 38 years

Sex: Male

Qualification: 1st degree

Discipline: Electrical services engineering

Experience with Coy: 8 years

Position: Supervisor (services)

H3: Age: 43years

Sex: Male

Qualification: HND

Discipline: Building

Experience with Coy: 8 years

Position: Site manager

H4: Age: 58 years

Sex: Male

Qualification: BArch

Discipline: Architecture

Experience with Coy: 8years

Position: Project Architect

A: Thank Almighty God for his blessings upon us today. The structural collapse is a national embarrassment to the building industry. We have been in this problem pronouncedly for about 17 years now; it happens in the past but it took a new dimension in those years with frequent occurrences. The whole

of us here joined this industry almost the same time; in fact, we started the building section of the company about 9 years ago. But I was in another company for 22 years. My experience spans 31 years in the industry. My colleagues are like 8-12 years in the building industry. Cut-in, we are his boy's sir. Buildings will continue to collapse until professionals and government realise that building regulation is as important as the food we eat. We cannot stay 3 days without food or water but we can stay 20 years without regulations to guide the building construction industry. How can a responsible government refused to develop a regulation for the industry which contributes 2-3% to GDP of the nation. This can be harness for more if appropriate legislation is being put in place. Our government are not interested in what will generate employment or put food on the table of the common Nigerians. Even the professionals are to be blamed; why do we fight each other instead of working in harmony for the growth of the industry or the project. We are interested in who should be the leader of the building team. We have different specialisation that is why it is called team; but professionals in Nigeria don't know that. We do the survey plans, then architecture, structures, electrical and mechanical some will prepare the bill and attached their stamp. That is a great mess and corrupt mind of our professionals. They have first neglected the standard and the politicians took advantage of what they have created in industry. For example, company A rejected contract based on some conditions attached and Company B will gladly collect the same contract and

mobilised to site. That is a very wrong practice; we should be united as an industry with a single voice if we really want to solve the problem of structural collapse in the industry. Corruption in the industry has been a factor contributing to this problem. Professional bodies call for CPD because they want money but not genuinely for the development of the industry. Oh sorry; I have not given you chance to ask your question.

Q: I am ok with your explanation; all my questions are like coming with answers sir. But what impact risks do we expect from these failures to the industry?

Q: Off course we have them now and not expecting. We have death, we have loss in terms of investors and properties we also have irregularities in the planning of cities everywhere in the country. With every structural collapse in the country there are records of deaths, which are how we are losing investors daily and our own property investment.

Q: Do you have any suggestions on the improvement of the structural aspect of MSRB control mechanisms for implementation within the industry?

A: Yes; we need all professionals as one body with just departments. See telecommunication for instance, there is Glo network, Mtn network Etisalat etc. all controlled by Nigeria telecommunication industry that is what we require now to stamp out the problem. With that all other things like insurance of buildings will just be put in place by that body for different departments comprises of engineering,

building, architecture, urban planning and quantity surveying.

COMPANY I MEETING TRANSCRIPT

No of stakeholders: 1

Type of Interview: Face-to-Face

I1: Age: 47 years

Sex: Male

Qualification: Bsc

Discipline: Civil engineering

Experience with Coy: 13 years

Position: Structural engineer

Q: How do you apply BC structural aspects for HRRB in your Company?

A: We apply company standard and not BC standard. The BC has no legal backing so it is not mandatory for implementation. We construct safe buildings structures; we promote fair playing ground without taking any undue advantage of other companies. We ensure durability & maintain quality of our laid down standard for construction. We guarantee our clients 20 years without any crack of structures.

Q: Have you worked with this company up to 20 years?

A: No, I have worked here for 13 years now.

Q: What are the processes of obtaining approval for HRRB construction in your company?

A: We are not large company who skipped such process because of their presence everywhere. But our strategies are just being an insider in the development control. We have

friends that handle all the process for us on an agreed fee.

Q: Are they staff of the agency or an outside?

A: Continuous laughter; they are the same. Those outside are boys of those inside, having direct link inside is better to reduce money you will spend but both facilitate speedy progress of approval.

Q: Do you think such familiarity breed some level of compromise to standard implementation?

A: Accepted; it does because you will not be disturbed for peanuts at the site and just mentioning of a name of one director who was in charge of the approval scare away younger officials moving around in sites.

Q: What are the factors which affect implementation of BC structural aspect for MRSB?

1. Lack of Regulation of the BC,
2. Lack of adequate monitory of the enforcement agency,
3. I can mention nepotism and favouritism from the explanation I gave before. Those who may not want to part with some money will have their approval delayed; cancelled, un-necessary corrections and most of the time got missing within the offices,
4. Lack of Professional team building in Nigeria and
5. Inadequate professionals training for building BC HRRB implementation

Q: What are the causal factors of the non-implementation?

A: Government unwillingness, dis-unity of professionals and corruption in our society causes all these problems.

Q: Any impact risks to the professional practice and the building industry?

A: The known fact is buildings are collapsing, deaths are occurring & huge investments destroyed but our cities , our investors, unprofessional practices and our health and children are all in danger but many not looking in that direction.

Q: what do you want government or professional body to put in place for improvement of the implementation process for MSRB?

A: I will suggest the introduction of BC standard practices in our universities to start with. Then empower the enforcement officials with money, mobility, technology and continuous training. Also there should be a monitoring group inform of task force to monitor both the professionals and the enforcement agencies. There should be stringent punishment for any one or company who did not comply. Finally bring in insurance policy to the industr

APPENDIX C: PARTICIPANT INFORMATION SHEET and Consent Form

PARTICIPANT INFORMATION SHEET

Research Student - Sunday Ukwe-Nya Yakubu

Name of Department - Architecture

Research Topic: Barriers to the Implementation and Enforcement of the Nigeria Building Codes Structural Provisions for mid-rise residential buildings: The Case of Nigeria

Introduction

The research seeks to examine the barriers to the Development & Implementation of Structural Design Criteria of the Nigeria Building Code for Affordable Housing Development in Lokoja Municipality, Nigeria. The study will assess the extent to which key factors that affects the development and implementation of structural aspects of the Building Code, the casual factors which impede the implementation of the code features and also to quantify the impact risks associated with the non-implementation of structural aspects of the code on buildings, people, the environment, professional practice and the house building industry development.

My name is Sunday Ukwe-Nya Yakubu and I am currently a PhD student at the University of Strathclyde, Glasgow. I can be contacted at the following email address: Sunday.yakubu@strath.ac.uk or mobile line +2348034355960 for clarification.

Participation

You have been contacted with a request for your involvement in this project as it is felt that you may be able to provide information which will allow for an in-depth analysis to be completed. Taking part in this study is, however, entirely voluntary and you are free to withdraw at any time.

What happens to the information in the project?

If requested, you can remain anonymous when information is referenced, within the Thesis.

Any information provided will be stored electronically on my personal computer and on an external hard drive as a backup. There may also be one hard paper copy of information kept. No information from the project will be redistributed without your prior consent.

Notes from any discussions will be transcribed and forwarded to you after, to confirm that all information recorded is accurate.

The University of Strathclyde is registered with the Information Commissioner's Office who implements the Data Protection Act 1998. All personal data on participants will be processed in accordance with the provisions of the Data Protection Act 1998.

Thank you for reading this information

Consent Form for all Built environment stakeholders including policy makers

Name of department: Dept. Architecture,

Faculty of Engineering,
James Weir Building 75 Montrose Street,
University of Strathclyde, G1 1XJ,
Glasgow, United Kingdom.

Title of the study: Barriers to the Implementation and Enforcement of the Nigeria Building Codes
Structural Provisions for mid-rise residential buildings: The Case of Nigeria

- I confirm that I have read and understood the information sheet for the above research and the researcher has answered any queries to my satisfaction.
- I understand that my participation is voluntary and that I am free to withdraw from the project at any time, up to the point of completion, without having to give a reason and without any consequences. If I exercise my right to withdraw and I don't want my data to be used, any data which have been collected from me will be destroyed.
- I understand that I can withdraw from the study any personal data (i.e. data which identify me personally) at any time.
- I understand that anonymised data (i.e. data which do not identify me personally) cannot be withdrawn once they have been included in the study.
- I understand that any information recorded in the investigation will remain confidential and no information that identifies me will be made publicly available.
- I consent to being a participant in the research investigation
- I consent to being audio and/or video recorded as part of the research were applicable.

Name:	
Signature of Participant:	Date:

APPENDIX D: PILOT TEST EXPERTS OBSERVATION & COMMENTS

Table 6.6 Pilot Test Questions, Experts Observation and the Final Amendment of the sections

Sections & Coding Variables	Pilot Test Questions	Experts Observation	Final Amendment
Section 1 Heading	Section 1: General Demographic Data	Section 1: Fix instructions first. General Demographic Data	Section 1: Instructions: Tick the options in the box as they relate to your opinion on the objective criteria provided by the researcher General Demographic Data
Q1D3	WAEC/SSCE/NECO ND/NCE Tech HND Bachelor Degree Master Degree PhD	Add Trade Test & PGD to qualifications	Trade Test/WAEC/SSCE/NECO, ND/NCE Tech HND, PGD, Bachelor Degree Master Degree PhD
Q3FA	(Where; very un-satisfactory=1, unsatisfactory=2, partially satisfactory=3, satisfactory=4 and very satisfactory =5 Legislation Absence of approved standard Lack of leadership Lack of political interest Inadequate implementation Process External factors Lack of awareness High poverty level Insufficient public dialogue High professional fees	Use the same criteria to agree with your question like in Q3FB Remove the following word: As they In Q3FA High, Poverty level Insufficient,	Replaced with as they Satisfactory Approved standard Leadership Political interest Implementation Process Awareness Poverty level Public dialogue Professional fees
Q3FB	(Where; Least affecting=1, Low affecting=2, medium affecting=3, Affecting=4, Most affecting = 5) Lack of awareness High poverty level Lack of leadership High professional fees Inadequate implementation Process Legislation Absence of approved standard Insufficient public dialogue	(Most affecting = 5, Affecting=4, medium affecting=3, Low affecting=2, Where; Least affecting=1,) Let them be in the other of response not to confused respondents. Remove the following words: Absence, Lack, Inadequate, High,	(Most affecting = 5, Affecting=4, medium affecting=3, Low affecting=2, Where; Least affecting=1,) Awareness Poverty level Leadership Professional fees Implementation Process Legislation Approved standard Public dialogue

	Lack of political interest High professional fees	Poverty level Insufficient,	Political interest Professional fees
Q4CA	-Inadequate capacity building -Absence of professional involvement in decision making for the building industry -Lack of respects for public opinion & the poor masses -Abuse of human right -Unemployment & lack of financial strength	Remove these words: -Inadequate -Absence -Lack -Abuse -Un	- Capacity building -Professional involvement in decision making for the building industry -Respects for public opinion & the poor masses -Human right -Employment & Financial strength
Q4CB	-Inadequate capacity building -Absence of professional involvement in decision making for the building industry -Unemployment & lack of financial strength -Abuse of human right -Lack of respects for public opinion & the poor masses	Remove these words: -Inadequate -Absence -Lack -Abuse -Un	-Capacity building -Professional involvement in decision making for the building industry -Employment & Financial strength -Human right -Respects for public opinion & the poor masses

Source: (Author construction 2016)

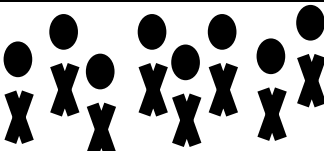
APPENDIX E: MATRIX OF COMMENTS FROM FOCUS GROUP DISCUSSION

COMMENTS RECEIVED DURING FOCUS GROUP DISCUSSION ON THE DEVELOPMENT & IMPLEMENTATION OF BC STRUCTURAL ASPECTS FOR MRRB IN NIGERIA.

From August 2015-November 2015

Points of introduction in the entire forum

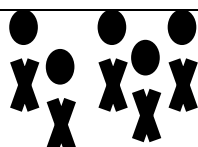
1. Nigeria BC, its importance and problems,
2. The structural collapse of buildings in Nigeria, failure of all stakeholders,
3. The key factors/causal factors which impedes the development, implementation & enforcement of structural aspects of BC in HRRB,
4. Impact risks on the industry, professional practice and the users of buildings and
5. Strategies to development & implementation of BC SDC for HRRB to reduce the impact risks on the industry, professional practice and the users of buildings.

Matrix of Comments from the consultation process			
Focus Group A: Lagos 			
S/no	Issues	Suggestions	Action by Researcher
1	BC SDC Implementation for MSRB (Technical) & Administrative issues.	a. Let the Building industry collaborate with external bodies like National Board for Technical Education (NBTE), Independent Corrupt Practices Commission (ICPC), and National Building Road & Research Institute (NBRRI) e. t. c at different levels of BC structural aspects implementation.	This issue shall be addressed during formatting of final document for policy framework.
	Technical, Administrative & Legal	b. The political class should help in motivating professionals to assist in the implementation of BC; laws against defaulters, insuring for confidence should be enacted and penalties should be enforced, because the subject matter has a very vital fact that helps in the development of ideal Multi-storey residential buildings, to reduce risks of structural collapse & death if the code is properly implemented.	Noted

	Administrative	c. It will be of help to our country Nigeria, if we can do away with this foreign code and be bold enough to call our professionals to engage the masses in developing friendly code which can be effective from all zones of the country. Remember similar code like IBC of USA and Eurocodes of the Europeans.	Noted but no change required until the BC review committee approved it.
	Administrative social responsibility	d. The structural aspects of this building code implementation process for MRRB in Nigeria are not yet updated. It is rarely used by the stakeholders in the construction industry. We need adequate awareness for proper implementation and enforcement.	Noted for framework development
	Administrative	e. The major challenges we witness daily within our locality on housing development are lack of government interest in developing areas creating unplanned street & housing congestion. This is as a result of non-implementation of BC structural aspects. If I may suggest, the government of the day has the largest share to contribute to all the laws binding engineering practices. There should be an urgent review of all policies on engineering practices and not structural aspects of building alone.	Noted
	Technical	f. Let mid-rise buildings in Nigeria be a specialisation with special training and this should start after spending years in building bungalows (normal building) structural aspects.	Noted for further action
	Technical	g. Non-professionals in the building industry causes building collapse because they lack professional certification to execute such jobs. Stiffer penalties should be handed down to defaulters to safe life and re-enforce confidence in investors through monitoring process by experts of MRRB.	Noted
Focus Group B: PH 			

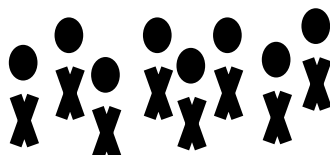
	Issues	Suggestions	Action
2	Technical	a. They should be a removal of all non-registered members of professional bodies such as Council of registered builders of Nigeria (CORBON), Architect registration council of Nigeria (ARCON), Council for the regulation of engineering in Nigeria (COREN), from town planning because they lack the knowledge of implementing Building Regulation structural aspects of MRRB.	Noted but not professional to ask for termination of appointments. I think training and encouragement to get registered should be more appropriate.
	Technical	b. To eliminate structural building collapse in Nigeria, all State chapters of professional bodies & Federal Capital Territory (FCT) should be serious to fight non-professionals hijacking building practices.	Noted.
	Technical/ Admin issues	c. They should be periodic update of membership forms with town planning and development control responsible for enforcement of those qualified to practice building construction in Nigeria.	Noted
	Technical/ Admin issues	d. Periodic meetings of senior professionals with development control should be mandatory to table some unknown problems to development control as the case maybe.	Noted
	Technical	e. Building registration numbers should be allocated during approval in Lagos, Abuja, PH and other States to quickly identify those responsible for such buildings structural problems.	Noted for further recommendation
	Technical	f. Let it be mandatory for those who design MSRB to supervise and certify okay at completion in-line with their inputs as stated in NBC 2006.	Noted
	Administrative	g. The complex approval process should be review to encourage local participation of building developers to ease implementation.	Noted
	Administrative	h. Let there be an establishment of all building professionals little commission responsible for monitoring the implementation process.	This issue is noted for formatting in the final framework drafting.

Focus Group C: Enugu

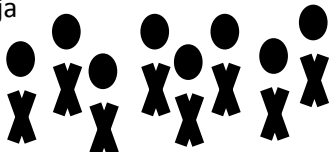


	Issues	Suggestions	Action
3	Technical	a. The regular occurrence of structural building collapse is a clear statement to the fact that rules are not be followed in the building construction industry. There is an urgent need to bring all the professionals in building construction under one umbrella body in Nigeria. You know all investigations carried out on collapse structures end up inconclusive with no sanctions applied so far from any report.	Further action required for policy framework proposal.
	Admin social issue	b. Awareness is very low for the actualisation of desired standard implementation in the building industry. There is a need to seriously sensitise the people at all levels in the implementation of BC structural aspects for MRSB.	Noted

Focus Group D: Lokoja



s/no	Issues	Suggestions	Action
4	legal	a. Laws that will liberate the building profession should be enacted about building practices. Right now professionals are handicapped to apply the contents of the BC for MSRB. We have no insurance so investors are not coming.	Noted
	Legal	b. BC needs legislative backing for full implementation by professionals.	Noted as known fact.
	Technical	c. Let special building congress be called for professionals in Nigeria specifically for the BC structural problems, issue of job specialisation for in the industry to be discussed.	Noted

		d. Building code should be provided handy with basic information for easy accessibility and implementation in every building construction site.	Further action required
		e. If the rules are well articulated for people to know, then following the rules as expected will be easier. What this means is that, let us come together as professionals and create rules for the industry for government to follow.	Noted
		f. There is a need for stronger implementation body for the building industry.	Required for consideration in policy framework development for implementation.
	Legal	g. Policing of construction process to curb corruption should be intensifying through appropriate commission to reduce non-implementation of structural aspects of BC.	
Focus Group E: Abuja 			
s/no	Issues	Suggestions	Action
5		a. Inappropriate policy framework for building industry is responsible for the poor implementation. Let there be proper policy framework that is all inclusive of both government and the local communities for easy implementation.	Noted
		b. High level of self-interest demonstrating by some professionals is un-called for. This breed corruption and scare away committed professionals. I suggest another independent body to monitor implementation process apart from government.	Noted for action in final drafting of policy framework
	Administrative &	c. Professionals in the building	Noted

	Technical issue	industry should rise up & put government on the check, because non-implementation of BC is as good as not having it. That is why we have building collapse everywhere. A review should be made to reflect current realities for deliberation on common ground for implementation.	
	Administration	d. Let government introduce BC development & implementation strategies in our built environment tertiary institutions curriculum.	Required for further recommendation
	Administrative & Technical issue	e. Government should re-introduce craft & technical training institute for skills development to help in averting building collapse.	noted
		f. The construction industry board should be established by the government for implementation process, training of building construction professionals and monitoring in my own suggestion.	noted for action on policy framework final proposal
		g. Professionals in Nigeria should form a union group against government and demand for their right to implementation policy & laws to guide the industry.	Consideration to be given for final documents as pressure group
		h. Create special task force on building enforcement within the country with offices spread across all local governments.	The issue shall be address during final drafting of framework.

APPENDIX F: Weighted Formula

Computation of the mean using weighted arithmetic mean formula

$$\bar{x} = \sum fx / \sum f$$

Where: $\bar{x}$ = mean, x = points on the likerts scale (1-5), f = Frequency of respondents on each point on the scale

1. Computation of the Relative Importance Index (RII) for the variable factor interested in using the formula as:

$$RII = \sum fx / \sum f \cdot 1/A$$

$$RII = \bar{x}/A$$

Where A = Maximum point on the Likerts scale (for this research is 5)

2. Now rank the factors based on their RII Values, variable factors with highest RII values is ranked first and next second to n
3. Interpretation of the RII values as: $RII < 0.60$ = low rating variable factor

≤ 0.80 = high rating,

≥ 0.80 = very high rating

Presented below is an example of the RII computation as adapted from authors above for the ranking

$$x_i = 1/5 = 0.20$$

$$x_i = 2/5 = 0.40$$

$$x_i = 3/5 = 0.60$$

$$x_i = 4/5 = 0.80$$

$$x_i = 5/5 = 1$$

f = frequency of responses (Where; Very unsatisfactory =1, Unsatisfactory =2, partially satisfactory=3, satisfactory= 4, very satisfactory=5)

For example: Enforcement of BC Standard & Regulations

Very unsatisfactory	31
Unsatisfactory	166
Partially satisfactory	131
Satisfactory	47
Very satisfactory	3
$\sum f$	378

Excel Formula:

Relative Importance Index (RII) = $((31*1) + (166*2) + (131*3) + (47*4) + (3*5))/378/5=0.5074$ or
 $RII = ((31*0.20) + (166*0.40) + (131*0.60) + (47* 0.80) + (3*1))/378 = 0.5074$

APPENDIX G: OBJECTIVE CRITERIA FOR SITE CASE MEASUREMENT

Q2ESM: Classify the level of implementation, enforcement, and compliance to structural provisions of mid-rise residential buildings development projects with respect to Building Code Requirements. (For researcher site Visitation please skip).

NBC 2006 sections & Compliance Forms Requirement as Objectives criteria for the measurement of current practice	Current Practice measurement	Type of Buildings	Location/ State	Non-compliance	Partial compliance	Full compliance	Remarks
1. Foundation							
<u>Soil bearing strata analysis report</u> <u>Excavation</u> Depth: 930mm-1500mm Width: 600mm-1000mm Shuttering/support (if applicable) Treatments							
<u>Footings</u> -Blinding thickness: 50mm-100mm -Reinforcement bending & placement (sizes) -Concrete work, foundation bases, column beams & ground beams (sizes) Plain concrete Thickness: 150mm Width: 200mm min.-225mm Over all width: 675mm including both edges extension Reinforced concrete Footings;							

-Blinding= 75mm -Footings on soil=150mm -Footings on poles=300mm Deposition of concrete footing- shall not be deposited in water except by approved means & supervision Protection of concrete footing- during deposition from freezing and not allow water flow through for 5 days. Form work for concrete footings- do not cast against the earth when soil warrant forming. Masonry unit footings- Width 200minimum, depth twice the wall, pier or column projection (225x2) 450mm Mat, Raft or Float Foundation used only when structural designs is practically uniform balanced loading & soil is of uniform bearing capacity Concrete work quality- water quality, formwork, curing process No of days 7, 14 and 28days before work commencement on it. <u>Timber footings or wood foundation</u> Footings shall be							

treated in accordance with AWP A C2 or C3: (pressure treatment lumber bridge tiles) Wood foundation installed in accordance with N EoPATR7 (Basic all weather wood foundation)							
<u>Foundation Walls construction</u> The following thickness are allowed Sands crete block Thickness: 225mm, 225mm,450mm Hollow masonry (unreinforced) 200mm,250mm,300mm Solid masonry (unreinforced) 200, 250mm Plain concrete 300mm,200mm thick Cavity walls: 250mm with gables not more than 6000mm							
<u>Back Filling/Earth filling</u> -Depth -Material used -Progressively compacted -Rammed <u>Hard core filling</u> 150mm-300mm -Materials/Sizes -Depth -Progressively filled -Rammed							
2. Floor Rooms area: 14m ² at least a room							

Other: 10.8m² Width:3000mm both ways <u>Over site concrete</u> -Thickness 150mm -Formwork -Reinforcement -Curing DP membrane shall be installed in multi-storeyed: <u>Suspended floor slab</u> -thickness: 150mm -Reinforcement bars placement & sizes -Concrete mix design -Supervision -curing <u>Staircase</u> -Risers -Tread -Going -Anti slip -Nosing -Balusters							
3. Walls Height: 3000mm min. Thickness: Shall not be less than h/10 i.e. 300mm so Load bearing accepted @ 225-300mm Internal non-load bearing walls: 113mm Max. Length of wall: 3650mm or 7000mm if columns are provided Lintel @ 1m thickness: 200mm DPM on exterior							

surface of walls Wall rendering cement sand-mortar: (1:6) Ceiling height of rooms: 2400mm Ceiling height of hall ways: 2200mm Ceiling spacing: 1200mm							
4. <u>Roof & closing-up</u> Min. Pitch angle: 30° Span of rafters: 3500mm for lean to roofs 6000mm for gable roofs 10,000mm for triangular trusses for economical solution <u>Formwork/support</u> Material used: Adequacy in size: Strength & quality: <u>Roof frames & structures</u> Minimum specification Details: Materials used: Adequacy in Sizes: Strength & quality: 50mmx 50mm-75mm Hardwood (HW) purlins @ 900mm c/c 150mmx75mm HW rafters @ 1200- 1500c/c 100mmx75mm HW							

struts 100mmx150mm HW timber kingpost @ 1200mm-1500mmc/c 150mmx 75mm HW tie beam @ 1200mm- 1500mmc/c Tie Beam shall be of conc. Or timber tied to wall plate by nail or bolt. Tie beam shall be as braces to independent column, pole a& load bearing walls <u>Wall plates</u> Material used: Adequacy in size: Strength & quality of materials Minimum specification HW/Conc. 150mmx100mm wall plate <u>Concrete roof slabs</u> Thickness Reinforcement & Placement Sizes Strength achieved with cube test of 7, 14 & 28days Curing process: Sealant materials: <u>Eaves & Fascia board</u> Materials used: Sizes Strength & quality <u>Insulation (if any)</u> Materials: Adequacy in size Strength & quality.							

APPENDIX H: EXAMPLE OF NIGERIA BUILDING DEVELOPMENT PLANNING STANDARDS & REGULATIONS 1954, 1959 AND 1960 SUGGESTED AMENDMENTS (from National Archives)

NC/83/22
7/13/5/5

N.A.L.N. 68 of 1963

NORTHERN NIGERIA PUBLIC NOTICE
THE NATIVE AUTHORITY LAW, 1954 (No. 4 OF 1954)
THE KANO NATIVE AUTHORITY (BUILDING LINES)
RULES, 1963

Date of Commencement : 2nd May, 1963

In exercise of the powers conferred upon native authorities by paragraph (51) of section 37 of the Native Authority Law, 1954, the following rules are hereby made by the Kano Native Authority with the approval of the Governor acting in accordance with the advice of the Executive Council :-

Title.

1. These rules may be cited as the Kano Native Authority (Building Lines) Rules, 1963.

Definitions.

2. In these rules -

"immobilised motor vehicle" means any motor vehicle which is incapable of propulsion without repair or without the replacement of any working part, and shall include any portion or fragment of any such vehicle;

"Native Authority" means the Kano Native Authority;

"obstruction" means any building or any structure of a permanent nature or any tree or permanent crop, or any immobilised motor vehicle or any lumber, brick, stone, iron, timber, thatch, cable, bale, cask, bottle, tin, can, carton, box or other impediment;

"road" means any thoroughfare used by the public or under construction, other than a road to which the Building Lines Regulation Ordinance or the Building Lines (Federal Trunk Roads) Ordinance, 1957 applies.

Cap. 24 of the
1948 Laws.
Cap. 27 of the
1958 Laws.

Space on both
sides of roads
to be kept clear
of obstruction.

3. No person shall in respect of any roads situated in Kano City and Waje Districts cause any obstruction to be placed on either side thereof within a distance of one hundred feet from the centre line of the road or between any existing building and the centre line of the road, without the written permission of the Native Authority.

Provided that no building in existence at the date of the coming into force of these rules shall be deemed to be an obstruction

Penalties.

4. Any person who contravenes the provisions of rule 3 shall be guilty of an offence and shall be liable upon conviction to a fine not exceeding twenty-five pounds or to imprisonment for a term not exceeding three months or to both such fine and imprisonment.

Notice to
remove
obstructions.

5. (1) In the event of any contravention of the provisions of rule 3 the Native Authority shall cause a notice in writing to be served on the person responsible for such contravention requiring such person to remove the obstruction within a time to be specified in the notice.

(2) If such person does not remove the obstruction within the time so specified the Native Authority may itself remove the obstruction.

(3) Any expenses incurred by the Native Authority in removing any obstruction aforesaid may be recovered from the person causing such obstruction as a civil debt in addition to any other penalty to which he may be liable.

MADE by the Kano Native Authority
this first day of September 1962.

The Common Seal of the
Kano Native Authority
was hereto affixed in
the presence of
Alhaji Muhammadu Sanusi

Signified in accordance with the Kano
Native Authority Standing Orders, 1955
dated the 10th day of April, 1955.

Alhaji Sami Bayero
Clerk of the Council

APPROVED this 23rd day of April 1963

By His Excellency's Command

Alhaji
Secretary to the Executive Council
of Northern Nigeria

N.A.L.N. of 1959

NORTHERN REGIONAL PUBLIC NOTICE

THE NATIVE AUTHORITY LAW, 1954 (NO. 4 OF 1954)

THE JOS NATIVE AUTHORITY (BUILDING LINES)
RULES, 1959

Date of Commencement: 27th August, 1959

In exercise of the powers conferred upon native authorities by paragraph (51) of section 37 of the Native Authority Law, 1954, the following rules are hereby made by the Jos Native Authority with the approval of the Governor of the Northern Region after consultation with the Executive Council :-

Citation.

1. These rules may be cited as the Jos Native Authority (Building Lines) Rules, 1959.

Definitions.

2. In these rules -

"immobilised motor vehicle" means any motor vehicle which is incapable of propulsion without repair or without the replacement of any working part, and shall include any portion or fragment of any such vehicle;

"Native Authority" means the Jos Native Authority;

"obstruction" means any building or any structure of a permanent nature or any tree or permanent crop, or any immobilised motor vehicle or any lumber, brick, stone, iron, timber, thatch, cable, bale, cask, bottle, tin, can, carton, box or other impediment;

"road" means any thoroughfare used by the public or under construction.

Space on both
sides of roads
to be kept clear
of obstructions.

Penalties.

Notice to remove
obstructions.

3. No person shall in respect of any roads situated in Jos Native Town or in Bukuru Town cause any obstruction to be placed on either side thereof within a distance of twenty feet from the centre line of the road or between any existing building and the centre line of the road, without the written permission of the Native Authority.

4. Any person who contravenes the provisions of rule 3 shall be guilty of an offence and shall be liable upon conviction to a fine not exceeding twenty-five pounds or to imprisonment for a term not exceeding three months or to both such fine and imprisonment.

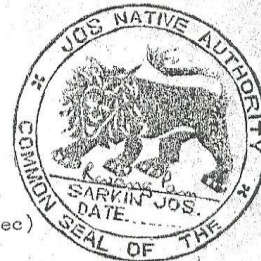
5. (1) In the event of any contravention of the provisions of rule 3 the Native Authority shall cause a notice in writing to be served on the person responsible for such contravention requiring such person to remove the obstruction within a time to be specified in the notice.

(2) If such person does not remove the obstruction within the time so specified the Native Authority may itself remove the obstruction.

(3) Any expenses incurred by the Native Authority in removing any obstruction aforesaid may be recovered from the person causing such obstruction as a civil debt in addition to any other penalty to which he may be liable.

MADE by the Jos Native Authority this 18th
day of April, 195⁹.

The Common Seal of the Jos
Native Authority was hereto
affixed in the presence of -



..... (Fom Bpt. L.G. Sec)

..... (Buge Wakilin Jos) (Rwang Pam)

..... (A.Gyang Madakin Jos)

Signified in accordance with the Jos Native Authority
Standing Order¹⁹⁵⁶, dated the 20th day of March, 1956.

M. Chuwang Bot (M. Chuwang Bot)
.....
Clerk to the Council.

APPROVED this 20th day of August, 1959.

By His Excellency's Command,

MW.369.

.....
Secretary to the Executive
Council of the Northern Region.

MAIN BUILDINGS ORDINANCE OF AUGUST 1960

SUGGESTED AMENDMENTS

Section 1. Interpretation

The amendments are of three types:-

- a. Certain definitions are deleted, "Buttress", "Column" and "Pier". These might better appear in the regulations concerning Structural Stability;
- b. Certain additions are suggested;
- c. All definitions concerning the measurement of buildings are collected in a new schedule entitled "General rules of measurement". In consequence Section 1 (viii) is added.

The details of the proposals are:-

"Building". ADD

(f) any electricity supply line and its supports which is, or is to be, vested in a public authority.

(g) any reservoir which is, or is to be, vested in a public authority.

"Buttress". DELETE

"Column". DELETE

"Combustible". DELETE the last full stop and ADD "and non-combustible shall be construed accordingly".

"Cubic Content". DELETE (see draft new schedule)

INSERT
"The Fire Resistance period of an element of structure shall be taken to be the grading period which is most nearly equal to but does not exceed the test period for which the element fulfils the relevant test requirements: the tests and grading shall be in accordance with British Standard 476: 1953".

"Floor area of a room". DELETE (see draft new schedule).

"Floor area of a storey". DELETE (see draft new schedule).

"Height of a room". DELETE (see draft new schedule).

"Height of a building". DELETE (see draft new schedule).

"Height of a storey other than the top storey". DELETE (see draft new schedule).

"Height of the top storey". DELETE (see draft new schedule).

"Pier". DELETE

"Plot". This is always a most difficult thing to define: the phrase given may suit Britain but does not necessarily suit a country where several equally important houses are erected separately on the same piece of land. The phrase "in one ownership" might well be inserted, and the point should be put to the Crown Law officers.

"Site". DELETE the last full stop and ADD "including its foundations."

"Street". DELETE the last full stop and ADD "and any land reserved for a future public road or footway and any drain in connection therewith."

ADD 1. (viii) "Any reference in this Ordinance to a height, width, area, cubic content or other dimension shall, unless the context otherwise requires, be taken to be a height, width, area, cubic content or other dimension as the case may be measured or calculated in accordance with the provisions of the sixth Schedule (General Rules of Measurement)."

Section 2. Classes of Buildings

It was found that in some territories the subdivision of the Classes into (i), (ii), (iii) by floor areas was useful but in other territories it was not. It is therefore suggested that all these sub classes (except for Class B) should be DELETED and an addition made to Section 33 (see below). Also another class of buildings must be ADDED:-

4. Buildings not principally used for human occupation -

- (i) Buildings for use principally by animals.
- (ii) Other buildings.

Note: The O.E.D. definition of "animal" includes birds, fish, etc.

Section 4.

(i) ADD: or to any building or part of a building which is erected for experiment upon or research into the behaviour of any material, method of construction or design technique provided that such experiment or research has been approved in writing by the Building Surveyor or by the head of one of the bodies listed in Subsection (ii) of this section for construction in an area under his jurisdiction.

(ii) ADD: (d) The armed forces of the Crown;

Section 9.

(ii) After "..... descriptions" ADD "calculations".

Section 10.

(a) ADD. "In the event of the Building Surveyor refusing a permit, he shall list the numbers of the regulations which would be contravened by the proposed buildings: this list shall not be treated as being exhaustive and no such refusal shall be construed as implying any approval of any part of the proposed building."

(c) ADD. "Approval of drawings conveys no title to land or waiver to any term in a lease or licence."

Section 12.

(ii) First line, after "..... person" ADD "other than not exceeding two watchmen".

(iii) Penultimate line, DELETE "three" and SUBSTITUTE "two".

Section 13. ADD

(v) Upon the application of -

- (a) the Building Surveyor where in his opinion any building is or is liable to become dangerous; or
- (b) the owner where a notice has been served on him by the Building Surveyor under this Section; or
- (c) the owner where the Building Surveyor has supplied a certificate to him showing that a building should be closed to enable any construction work to be carried out without danger to the occupiers or the public;

A magistrate shall on being satisfied that notice has been given in accordance with the provisions of subsection (vi) of this section make a Closure Order.

(vi)a. Seven days notice of intention to apply for a Closure Order shall be given by the person making such application by posting a copy of such notice upon a conspicuous part of the building to be affected, and upon being so posted the notice shall be deemed to be notice to all persons of such intention; Provided that in the case of an emergency such notice of intention shall be given as is practicable.

b. the notice shall be in clear and legible form in both the English and languages.

(vii) A Closure Order made under this Section shall -

- (a) specify the building to be closed; and
- (b) order the closure thereof under the direction of a police officer; and
- (c) order that the building remain closed until the Building Surveyor shall have certified in writing that the order is no longer required.

(viii) No person shall occupy any building during the continuance in force of a Closure Order made in respect thereof.

Note: In countries where there are Ordinances such as a Landlord and Tenant Ordinance, which restrict the power of eviction, it will be necessary to elaborate this Closure procedure to protect the tenant by making it possible for him to resume occupation after the Closure ceases.

Section 16.

(iii) ADD "..... on matters of law only".

Section 33

line 7. after "Ordinance" ADD "or to certain groups of buildings in any class..."

Note: This covers the removal of subclasses according to area from Section 2.

Section 40. New Section ADD:-

40. Persons practising certain professions occupations and trades connected with the building industry.

The (Governor-in-Council) is hereby empowered to issue regulations applying to any or all of the professions, occupations and trades specified in the Fourth Schedule to this Ordinance in relation to any or all of the matters specified in the Fifth Schedule to this Ordinance, and also to determine the areas in which such regulations shall apply. These regulations may differ in different areas.

Note: Some of these trades may be covered elsewhere in the laws.

First Schedule

ADD (r) Projections.

Third Schedule

DELETE (i)

RENUMBER (ii) (a) to (i)

DELETE the first two lines of the old (ii) (a) and SUBSTITUTE "Every application for a permit to construct a building defined in classes A, B, C, D, E, F, of Section 2 shall be on the"

RENUMBER (ii) (b) as (ii)

RENUMBER (ii) (c) as (iii)

ADD (iv) "Where regulations are made referring to certain groups of buildings in specific areas the Building Surveyor may require only the particulars on the prescribed form without drawings or with drawings in less detail than set out above."

ADD Fourth Schedule

ADD Fifth Schedule

ADD Sixth Schedule (General rules of measurement) (to follow)

5.

FOURTH SCHEDULE

Building Contractors

Lift Contractors

Escalator Contractors

Electricians

Drain Layers

Plumbers

6.

FIFTH SCHEDULE

1. Matters with regard to Contractors;

- a. Registration of building contractors, lift contractors and escalator contractors;
- b. Duties of registered contractors;
- c. Disciplinary Boards for registered contractors;
- d. Buildings and works for the construction of which registered contractors must be employed.

2. Matters with regard to Tradesmen;

- a. Registration of Electricians, Drain Layers, and Plumbers.
- b. Duties of registered Electricians, Drain Layers, and Plumbers.
- c. Disciplinary procedure for registered Electricians, Drain Layers and Plumbers.
- d. Buildings and works for the construction of which registered Electricians, Drain Layers, and Plumbers must be employed.



First Mid-Rise Storey building in Nigeria Built in 1845 Badagry.

Appendix 7A: Variable communalities table

Communalities		
	Initial	Extraction
Degree of Compliance	1.000	.617
Q3FA legislation	1.000	.671
Q3FA Approved standard	1.000	.620
Q3FA Political interest	1.000	.833
Q3FA Public Dialogue	1.000	.776
Q3FB Leadership	1.000	.971
Q3FB Political interest	1.000	.901
Corruption	1.000	.766
Professional rivalry	1.000	.714
Professional Vested interest	1.000	.813
Capacity Building	1.000	.727
Professional involvement in decision making	1.000	.745
Technological Expertise	1.000	.713
Respects public opinion	1.000	.782
Human right	1.000	.830
Employment & financial strength	1.000	.813
Incessant collapse of buildings	1.000	.840
Loss of investors confidence	1.000	.867
Sub-standard materials & houses	1.000	.701
House property destruction	1.000	.726
Environmental pollution & disease outbreak	1.000	.545
Extraction Method: Maximum Likelihood		

Appendix 7B: Tables of factor loadings of each of the variables (items) for the second extraction

Table 7.16: Rotated factor loadings

Pattern Matrix ^a								
	Factor							
	1	2	3	4	5	6	7	8
legislation	.062	.074	-.106	-.159	-.042	.595	-.261	.046
Approved standard	-.296	.686	.197	.033	-.055	-.078	-.047	.101
Political interest	-.170	.185	.180	-.211	.146	-.391	.228	.572
Public Dialogue	-.063	-.169	-.207	-.103	.672	.000	.354	.117
Leadership	-.246	.086	.210	.704	-.067	.169	-.103	.139
Political will	-.297	.064	.309	.200	.133	.408	.115	-.120
Corruption	.084	.058	-.072	.168	.025	.096	.020	.844
Professional rivalry	.724	.436	-.165	.162	-.061	.300	.126	-.178
Professional Vested interest	.658	.448	-.355	.008	.096	-.037	.184	-.091
Capacity Building	-.025	.089	.812	.129	.127	-.117	.090	-.066
Professional involvement in decision making	.806	-.135	-.059	-.162	.124	.064	-.078	.149
Technological Expertise	-.045	-.370	.722	-.099	.173	.058	.074	.065
Respects public opinion	.314	-.133	-.022	-.059	.799	.068	-.039	.135

Human right	-.068	-.073	.155	-.047	.879	-.043	-.124	-.055
Employment & financial strength	.207	-.776	.308	-.047	.214	.076	-.037	-.135
Incessant collapse of buildings	-.230	-.029	.169	-.162	-.278	.085	.667	.043
Loss of investors' confidence	-.069	.108	.011	.212	.035	-.753	.078	-.178
Sub-standard materials & houses	.106	-.074	.657	.229	.044	.344	.095	-.265
House property destruction	-.133	-.164	.132	-.765	-.054	.214	.163	.064
Environmental pollution & disease outbreak	-.201	-.152	.257	-.229	-.353	.092	.561	-.051
Extraction Method: Maximum likelihood. Rotation Method: Oblimin with Kaiser Normalization.								
a. Rotation converged in 19 iterations.								

Table 7.17 Factor Correlation Matrix								
Factor	1	2	3	4	5	6	7	8
1	0.302	-0.613	0.491	-0.314	0.328	0.153	-0.241	-0.066
2	-0.79	-0.122	0.486	0.126	-0.217	0.246	0.018	-0.043
3	0.163	-0.069	0.066	0.88	0.369	0.224	0.023	-0.042
4	0.405	-0.086	0.059	0.031	-0.631	0.495	0.336	-0.262
5	0.045	0.555	0.291	-0.278	0.453	0.367	0.428	0.071
6	0.163	0.525	0.33	0.053	-0.141	-0.04	-0.639	-0.396

7	0.248	0.075	0.562	0.17	-0.25	-0.525	0.248	0.434
8	0.07	0.085	-0.082	-0.005	-0.154	0.456	-0.419	0.757
Extraction Method: Maximum likelihood.								
Rotation Method: Oblimin with Kaiser Normalization.								

Appendix 7C: Table 7.27: Strength and association of the factors Correlations

		Degree of Compliance	Q3F A legislation	Q3 FA Approved standard	Q3 FA Political Dialogue	Q3F B Leadership	Q3 FB Political interest	Corruption	Professional rivalry	Professional Vested interest	Capacity Building	Professional involvement in legislation	Technological Expertise	Respects public opinion	Human right	Employment & financial strength	Incessant collapse of institutions	Loss of investors confidence	Sub-standard material	House property destruction	Environmental pollution & disease
Degree of Compliance	Pearson Corr	1	.113*	-.068	-.060	.061	.035	-.067	-.067	-.067	-.063	-.042	.157**	.000	.039	.047	-.053	-.079	.110*	.016	.020
	Sig. (2-N)		.029	.189	.029	.239	.501	.196	.000	.000	.222	.414	.002	.998	.451	.364	.302	.123	.033	.755	.694
		378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378
Q3FA legislation	Pearson Corr	.113*	1	.025	.038	-.016	.029	-.057	.208**	.148**	.044	.020	.292**	.023	.029	.132*	-.068	-.058	.210**	.156**	.008
	Sig. (2-N)	.029		.629	.465	.000	.279	.577	.000	.004	.391	.701	.000	.651	.580	.010	.188	.260	.000	.002	.883
		378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378
Q3FA Approved standard	Pearson Corr	-.068	.025	1	.112*	.187*	.089	.054	.096	.154**	.215**	.293**	-.080	.195**	.026	.556**	.051	.118*	.057	-.118*	
	Sig. (2-N)	.189	.629		.029	.060	.083	.292	.063	.003	.000	.000	.122	.000	.615	.000	.325	.022	.266	.565	.021
		378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378	378
Q3FA Political	Pearson Corr	-.060	.038	.112*	1	-.076	.046	.095	-.039	.030	.099	.118*	.077	.053	.066	.147**	.085	.491	.155**	-.074	
	Sig. (2-N)		.029	.189		.029	.239	.501	.196	.000	.222	.414	.002	.998	.451	.364	.302	.123	.033	.755	.694

al intere st	Sig. (2- N	.242 378	.465 378	.02 9 378		.14 2 378	.369 378	.06 6 37	.097 378	.450 378	.557 378	.05 4 378	.022 378	.136 378	.30 8 378	.19 8 37	.004 378	.09 8 378	0.00 0 378	.00 3 378	.328 378	.153 378
Q3FA Public Dialog	Pear son Corr	-.115* 378	-.164** 378	-.02 6 378	.07 6 37	1 378	.291* 378	.07 2 37	.125* 378	.211** 378	.047 378	.03 4 378	-.144** 378	-.100 378	-.07 6 378	-.52** 378	-.026 378	.07 2 378	.051 378	-.01 6 378	-.339** 378	-.284** 378
ue	Sig. (2- N	.025 378	.001 378	.60 9 378	.14 2 37		.000 378	.16 5 37	.015 378	.000 378	.364 378	.50 8 378	.005 378	.053 378	.14 2 378	.00 0 37	.617 378	.16 3 378	.327 378	.76 3 378	.000 378	.000 378
Q3FB Leade rship	Pear son Corr Sig. (2- N	.061 378	-.056 378	.18 7** 378	-.04 6 37	.29 1** 378	1 378	.25 6** 37	.504* 378	.039 378	-.149** 378	-.48 5** 378	-.238** 378	.020 378	-.08 6 378	-.03 8 37	-.089 378	.02 8 378	.003 378	.22 7** 378	-.398** 378	-.116* 378
Q3FB Politica l intere st	Pear son Corr Sig. (2- N	.035 378	.029 378	.08 9 378	-.09 5 37	.07 2 378	.256* 378	1 37	-.029 378	.139** 378	-.171** 378	-.21 1** 378	-.183** 378	.249** 378	-.06 8 378	.07 3 37	.064 378	.05 1 378	-.185** 378	.34** 4 378	.035 378	-.088 378
Corru ption	Pear son Corr Sig. (2- N	-.054 378	-.057 378	.05 4 378	.08 6 37	.12 5* 378	.504* 378	-.02 9 37	1 378	.018 378	.020 378	.02 8 378	.702* 378	-.056 378	.07 4 378	.00 6 37	.138** 378	-.30 8 378	.548 378	.49 9 378	.446 378	-.337 378
Profe ssional rivalry	Pear son Corr Sig. (2- N	-.067 378	-.208** 378	.09 6 378	-.03 9 37	.21 1** 378	.039 378	.13 9** 37	.018 378	1 378	.615** 378	.35 6** 378	-.027 378	.241** 378	-.11 7* 378	-.18 1** 37	.303** 378	.23 7** 378	-.030 378	.04 6 378	-.088 378	-.104* 378
Profe ssional Veste d intere st	Pear son Corr Sig. (2- N	-.182** 378	-.148** 378	.15 4** 378	.03 0 37	.04 7 378	-.149* 378	-.17 1** 37	.020 378	.615** 378	1 378	.49 0** 378	.520** 378	-.479** 378	.11 6* 378	-.08 2 37	-.488** 378	-.07 7 378	.092 378	-.16 4** 378	-.178** 378	-.032 378
		.000 378	.004 378	.00 3 378	.55 7 37	.36 4 378	.004 378	.00 1 37	.703 378	.000 378		.00 0 378	.000 378	.000 378	.02 5 378	.11 0 37	.000 378	.13 5 378	.073 378	.00 1 378	.001 378	.533 378

Capacity Building	Pearson Corr	-.063	.044	-.215**	-.099	.034	-.485*	-.211**	.028	.356**	.490**	1	.530**	.091	.253**	.041	.215**	-.720**	.020	.309*	-.554**	.179**
ng	Sig. (2-N)	.222	.391	.000	.054	.508	.000	.000	.593	.002	.000		.000	.076	.000	.428	.000	.000	.694	.034	.003	.000
		378	378	378	37	378	378	37	378	378	378	378	378	378	378	37	378	378	378	378	378	378
Professional involvement in decision	Pearson Corr	-.042	.020	-.293**	-.118*	-.144**	-.238*	-.183**	.702*	-.027	.520**	.530**	1	.048	.405**	.036	.255**	-.197**	-.093	.059	.055	.367**
	Sig. (2-N)	.414	.701	.000	.022	.005	.000	.000	.000	.606	.000	.000		.352	.000	.490	.000	.000	.071	.251	.290	.000
		378	378	378	37	378	378	37	378	378	378	378	378	378	378	37	378	378	378	378	378	378
Technological Expertise	Pearson Corr	.157**	.292**	-.080	.077	-.100	.020	.249**	-.056	.241**	.479**	.091	.048	1	.126*	.260**	.448**	.119*	-.102*	.366**	.246**	.117*
	Sig. (2-N)	.002	.000	.122	.136	.053	.697	.000	.280	.000	.000	.076	.352		.014	.000	.000	.021	.048	.000	.023	
		378	378	378	37	378	378	37	378	378	378	378	378	378	378	37	378	378	378	378	378	378
Respects public opinion	Pearson Corr	.000	.023	-.195**	.053	-.076	-.086	.068	.074	-.117*	.116*	.253**	.405**	.126*	1	.610**	.299**	-.179**	-.102*	.031	-.022	-.018
	Sig. (2-N)	.998	.651	.000	.308	.142	.094	.188	.151	.022	.025	.000	.000	.014		.000	.000	.000	.048	.550	.672	.726
		378	378	378	37	378	378	37	378	378	378	378	378	378	378	37	378	378	378	378	378	378
Human right	Pearson Corr	.039	.029	-.026	.066	-.523**	-.038	.073	.006	.181**	-.082	.041	.036	.260**	.610**	1	.287**	-.205**	.062	.124*	-.038	-.140**
	Sig. (2-N)	.451	.580	.615	.198	.000	.463	.159	.912	.000	.110	.428	.490	.000	.000		.000	.000	.227	.016	.457	.006
		378	378	378	37	378	378	37	378	378	378	378	378	378	378	37	378	378	378	378	378	378
Employment & financial strength	Pearson Corr	.047	.132*	-.556**	-.147**	-.026	-.089	.064	-.138**	-.303**	.488**	.215**	.255**	.448**	.299**	.287**	1	-.100	-.128*	.327**	.200**	.278**
	Sig. (2-N)	.364	.010	.000	.004	.617	.085	.212	.007	.000	.000	.000	.000	.000	.000	.000		.052	.013	.000	.000	.000
		378	378	378	37	378	378	37	378	378	378	378	378	378	378	37	378	378	378	378	378	378
Incessant collapse	Pearson Corr	-.053	-.068	.051	.085	.072	.028	.051	-.008	.237**	-.077	-.720**	.197**	.119*	-.179**	-.205**	-.100	1	-.023	.103*	.210**	.038

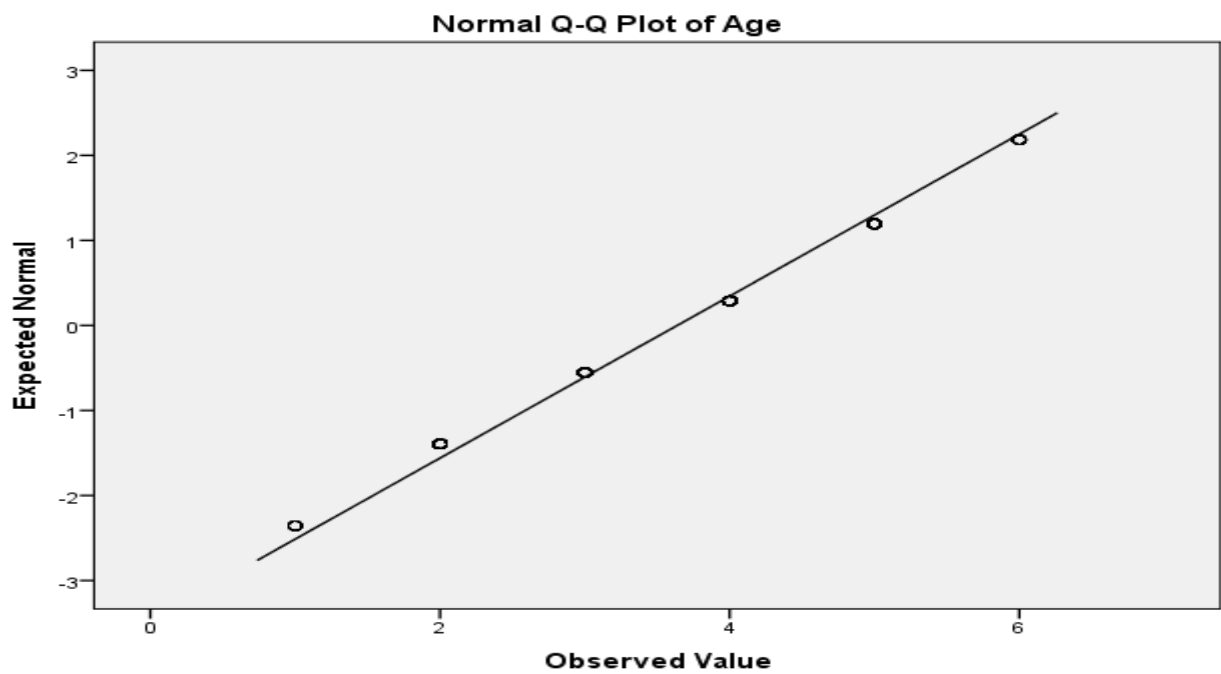
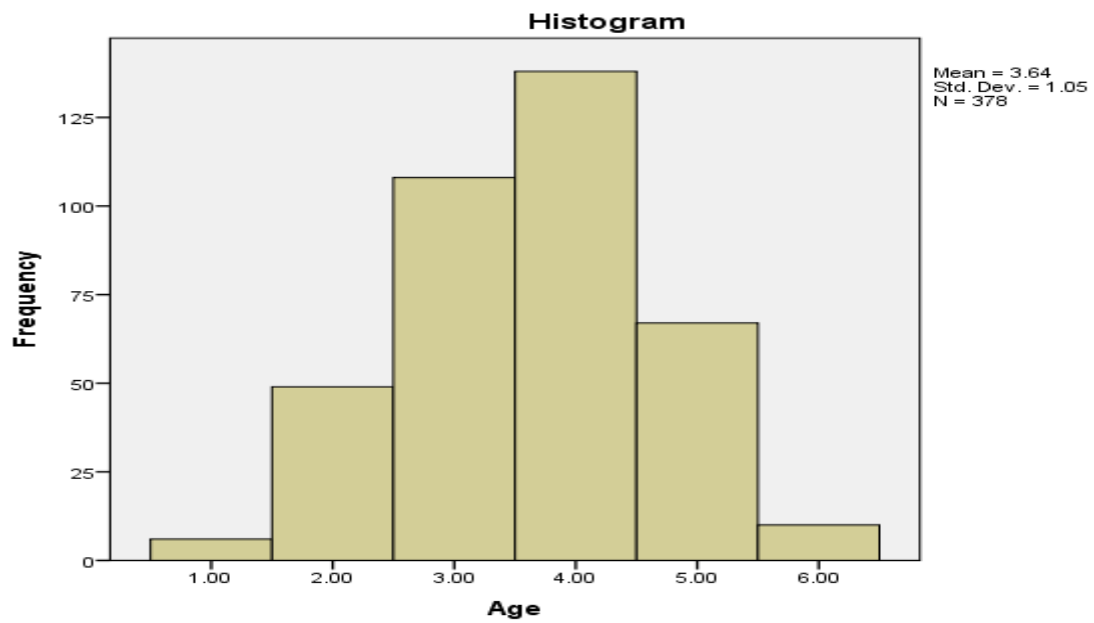
se of buildi ngs	Sig. (2- N	.302 378	.188 378	.32 5 378	.09 8 37	.16 3 378	.592 378	.32 6 37	.870 378	.000 378	.135 378	.00 0 378	.000 378	.021 378	.00 0 378	.00 0 37	.052 378		.662 378	.04 6 378	.000 378	.462 378
Loss of invest ors confid ence	Pear son Corr Sig. (2- N	-.079 378	- .058 378	.11 8 378	.08 9 37	.05 1 378	.003 378	-. .49 2 37	-. .548 378	-.030 378	.092 378	.02 0 378	-.093 378	-.102 378	- .10 2 378	.06 2 37	-. .128 378	- .02 3 378	1 378	- .15 1 378	- .220 378	-.143 378
Sub- stand ard materi als & house	Pear son Corr Sig. (2- N	.110 378	.210 378	- .05 7 378	- .15 5 37	- .01 6 378	.227 378	.34 4 37	-. .499 378	.046 378	-. .164 378	.30 9 378	-.059 378	.366 378	.03 1 378	.12 4 37	.327 378	.10 3 378	- .151 378	1 378	.006 378	.181 378
Hous e prop erty destru ction	Pear son Corr Sig. (2- N	.016 378	.156 378	- .03 0 378	.05 0 37	-. .33 9 378	-. .398 378	.03 5 37	-. .446 378	-.088 378	-. .178 378	-. .55 4 378	.055 378	.246 378	.02 2 378	-. .03 8 37	.200 378	.21 0 378	- .220 378	.00 6 378	1 378	.074 378
Enviro nment al polluti on & disea se	Pear son Corr Sig. (2- N	.020 378	.008 378	- .11 8 378	- .07 4 37	- .28 4 378	-. .116 378	-. .08 8 37	-. .337 378	-. .104 378	-.032 378	.17 9 378	.367 378	.117 378	- .01 8 378	- .14 0 37	.278 378	.03 8 378	- .143 378	.18 1 378	.074 378	1 378

*. Correlation is significant at the 0.05 level (2-tailed).

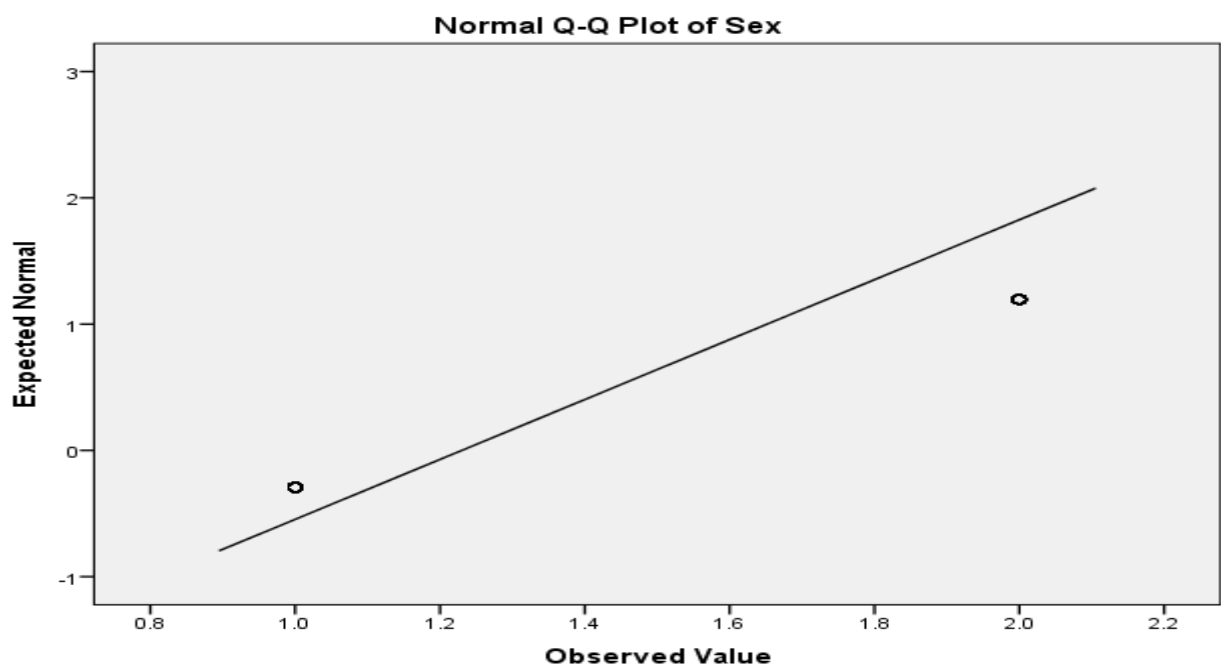
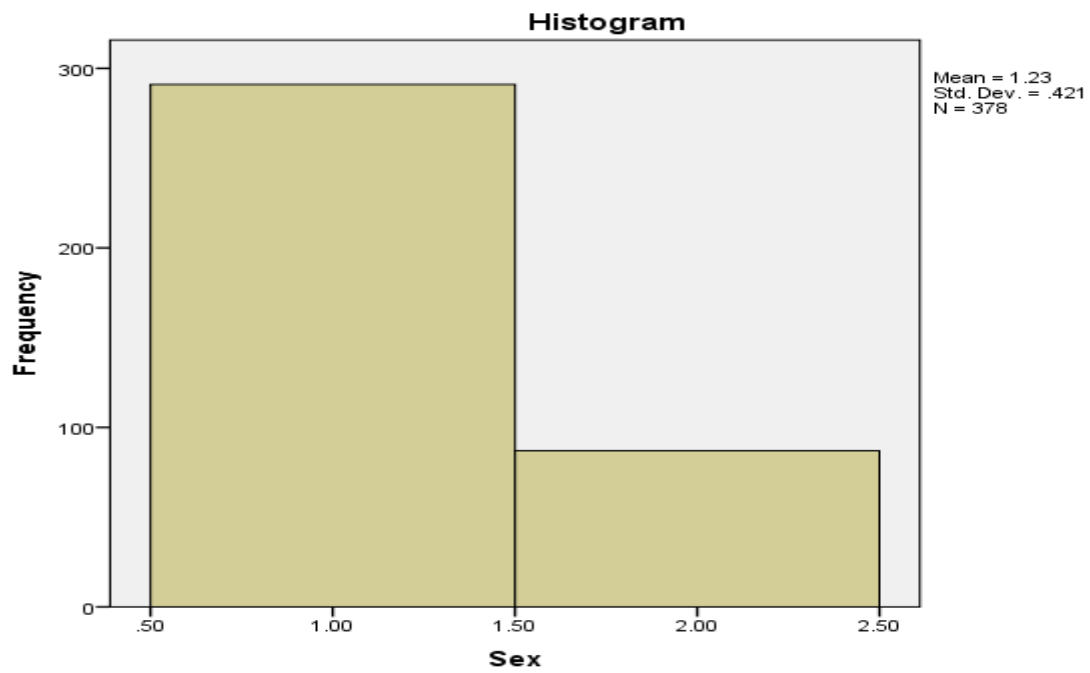
**. Correlation is significant at the 0.01 level (2-tailed).

Distributions of variable

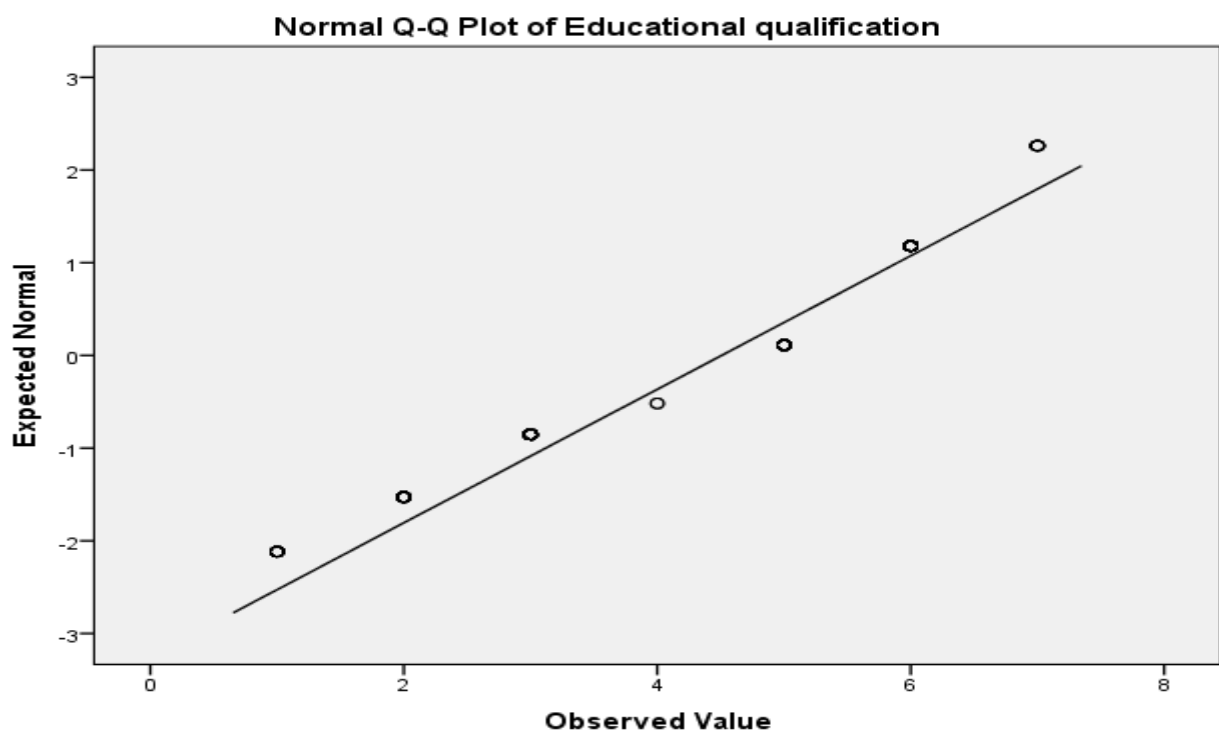
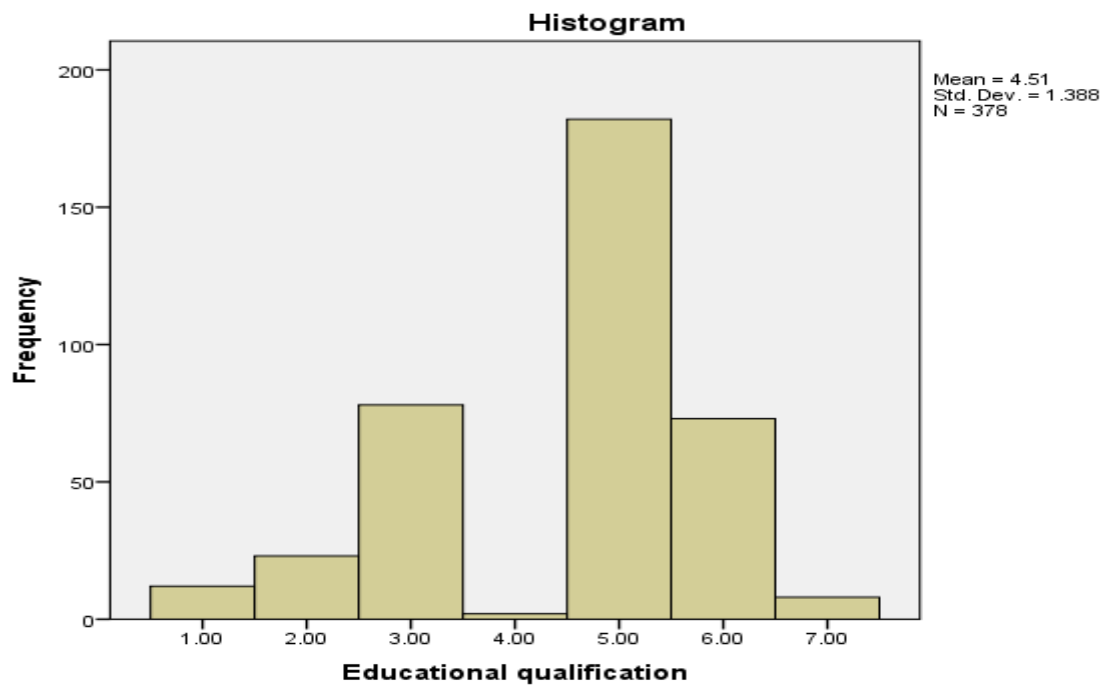
Age



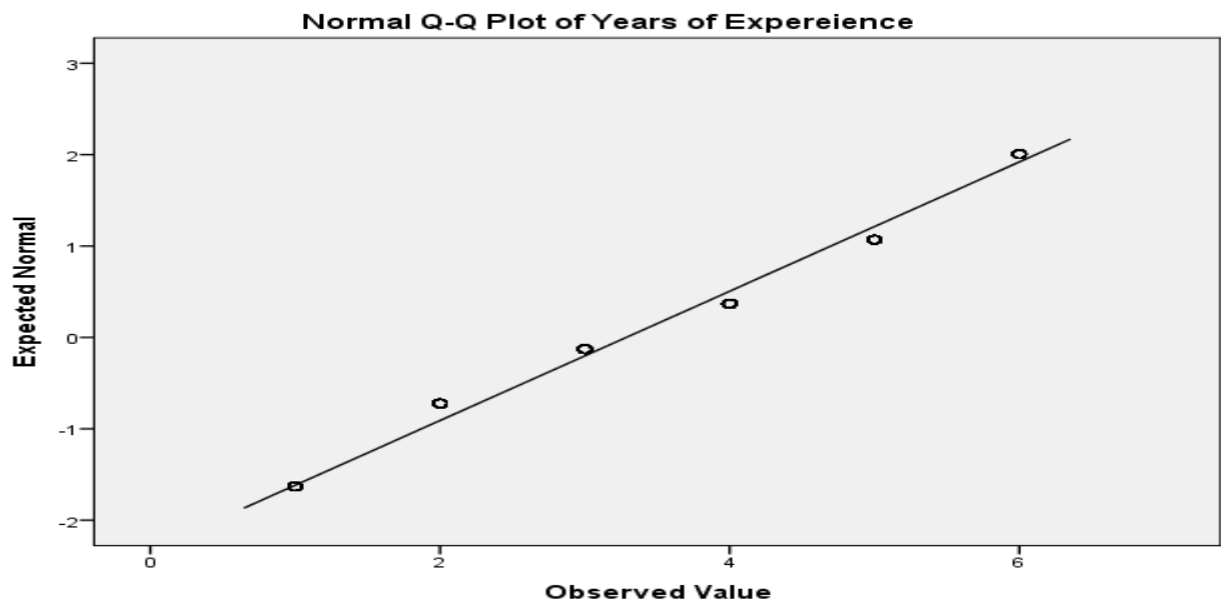
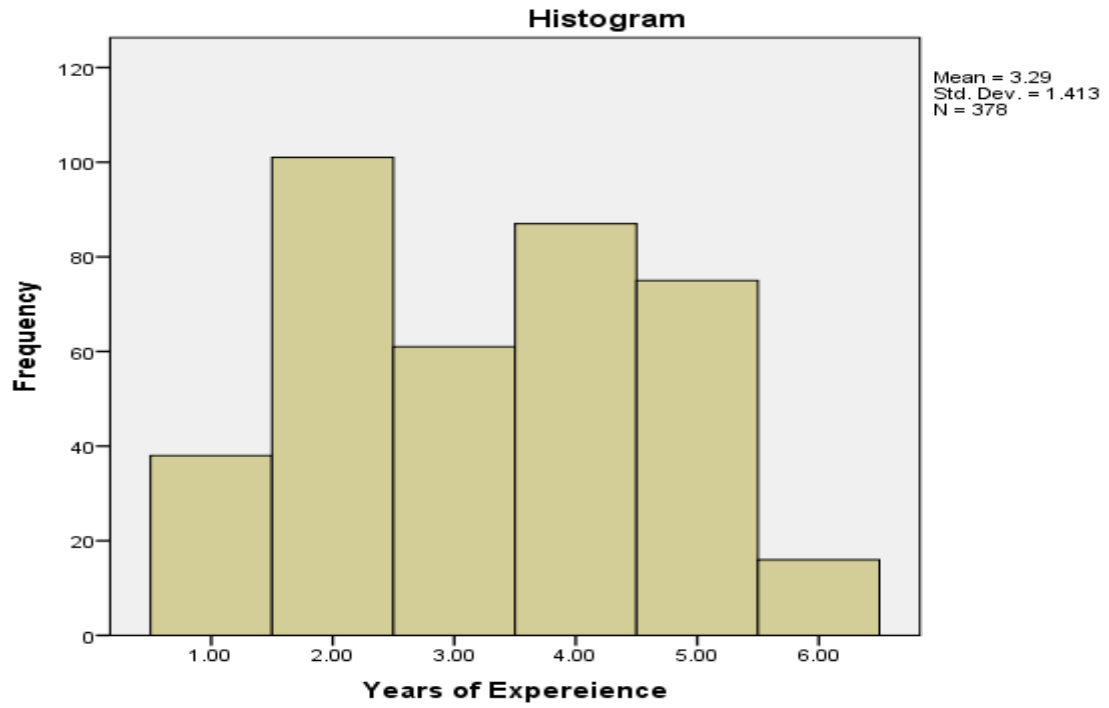
Sex



Educational qualification



Years of Experience



MONITORING TOOLS THAT CAN AID BUILDING COMPLIANCE

COMPLIANCE INFORMATION FORM (CIF)											
Team: ENFORCEMENT OFFICIAL Program-----						Lead Person----- Date Initiated-----					
Information Data			Regulating Body	Activity	Facility Affected	Compliance status			Violations		Remarks
Fresh information	Previous Information requested	Request issued Number				Complied	Non-compliance	Pattern of non-compliance	Serious	Mild	

PERMITS/REGULATIONS ASSESSMENT & DOCUMENTS (PRAD)								
Team: ENFORCEMENT OFFICIAL Program-----					Lead Person----- Date Initiated-----			
Data group (Area applicable)	Milestones requirements	Installation process	Permits/Regulations requirements	Compliance progress				Remark
				Early stage	medium	Late	Re-start process	

ENFORCEMENT PROCESS EVIDENCE COLLECTION FORM (EPECF)							
Team ENFORCEMENT OFFICIAL Program-----				Lead Person----- Date Initiated-----			
s/no	Activities in place for implementation		Enforcement for compliance			Notes for action	Remarks
			Initiated or partially implemented	Not yet implemented	Fully implemented		
	Idea to be explored						
	Initial professional leader to drive it						
	Process/schedule determined						
	Delivering procedure development						
	Competent Team members						
	Evaluation & Feedback procedure development						
	Accountability of leader structural details						
	Data process & policy						
	Any other						

FIDELITY MEASUREMENT AND FEEDBACK ON IMPLEMENTATION (FMFI)											Remark
Team ENFORCEMENT OFFICIAL Program-----					Lead Person----- Date Initiated-----						
DELIVERY PLAN:											
s/no	Concepts/Areas	Delivery process	Enforcement Frequency of visit	Target population	Person (s) Responsible	Evaluation & Feed back	Timeline for the program	Performance measurement based on criteria			Challenges
								Poor	Fair	Good	

COMPLIANCE ADHERENCE DELIVERY PLAN											Remark
Team ENFORCEMENT OFFICIAL/PROFESSIONAL Program-----					Lead Person----- Date Initiated-----						
GUIDE for the REVIEW of PAST and CURRENT COMPLIANCE PERFORMANCE											
Initiative name & Regulation requirement (if any)	Name of leader & Key team members	Target population (stakeholder's)	Initiative start date and end date	Where? On-site (projects) or Off-site (documents review)	Priorities and Strategic plan	Expected outcomes (with measuring indicators)	Evidence of outcomes (Impact with data and date as fact)	Financial involvement (Annual or periodic?) (If any)	Challenges		

COMPLIANCE ACTION PLANNING FORM (CAPF)						
Team: CLIENT RESPONSIBILITY			Lead Professional -----			
Program-----			Date Initiated-----			
Action Planning:						
s/no	Activities	Time Frame	Person (s) Responsible	Responsibility (s)	Resources needed (professional, official)	Remark

Conference and articles papers in progress

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Volume I

Creating built environments of new opportunities

Edited by
Kalle Kähkönen
Marko Keinänen



TAMPERE UNIVERSITY OF TECHNOLOGY



Factors Affecting the Development & Implementation of The Structural Aspects of the Nigeria Building Code Amongst the Stakeholder's within the House Building Construction sector in the Lokoja Municipality (WBC 16 proceedings. Vol.1 pp.250-261)

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Abstract

The failure of the Nigeria Building Code (BC) development and implementation for the structural house building construction process in the Lokoja Municipality to protect the buildings, occupants and the environment as a result of vested stakeholder interests reverberates with significant impacts on house building failures leading to fatalities. There have been 742 recorded deaths, 96 injuries and 63 building failures: three cases from 1976–1978, 19 cases from 1982–1995, and 42 cases from 2000 to 16 September 2014 in Nigeria. These cause investors to lose confidence and allow the entry of nonprofessionals into the industry. This paper identifies and examines the key factors that affect the development and implementation of structural aspects of house BCs, drawing on contextual analysis and international experience. This paper represents part of a large Ph.D. research project, focusing on the key internal and external factors affecting the development and implementation of structural aspects of a BC. This paper has identified a multitude of inter-locking key factors that affect BC implementation in Lokoja including legislation, absence of approved standards, lack of good leadership, lack of political interest or will, inadequate implementation processes, lack of code awareness, high poverty level, high professional fees and insufficient public dialogue. There are also causal factors involved, which impact risks associated with the non-implementation of the code on consumers and the development of industry and professional practice. These include corruption, professional rivalry, professional vested interest, inadequate capacity building, absence of professional involvement in decision making, lack of respect for the poor and public opinion, abuse of human rights and unemployment

Keywords: Building Code, Development, Implementation, Structural Aspects, Stakeholder

1. Introduction

Building codes (BCs), which stipulate minimum standards for building health, safety and the wellbeing of the occupants and their environments, have been in existence from the time humans began manipulating their own environment. The first recorded case that set a minimum standard for building practises was the Code of Hammurabi in ca. 3000 BC (Trombly, 2006). The non-implementation of Nigeria BCs, which set minimum standards for building practises, has caused severe consequences regarding structural building collapse in the house building construction industry in Nigeria (Olusola *et al*, 2011). Codes are designed to protect buildings from structural failure, and the people and property inside them from death and extreme adverse effects on health and safety. BC development laid a solid foundation on which professionals boast of their work meeting minimum standards in a particular jurisdiction (Ghosh, 2002). All houses and their construction and management stages are regulated by BCs, which seek to harmonise best practises, materials, methods and processes to achieve a building that is habitable (Ayedun *et al* , 2012).

The building process, from planning and design to construction and management, is very complex; therefore, it requires a very strong regulatory regime and compliance mechanisms to sustain expected standards. The emphasis on building construction with very little attention to planning, implementation and enforcement among the stakeholders can be regarded as tantamount to impropriety (Davidson *et al* , 2003). The responsibility for building plan approval rests with the department of urban planning at the Federal, State and Municipal levels in Nigeria, while the execution, supervision and management of the operational process for implementation rests within the development control department; who enforce the implementation and ensure that the professionals and owner comply with building code provisions (NBC, 2006). However, the enforcement; once it is adopted provides an opportunity for training regarding the required skills and new technology for enforcement, implementation and compliance encompassing all stakeholders in the house building construction process (Olusola *et al* , 2011).

This paper reports details from previous studies to identify and establish the key factors preventing the implementation of the Nigeria BC to structural aspects of house building construction in the Lokoja municipality, Nigeria. Various studies have outlined different factors affecting the implementation of structural aspects of Nigeria BCs such as lack of enactment (Obiegbu , 2008), poor leadership, lack of political will, poor implementation practices,(Fagbele, 2010), lack of code reference standard, lack of

BC awareness (Dauda *et al*, 2012), insufficient implementation and approval of building development processes, insufficient public dialogue and lack of innovative technology (Olagunju *et*

al , 2013; Olusola *et al*, 2011). These studies have concluded that in order to overcome the challenges affecting the implementation of BC, the casual factors must be identified and uprooted to reduce the risks associated with poor house building construction practices. The aim of this paper is to identify and examine key factors that affect the structural aspects of BCs with respect to the casual factors and the subsequent risks to the consumer, professional practice and the house building industry in support of prior research findings.

2. BC features and their regulatory problems

The BCs have different components that work together to ensure a building's safety, benefits, welfare convenience to all persons involved in building processes (CASA, 2012). Al-Fahad (2012) stated that the Productivity Commission (2004) presented the four aspects of BCs (see also NBC, 2006; Act, 2013: p.21; ICC, 2006; 2009): legislative (legal aspects of building rules and regulations), social (deals with the relationship of the people with respect to the code and the building environment), administrative (deals with BC administration and the discharge of its functions in any country) and technical (deals with technical requirements for pre-design, design, construction and post construction). With these features, clarifying any part of a problem that might arise can easily be achieved. These features are inter-connected; relating different features of the BC with associated problems that must be collectively resolved for improved implementation.

The Building Control requirements within Nigeria lie at the centre of an idea or discussion surrounded by a multitude of problems. The individual legal, administrative, technical and social problems affect the functionality of the BC. All problems are in a circle, indicating that all problems affect each other. To eradicate the BC problems, the legal, technical, social and administrative problems must be solved simultaneously, to not pollute the central idea of its basic objectives through their correspondences.

3. Structural Aspects of house Building Construction Process

In current building practises within Lokoja municipality, the structural aspects of house building construction involve the following stages: from building design for approval by urban planning department to building construction to the monitoring and inspection by the development control department. Table 1 presents typical development planning permit procedures for building structural aspects approval within Nigeria.

Table 1: A summary of the building approval process within Nigeria

S/no	Approval process	S/no	Approval process
1	Submission of building plans and supporting documents	6	Charting of development plans into relevant plots to check if within the layout plans of the government information data
2	Initial scrutiny of the basic design and documentation requirements	7	Township, processing and endorsement of the plans
3	Registration of the plans for approval and inspection with receipt attached	8	Collection by the person that submitted the plans
4	Inspection of the site by development control to write a report based on standard regulation	9	Monitoring post approval
5	Payment of approval processing fees to further enhance the treatment of plans	10	Penalty for the contravention of approval process

Source: Building development control offices, December (2014)

The supporting documents to be attached to the complete set of building plans include: Environmental Impact Assessment report (for factory or industrial buildings), Site Analysis Report for all building plans, and Letter of Attestation²⁵. The letter must include the name; professional qualification (must be member of Council of Registered Builder of Nigeria (CORBON) or Council for the Regulation of Engineering in Nigeria (COREN), a photocopy of the certificates, residential address and functional telephone numbers of the builders.

3.1 Regulatory Enforcement Monitoring in the Current House Building

Construction Process

²⁵ Implementation policy started in 2011 by the Development Control Abuja and Lagos State for builders and engineers involved in the erection of multi-storey buildings, as a result of incessant collapse of buildings

Olaitan and Yakubu (2013) reported a field survey for developing areas of Lokoja. They presented a damming report on the regulatory failure and non-compliance practises of the building code provision. The survey is summarised as in table 2 below.

Table 2:A summary of Building regulatory failure & non- compliance practices

Building type	No. of houses observed	No. of building approval obtained	No. of visits by Development Control during construction	No. of architects, builders and engineers involved	Drainage provision	Road setback allowed	Total
Storey buildings							
BOldPQrts	5	1	0	1	2	1	10
GDM	5	2	0	2	1	0	10
Z8	7	2	0	0	0	5	13
Felele	15	4	0	2	1	2	24
Bungalows							
BOldPQrts	30	5	0	2	1	3	41
GDM	25	3	0	0	1	4	33
Z8	20	4	0	0	0	9	33
Felele	60	7	0	3	0	2	72
Total	167	28	0	10	6	26	237

Source: Adapted and modified from Olaitan and Yakubu , (2013: p.145)

Where: BOldPQrts=Back of old poly quarters, GDM=Gadumo, Z8=Zone 8

The study presented in Table 2 observed 167 buildings, of which, 28 buildings obtained approval, representing 16%. Ten had at least one professional, amounting 0.59%, and 0.0% of site visits were recoded for enforcement indicating a total regulatory failure of enforcement

3.2 Recorded Cases of Structural Building Failure

The figure below illustrates an example of recorded cases of building failure across the country. Bayo (1995, cited by Tanko et al, 2013), Kingsley (2010), Abimbola and James (2012) and author recorded a total of 63 structural building collapse: three cases from 1976–1978, 19 cases from 1982–1995, and 42 cases from 2000 to 16 September 2014 in Nigeria. There have been 742 recorded deaths, 96 injuries and 63 building failures. Fagbenle and Oluwunmi (2010) argued that professionals and nonprofessionals undermined the regulation of BCs for structural buildings because of inadequate legislation and unaccountability in the industry. The study recommended the life imprisonment as the minimum punishment for those involved in any building collapse.

4. Key Factors Affecting the Implementation of BC Structural Element Provisions

The body of literature reviewed presented various factors that impede the implementation of the structural aspects of the building code provision. These factors include a lack of awareness of the NBC and a lack of legal framework. Dauda *et al* (2012) argued that the lack of awareness among the populace reduces the degree of compliance with the required regulations. The more people are aware of the existence of these regulations within their municipality the better; their awareness partly determines the extent to which people will comply with the regulations. Further, Dauda *et al* (2012) stressed that lack of legal framework makes legislative support difficult. Another key factor is uncontrolled urban growth. Abubakari and Romanus (2011) observed that urban growth was not adequately controlled due to the rapid, chaotic growth of cities during a rapid period of industrial development as witnessed in counties such as Nigeria. There was a massive exodus of migration to the cities in search of greener pastures, which created squatter settlements and informal sector activities that continued to grow because of implementation problems (Wafula, 2012). The increased urban pressure on buildings and facilities is due to a lack of government unplanned urbanisation in line with urban growth.

The majority of urban centres in developing countries are not planned, and where plans exist, enforcement is absent (Kimani & Musungu, 2010). An inadequate implementation process and manpower for enforcement is another key factor identified in reviews. Berrisford (2010) showed that unclear implementation procedures for structural aspects of buildings and inadequate technical manpower within the local authority to enforce implementation of building development were a

serious challenge in African cities (Berrisford, 2010). The study observed that the local council had neither clear standards for implementing each of the structural aspects of the code provisions nor the technical expertise in the areas of building health inspectors. Absence of approved standards and laxity in the approval process also discourage developers to submit their drawings for approval and start development immediately without worrying about consequences of their actions. If the approval process can be hastened, barriers to the implementation of building regulations will be eliminated (Berrisford, 2010).

Lack of government directive and promotion is also identified as key factor hindering the development and implementation of the structural aspects of the BCs provisions in Lokoja Municipality. The development policies in developing countries have been characterised by failures as a result of bureaucratic decisions, delays, poor specialised bodies, ineffective local institutions and staff, lack of institutional framework for development planning and the lack of or inadequate participation by the beneficiary population, as cited in many African countries – Botswana, Kenya, Zambia, Zimbabwe, Tanzania and Nigeria (Berrisford, 2010). The federal government's concentration of power has left local governments with no experts to drive policy formulation and implementation in an effective direction (Berrisford, 2010). Political Interference or lack of political will at all levels is also cited as another factor hindering the further development and implementation of building code provisions. Obiegbo confirmed that the government, both central and local council, lack commitment to building regulations, which has clearly been seen in the case of Nigeria's BCs, which have come before the national assembly for decades without legal backing. In the opinion of Nyangweso, (2007), a high professional fee is also identified as a constraint to implementation. On average, each professional charges 3–15% of the total cost of house construction as professional fees. Land within a developing area (like Lokoja) costs N800, 000 (£2,858.01) for 450.00 m² of land. Such high costs may discourage developers to involve professional in the development of house building construction, thereby increasing the risk of building collapse much further (Berrisford, 2010).

Other factors that impede the development and implementation of BCs in developing countries are as follows; absence of a national building safety strategy, out-dated and incomplete building legislation, lack of data regarding the country's building market and legislation requirements in both the public and private sectors, weak private-sector technological capability due to a shortage of adequately trained staff, out-dated bylaws, quality control and safety systems, inability to enforce building control and development Initiatives and underfunded regulatory agencies lacking skilled staff and other necessary resources, resulting in inadequate inspection, monitoring and certification capabilities (Fundi et al, 2011; Kimani & Musungu, 2010).

4.1 Causal Factors/Impact Risk of Non-Implementation of BC Provisions

A number of studies have identified casual factors associated with the poor implementation of building code provisions within Nigeria as a whole. For instance, Ayedun et al (2012) and Oyinola (2011) agreed that corruption at different levels of political leadership and amongst stakeholders impedes the implementation of standards in Nigeria. Corruption in Nigeria, as presented by the authors, comes in different dimensions: lack of quality education for children, election manipulation by money and bribery, and backdoor business decided in one man's sitting room to steal public resources (Transparency International, 2013). The Civil Society Organisations Report (2008), Transparency International (2013), Ayedun et al (2012), Oyinola (2011) and others attributed the following reasons to corruption in Nigeria:

- Weak government corruption fighting institutions.
- Lack of access to public information.
- Pre-bargaining and negotiation.
- A low record of punitive punishment for corrupt officials.
- Insincerity of government.
- Insecurity of informants.
- Systemic disorder.
- Poverty.
- Nepotism

Lack of professional involvement in house building construction is another causal factor that impedes implementation. Omeife and Windapo (2013) argued that a lack of professional participation in house building construction affects the implementation of standards, thereby causing building collapse. Hence, Agapiou *et al* (1998), therefore, called for greater efforts to enhance the collaboration and coordination of all stakeholders working towards better housing for all. Professional rivalry and mutual suspicious are also causal factors. Agapiou *et al* (1998) upheld that stakeholders should develop cordial relationships for the interest of clients and projects, and denounce the current practises of opponent attacks, which exist in the construction industry. The study suggested that there should be an interest in making the relationships work to achieve the desired goals among stakeholders, recognizing that cordial working relationships may not be free from constraints, but closer ties among stakeholders in closing the existing gaps and wastages will go a long way in overcoming the obstacles to create trust and to reduce the cost of construction. The study highlighted some key factors for 'effective partnership relationships', such as "Compatibility among stakeholder, each stakeholder norms of practices, High degree of internal trust, Robust team building, Genuine openness towards those outside the partnership" Agapiou *et al* (1998: p.359). Another causal factor that impedes the implementation of structural aspects of house building is inadequate capacity building. Dixit (2008) stated that implementing BCs could be easy through capacity building by training all management, professionals, and artisans/tradesmen (etc.) to develop control. The risks associated with non-implementation of the BCs due to causal factors were incessant collapse of structural aspects of buildings, loss of investors in the sector, unplanned cities, and non-professionals in the industry, substandard building materials, and congestion of houses, blockages of drainages and roads, and environmental pollution.

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4.2 Strategies to Improve the Implementation of BC Provisions within Nigeria

Many authors have supported different models that could ease the implementation process among various stakeholders, including Pinder *et al* (2013) who stated that, if more adaptable buildings were constructed in terms of standard regulations, cost considerations and cultural considerations, the change in the mind set of stakeholders would help resolve a key issue through his model, the Virtuous Circle to Curb the Circle of Blame (Pinder *et al* , 2013). The model posits that government policies and regulations have a greater influence on the mind-sets of the people concerning choices of buildings. However, few studies have modelled how the regulatory enforcement design can be complied with effectively to balance the interests of all stakeholders. Compliance to Building Code requirements is fraught with difficulties if construction firms, Central and Local Government lack

effective expertise to comply with regulatory requirements. The lack of expertise necessitates the need for a top-down approach to raise awareness amongst the multitude of professionals involved in the house building process, as well as artisans/tradesmen, house owners and the general public (Surya 2008), coupled with strengthening of the role & capacity of local government officials, academic institutions and NGOs in the implementation process. Agapiou (1998) highlighted the significance of capacity building through training and development of personnel, which would invariably enhance the implementation process of the structural aspects of BCs in the house building construction industry (see also Dixit, 2008). Agapiou (1998) stated that more emphasis should be on performance criteria for training instead of merely showing the syllabus to be covered and assessing the trainer. The trainer must design qualifications in line with the statement of competence via valid assessment of work performance. They must also monitor the inspectors, evaluate and verify the system for a successful implementation of the training programme that has recently began in the house building construction industry in Nigeria.

5. Conclusions

What this paper aimed to achieve was to identify and examine key factors that constrain the development and implementation of BCs. It was observed that the structural aspects of the BC were not being implemented as a result of policy (administrative) and legislative failures from government agencies at all levels. These failures adversely affected the implementation of the technical features by the various professionals involved in the building construction process and, therefore, created lapses in the publicity of the BC. These were blamed on causal factors that

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significantly increased building risks over time. It can be stated that the administrative features of BC policies are critically important to the development and implementation of BCs, and impact significantly government enforcement agencies (town planning boards, development control, etc.), professionals implementing technical features into their practices and others complying with the standards. If the key factors that affect the development and implementation of BCs must be eliminated, an effective policy design framework must be put into place to uproot and break the causal factor's shark-like teeth that grip the key factors. This paper suggested strongly that, taking into account the identified key and causal factors, an effective policy development and detailed implementation framework design showing what to do, who will do it, when it has to be done, how it should be done and time taken amongst the stakeholders would drastically reduce the impact risks on the industry and help solve the problem of non-implementation of the BC and incessant collapse

of buildings. This paper has clearly presented a solution involving stakeholders' mind set change, partnership and collaborative working relationships, and mutual trust building to ease the implementation process and capacity building of stakeholders. The findings of this paper has identified that; systemic disorder including; high level of national corruption, professional rivalry/vested interest, inadequate capacity building amongst the stakeholder's through bureaucratic process impede the development and implementation of structural aspects of BC within the house construction sector in Lokoja Municipality, Nigeria.

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Determinants of non-compliance with Structural Building code standards in Nigeria.

(Article in progress for publication)

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Abstract

This paper reports a cross-sectional study which uses empirical analyses to examine determinants of non-compliance with structural building codes within Nigeria. The study targets professionals and other relevant stakeholders in building development projects, and data were collected using stratified sampling and through the administration of 600 paper-based questionnaires and by conducting semi-structured face-to-face interviews with key staff members, structured around the key factors and causal factors which impede standards implementation's development, professional practice and consumers identified from earlier research of (Yakubu and Agapiou 2016). A total of 378 valid questionnaires were utilized, representing a valid response rate of 63%. Using SPSS for quantitative analysis and NVivo 10 software as the basis for qualitative analysis, the findings reveal that the administrative related framework was the most influential in leading to non-compliance with building standards in residential projects, followed by the technical framework and to a lesser extent sociological factor, together with a new exploratory approach to enhance compliance. The findings highlight the need to develop credible and acceptable best practices to improve administrative and technical failure aspects of building standards and regulatory compliance in residential development projects in Nigeria, which should encompass monitoring, the continual review of compliance, and training for capacity development for a positive social impact.

Keywords: Accountability, Affordable Housing, Building Regulation, Change Management, Nigeria

Introduction

Windapo and Rotimi (2012) reported that the global construction industry suffers from persistent non-compliance with standards and regulations. Unlike developed nations, which regularly review and update their building standards in order to meet best practice, the construction industry in developing countries pays little respect to regulatory compliance, despite continuous growth and construction of high-rise residential buildings (HRRB) (Dahiru et al., 2011; Nigerian National Bureau of Statistics, 2015).

Mbamali and Okotie (2012) have argued that industry and government stakeholders should stabilise the industry by increasing adherence to regulations, which in turn would attract investors, create employment, and increase the industry's contribution to gross domestic product (GDP) in line with levels seen in developed nations. For example, the Nigerian construction industry's actual contribution to GDP between 2010 and 2011 was 2.88% and 3.05% in 2012 (Nigerian National Bureau of Statistics, 2015).

The compliance process for current HRRB development projects in Nigeria includes design planning approval and inspections, both during and after construction, which are within the administrative, technical, legal and social aspects of the framework of the building code standards and regulations (BCSR) (Yakubu and Agapiou, 2016). Non-compliance with BCSR has been a contributing cause in several cases of structural collapse (Mbamali and Okotie, 2012; Dahiru et al., 2012). Dahiru et al. (2012) stated that non-compliance with BCSR in Nigeria is due to systemic corruption during the approval process, and places the blame on professionals in the construction industry, as well as government officials, emphasising that HRRB projects in Nigeria are characterised by non-compliance with structural BCSR (cited in Yakubu and Agapiou, 2016). The Sarbanes-Oxley Act 2002 (cited in Windapo and Rotimi, 2012) described compliance as conforming to, or being in a process of becoming so, with rules/established guidelines, such as specifications, policy, legislation, standards or law, while Laubscher (2011:29) declared that 'building standards is an official technical reference document, that sets standards for building and construction works through quality, performance, size, measurement criteria and the methodology of operations.' Abdullahi et al. (2013) argued that industries and manufacturers in developing countries have little regard for compliance with standards, even to well-known standards such as ISO 14001 (environmental management system) and ISO 9000 (quality management system). In Nigeria, standards and regulations are not enforced through an established institution, but rather through societal class and individual personalities, which tend to be more influential than institutions, standards and regulations, and the law (Okpala, 1984); furthermore, rules and regulations may be broken by approaching an individual who is well-

placed in society (Okpala, 1984). Oyinola (2011) and Ayedun et al. (2012) cited in (Yakubu and Agapiou 2016) attributed such practice to corruption at different levels of Nigerian leadership, demonstrated in the form of nepotism and systemic disorder to favour the chosen few, and thereby affecting the degree of compliance/alignment to standards and regulations in high-rise residential construction principles in Nigeria

Casa (2012) established that a building code as a document possesses different components that work together to ensure building safety, benefits and welfare, as well as providing convenience to all persons related to the building process. These components include administrative, legislative, technical and social aspects. Al-Fahad (2012) stressed that the legislative aspect deals with the legality of building rules and regulations, while the social aspect deals with relationships between people with respect to the code and the built environment, the administrative aspect deals with BC administration and the discharge of its functions in any country, and finally, the technical aspect deals with the technical requirements for pre-design, design, construction and the post-construction stages of building.

Ayedun et al. (2012), Olagunju et al. (2013) and Olusola et al. (2011) have all noted that building development projects in Nigeria do not fully comply with structural BCSR. This study investigates earlier findings of key and causal factors affecting the implementation of structural aspects of the Nigerian building code, which was drawn on contextual analysis and international experience by (Yakubu and Agapiou, 2016). This paper is an empirical/exploratory study, prompted by evidence of non-compliance with BCSR in HRRB projects by Yakubu and Agapiou (2016), and aims to examine determinants of non-compliance with structural BCSR for such development projects in Nigeria within the context framework of the administrative, technical, legal, and sociological aspects of non-compliance. The outcome of this study will assist in the development of a policy framework for standards and regulatory requirements for a structural building code for Nigerian HRRB projects of early findings of Yakubu and Agapiou (2016).

Non-Compliance with Building Standards and Regulations in High-Rise Residential Buildings

The causes and effects of non-compliance with building regulations vary between countries and from state to state. For example, in Kuwait, Al-Fahad (2012) cited in (Yakubu and Agapiou 2016) established that the administrative system and technical and social factors, are the major challenges to non-compliance faced by the building industry, and this results in unauthorised buildings, the illegal conversion of buildings, street conversions to refuse dumps, and sub-standard houses, especially for middle and low-income earners. Sharkheyli et al. (2012) argued that non-compliance

varies according to the general context of the social, economic, cultural, and legal framework, together with the quality of the urban and environmental conditions of the affected areas. Similarly, Arimah and Adeagbo (2000) have suggested that the extent to which stakeholders in Nigeria are aware of existing standards and regulations largely determines the extent of their compliance. Although the constructors of high, medium and low quality buildings may exhibit a significant response with regards to awareness, this does not necessarily translate into compliance in terms of air-space, occupancy ratio, zoning, or over development of plots, resulting in poor circulation, inadequate space, and overcrowding in low and medium income areas. According to Arimah and Adeagbo (2000) and Alnsour and Meaton (2009), non-compliance is mostly by poor and illiterate people due to their low quality of life.

Arimah and Adeagbo (2000) further opined that factors affecting non-compliance can be categorised as institutional (regulations and standards), administrative and public. The content and intent of the set regulations and standards are not in compliance with socioeconomic characteristics, culture and values of the public, because they are outdated, foreign, rigid and restrictive. With regards to the administrative factor, inter-agency co-ordination for effective implementation is lacking in the relevant agencies.

Other plausible reasons have been provided for non-compliance with structural BCSR in Nigeria, which draw upon contextual analysis and international experience, including ignorance of the law. Windapo and Rotimi (2012) (cited in Yakubu and Agapiou, 2016). argued that the majority of low and medium income earners undertaking developments in satellite communities are ignorant of the requirements of the building regulations in Nigeria. Corruption, due to systemic and leadership disorders, is another significant contributing factor to non-compliance (Ayedun et al., 2012), together with a lack of professional participation in the development of HRRB projects in Nigeria (Omeife and Windapo, 2013), professional rivalry and mutual suspicion, a lack of technical knowledge, and an inadequate capacity to train construction site workers (Agapiou, 1998). Training has been shown to enhance skills in new technology and result in changes to professional practice (Dixit, 2008) all cited in (Yakubu and Agapiou, 2016).

Evidence of Non-Compliance with Building Standards and Regulations

It is obvious that non-compliance with BCSR is not limited to Nigeria and also occurs globally, as the literature reports cases of non-compliance in countries including Scotland, Canada, Kenya, South Africa and Ghana.

Laubscher (2011:40) noted that in South Africa there was the problem of code 'uniformity' and the promise by the government to review the code every five years was not upheld in either 2000 or 2005 following the publication of the revisions in 1991. However, in 2008, Notice NO. R.574 was published in the Government Gazette and Laubscher (2011:40) noted that the '1st October, 2008 (Government Gazette No. 31084, 30 May, 2008:45-68) marks the operational of the National Building Regulations (NBR) and Building Standards Act (103, 1977), which was declared by the honourable minister of trade & industry' (see also Wafula and Talukhaba, 2011).

Sanewu et al. (2011) described that the short-comings of Kenyan building regulations date back to colonial-era irregularities, a lack of modern requirements in the building code, and the absence of non-accountable parties when a building collapses. These factors compelled the country to review the existing code in 2009 (see also Kimani and Musungu, 2010).

The CASA Association (2012) reported that on the 22nd May 2012 Ghana initiated a forum for construction professionals to review their building code with respect to climate change, disaster risk reduction, and sustainable growth development. Having discovered that the building code lacked international best practices for green architecture, environmental quality, energy efficiency, and disaster risk reduction, the forum aimed to incorporate these into the Ghana building code. This was followed by the provision of administrative guidelines for the prudent governance process, efficient management of the guidelines for compliance, and the provision of a communication roadmap for public ownership of the Ghana building code (CASA Association, 2012).

Baiche et al. (2006) described how in 1990 and 2000, the Canada Mortgage and Housing Corporation and the Ontario Home Warranty Program undertook a survey to evaluate the cause of 44 building failures and to document the extent of these failures in order to identify the key underlying factors.

In Scotland, the Building Standard System, which is administered and enforced by local authorities, is responsible for some limitations aimed at protecting public interest and the discharging of duties, such as preparing the building regulations and associated guidelines, providing views on compliance to assist verifiers (currently local authorities) in decision-making, granting the relaxation of regulations in exceptional cases, maintaining a register of approved certifiers, monitoring and auditing the certification system and the performance of verifiers, and verifying Crown building work. This has led to the establishment of the Scottish Building Standards Agency, which was created as part of an implementation approach in June 2004 and then as a directorate in April 2008 for the Built Environment, which combines architecture policy, building standards and planning. The Scotland Building Standard division, which acts on behalf of Scottish Ministers, helps to facilitate the

functions of the Scotland Building Standards through compliance with building regulations (Building (Scotland) Act, 2003).

However, in Nigeria the problem of non-compliance can be observed due to the visible contributing factors concerned with a lack of legislative backing for building standards and regulations, inadequate awareness, corrupt leadership, and poor implementation and enforcement processes (Dahiru, et al., 2012; Olagunju et al., 2013; Olusola et al., 2011; Omeife and Windapo, 2013). For example, Olaitan and Yakubu (2013) presented a regulatory enforcement failure and non-compliance practices for the building code provision in Nigeria after assessing 167 buildings, only 28 of which (16%) had obtained approval, 10 had at least one professional (0.59%), and none of the site visits were recorded for enforcement, indicating a total regulatory failure of enforcement.

Further evidence of enforcement and compliance failure is the overwhelming number of recorded cases of building collapse across major cities in Nigeria. In total, there have been 63 structural building collapses: three cases from 1976–1978, 19 from 1982–1995, and 42 from 2000 to 16 September 2014; resulting in 742 recorded deaths and 96 injuries (Tanko et al., 2013, citing Bayo, 1995; Ayedun et al., 2012; Olagunju et al., 2013, Windapo and Rotimi, 2012, all cited in Yakubu, and Agapiou, 2016). Fagbenle and Oluwunmi (2010) argued that these failures were the result of professionals and non-professionals undermining the regulation of the building code for structural building development projects due to inadequate legislation and unaccountability in the industry.

Potential Solutions to the Problem

Various useful suggestions for potential solutions to the problem of non-compliance to BCSR in Nigeria have been made. Fagbenle and Oluwunmi (2010) suggested the life imprisonment if found guilty of any professionals or non-professionals, whilst other relevant stakeholders have suggested legislative enactment of the building code, monitory and evaluations of building development projects by professional bodies, empowerment of enforcement agencies, the introduction of an independent regulatory body, the insurance of building projects, the introduction of forensic analysis to aid in assessing the actual causes of failure, skills training, and continuous professional development (Olagunju et al., 2013; Ayedun et al., 2012; Dahiru et al., 2012; Tanko et al., 2013).

Objectives

This study explores the determinants of non-compliance with structural BCSR in HRRB development projects within the context framework of administrative, technical, legal, and sociological aspects of the structural provisions of the BCSR in Nigeria. Twenty-one indicators of key factors and causal factors which impede enforcement and compliance with impact risks associated with industry

development, professional practice and consumers identified by professionals and other relevant stakeholders, and from contextual analysis in the building construction industry in the previous research of (Yakubu and Agapiou 2016), were investigated empirically and exploratory. Individual indicators or groups of factors relating to a particular context framework of the BCSR that generally lead to non-compliance were assessed using exploratory factor analysis (EFA) by maximum likelihood estimation (MLE) to remove data redundancy and to reveal the underlying pattern of the causality relationship. The study also examines the strengths and associations of the causes to non-compliance indicators, and the relative effects of each indicator within and across other factors. One factor and structural equation modelling (SEM) is performed to predict direct and indirect outcomes of non-compliance empirically. Furthermore, an exploratory study of non-compliance with the structural provisions of the BCSR was also used to investigate interview data through inductive and deductive reasoning. Deductive reasoning uses the context of legal, administrative, technical, and social aspects of the BCSR as a scale to plot compliance practices of HRRB projects and inductive reasoning is used as an appropriating approach to improve compliance and the enforcement of standards in high-rise development projects in Nigeria.

Conceptual model of non-compliance factors

Figure 1 depicts a summary of the conceptual model of non-compliance indicators within the administrative, technical and sociological framework one factor confirmatory factor analysis (CFA) statistical test.

INSERT FIGURE1 HERE

Research Methodology

Data Collection

This paper is a cross-sectional research study which uses both a questionnaire and semi-structured interview research design to describe the nature of the existing conditions for subsequent analysis and discussion. This type of study was chosen because the researcher was interested in connecting with individual professionals, industry participants, and government officials in different Nigerian states within a particular time period. It also facilitated communication with a wide range of stakeholders in the Nigerian construction industry. In addition, other research, for example Migosi et al. (2013), has also used this approach to investigate similar issues.

Stratified random sampling was used to distribute a questionnaire to individuals who differed in terms of their professional discipline, gender, years of experience, professional position, and

academic qualifications. This was to ensure that a wide range of views were represented and to avoid any potential selection bias, as argued by Randolph and Myers (2013). In total, 600 paper-based structured questionnaires were self-administered in the study, targeting stakeholders in the development of HRRB development projects in Nigeria. The dataset of respondents includes: architects (55), builders²⁶ (65), engineers (structural and civil) (60), urban planners (70), quantity surveyors (20), land/GI surveyors (15), academics (35), development control professionals (75), legislators²⁷ (10), contractors²⁸ (65), industry participants (20), artisans (25), estate valuers (20), insurance brokers (10), professional bodies (20), members of standard organisations of Nigeria (10), union/NGOs (10) and facility/construction managers (25). Of the 600 questionnaires distributed, 426 were returned, representing a 70% response rate; 48 were deemed to be invalid for not providing complete information for appropriate categorisation into professional discipline, and some did not report their academic qualification, years of experience, or gender, which meant that the number of valid responses used in the analysis was 378, representing 63%.

Questionnaire Design

The questionnaire was the main instrument used for empirical data collection and consists of respondents' demographic data, including their age, sex, educational qualifications, professional discipline, and the number of years they have worked in the building construction industry in Nigeria. Twenty-one primary variable indicators were assessed, including corruption, capacity building, employment/financial strength (financial capacity), professional rivalry, professional vested interests, technological expertise (specialisation and technical know-how), professional involvement in decision-making, human rights, public opinion, incessant collapse of buildings, loss of investors, and entry of non-professionals to the industry. Others were death from building failures, destruction of houses, unplanned cities, the implementation process, political will/interest, approved standards, awareness, and leadership and legislation which were identified as factors affecting implementation and compliance by (Yakubu and Agapiou, 2016). A CFA statistical test from the conceptual model was employed and all the factors were rated on a five-point frequency scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The Likert-point frequency scale measured these variables relating to how to they impede implementation, enforcement, and compliance with structural aspects of BCSR within HRRB development projects. An additional section was added in which

²⁶ Academically trained and professionally certified person(s) responsible for the erection, execution and supervision of the work of artisans and tradesmen in the construction of buildings in accordance to building drawings in Nigeria.

²⁷ Responsible for the enactment of BCSR in Nigeria.

²⁸ An individual or company that provides materials or labour to the government, an individual or another company, as a contract in building construction practice in Nigeria.

respondents were asked to suggest potential solutions to these problems. The approach to structuring the self-administered questionnaires was a drop-and-pick method, where respondents were allowed a week to complete it at their own convenience.

Interview Design

This research interview was designed via the coding of questions focusing on the four core aspects of this research, including the level of enforcement of structural aspects of BCSR, key factors affecting the development and implementation of structural aspects of BCSR and implementation, and the causal factors which impede the implementation and the impact risks associated with non-compliance to the industry, consumer and professional practices. The selection of industries employed a purposive sampling approach to allow well-known practicing industries in HRRB projects, government developmental projects and private developmental projects in some cities in Abuja, Lagos, Port-Harcourt and Lokoja, in order to gain from their wealth of experience. Nine industries were identified and interviews were held with 15 key staff members, who had different professional disciplines, including structural engineers, heads of building departments, site managers, architects, quantity surveyors, and builders and project site supervisors.

The approach adopted when conducting the interviews was the question and answer approach, whereby the researcher asked guiding questions and allowed the interviewees to respond whilst the researcher recorded their answers using a stereo 8GB recorder with the prior knowledge of the interviewees. The recorded data was uploaded into Nvivo 10 software for transcribing with constant re-uploading into the software for comparison. This process was repeated many times in order to reduce the blocks of data to subthemes and major themes or key words in line with the research question as an athenatic network.

Data Analysis

Empirical Analysis of the Questionnaire

The data were processed into numerical codes and entered into a pre-designed data entry spreadsheet in SPSS 23. Missing values were managed by excluding from the cases pairwise. The data analysis, also carried out using SPSS 23, generated descriptive statistics, such as frequencies for categorical variables to determine how many people provided each response (e.g. number of males or females) and the mean, median and standard deviation for continuous variables, which provides a basic summary of the descriptive statistics. EFA was then employed to extract the most influential factors after rotation and removal of redundant variables, by looking for groups among the inter-correlations of a set of variables. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy

recommends a value of 0.5 and above in order for a data set to be suitable for factor analysis, and the Bartlett's test of sphericity value has to be significant at 0.05 or less for suitability (Kaiser, 1970, 1974; Bartlett, 1954, cited in Williams et al., 2010; Pallant, 2013). The factors were reduced using the MLE method with an initial eigenvalue of 1 and more. Many checks were employed for the reduction in addition to the eigenvalues, including a total variance explained table, a scree plot, pattern matrix, and structure matrix. The rotation method for the extracted variables was Oblimin with Kaiser Normalisation rotation. The factor correlation matrix indicates the strength and associations of the variable items, and the factors and regression analysis was employed to determine the relative cause and effects across others factors, assuming a constant variance regression line and an underlying linear relationship between the observed and unobserved (latent trait) variable factors.

This study's empirical analysis is based on the following null-hypothesis:

H₀: Non-compliance to structural BC standards and regulations structural provisions in HRRB is constrained by the systemic failure of technical, sociological and administrative governance.

Exploratory Analysis of the Interview Data

This study adopts different approaches and contexts when analysing the interview data. Key words and the main themes of this research were identified by content analysis and discourse, and by examining the way actual words were used during the interview, whilst relational analysis was used to identify concepts of the interview, to explore any existing relationships between the concepts of the interview and the context of the research framework of legal, technical, administrative and sociological aspects, as argued by Creswell and Gary in order to determine some common ground as an acceptable approach for deductive/inductive reasoning. These approaches guided this study in the analysis of the interviews by creating nodes for coding using the manual research based theme created as a guide for the nodes. This involves using an inductive approach to break up the interviews into useful blocks of data consisting of words, phrases, sentences or paragraphs, as proposed by Cresswell (2003) and Gary (2013). The researcher then makes lists of all the codes and looks for similar codes to reduce the long list of compliance issues. At this point the researcher compared the codes generated from the interviews via constant comparisons in order to match all similar codes and then generated a single list of nodes which were used for classification cluster analysis of the interviews.

Empirical Questionnaire Results

Sample

This section describes the characteristics of the sample before presenting the results of the analysis. A total of 378 valid questionnaires were returned, representing a response rate of 63%. Table 1 shows the demographic characteristics of the sample respondents. The highest response rate (modal age) age group was 41-50 at 36.5% with a standard deviation of 1.05, followed by the 31-40 age group at 28.6%, while a response rate of 17.7% was recorded for the 51-60 age group, and 1.6% for the age group 18-20²⁹ years; the cumulative age response was 97.4%. This indicates the concern of the active and vibrant professionals' modal age group for non-compliance with structural aspects of the building code in the industry. The building construction industry in Nigeria is seen as a male dominated profession, and this was reflected in the sex distribution of the respondents, with 77% male and 23% female. The modal educational qualification was a Bachelor's degree with a 48.1% response rate and a standard deviation of 1.39, followed by a Higher National Diploma (HND) at 20.8%, and a Master's degree at 19.3%. This examination of the responses was to facilitate the identification of influential factors in the analysis leading to non-compliance. Industry professionals and other relevant stakeholders are interested in solving the problem of non-compliance in the industry, as shown by their response rate of 68.8%.

INSERT TABLE 1 HERE

Table 2 is a summary of the non-parametric descriptive statistics for the indication of the spread or dispersion of the scores using an inter-quartile range (IQR) which does not assume a normal distribution. The age variable indicates a Md=4.0 (IQR:3,4), sex indicates a Md=1 (IQR:1,1), educational qualification shows a Md=5 (IQR:3,5), professional discipline indicates a Md=1 (IQR:1,2) and years of experience indicates a Md=3 (IQR:2,3), for the sample characteristics respectively.

INSERT TABLE 2 HERE

Variable Indicators

To understand how the measurements of the indicators are spread out from the average (mean) or expected value, Table 3 describes and summarises the characteristics of the indicators using descriptive statistics. The results show high standard deviations of 0.54 to 0.96 and mean values of 2.0 to 4.60 for the factor indicators.

INSERT TABLE 3 HERE

Most Influential Factor Leading to Non-Compliance

²⁹ Graduating to practice building construction at the age of 18-20 is rarely possible in Nigeria; the six respondents represent individuals serving as contractors.

To determine the most influential indicators leading to non-compliance with building regulations in HRRB projects, data sampling adequacy and Bartlett's test of significance were conducted, and for this research data the KMO value is 0.923 and the Bartlett's test is significant ($P=0.000$), indicating that factor analysis is appropriate to help explore and determine the most influential factors leading to non-compliance with building regulations. Communalities explain the high values of variance at > 0.60 to 0.9 for the indicators.

Eight indicators meet the Kaiser criterion with initial eigenvalues of 1 or more and were extracted as explained with the total variance shown in Table 4. Before rotation, 100% is explored using 21 indicators, and after rotation, 67% is explored by 8 factors.

INSERT TABLE 4 HERE

Further checks for factor indicator extraction, including the use of a scree plot which indicates a clear break from the extracted factors 1 to 8, indicating that these factors capture much more information than the remainder.

Another check leading to the determination of the most influential factor indicators of non-compliance was factor loading of the pattern matrix using MLE methods and oblimin with the Kaiser Normalisation rotation method, as shown in Table 5. The factor loadings of each variable indicate strong (highest) loading of the following items: factor 1, professional vested interest at 0.66, and professional involvement in decision-making (PIDM) at 0.81, and professional rivalry at 0.72. Factor 2 highest loading indicates 0.69 and 0.78 for approved standards, and employment/financial strength, respectively, and capacity building at 0.81, technological expertise at 0.72 are on factor 3, whilst political interest at 0.57 and corruption at 0.84 are on factor 8. Each factor can be labelled as it relates to the context framework of this study; factor 1 relates to the administrative framework of the study, factor 2 relates to administrative/sociological context of this research, and factor 3 indicates the technical framework, whilst factor 8 indicates the administrative governance factor.

INSERT TABLE 5 HERE

The structure matrix presented in Table 6 shows the correlation between variables and factors. The variable item of capacity building indicates the highest factor correlation (FC) of 0.99 in factor 1, while factor 2 shows the FC of human rights and the incessant collapse of buildings at both -0.99. Factor 3 indicates 0.96 for professional rivalry, while the highest FC is professional vested interest for factor 4. In factor 5, the correlation between the factor and the variable items indicates respect for public opinion as the highest at 0.93 and for factor 6 the highest FC indicates corruption at 0.97. Factor 7 indicates professional involvement in building decision-making as being the highest FC at

0.98 and factor 8 shows technological expertise has a FC of 0.94. In identifying the related research context framework, factor 1 relates to technical framework, factor 2 indicates the technical and sociological frameworks, factors 3 and 4 both indicate the administrative related framework, factor 5 relates to the sociological context framework, factors 6 and 7 both relate to the administrative framework, and factor 8 to the technical framework. Both factor 2 (sociological framework) and factor 5 (sociological framework) show a negative correlation impact on most items from other factors of the administrative and technical framework.

INSERT TABLE 6 HERE

One Factor Measurement Model Confirmatory Analysis

A dependent variable implementation and enforcement for compliance to structural BCSR in HRRB projects is manifested (predicted) by 19 directly observed variables. Figure 2 indicates a one factor model of CFA, with standardised high factor loading as the best indicator value and poor factor loading as a suggestion indicating other factors in the group. Capacity building indicates the best loading at 0.96, professional involvement in decision making 0.92, professional rivalry has standardised factor loading at 0.86, and respect for public opinion, human right, and public dialogue indicates factor loading of 0.79, 0.92 and 0.86, respectively, while environmental pollution and disease has the lowest factor loading of 0.48, suggesting different group effects in the implementation and enforcement of compliance to structural BCSR in HRRB projects in Nigeria.

INSERT FIGURE 2 HERE

Underlying Pattern and the Strength and Association of the Most Influential Factors Relationship

To address the research hypothesis, the pattern of the most influential factor indicator relationships leading to non-compliance after rotation was investigated, and Table 7 summarises the strength of the relationships between the factors. This is positively and negatively high, at $r = -0.68$ and $r = 0.77$, between the technical, sociological and administrative aspects of the structural BCSR framework, revealing a strong positive and negative correlation relationship between the factors. The relationship between these factors is strong enough to exclude the possibility of sampling error. Therefore this study concludes with the finding that non-compliance with structural BCSR in HRRB in Nigeria is consistently constrained by the systemic failure of administration, technical and sociological aspects of the building code.

INSERT TABLE 7 HERE

Development of a Theoretical Model for the structural equation modelling Analysis

To test the hypothesis a model was developed from the theory as it relates to the research context framework of technical, administrative and sociological aspects, as shown in Figure 3. The test is to establish consistency with the observed data for direct and indirect predictions.

INSERT FIGURE 3

Confirmatory Factor Analysis Structural Equation Modelling Measurement Analysis

The model in Figure 4 indicates the standardised regression coefficients and factor loading (SR) estimates of capacity building at 0.81, squared multiple correlations (SMC) at 0.772 and technological expertise (SR=0.70, SMC=0.652), although employment/financial strength is low (SR=0.43, SMC=0.38), suggesting an unreliable indicator of the technical factor. The sociological factor indicates (SR=0.67, SMC=0.501) for human rights and respect for public opinion (SR=0.58, SMC=0.467), while for the administrative governance factor the results are professional rivalry (SR=0.90, SMC=0.671), professional involvement in decision-making (SR=0.76, SMC=0.601), professional vested interest (SR=0.80, SMC=0.731) and corruption (SR=0.63, SMC=0.468). The correlation between the technical and sociological factors indicates 0.75 and – 0.30 between the administrative governance factor and the sociological factor and the covariance is significant at 1.68 ($p < 0.05$).

The square multiple correlations provide information about how much variance of an observed variable the factor can account for. Similarly, the unobserved variable technical factor standardised weight is 0.64 in relation to non-compliance, and for the sociological factor (SR=0.45) and the administrative governance factor (SR=0.80), with the overall effects of a 0.63 weighting for the three unobserved factors to non-compliance.

INSERT FIGURE 4

The overall model test for goodness appears to fit with the Chi-square χ^2 test and yields statistics of 10.616 and $df = 11$, and a corresponding P-value of 0.564. The hypothesis that the current model is correct can be accepted since the p-value is too high to reject the model, as shown in the text output below.

Computation of degree of freedom (Default model)

Number of distinct sample moments: 38
Number of distinct parameters to be estimated: 27
Degree of freedom (38-27): 11

Results (Default model)

Minimum was achieved
Chi-square = 10.616
Degree of freedom = 11
Probability level = .564

Exploratory Interview Results

Qualitative Cluster Results

This research nodes used for exploratory cluster analysis indicates the results as summarised in Figure 5. These were classified within this research framework (administration and technical) context theory of building code structural provisions implementation and enforcement, and a new concept or theme, which although hard to classify, was labelled economic value by the researcher. This new concept clustered insurance, independent supervisory commission, legislation, and property loss, death and injuries.

INSERT FIGURE 5

Exploratory Interview Analysis Findings

The research interview guidelines were grouped into four focus areas and a fifth to allow for suggestions. This was primarily for data triangulation with the questionnaire (empirical) findings in the subject matter of BCSR in HRRB projects in Nigeria. The emergent subthemes significantly related to the major theme results from the questionnaire survey. For example, the classification analysis indicates rivalry among professionals, professional vested interest and corruption in a single cluster tree.

It is worth noting that corruption, vested interest; decision-making and rivalry also loaded in the EFA after rotation and are related to the administrative aspect of the building standards and regulations. The results also suggest that the technical aspect of the BCSR was second in the quantitative exploratory research analysis.

Critical examination of the four aspects of the BCSR, namely administrative, technical, social and legal aspects, provided a clearer focus through which non-compliance with the structural provision of the BCSR for MRRB projects in Nigeria can be established. Two major aspects which influence the

non-compliance of building code structural provisions are the administrative aspect, followed by the technical aspect, and to a lesser extent the sociological aspect. Similarly, administrative aspects and technical aspects were also found to be a major influence as identified by the interview cluster analysis, and whilst these aspects are not within the research contextual framework they are worthy of further examination. The direct impact of non-compliance to these two aspects of the BCSR is structural building failures and collapse.

Discussion

The findings from the analysis are discussed below in order to produce comprehensive answers to the principal aim of the research within the research framework. The principal aim of this research was to identify and examine the most influential factors leading to non-compliance in HRRB construction practice within the framework of the technical, administrative, legal, and sociological aspects of the 2006 BCSR in Nigeria. These were structured around four research focuses which are key factors, causal factors impeding compliance, impact risks, and the possible framework for building enforcement control.

The original intent of the BCSR was to ensure that building development projects were built to the standards and specification for public health and safety. In addition, they are a tool to promote implementation, enforcement and compliance in the construction of building development projects (Labuscher, 2011; Dahiru, et al., 2012; Dodo, 2014; OECD, 2000; Imrie, 2004).

The findings of this study have revealed that there is an administrative failure, technical failure, and sociological failure in the structural provisions of the BCSR, and also a hard to classify new theme, which also affects compliance with the structural provisions of the BCSR.

Administrative aspect failure of the structural provisions of the building code standards and Regulations

The findings identified contributing factors of both key causal and impact risks, which impede and are associated with the implementation and enforcement of BCSR. Of which, eight factors related to administrative framework failures, including corruption, professional rivalry, leadership, professional involvement in decision-making, professional vested interest, political interest/will, and the implementation process, thereby providing a stronger view of administrative factors contributing to the failure of structural provisions of BCSR for HRRB.

The Civil Society of Nigeria (2008) and Transparency International (2013) have reported that corruption is the cause of systemic disorder and the insincerity of government institutions in Nigeria. UNCAC (2004) has advised periodic evaluation of administrative systems with a focus on determining adequate performance in order to prevent failures that can breed petty and grand corruption, which is capable of destroying an organisation through leadership compromise, personal/professional interest or rivalry, and through a lack of political will to drive accountable policy measures to regulate practices. Oyinola (2011), Ayendun et al. (2012) noted that governance failures at all levels in Nigeria is as a result of corruption which is present deep within every sector. UNDP (2008) advocated the integration of accountability policy measures into national development plans and the establishment of coordinated anticorruption laws and regulations, together with public disclosure to help in reducing governance system failures. This finding indicates that systemic disorder and governance failures, which are the main problem in the structural provisions of standards and regulations failure, can be prevented by observing relevant indicators of corruption (perception-based/experienced-based, proxy indicators, indicators based on single data source and composite and objectives indicators) to ensure that there are adequate administrative procedures for those in public offices deemed prone to corruption, as advised by UNCAC (2004). Similarly, this study's finding of the non-involvement of professionals and professional interest/rivalry in building industry decision-making, creates conflict and an ineffective administrative system. This is supported by Arimah and Adeagbo (2000), and Omeife and Windapo (2013), who have stated that non-compliance and ineffective implementation of the building code is as a result of a lack of professional participation in industry policy-making and a lack of inter-agency coordination of enforcement officials.

Earlier literature detailed how to reduce the impact of conflict between professionals and stakeholders through constructive negotiation, mapping of interests, and prioritisation of stakeholders' interest (Freemen, 1984; Blattberg, 2004; Bourne, 2010, 2006; Boatright; 1994, Scott et al., 2006). The finding that the leadership factor contributes to administrative failures of structural provisions of BCSR indicates incompetency, non-accountability and ineffective practices and procedures of those in public offices. Fagbenle and Oluwunmi (2010) have noted that the unaccountability of leaders makes professionals and other stakeholders undermine the importance of standards and regulations in the building construction industry in Nigeria.

This research has shown that the administrative failure aspect is responsible for the most influential factors leading to non-compliance with BCSR in HRRB projects in Nigeria. This finding indicates that the administrative aspect of building code services provision is inadequate to enhance proper

compliance. It also indicates a lack of proactive and system supportive administrative decisions in the implementation and enforcement process of the structural provisions of the BCSR. The reason for this can be traced to a study by Nijsen et al. (2009) on the concept of compliance by Adam Smith (1966), which is due to the administrative burden problem created and imposed on the industry or on practitioners. Administrators should regularly ask for feedback from all levels of practitioners, with particular attention paid to satisfaction and the fidelity (performance assessment) of the outcome in order to reduce barriers and create enabling environments for vigorous and enthusiastic practices (National Implementation Research Network, 2015). Supportive and proactive administrative systems create enthusiasm which reduces barriers, creates administrative enabling structures for administrators, and encourages satisfaction by regularly asking for feedback on fidelity measures (NIRN, 2015).

Nijsen et al. (2009) stressed that policy makers and regulatory inspectors should clearly illustrate how administrative systems can be responsible for promoting quality and compliance. Their study further stresses that the reporting and monitoring of compliance makes the administrative process easier and more efficient for both professionals and the industry, and consequently should be introduced. This implies that in order to achieve success, direct and frequent communication from the practice level to policy makers and administrators (the practice-policy communication loop) should be implemented (NIRN, 2015).

Technical failure Issues

Second most influential group of factors affecting compliance after the administrative aspect is technical failures relating to the context framework of the technical aspect of the BCSR. These five factors, including technological expertise, capacity building, sub-standard materials and houses, incessant collapse of buildings, and structural failures/property destruction, are issues of training and development and were identified and examined as technical framework related failures. This result shows the significant effect of technical factor failure on non-compliance. The findings for capacity building, technological expertise, and structural failures/building collapse, and house property destruction, are an issue related to the training and development of professionals and relevant stakeholders in the technical aspects of the BCSR. This finding indicates that the technical framework of the structural building code provisions for HRRB development projects in Nigeria is not being implemented and enforced as expected in order to reduce structural failures. To overcome this challenge, training and re-training of professionals, artisans and other relevant stakeholders should be a priority, as increased knowledge of industry professionals and relevant stakeholders acquired through training and development will result in more professionals and other relevant

stakeholders being better technically equipped to implement and enforce standards and consequently reduce non-compliance, structural failures and building collapse and property loss. Similarly, better trained professionals and industry practitioners in modern technology and construction methods, will lead to less technical provisions of BCSR failures. In general, more training and development indicates a better technical factor and less non-compliance to structural BCSR in HRRB projects in Nigeria.

This result supports the advocacy of building construction skills training in developing countries, where advanced technology for the production process is scarce (Muya, Mulenga, Bwalya, Edum-Fotwe, and Price, 2004). The construction industry in this digital age is characterised by advanced technology, modern construction methodology, and high-tech materials that require consistent improvements to training and development in order to meet the appropriate industry needs (Agapiou, Price, and McCaffer, 1995). The findings indicate that increased training of professionals and skilled relevant stakeholders will result in the avoidance of non-professional practices currently exhibited in HRRB projects in Nigeria. This reinforces the findings of Fixsen et al. (2013), Meyers et al. (2012), Blasé et al. (2013-2015) and NIRN (2015), that good training provides ample opportunities for demonstrations and rehearsals to practice the skills being taught. A lack of training of building professionals can hinder best practices and innovations that could help in the development of the sector.

Sociological Failure Issues

The research findings also revealed four sociological factors contributing to the BCSR and compliance failures, including human rights, public dialogue, respect for public opinion, and employment/financial strength, which revealed the sociological aspect of the building code failure for HRRB projects in Nigeria.

The findings indicate that human rights, respect for public opinion, and public dialogue (sociological framework) to a lesser extent have a direct relative cause and effect on poor-implementation, enforcement and non-compliance. From the literature it was revealed that the more the social positive impact (e.g. scholarships for vibrant youths who act as a force for change in every society, skills training acquisition, and infrastructural development) felt by the people within society from the government or industry, the more willing they are to comply with government or industry standards and regulations voluntarily. This is expressed through the corporate social responsibility (CSR) concept proposed by Carroll (1979), with subsequent revisions in 1983 and 1991 (cited in Watts, Dainty, and Fernie, 2016; Manuel & Lucia, 2007; Gupta, 2012), as an acceptable global practice of

many companies in four categories of social responsibilities: economic, legal, ethical, and philanthropic.

This pyramid of responsibilities reveals a linkage between the industry and the people or community, the different types of obligations, who industry should be responsible to and being responsive. Lantos (2002, cited in Manuel & Lucia, 2007) stated that CSR is a mandatory ethical responsibility of companies to society, and the fulfilment of a company's philanthropic responsibilities go beyond preventing possible harm to help in alleviating social suffering without considering the business benefit first. However, this will immensely benefit a company through the positive publicity from protecting public interests, such as health, safety, and the environment for social integration (OECD, 2000). This finding indicates that for people to comply with rules and regulations as desired, their human rights and respective responsibilities should not be ignored in any managerial decision-making process by organisations and governments. From literature it was also revealed that the planning process must consider the values of the public, and the values held by them should be upheld in policy formulation and implementation strategy planning (Bitchta, 2003). This confirms the actual positive impact of CSR in society as a channel through which structural provisions of BCSR can easily be implemented and enforced in HRRB projects in Nigeria for employers, consumers, investors and suppliers in the community. Despite the limited impact of CSR progress in the industry, it is hoped that if industry and government focus on achieving the legal and economic obligations, as advised by Carroll's pyramid with high philanthropic opportunities in each public area, then compliance with the standards and regulations will increase over time.

Economic Value – New Theme

From the analysis it can be seen that a hard to classify group emerged, which suggests the necessity of an insurance policy or framework to reduce the impact of property loss, death and injuries as a results of administrative, technical, and sociological failures of the BCSR structural provisions in the development of HRRB projects in Nigeria. This may be within the framework of a building construction independent supervisory commission, which could be enacted through legislation and awareness creation. Dahiru et al. (2012), and Arimah and Adeagbo (2000) have reported that the extent of public awareness determines the extent of compliance with standards and regulations, in order to reduce structural failures and the collapse of HRRB projects. Following contextual analysis, Jorgen (2010) argued that it is appropriate for regulatory power to be delegated to a third party (independent body) and noted that such practices will improve technical and complex

administrative decision-making that requires experts as the heads of affairs. Previous literature further highlights the importance of a third party or hybrid approach to effective regulatory implementation and compliance (Yu et al., 2013; Evans et al., 2010; Makela et al., 2011).

An independent supervisory commission as credible, acceptable and best practice, is demonstrated by their presence in the UK, USA, SA, India, China, and Australia among others, which improves administrative and technical failures of standards and regulations for economic value by promoting investment through credible regulations for investors. This study advocates for the establishment of an independent building regulation commission for building control enforcement policy framework as a comprehensive strategy to improve regulatory compliance in HRRB projects in Nigeria, which should include monitoring, continual review of the compliance level, and training for capacity development.

Conceptual Building Control Enforcement Policy Framework

The conceptual building control enforcement policy framework for this study advocates the adoption of the modern credible commitment theory of regulation, as revealed from the exploratory study and contextual analysis, and international experience.

This study has identified the need to establish an independent building regulation authority, to be called the independent building regulation commission, which should be enacted through a building regulation Act. The commission should be equipped with adequate resources (materials, financial, and individuals) in order to drive the credible process of consultations on building design and regulation requirements, to assess proposed plans for compliance, and to inspect construction sites at different critical stages. Continuous capacity building for the established commission should be a priority, and monitoring and evaluation of activities for performance assessment (fidelity) should be clearly stated. This should be followed by an insurance plan and strategic plan for improvements following the fidelity findings, with consideration paid to quality management and complaint procedures. Figure 6 summarises the conceptual framework for building enforcement control by this study.

INSERT FIGURE 6 HERE

Conclusions

The aim of this study was to identify and examine the main influential factors leading to non-compliance with structural BCSR in HRRB projects in Nigeria. It has revealed the underlying pattern of the factors strengths and associations in the relationship, and examined the relative effects of the

main influential factors on aspects of the BCSR framework (administrative, technical, sociological and legal). Specifically, this study aimed to determine whether there is a relationship between the determinant factors and their influences on non-compliance with standards and regulations. The findings suggest a stronger influence of the administrative aspect followed by the technical aspect, and to a lesser extent the sociological aspect. When examining the broad research framework of building standards and regulations, it is worth noting that administrative failure impacts negatively on technical and social aspects of the building code for compliance issues. The technical aspect of the regulations was identified after the administrative aspect and shows a stronger influence on sociological aspects, which means that enhancing technical aspects may create a social empowerment interest. The implication is that if compliance is to be achieved, then the public must be engaged and empowered, professionals and relevant stakeholders have to be technically trained in new technological developments, and the greatest influence of administration must be re-designed in order to reduce the negative impact on the technical and sociological factors of the structural provisions of BCSE for compliance in HRRB projects.

This indicates that the theoretical model is consistent with the observed data for factors of non-compliance with structural BCSE in HRRB through the systemic failure of technical, sociological and administrative aspects. Hence, the theoretical null-hypothesis can be accepted as the research conclusion, as argued by Migosi et al. (2013).

This study's findings shed more light on the aspects of BCSR that are mostly influencing implementation, enforcement and compliance of structural provisions, and will guide professionals and other relevant stakeholders in the building construction industry in Nigeria to view BCSR compliance constraints within this framework. The findings will also help professionals and other relevant stakeholders to quickly identify the technical skills shortages which require urgent training and development by the Federal government for the building construction sector in Nigeria. This research will be of assistance to HRRB policy makers in the development of a credible commitment practices policy for better building enforcement control.

The findings of this research also suggest a new hypothesis and open a debate for advancing the research in the implementation and enforcement of BCSR in:

1. Building construction industry administrative (systemic) failure.
2. Skills shortage in the building construction sector in Nigeria as a result of technical failure of BCSR structural provisions.
3. Sociological failure of standards and regulations: A case of industry CSR in Nigeria.

These findings are in line with previous research and support the claim that the administrative system, technical process and social effects are among the major causes of non-compliance with building standards and regulations, for example administrative factor (Al-Fahad, 2012), public financial strength (poverty) (Sarhhelyli et al., 2012), political-cultural factor (Alsour and Meaton, 2009), institutional context, administrative machinery, public poverty and illiteracy (Arimah and Adeagbo, 2000). However, in this study the analysis indicates another factor for non-compliance in the Nigerian context to structural building standards and regulations as training and development for the implementation process.

Consequently, the findings of this research make a significant contribution to the body of knowledge in the debate of implementation science, enforcement and compliance to standards and regulations in the development of HRRB projects in Nigeria.

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Table 1: Demographic characteristics of the respondents

	Frequency	%	Valid %	Cumulative %
Age				
18-20	6	1.6	1.6	1.6
21-30	49	13.0	13.0	14.6
31-40	108	28.6	28.6	43.1
41-50	138	36.5	36.5	79.6
51-60	67	17.7	17.7	97.4
60+	10	2.6	2.6	100.0
Total	378	100.0	100.0	
Sex				
Male	291	77.0	77.0	77.0
Female	87	23.0	23.0	100.0
Total	378	100.0	100.0	
Educational Qualifications				
WASSC/SSCE/NECO/Trade Test	12	3.2	3.2	3.2
ND/NCETech	23	6.1	6.1	9.3
HND	78	20.8	20.8	29.9
PGD	2	0.5	0.5	30.4
Bachelor degree	182	48.1	48.1	78.6
Master Degree	73	19.3	19.3	97.9
PhD	8	2.1	2.1	100.0
Total	378	100.0	100.0	
Profession (Occupation)				
Industry practitioners	260	68.8	68.8	68.8
Regulators	118	31.2	31.2	100.0

Total	278	100.0	100.0	
Years of experience				
1-4	38	10.1	10.1	10.1
4-10	101	26.7	26.7	36.8
10-16	61	16.1	16.1	52.9
16-21	87	23.0	23.0	75.9
21-30	75	19.8	19.8	95.8
31 & above	16	4.2	4.2	100.0
Total	378	100.0	100.0	

Table 2: Non-parametric descriptive statistics of dispersion

		Age	Sex	Educational qualification	Profession (Occupation)	Years of Experience
N	Valid	378	378	378	378	378
	Missing					
Median		4.0000	1.0000	5.0000	1.0000	3.0000
Range		5.00	1.00	6.00	1.00	5.00
Sum		1375.00	465.00	1704.00	496.00	1242.00
Percentiles	25	3.0000	1.0000	3.0000	1.0000	2.0000
	50	4.0000	1.0000	5.0000	1.0000	3.0000
	75	4.0000	1.0000	5.0000	2.0000	4.0000

Table 3: Characteristics of the indicators

	LG	AS	LD	PI	IMP	AW	PL	PD	PF	
N Valid	378	378	378	378	378	378	378	378	378	
Missing	1156	1156	1156	1156	1156	1156	1156	1156	1156	
Mean	2.0053	2.2116	2.2434	2.2098	2.3095	2.1005	2.6931	2.5476	2.6005	
Std. Deviation	.77424	.62881	.72399	.87077	.74061	.90998	.54603	.60861	.67285	
	CB	PIDM	EFS	TE	PR	PVI	HR	RPO	ICB	Cptn
N Valid	378	378	378	378	378	378	378	378	378	378
Missing	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156
Mean	3.7063	3.6667	3.2593	2.6111	3.7487	4.0582	2.7804	2.8677	4.6825	4.6164
Std. Deviation	.64410	.68713	.71844	.79092	.87270	.66898	.96459	.84844	.72453	.66631
	UPLC	EPD	SMH	ENP	HPD	SEDB	DBC	RFH	LIC	CGH
N Valid	378	378	378	378	378	378	378	378	378	378
Missing	1156	1156	1156	1156	1156	1156	1156	1156	1156	1156
Mean	3.4206	3.3413	3.7751	4.1217	3.6984	3.4788	4.0714	3.3889	4.1931	3.4021

Std. Deviation	.93859	.88754	1.02215	.69175	.80387	.68001	.82576	.67512	.84455	.86928

Table 4: Total variance explained by likelihood of 8 factors

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.17	15.095	15.095	3.17	15.095	15.095	2.313	11.015	11.015
2	2.539	12.091	27.186	2.539	12.091	27.186	2.026	9.646	20.66
3	1.855	8.835	36.021	1.855	8.835	36.021	1.983	9.444	30.104
4	1.728	8.231	44.252	1.728	8.231	44.252	1.935	9.212	39.316
5	1.369	6.517	50.768	1.369	6.517	50.768	1.801	8.577	47.893
6	1.226	5.837	56.605	1.226	5.837	56.605	1.462	6.961	54.855
7	1.111	5.29	61.895	1.111	5.29	61.895	1.388	6.611	61.466
8	1.074	5.115	67.01	1.074	5.115	67.01	1.164	5.544	67.01
9	0.981	4.671	71.681						
10	0.93	4.429	76.11						
11	0.804	3.827	79.937						
12	0.704	3.351	83.288						
13	0.628	2.989	86.277						
14	0.564	2.684	88.961						
15	0.471	2.245	91.206						
16	0.45	2.142	93.347						
17	0.427	2.031	95.379						
18	0.306	1.457	96.836						
19	0.264	1.257	98.093						
20	0.226	1.076	99.169						
21	0.174	0.831	100						

Table 5: Pattern Matrix

	Factor							
	1	2	3	4	5	6	7	8
legislation	0.062	0.074	-0.106	-0.159	-0.042	0.595	-0.261	0.046
Approved standard	-0.296	0.686	0.197	0.033	-0.055	-0.078	-0.047	0.101
Political interest	-0.17	0.185	0.18	-0.211	0.146	-0.391	0.228	0.572
Public Dialogue	-0.063	-0.169	-0.207	-0.103	..672	0	0.354	0.117
Leadership	-0.246	0.086	0.21	0.704	-0.067	0.169	-0.103	0.139
Political will	-0.297	0.064	0.309	0.2	0.133	0.408	0.115	-0.12
Corruption	0.084	0.058	-0.072	0.168	0.025	0.096	0.02	0.844
Professional rivalry	0.724	0.436	-0.165	0.162	-0.061	0.3	0.126	-0.178
Professional Vested interest	0.658	0.448	-0.355	0.008	0.096	-0.037	0.184	-0.091
Capacity Building	-0.025	0.089	0.812	0.129	0.127	-0.117	0.09	-0.066
Professional involvement in decision making	0.806	-0.135	-0.059	-0.162	0.124	0.064	-0.078	0.149
Technological Expertise	-0.045	-0.37	0.722	-0.099	0.173	0.058	0.074	0.065
Respects public opinion	0.314	-0.133	-0.022	-0.059	0.799	0.068	-0.039	0.135
Human right	-0.068	-0.073	0.155	-0.047	0.879	-0.043	-0.124	-0.055
Employment & financial strength	0.207	-0.776	0.308	-0.047	0.214	0.076	-0.037	-0.135
Incessant collapse of buildings	-0.23	-0.029	0.169	-0.162	-0.278	0.085	0.667	0.043
Loss of investors' confidence	-0.069	0.108	0.011	0.212	0.035	-0.753	0.078	-0.178

Extraction method: maximum likelihood.

Rotation method: oblimin with Kaiser normalisation.

a. Rotation converged in 9 iterations.

Table 6: Structure matrix

	Factor							
	1	2	3	4	5	6	7	8
CPTN	0.831	-0.825	0.841	0.868	-0.825	0.970	0.620	0.844
CB	0.986	-0.782	0.744	0.862	-0.761	0.801	0.764	0.782
PID M	0.970	-0.791	0.797	0.738	-0.854	0.709	0.984	0.791
EFS	0.930	-0.842	0.788	0.629	-0.727	-0.817	0.902	0.660
TE	0.926	-0.805	0.642	0.631	-0.735	0.821	-0.781	0.942
PR	0.722	-0.746	0.961	0.906	-0.820	0.700	0.740	0.852
PVI	0.757	-0.738	0.908	0.974	-0.845	0.962	0.809	0.945
HR	0.813	-0.993	0.757	0.890	-0.855	0.880	0.943	0.755
RPO	0.838	-0.954	0.799	0.826	-0.950	0.877	0.827	0.844
LG	0.562	0.674	0.595	0.701	-0.660	0.761	0.610	0.546
AS	0.960	0.686	0.792	0.721	-0.782	0.808	0.847	0.901
PI	0.700	0.850	0.804	0.813	-0.863	0.657	0.833	0.748
PD	0.634	-0.699	0.789	.672	-0.703	0.900	0.854	0.817
LD	0.731	-0.725	0.841	0.704	-0.867	0.691	-0.803	0.839
PW	0.886	-0.782	0.744	0.820	0.733	0.572	0.715	-0.620
ICB	0.970	-0.991	0.797	0.768	0.725	0.964	0.820	0.844
LIC	0.930	-0.722	0.708	0.862	-0.761	0.800	0.564	0.718

Extraction method: maximum likelihood.

Rotation method: oblimin with Kaiser Normalisation

Table 7: Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8
1	1.000	-.790	.591	.604	-.648	.672	.682	-.706
2	.970	1.000	.682	.681	-.716	.618	.759	.682
3	.591	-.665	1.000	.822	.671	.711	.722	.680
4	.605	-.787	.832	1.000	-.662	.791	.644	.681
5	-.645	-.652	.733	.764	1.000	.871	.655	-.692
6	.672	-.702	.681	.700	-.608	1.000	.709	.771
7	.582	-.759	.752	.644	-.654	.709	1.000	.772
8	.706	-.682	.680	.680	-.692	.771	.772	1.000

Extraction Method: Maximum likelihood.

Rotation Method: Oblimin with Kaiser Normalization.

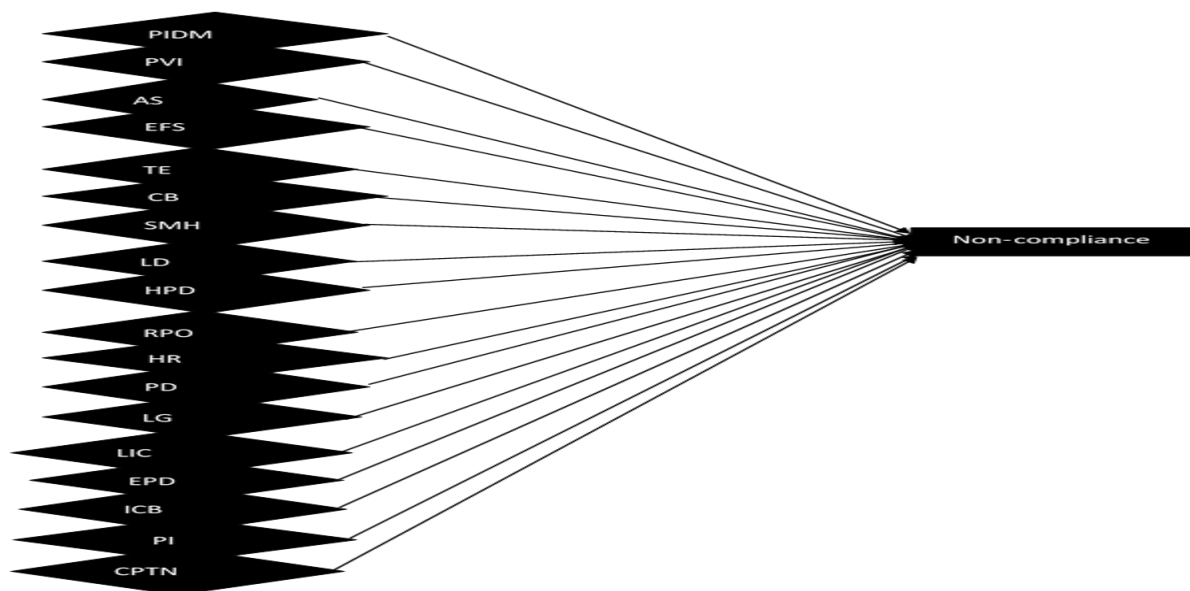


Figure 1: Conceptual model of non-compliance indicators

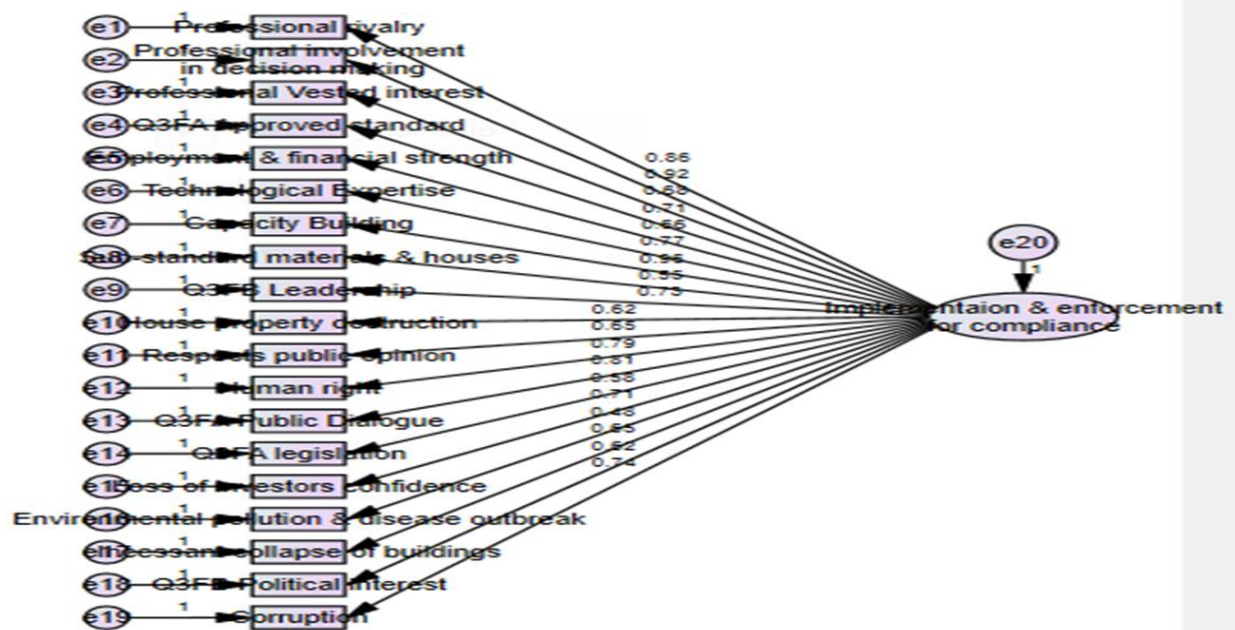


Figure 2: One factor model of CFA

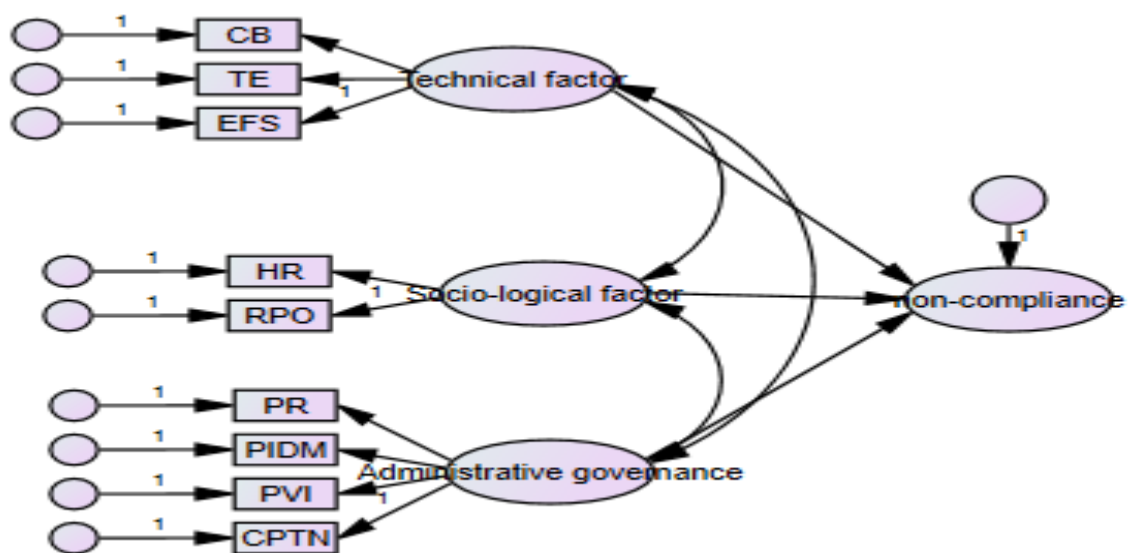


Figure 3: Theoretical model for SEM hypothesis testing

CB – capacity building, TE – technological expertise, EFS – employment/financial strength, HR – human rights, RPO – respect for public opinion, CPTN - corruption, PR – professional rivalry, PIDM – professional involvement in decision making, PVI – professional vested interest

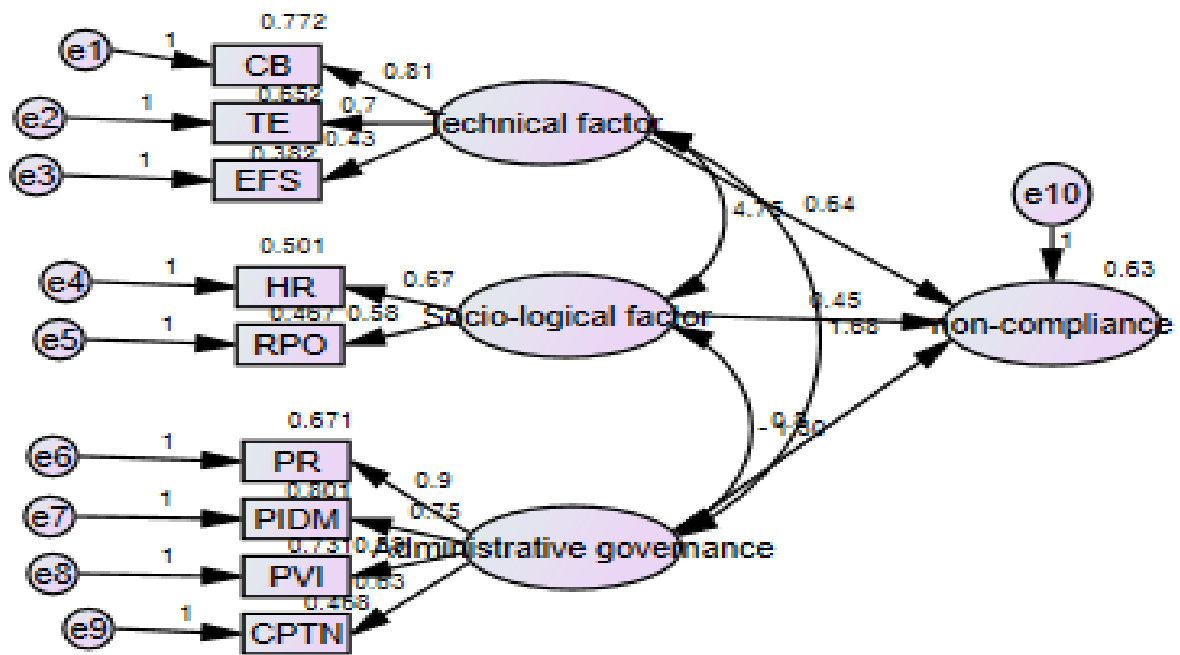


Figure 4: CFA SEM with standardised estimates-non-compliance

CPTN - corruption, PR – professional rivalry, PIDM – professional involvement in decision making, PVI – professional vested interest, HR – human rights, RPO – respect for public opinion, CB – capacity building, TE – technological expertise, EFS – employment/financial strength

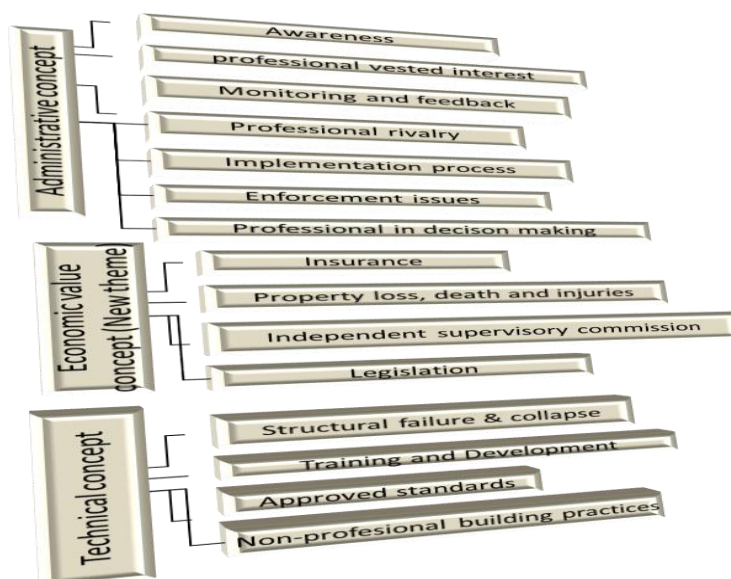


Figure 5: cluster analysis as related to contextual theory

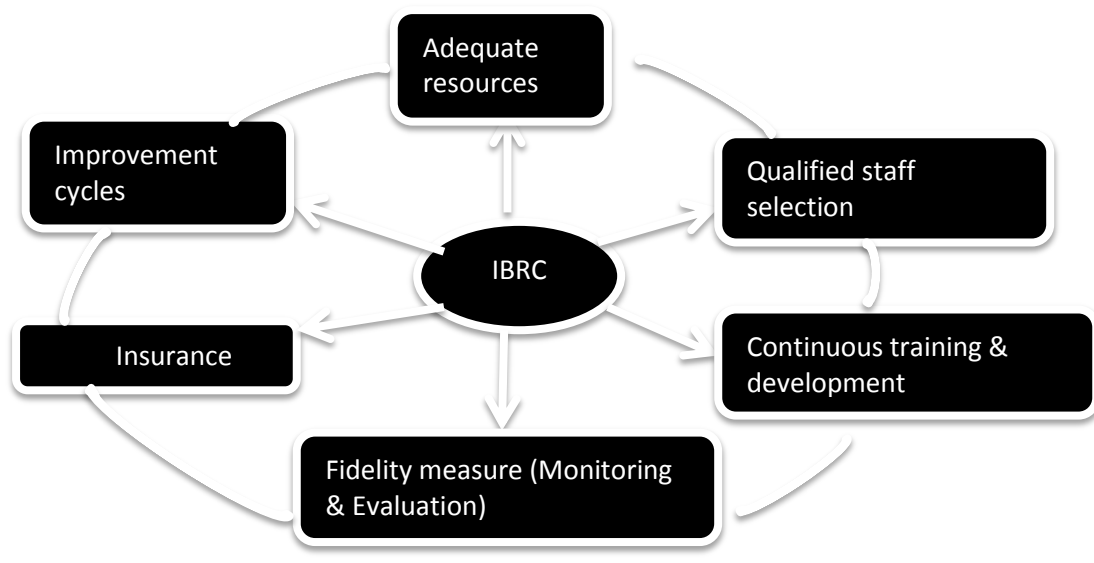


Figure 6: Conceptual Building Control Enforcement policy framework

The framework emphasises the continuous sequence of stages in relationship to the central idea of IBRC, rather than the connecting arrows within the circle.

Building construction skills training for standards compliance: The Case of Nigeria

(Article in progress)

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Abstract

This paper aims to examine how much effect skills training and development has on the overall standards and regulatory compliance with structural aspects of building projects in Nigeria. This paper targets construction projects sites for case measurement. A purposive sampling technique was used in the selection of six states in Nigeria for data collection, in which, 104 high-rise residential building projects were identified and investigated. The objectives criteria for the measurement were the compliance form requirements for the structural aspects of the Nigeria building regulations 2006. The investigative indices by this study were required activities of professionals and craft skills workers in the construction of structural aspects of building within Foundation, floor slab, walls, and roof with 29 investigating indicators. All the buildings fall into one of the three levels threshold of buildings grading category (full compliance, partial, and non-compliance) based on indicators over a 6 month measurement period. To validate the percentage of compliance levels (full compliance, partial and non-compliance), measurements data were aggregated between 0% and 100% on multiple buildings within the four case measurement stages (foundation, foundation + slab, foundation + slab + wall, and foundation + slab + wall + roof) and where data is not aggregated on multiple buildings, each building case measurement data were treated individually to determine the validation of compliance grading level. In which, non-compliance — In spite of any prevailing circumstance within the building projects over a 6 month measured, which aggregate indicators percentage falls within 0% and 49% were considered risky and non-compliance to building standards and regulations. Partial compliance — regardless of circumstance: involves buildings with aggregate indicators percentage of between 50% and 69% within the 6 months period of this case measurement and Full compliance indicates buildings with aggregate indicators percentage of between 70% and 100% within the 6 months period of this case measurement. It was observed from the results that, majority of core activities in the foundation

and slab fell under non-compliance. This finding not only draws attention to construction skills shortfalls, but also informs the inspectorates and policy makers to double-up monitoring or introduce specialized regulations that can be strict on professionals and craft men at those stages of skills shortfalls within the policy framework.

Keywords: Construction, skills, training, quality, compliance, structural, regulation

1. Introduction

Construction industry in the world is complex and skill labour-intensive especially in the developing countries where advance technology for the production process is scarce (Muya, Mulenga, Bwalya, Edum-Fotwe, and Price, 2004). Skill training and development within the construction industry, not only enhances construction quality but also have advantage to improve productivity (ratio of input to output) and meet industry desired output of standards and regulations compliance (Apaluwah A. O and Apaluwah A.O.S, 2015). Adams (2001) cited in Apaluwah and Apaluwah (2015) says that, skills training and development differs with possibility of confusing the term and intent of the word, therefore this study skills focus is within the activities that influences employment and earning in the structural aspects of building projects for both the professionals and the artisans. Construction industry in this digital age is characterizing with advance technology, modern construction methodology and high-tech materials that require consistent improving of skills to meet appropriate industry needs (Agapiou, A., Price, A.D.F and Mccaffer, 1995).

Agapiou, *et al* (1995) categories available skills training within Uk construction training centers as; plumbing and sheet metal, carpentry/joinery, bricklaying, plastering, painting/decoration/sign-writing, scaffolding, electrical, roofers, paving, glazing, plant operatives, bar bending, steel erecting, flooring, and crane drivers. However, Muya et al 2004 describes Zambia trade schools as lacking some required programmes in the Zambia construction industry such as; roofing, paving, scaffolding, gazing, light/ventilation, crane operative and steel fixers although admits to some informal and unconscious apprenticeship training acquired on the job in some aspects of the skills therefore putting the industry in danger. Construction skills training in Nigeria is more worrisome than that of Zambia, with not only unconscious apprenticeship but also unconscious professionals or non-professionals hijacking the industry without training and experience of building projects as argued by Muya et al (2004) and Agapiou et al (1995). Of which, construction projects are poorly finished, collapse of structural aspects and other structural defects overrun the Nigeria building industry as a

results of skills shortages among the professionals who manages the skills of artisans (Oladiran O. J, 2015). Professionals are required with basic technical skills in the Nigeria building construction industry to support earlier mentioned skills differently from academic qualifications as presented by Adavbiele (2013) cited in Kuroshi (2015) which must include; foundation skills, structural construction skills, information and communication technology (ICT) skills, software analysis of practical skills, regulation compliance skills, entrepreneurial skills and supervisory skills among others which can be enhance through research, training, fidelity (performance assessment), and favourable policy development.

The aim of this paper is to investigate and examine the impact of skills training on the overall compliance with standards and regulations in the construction of structural aspects of building projects in Nigeria. In particular, the paper investigates and records how much effect professionals skills and craft skills practices within the construction sector complied with standards and regulations skills in which other skills depended on for best practices. The results of this investigation will not only complement the research by Construction Industry Training Board (CITB 2014) on standards/regulations skills and knowledge gap within the construction industry but also gives a direction approach on standards/regulation compliance to drive many other required skills within the construction sector among the professionals and craft skills labour as argued by Kuroshi P (2015) on professionals and vocational trade operatives in Nigeria construction industry.

The skills development and training provision in Nigeria will be discussed with respect to previous research on skills training and development. After which, skills training and development policy framework review in Nigeria and drivers of needs for building construction professionals and craft skills training and development, followed by research methods for data collection. A section for case study analysis and results shall summarize the results.

1.1 Skills development and training provision in Nigeria

It has been established from previous research that, the gap between research and practice is the implementation science. For example Dyke, M. K. (2015) argued that the existing gap between research and practice globally is the implementation gap. The study further confirmed that implementing officers don't use innovations with fidelity (performance assessment), don't build capacity (training) to sustain innovations and don't scale innovations to provide benefits to citizens, industry and the society. Implementation of any program requires basic skills and the Nigeria construction industry is not an exception. Various steps have been taken to provide these needed

skills within the construction industry through formal education for professionals and informal education for the young and adult craft skills in accomplishing a specific task in vocational apprenticeship (Apaluwah and Apaluwah 2015)). For example, Ujene, A.O and Umoh A. A (2015) identified skills development and training provisions in Nigeria through trade group training, apprenticeship programme of government agency like National Directorate of Employment (NDE), on the job training through job rotation and job coaching, Industrial Training Fund (ITF) centers established by Act. No. 47 of 1971 to promote and encourage the acquisition of skills in the industry for indigenous manpower needs, seminars and workshops/conferences, technical vocational education training (TVET), National Business and Technical Examinations Board (NABTEB). However, the impact to the society and focus of these centers are loss within the political drama and personal interest of successive government. Of which, Zambia, in realizing the vacuum created the need to acquire skills in the construction industry through private training institutes in support of the central government for training and development of skills in the industry (Muya et al 2004). Of recent, a number of training and developmental initiative policy (National Vocational Training Qualification Framework NVTQF) targeting skills development by the Federal Government through National Board for Technical Education (NBTE) established by Act No. 9 11th January, 1977 of vocational qualification as a way of encouraging skills development in Nigeria emerged in 2010 (Okwa A. A, Musa, J. 2015). This innovative idea will enhance Nigeria building construction industry into the Global construction skills training light of such country like UK or Zambia as presented by Agapiou (1998) and Muya et al (2004).

1.2 Skills training and development Policy framework in Nigeria

The construction industry in Nigeria has been seen with a potential of reducing the rate of unemployment of the timid youths by the Federal government. The industry has been noted to contribute to the Gross Domestic Product (GDP) at 2.88% between 2010 and 2011 and in 2012 the GDP was 3.05% (Nigeria National Bureau of Statistics, 2015). NBTE in line with this development identified skills gap industries which require vocation education and training for her development with the proposal of National Vocational Qualification Framework (NVQF) on the 16th December 2010. In which, construction, hospitality-hotel and tourism, power, oil and gas, health and clothing textiles and leather works were identified and selected (Okwa and Musa, 2015). The aim was to train and developed human resources along with the national standards for different occupations for

those who have not attained a formal education to be employable like their formal educated counterpart as presented in figure 1, and also in given an investment opportunity for the creation of private technical and vocation training centres within Nigeria to award certificate qualification which will be guided by the policy framework of NVQF in the training qualification, assessment and award certification such as the one seen in Uk training centres (Okwa and Musa, 2015; Agapiou 1998). However, Agapiou (1998) sound a warning on training quality rather than a mere list of courses within the centres. The study further stresses precondition for implementation of NVQF as: access to all necessary information, funding and resources for the training providers and a clear role of relevant bodies in various capacity. For example in describing the activities within the NVQF, Okwa and Musa, presented education and industry certification process graph, schematic work competence for certification of the technical operation process and skills assessment and NVQ progressive chart for craft skills in the Nigeria context within the policy framework as presented in Figure1,2 and 3 below.

INSERT FIGURE 1 HERE

Source: Report of the national steering committee on the development of national vocational qualifications frameworks (NVQF) for Nigeria, August, 2011 adapted from (Okwa and Musa, 2015)

Okwa and Musa (2015, p.80) describe the education and industry qualifications as a guide to the 'equivalence' of each qualification. Although admitted to education or academic and industry qualification measuring different things; NVQ measure competence for a particular job and academic qualification measuring individual's knowledge with considerations to any other approved qualification. To justify the match-up of the qualifications, Okwa and Musa presented the required work competence certification within the technical operating process of the NVQF in figure2.

INSERT FIGURE 2 HERE

To achieve NVQ, each participant must demonstrate competence for the stipulated skills at the appropriate level to the required standard as demanded by the industry (Okwa and Musa, 2015).

What are not clear within the Nigeria NVQF from the research to this study are policy-practice communication loop and the system of funding for the training providers. Implementation of policy framework requires change and system transformation within the practice, the organisation and systems at all level. Knowing what needs to change and how much change is required per time to achieve the desired outcomes is the problem practice-policy communication loop is out to address

by studying the structure, procedure and feedback towards successful practice and program implementation by Fixsen 2006 cited in (NIRN, 2015). The goal is to creating a learning culture from their own experience and modifies the structure and design to reflect the learning process (NIRN, 2015; Fixsen and Blasé 2012). For the success, direct and frequent communication from the practice level to the policy makers and administrators level (the practice-policy communication loop) should be frequent to hear success, data collection, descriptions of experiences, constrains to make full and effective implementation at the practical stage with the help of implementation teams who have the skills, and abilities to help the industry make full and effective use of the innovations and enabled policy. Secondly, the system of funding for the training providers and other agencies designate for assessment, monitoring and certification accreditation.

Agapiou (1998) established that funding can cause difficulties for both the craft men, the training providers and the government agencies since the training requirements are difficult to predicts within some localities and also dictated by large building projects and new technologies; access to information through research funding and incentive funding to encourage trainees to attain a recognized qualification should be provided. Clarke and Wall, 1998; Ziderman (2001) cited in Muya et al (2007) affirm that government contribute to financing vocation and technical training in most countries and also regulate other funders but in some countries craft skills trainees do contribute through payment of user-fees at a subsidize rate, but stress that employers mode of funding is the only sustainable and supplementary to government funding. For example, in Nigeria, the skills training and development in the construction industry was driven by SURE-P partnership projects with NIOB of the last administration, the present administration scrapped SURE-P since 2015 in the fight against government corrupt agencies.

This is a step backward in the skills training and development initiative of the NIOB/NVQ proposals as presented in figure 3, indicating clearly that training and development within the construction sector initiated cannot absolutely be dependent on government for funding, thus; this study support Muya et al 2007 advocacy for supplementary funding from employers and subsidize registration fees for the trainees at the same time encourage investment in training by establishment of private construction training and development centers in the NVQF policy for skills assessment, certification and progressive chart for craft skills as seen in figure 3. This framework initiative is in line with similar study for young entrant's enrolment into National Vocational Qualification (NVQ) in the UK construction industry as describe by Agapiou et al (1995). Both UK NVQ and the Nigeria NVQ framework are based on national standard with regards to technology, market and employment patterns and also with the similar policy makers and regulators called NBTE in the Nigeria case and

National Council for Vocational Qualification (NCVQ) for UK. However, the NVQ of the UK was employer-led rather than education-led or government agencies-led, such as been driven in the Nigeria case for the purpose of job creation and not really the issue of quality skills shortfalls in the Nigeria building construction industry (Agapiou et al, 1995).

INSERT FIGURE 3 HERE

1.3 Drivers of need for construction professionals and craft skills training

Quality skills shortages, persistent import of required skills from the neighboring country, poor quality of finished buildings, structural failures and absolute collapse of structural aspects of building development projects, and the rise in demands of specialized skills in Nigeria among other factors are direct pointers to the need of skills training and development in the construction industry. However, CITB (2014) describe new legislation or regulatory requirements, new technologies and the introduction of new construction practices as key drivers for the need of construction professionals and craft skills training. Agapiou et al, (1995) stress that, the need of skills training was the existence of problems in the installation of prefabricated systems which was a new technology to traditional carpentry, joinery and glazing, these skills gap of new technologies gave rise to the need of training and development of traditional separate construction skills in the UK. Productivity and quality performance of construction workers and managers dependent on the training and retraining of workers for the new skills required for the new technologies (Muya M, Price A.D.F and Edum-Fotwe F.T, 2007). Muya M. et al (2003) advocate alternative construction employer's recruitment strategies to avoid skills shortages in the future by first upgrading the existing workforce and investment in training to address the persistent problem of skills shortage in the construction industry (Jayawardane and Gunawardena 1998, cited in Muya et al, 2007). Funding has been identified as the major challenges to drive required skills training in the construction industry globally. For example, Agapiou A. (1998) stress that, training cost can act as discouragement to small organisations that cannot buy products in large quantities and negotiate for relaxation of some percentage prices. In the same vain Muya et al (2007) describes that, who to pay for the skills training has been the dilemma within the government and the employers of skills in Zambia but stress further that for sustainability and significance of the craft training the funding contributions should come from the employers. Although, government financed trades training schools offering construction programmes were given some industry developmental policies of capacity building, institutional and regulatory framework by the Zambia government to boost the industry through the

establishment of National Council for Construction (NCC) Act No. 13 2003 to review and modify standards and legislation and to monitor the development of the industry (Muya, M., Price, A. D. F. and Edum-Fotwe, F. T., 2006).

1.4 Objectives

This paper aims to identify the skills gaps existing in the building construction industry and to establish professionals and craft skills compliance with standards/regulations skills and at the same time to examine the effect of craft and professionals skills practices in the overall compliance with structural aspects of building projects on standards and regulations skills. To achieve this aim, this study reviews the recent policy framework towards enhancing craft skills acquisition within the Nigeria building construction industry and high-rise residential development projects were identified and investigated in six cities of Nigeria, including; Lagos, Abuja, Port-Harcourt, Enugu, Lokoja and Kaduna, which was guided by the compliance form criteria requirements for the structural aspects of the Nigeria building regulations 2006 for the case measurement of the developmental building projects. The aim was to examine the impact of professionals and craft skills on standards/regulations skills compliance and also to investigate and establish the aspects of skills that mostly affecting compliance and requires urgent attention for training and development within the Nigeria construction industry.

2. Research Investigation Methods

2.1 Data collection process

This paper is a site visitation case measurement research study, targeting construction projects sites for case measurement and inspections. This type of method is adopted to actually describe the existing current professionals and craft skills practices with respect to standards/regulations skill compliance. This inspection and case measurement approach was chosen to measure and inspects based on the standards/regulations compliance conformity form for the structural aspects of buildings to establish professionals and craft skills compliance with standards/regulations skills. This approach was also used by Baiche, B., Walliman N. and Ogden, R. (2006) for rigorous inspection procedure of non-compliance checklist of regulations survey in Oxfordshire and Gloucestershire during the construction of housing projects for visual observation. A purposive sampling technique was used in the selection of six states in Nigeria for data collection, in which, 104 high-rise residential building development projects were identified and investigated. This consists of, Abuja (31), Lagos (20), Port-Harcourt (22), Enugu (10), Kaduna (6) and Lokoja (15). This study made site visitation to measure some level of compliance with standards and regulations of some high-rise

residential building (HRRB) development projects within Nigeria cities and the data is presented in table 1

2.2 Case measurement criteria

The objectives criteria for the measurement as the main instrument for data collection were the compliance form requirements for the structural aspects of the Nigeria building regulations 2006 (Not enacted at the time of this research). This consists of foundation compliance requirements, floor slab requirements, walls requirements and finally the roof compliance requirements. The investigative parameters by this study were the required activities of professionals and craft skills workers in the construction of structural aspects of building (Foundation, floor slab, walls and roof), including; soil strata analysis report, depth/width of foundation, treatment, thickness of the footings, foundation base, columns/ground beams were applicable, earth filling materials, depth and compartments methods of earth fill, type of foundation application for the soil, hard-core materials and sizes, DPC/DPM provision, reinforcement placement and sizes for the slab, thickness of the slab, concrete mix design, concrete placement methods, allowable time before placing of concrete, curing process and allowable time to next work start-up and supervision. Others measured were the room area, staircase requirements provision in the construction, height of wall, sizes of external and internal walls, length of walls before columns are provided, the lintel materials and thickness, ceiling height of rooms/hall ways, roof pitch, roof frames materials and physical strength observations, and wall plate/roof beam provision. The 29 indices were classified for compliance using the following criteria for the threshold of aggregate grading systems of the indicators compliance level as; 0-49% = Non-compliance, 50-69% = Partial compliance and 70-100% = Full compliance based on indicators over a 6 month measurement period.

2.3 Data Analysis

The record of compliance measurement was by numerical from 0 to 100% using the percentage of compliance with the existing compliance requirements form of the Nigeria building standards/regulations for the structural aspects of buildings.

All the buildings will fall into one of the three levels threshold of buildings grading category (full compliance, partial, and non-compliance) based on indicators over a 6 month measurement period. The measurement data percentage volume is based on the aggregate number of buildings measurement of 29 indicators in each state (inclusive of methods, process, and supervision) from building development sites. To validate the percentage of compliance levels (full compliance, partial and non-compliance), measurements data were aggregated between 0% and 100% on multiple

buildings within the four case measurement stages (foundation, foundation + slab, foundation + slab + wall, and foundation + slab + wall + roof) and where data is not aggregated on multiple buildings, each building case measurement data were treated individually to determine the validation of compliance grading level. In which, non-compliance — In spite of any prevailing circumstance within the building projects over a 6 month within the states measured at the discretion of the professionals and enforcement agencies, which aggregate indicators percentage falls within 0% and 49% were considered risky and non-compliance to building standards and regulations. Partial compliance — regardless of circumstance: involves buildings with aggregate indicators percentage of between 50% and 69% within the 6 months period of this case measurement and Full compliance indicates buildings with aggregate indicators percentage of between 70% and 100% within the 6 months period of this case measurement.

Tables, percentages, graphics for large data compliance measurement and Bar charts were employed to analyse and investigate the data. The researcher subdivided the whole building into four sections developmental stages as follows; Foundation as stage 1, Foundation + Slab³⁰ as stage 2, Foundation + Slab + Wall as 3 stage and Foundation + Slab + Wall + Roof (Whole structural building) as the 4th stage to establish the aspects of skills that mostly affecting compliance and requires urgent attention for training and development within the Nigeria construction industry.

3 Results of the site visitation for case measurement during building construction

3.1 Sample

This section presents the description of number of buildings measured in each cities and the percentage representation within the sample variables to aid in the analysis of the results. A total of 104 high-rise residential buildings in six cities were identified and investigated with 29 indicators of standards/regulations skills compliance requirements for the professionals and craft skills men. The highest number was in Abuja with 31 buildings representing 30% and the lowest was 6 buildings in Kaduna representing 6%. This is indicating lesser high-rise residential buildings in Kaduna as shown in Table 1.

³⁰ Slab in this case measurement means floor slab at ground and upper floor.

Table 1 Distribution of measured buildings

Variable Cities	Number of buildings measured	Percentage representation %
Abuja	31	30
Lagos	20	19
Port-Harcourt	22	21
Kaduna	6	6
Enugu	10	10
Lokoja	15	14
Total	104	100

Table 1 above shows that 30% of total buildings measured were in Abuja the Federal Capital Territory (FCT) of Nigeria. Lagos is 19% from South West, Port-Harcourt is 21% from South-South, kaduna from North is 6%, Enugu from South East is 10% and Lokoja from North Central is 14%.

3.1.1 The impact of professionals and craft skills on standards/regulations skills compliance

To examine the impact of professionals and craft skills on standards/regulations skills compliance, the 29 professionals and craft skills indicators were investigated and measured on site for grading using Nigeria standards/regulations skills compliance requirements form in the current practices of the projects. In which, compliance level description of the aggregation of the 29 compliance indicators between 0% and 100%

Non-compliance — indicate any measured over the 6 months research period in spite of any prevailing circumstance within the states, at the discretion of the professionals and enforcement agencies, which aggregate indicators percentage falls within 0% and 49% are considered risky and non-compliance to building standards and regulations.

Partial compliance — regardless of circumstance: involves buildings with aggregate indicators percentage of between 50% and 69% within the 6 months period of this case measurement

Full compliance indicates buildings with aggregate indicators percentage of between 70% and 100% within the 6 months' period of this case measurement and figure 4 describes and summarizes the results.

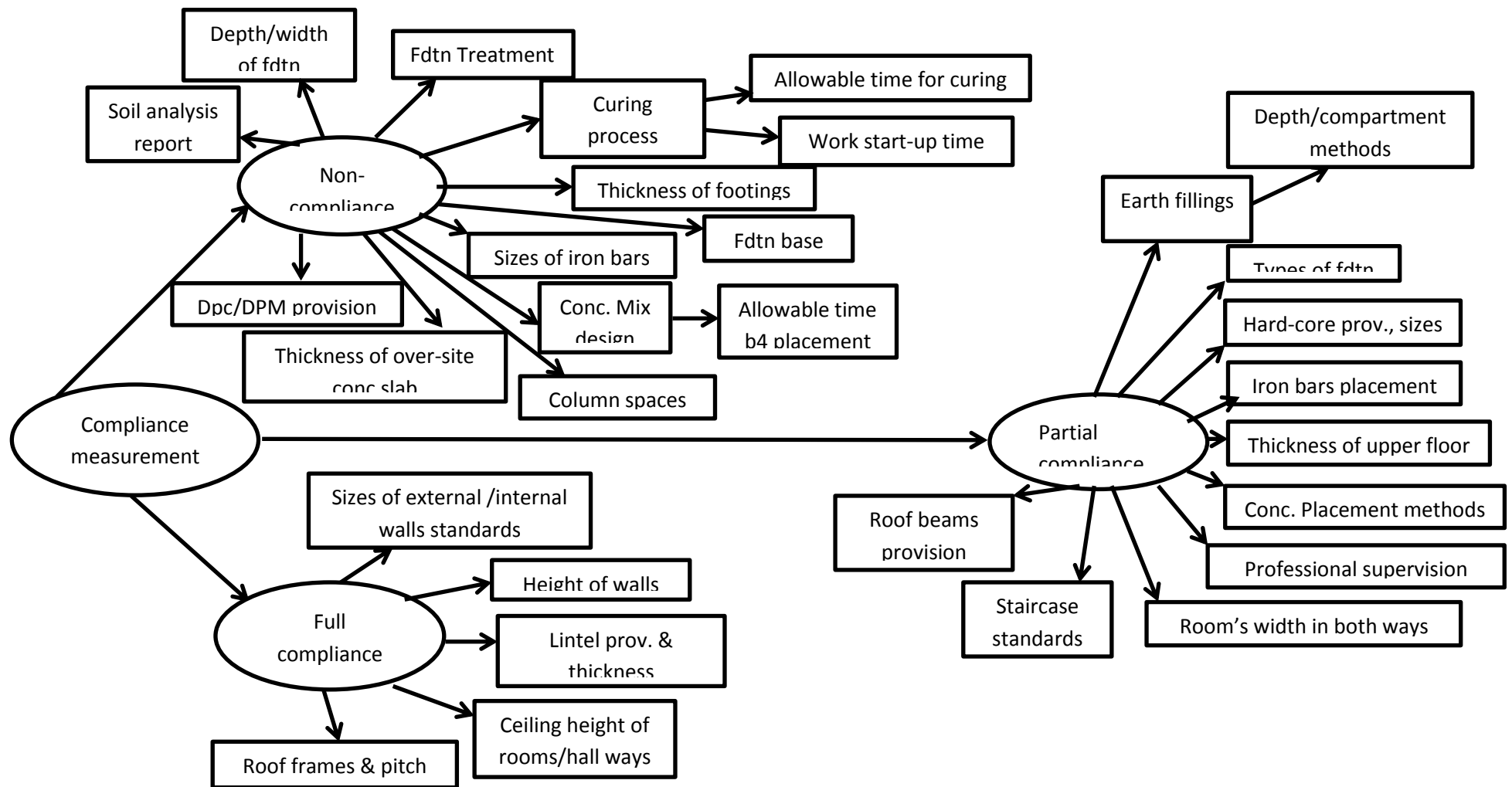


Figure4: Graphics for standards/regulations skills compliance measurement

3.1.2 Aspects of skills that mostly affecting compliance

To establish the aspects of skills that mostly affecting compliance and requires urgent attention for training and development within the Nigeria construction industry. This research subdivided the whole building into four developmental stages as follows; Foundation as stage 1, Foundation + Slab as stage 2, Foundation + Slab + Wall as 3 stage and Foundation + Slab + Wall + Roof (Whole structural building) as the 4th stage. The number of buildings measured in each city variable was also classified into full compliance, partial compliance and non-compliance within the stages as shown in table 2.

Table 2 Case measurement of building development projects in each city

Variable s	Stages of Case Measurement												
	Foundation			Foundation + Slab			Foundation + Slab + Wall			Foundation +Slab +Wall + Roof			Total
	Non-complian ce	Partial Complian ce	Full Complian ce	Non- compliance	Partial Compliance	Full Complianc e	Non- compliance	Partial Compliance	Full Compliance	Non- compliance	Partial Compliance	Full Complian ce	
Abuja	8	2	1	3	4	1	2	3	3	0	2	2	31
Lagos	3	2	0	4	2	0	1	3	0	0	3	2	20
Port- Harcour t	5	4	0	3	2	0	1	1	3	1	0	2	22
Kaduna	2	0	0	1	1	0	0	0	1	0	0	1	6
Enugu	2	1	0	2	2	0	1	0	1	0	1	0	10
Lokoja	4	0	0	2	1	0	2	2	2	0	1	1	15
Total	24	9	1	15	12	1	7	9	10	1	7	8	104

3.1.3 Degree of compliance from each city

Table 3 presents the degree of compliance for the measured buildings to establish the effects of professional and craft skills gaps within the Nigeria building construction industry. In which, the measurement indicates 45% non-compliance, 36% partial compliance and 19% full compliance across the six geo-political zones of Nigeria.

Table 3 degree of Compliance

Variables	Non-compliance	Partial compliance	Full compliance	Total
Abuja	13	11	7	31
Lagos	8	10	2	20
Port-Harcourt	10	7	5	22
Kaduna	3	1	2	6
Enugu	5	4	1	10
Lokoja	8	4	3	15
Total	47	37	20	104
% Of compliance	45%	35.5% (36%)	19%	100

4 Discussion of the research findings

The results of this study revealed that professional and craft skills practices do not complied with standards and regulations skills and foundation skills and therefore have greater impact on overall compliance with the construction of structural aspects of high-rise residential buildings in Nigeria. This

results support a similar investigation on skills training in the UK construction industry by CITB (2014) identifying standards/regulations knowledge skills gap for training.

This study results confirmed that professional's skills and craft skills training and development is required for technical foundations skills first and secondly standards/regulations skills, and to a lesser extent other structural construction skills for overall compliance with standards and regulations in the construction of high-rise residential buildings. Out of the 29 professionals and craft skills indicators investigated by this study to examine the impact of standards/regulations skills; 14 non-compliance identified and investigated were core activities for structural aspects of buildings on foundation skills, including; Depth/width of foundation, thickness of footing, foundation treatment, soil analysis report before foundation, concrete mix-design for foundation work and allowable time of placement, foundation column spaces, sizes of iron bars, curing process, allowable time of curing and work-start up time, provision of damp-proof course and damp-proof membrane, and thickness of oversite slab. From critical study of the results, 11 indicators identified and investigated were on partial compliance, these include; types of foundation selection, earth fillings, hardcore provision and sizes, iron bars placement, thickness of upper floor slab, concrete placement methods, professional supervision, rooms area, roof beams provision and staircase constructions requirements. This results support Adavbiele (2013) cited in Kuroshi (2015) on foundation skills and structural construction skills as part of skills list for training and development in the Nigeria construction industry. The results is an indication that foundation skills as well as standards/regulations skills is an aspects that requires urgent attention for professionals and craft skills training and development in the construction of high-rise residential buildings in Nigeria. This is established from the analysis in table 2 and 3. A total of 47 buildings indicate non-compliance representing 45% and 37 partial compliance representing 35.5% and 20 full compliance representing 19% of compliance. Table 2 analysis shows that majority of non-compliance were in stage 1 & 2 (Foundation and Foundation + slab) and majority of partial compliance were non-core activities within the whole stages exception of few and full compliance were in stages 3 & 4 activities of walls and roof. This analysis should give a directional approach to both industry practitioners, policy makers and professional's regulatory bodies on the next steps to building construction skills training and development and at the same time helping to strategies inspections at different stages of building construction.

4.1 Foundation skills and standards/regulations skills training for professionals and craftsmen

Construction has been identified as part of the key industries in the developmental programme of the government. It provides job opportunities and increase investment within the country, but all these will be a mirage without adequate training and development for specialized skills area like foundation skills and standards/regulations skills in the construction industry to increase investor's confidence (CITB 2014). This analysis has established that foundation skills and standards/regulations skills gaps impacts negatively on the overall compliance with standards and regulations compliance for the construction of structural aspects of high-rise residential buildings in Nigeria. Agapiou et al (1995) described the sources of this problem as an absence of essential information for construction skills planning and designing a training programme appropriate for the construction industry.

Oladiran (2015) stresses the importance of information through communication skills in the building construction sector. The study emphasis those, information are necessary in achieving the technical skills such as foundation skills and regulatory compliance skills as sustainable basis of core skilled workers in the building construction industry. There is a general belief of craftsmen lacking knowledge of building regulation skills. They are described as schedule reliance which lacks the knowledge of the question why? (Philosophy behind every application). However, Baiche et al (2006) argued that, with adequate training of the craftsmen in specialize area a lot of difference could be achieve in addressing the skills gaps of building regulation and technical knowledge.

This results has also buttress the studies from Kuroshi (2015), Ujene and Umoh (2015) and Oladiran (2015), that professionals in the industry requires urgent training for the knowledge gaps in specialize technical and managerial area such as: foundation skills, and regulatory compliance skills as identified in this study within the Nigeria construction industry. Professionals tend to shy away from the truth of not been trained for some aspects of projects especially in developing countries therefore taking up projects they lack basic skill for effective execution; this affects regulatory compliance in such projects, the study stresses further that, training and awareness of existing specialize skill relating to technical and regulatory compliance skills are important and should be provided continuously in the building construction industry (Baiche et al 2006).

5. Conclusions

Craft and professionals skills training and development has been seen to be a key driving force for the building construction industry, not only in Nigeria or developing countries but also in developed country like UK. The purpose of this paper was to identify and examines the impact of professionals and craft skills on standards/regulations skills compliance practices on the overall compliance (degree of compliance) with structural aspects of building projects in Nigeria. The study investigates also the aspects of skills within the structural aspects of building construction that professionals and craftsmen lack which mostly affecting compliance, specifically, the study aimed to identify the skills and knowledge gap to pay attention to immediately for training and development within the Nigeria building construction industry. It also reveals the recent policy framework towards enhancing craft skills acquisition within the Nigeria building construction industry and high-rise residential development projects. The case measurement analysis strongly suggests that inadequate foundation skills and standards/regulations skills among the professionals and craftsmen impact significantly on the overall compliance with standards. Critical study of the results indicates that, the majority of core structural activities were non-compliance, the first stage (Foundation) and second stage (Foundation + Slab) of the building development projects in Nigeria requires urgent attention for training and development of skills. This study revelation of the degree of compliance at 45% non-compliance, 35.5% partial compliance and 19% full compliance together with sub-divisional stages of the projects case measurement and the indicators (activities) clear regulatory compliance measurement into non-compliance, partial and full compliance not only draws attention to building construction skills shortfalls, but the results should help inspectorate, policy makers and relevant professional bodies in addressing the issue of enforcement and monitoring process within the NVQF.

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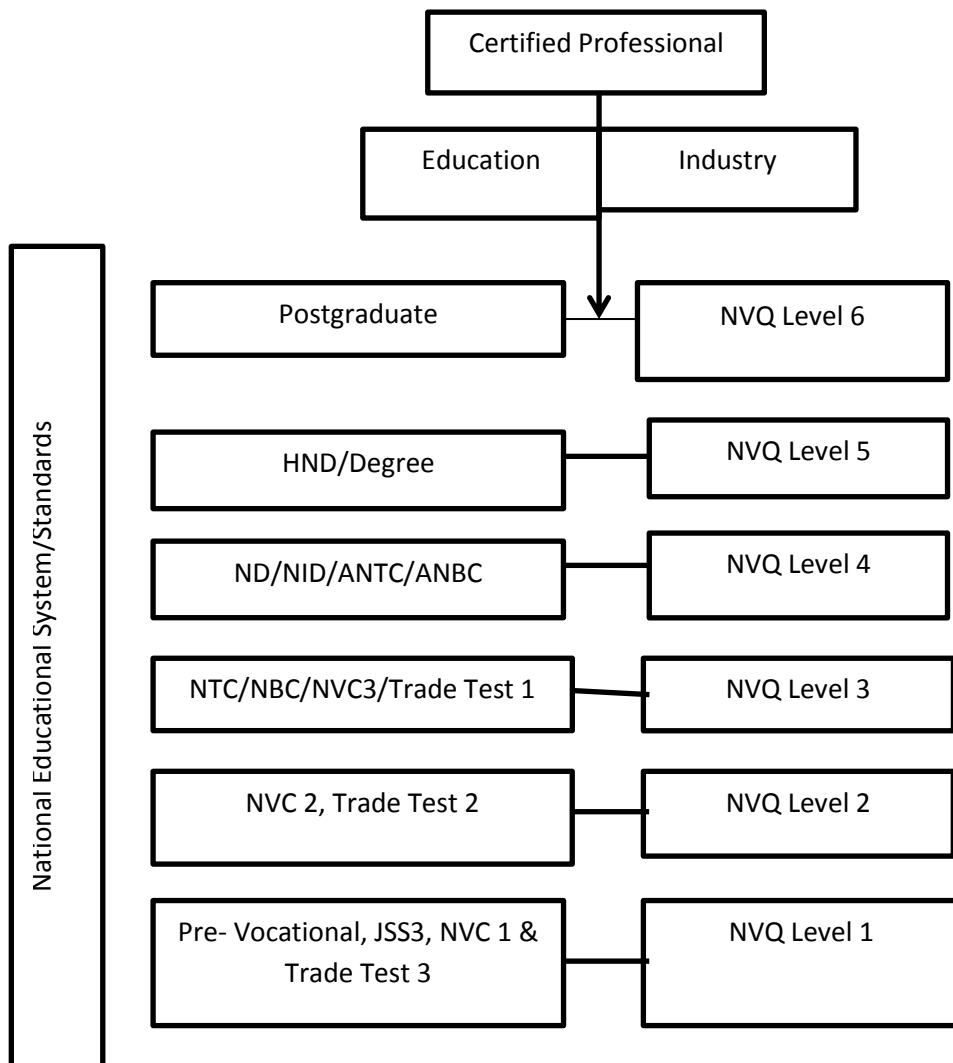


Figure1. Education and Industry certification matchup

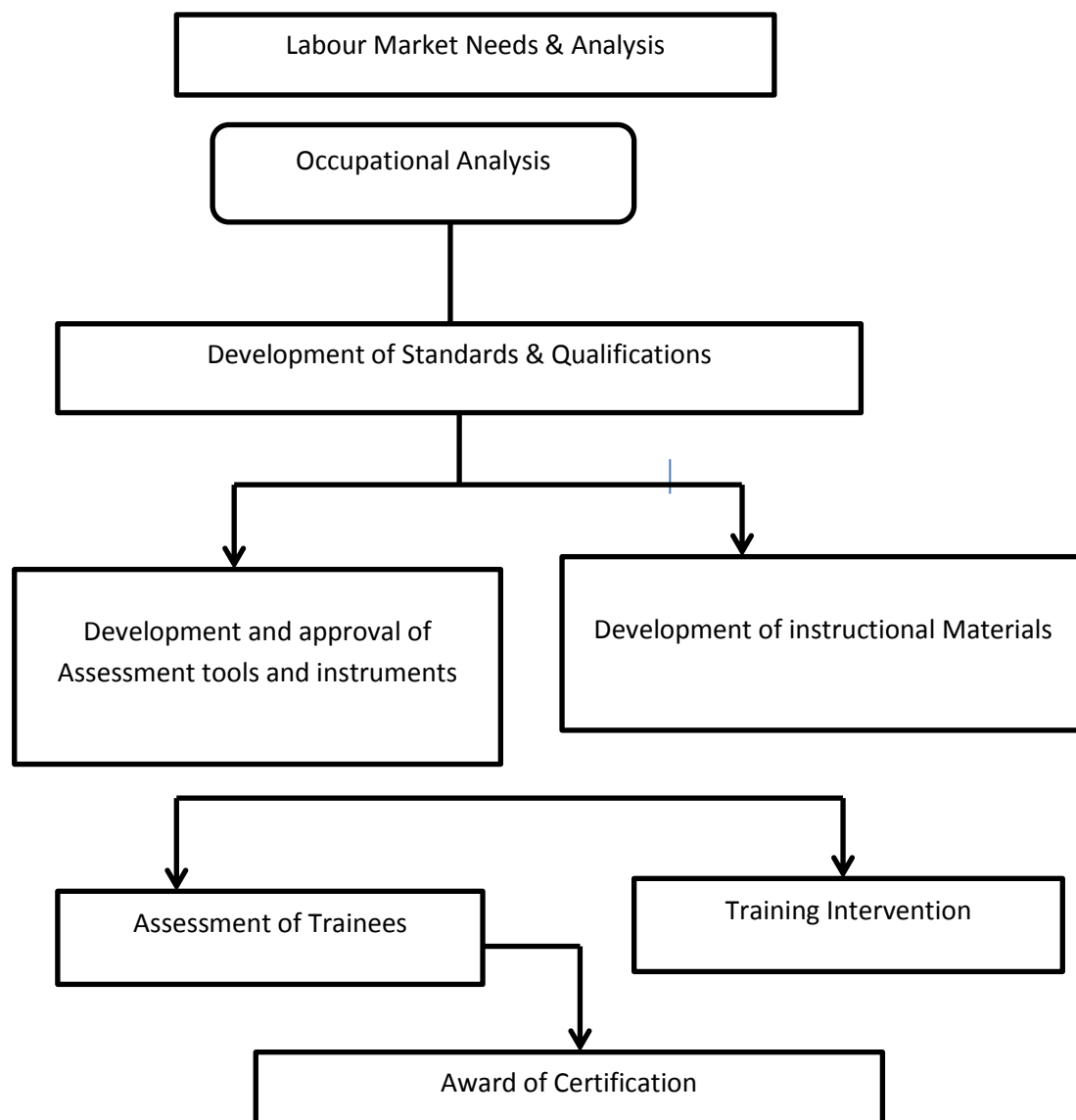
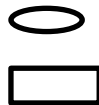
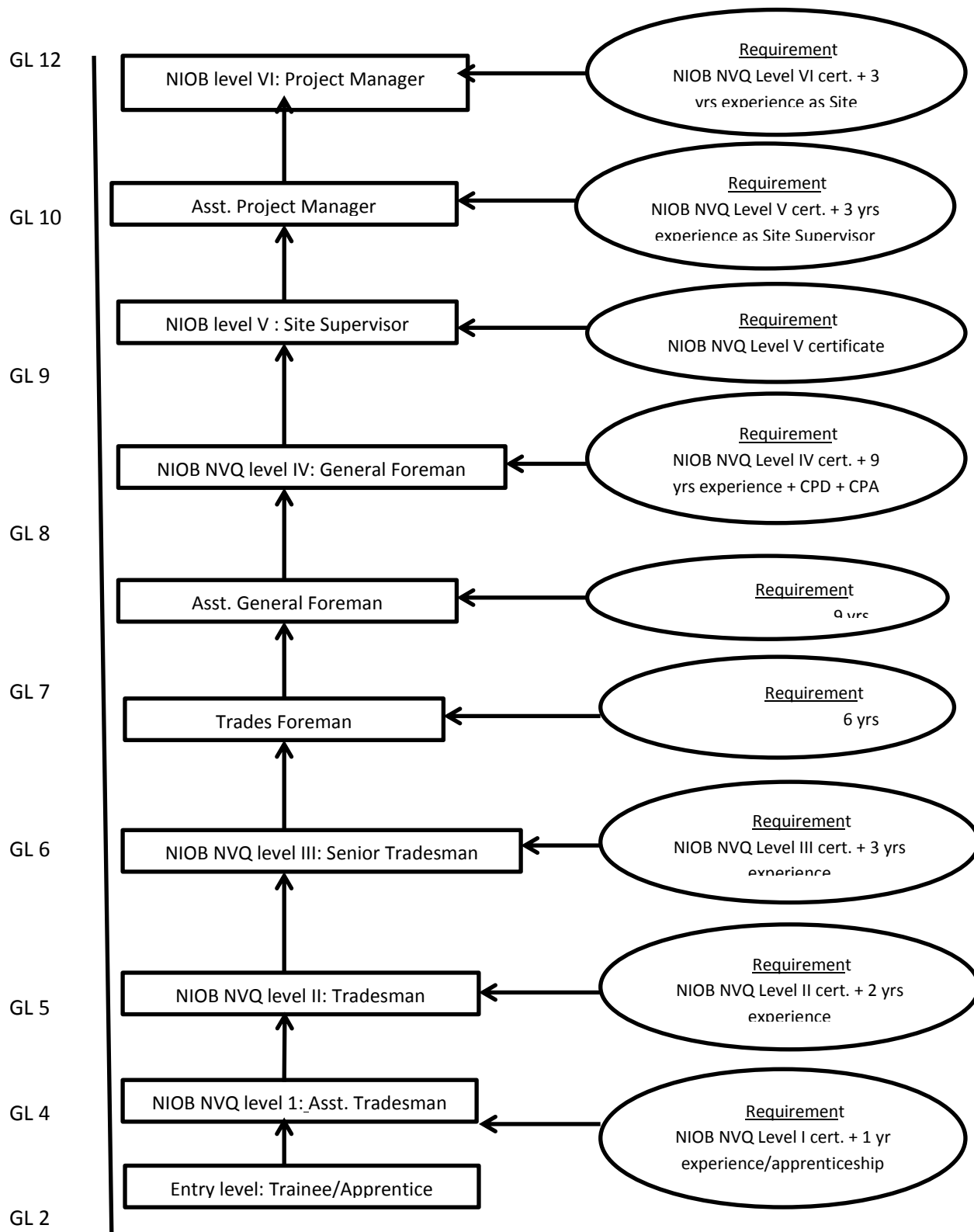


Figure2. Schematic diagram of technical work competence for certification

Source: The development of NVQF for Nigeria, August, 2011 adapted from (Okwa and Musa, 2015)



Public		CPA- Continuous Performance Assessment
Service Salary	<u>Legend</u>	CPD- Continuous Professional Development
Grade Level	What must be done to move up	
	Where you move up to	

Figure 3: NIOB Skills Assessment & Certification Board/NVQ Progressive Chart for craft skills

Source: Joint CORBON-NIOB report/proposals to council (April, 2015) Adapted from (Okwa and Musa, 2015)

FIELD SURVEY PICTURE PRESENTATION



Example of MRRB: 2 Bedroom Semi-Detached Residential Building with Low floor level therefore possibility of dampness to weakling the foundation



Source: Field work survey (2015)

Example: 1 Bedroom Twin Flat Residential Building

Issues: No standard set-back, 100mm over-site concrete, No building approval, no structural engineer, 2 meters soak away pit digging.



Source: Field work survey (2015)

Dampness due to foundation depth



Source: Field work survey (2015)

Incomplete foundation footing but foundation blocks wall in-progress. Foundation wall for Multi-storey construction in progress while a foundation level has not been determined, Depth of 900mm instead of 1500mm depth in an un-approved structural drawings



Source: Field work survey (2015)

Foundation depth measurement



Source: Field work survey (2015)

Concrete Blinding 16mm, concrete footing 220mm and foundation wall measurement



2 Bedroom Storey Building: The owner genuinely wanted to know why this structural problem could not be solved. I opted to resolve it and the discovery was that no foundation existed under that 225x225mm wall, maybe to reduce cost. No column in the wall span.



Source: Field work survey (2015)

Reinforcement rod exposed



Source: Field work survey (2015)

Structural crack of building under construction as a result of weak load bearing sand Crete block



Source: Field work survey (2015)

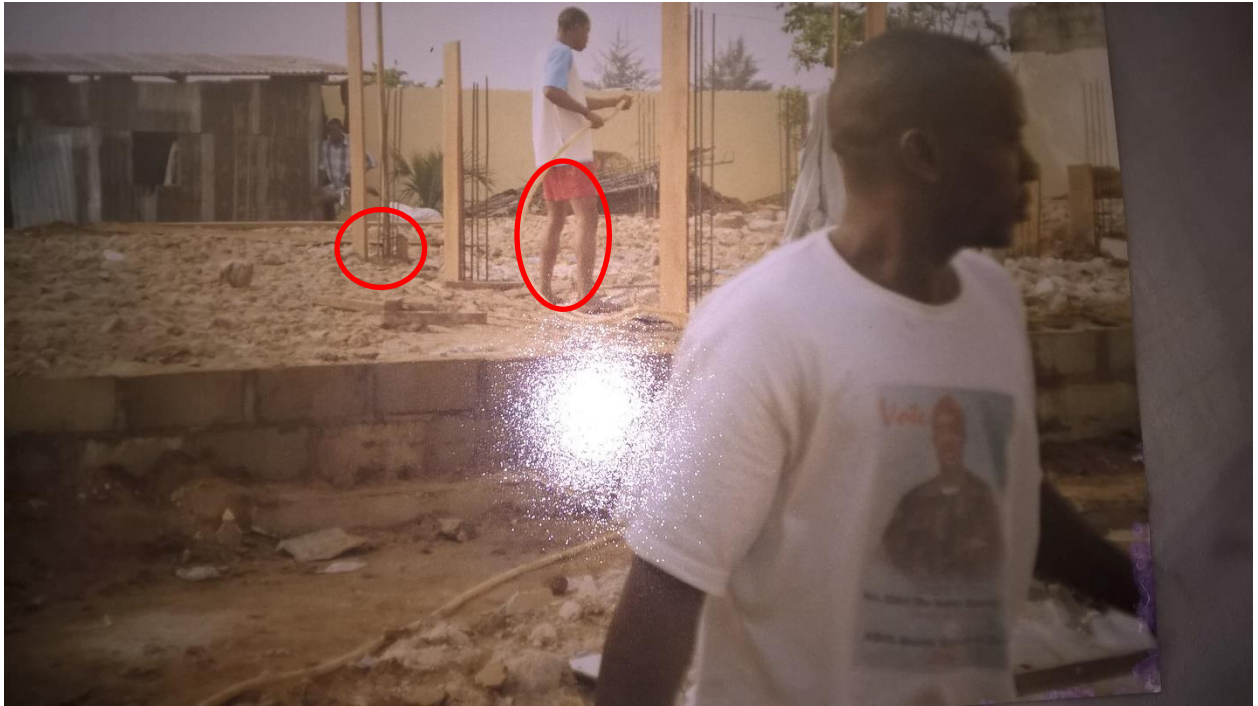
Stop work order but formwork centering construction in progress



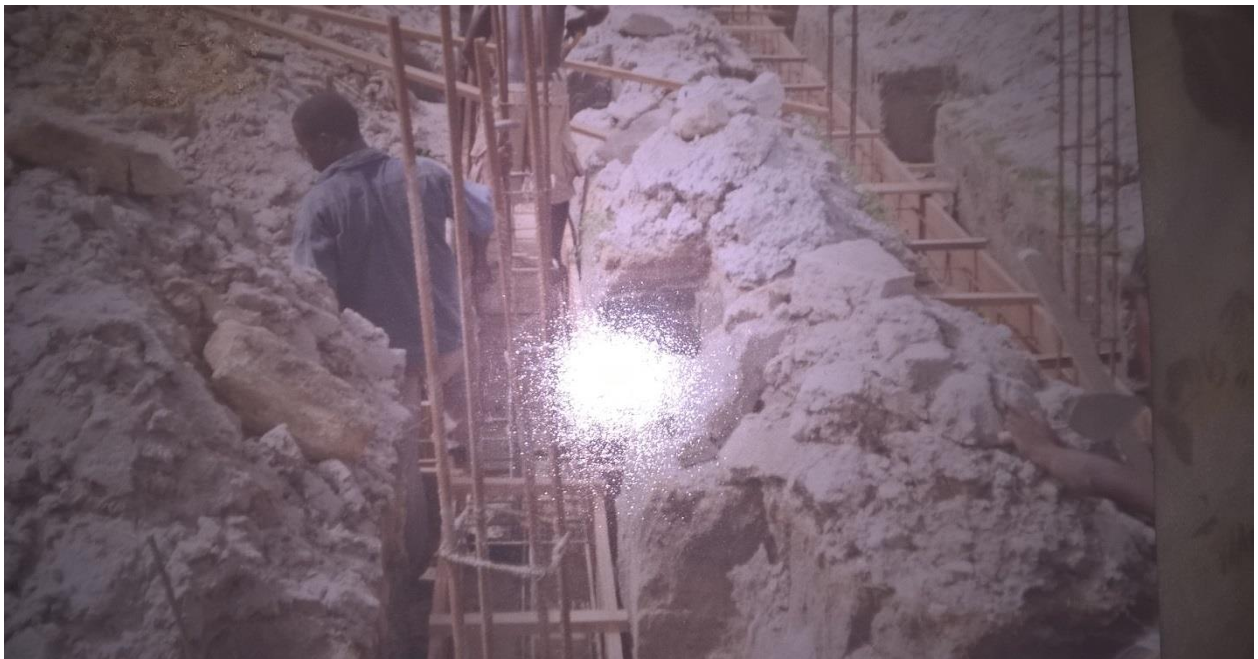
A brick layer supervising first floor reinforcement placements



We met this group placing staircase starter, no professional except an elderly brick layer in charge of the work



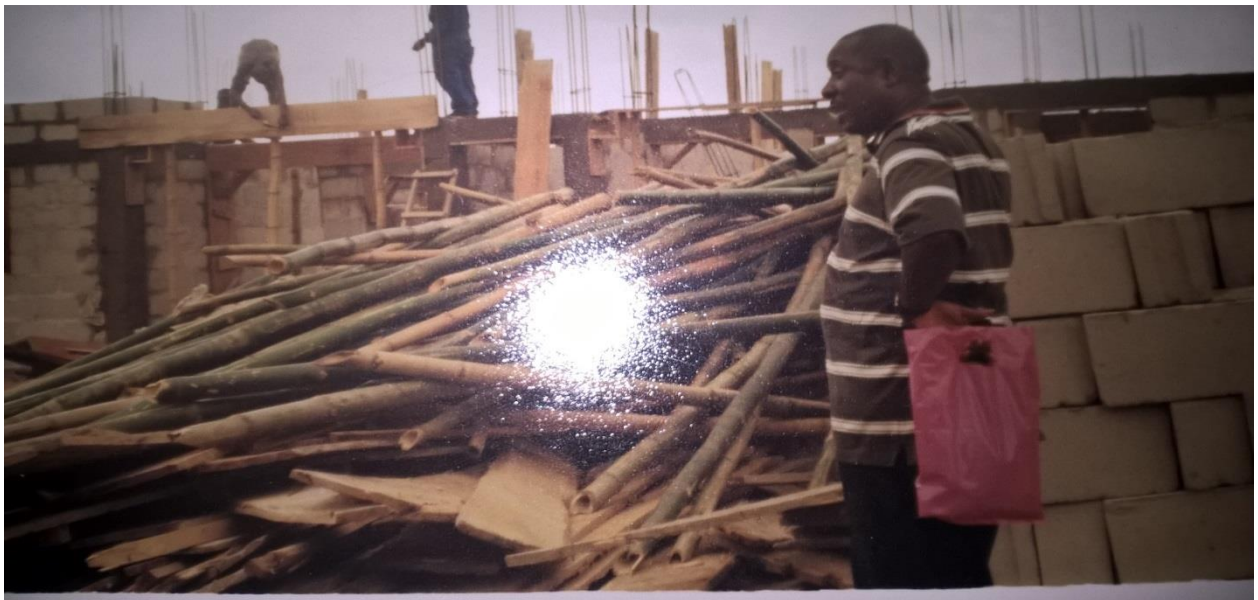
Rush construction: foundation wall, earth filling, and water used to compress the earth by soaking.



Very weak soil



2nd floor manual concrete placement and unprofessional staircase construction

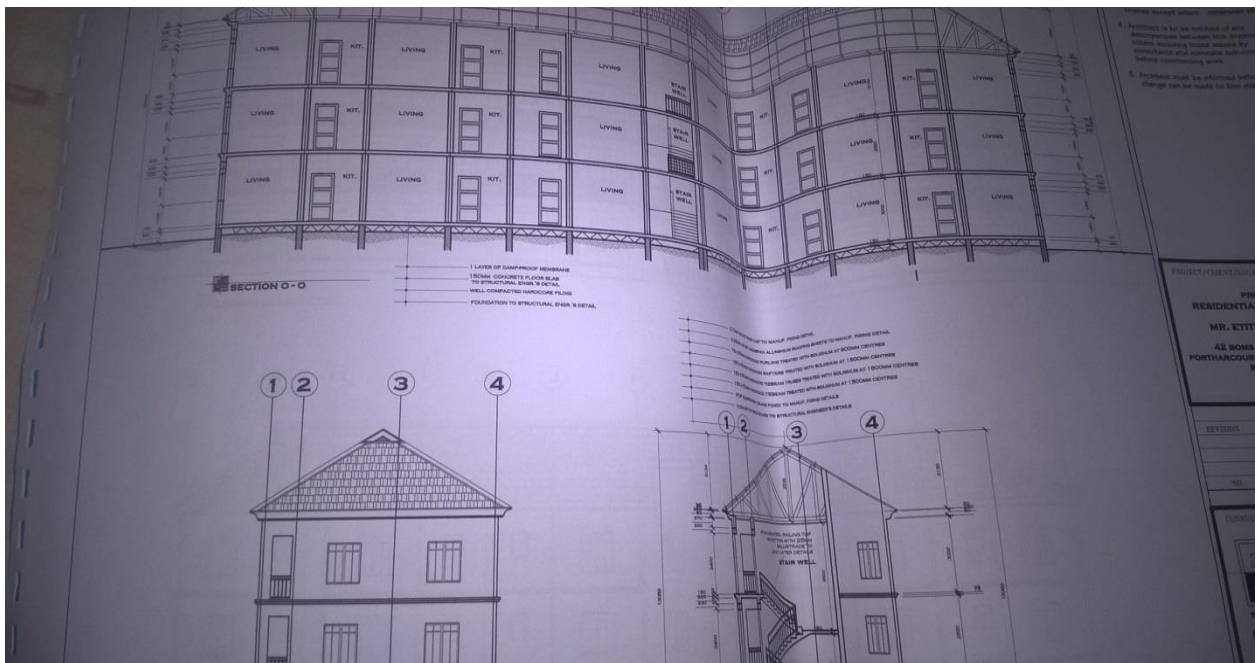


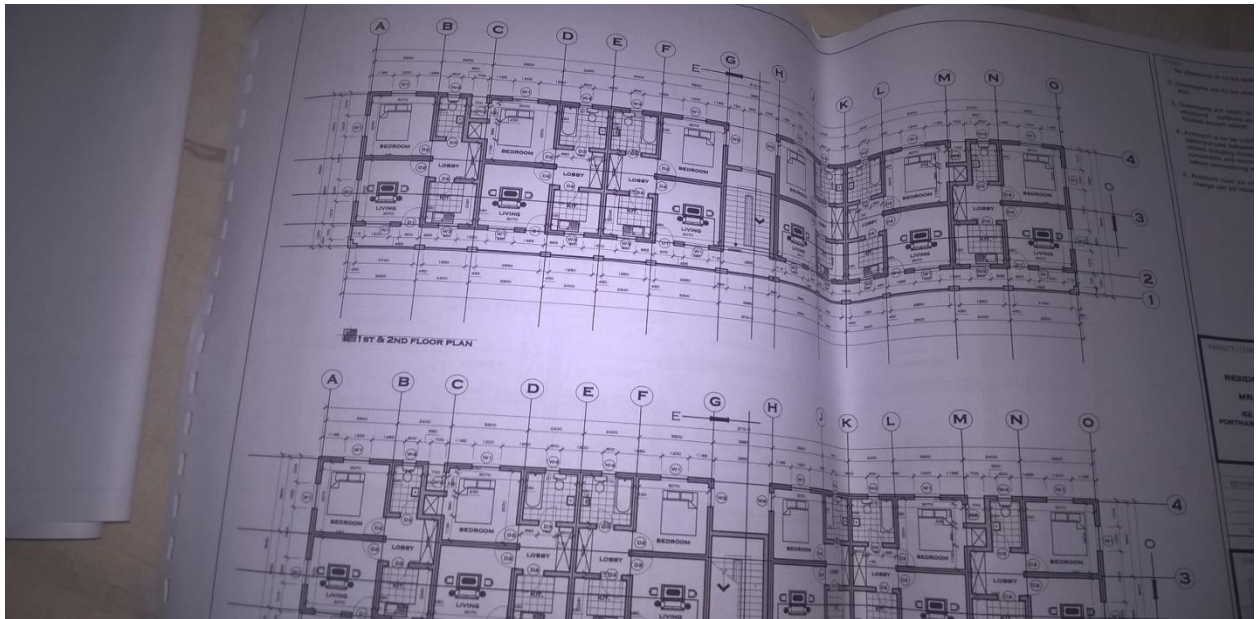
This supervisor is a complete non-professional at the mercy of the artisans. He is a material supplier.



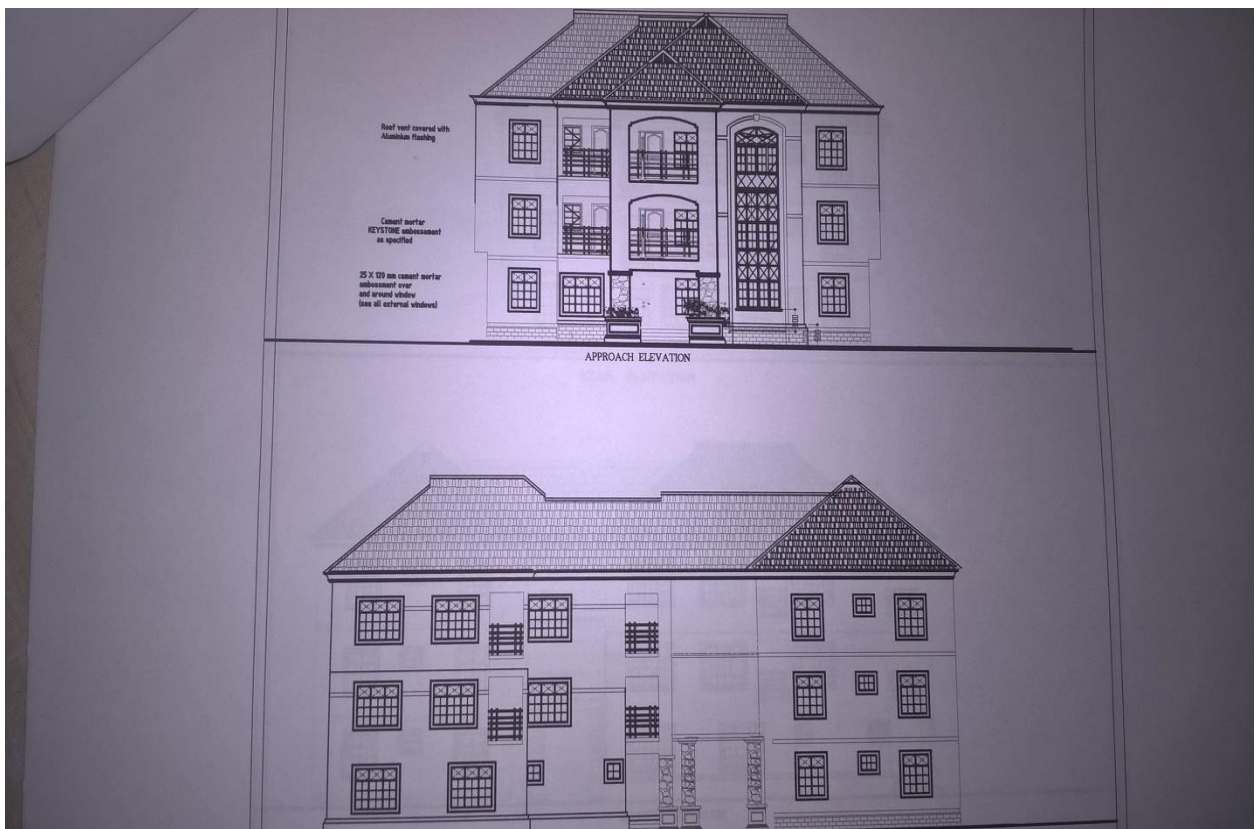
This roofing system is new in purlin spaces, sizes within the construction industry in Nigeria. The industry needs criteria to measure and certified the construction techniques.

Some Drawings on the on-going projects without standards approval

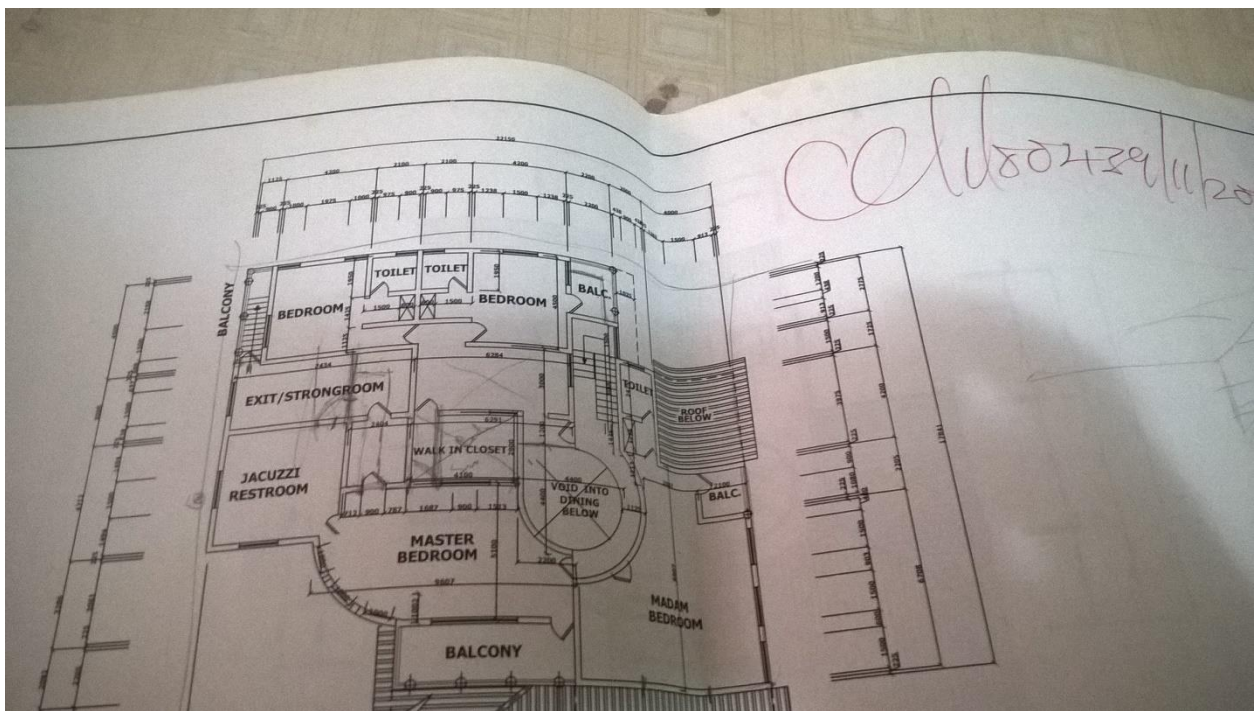
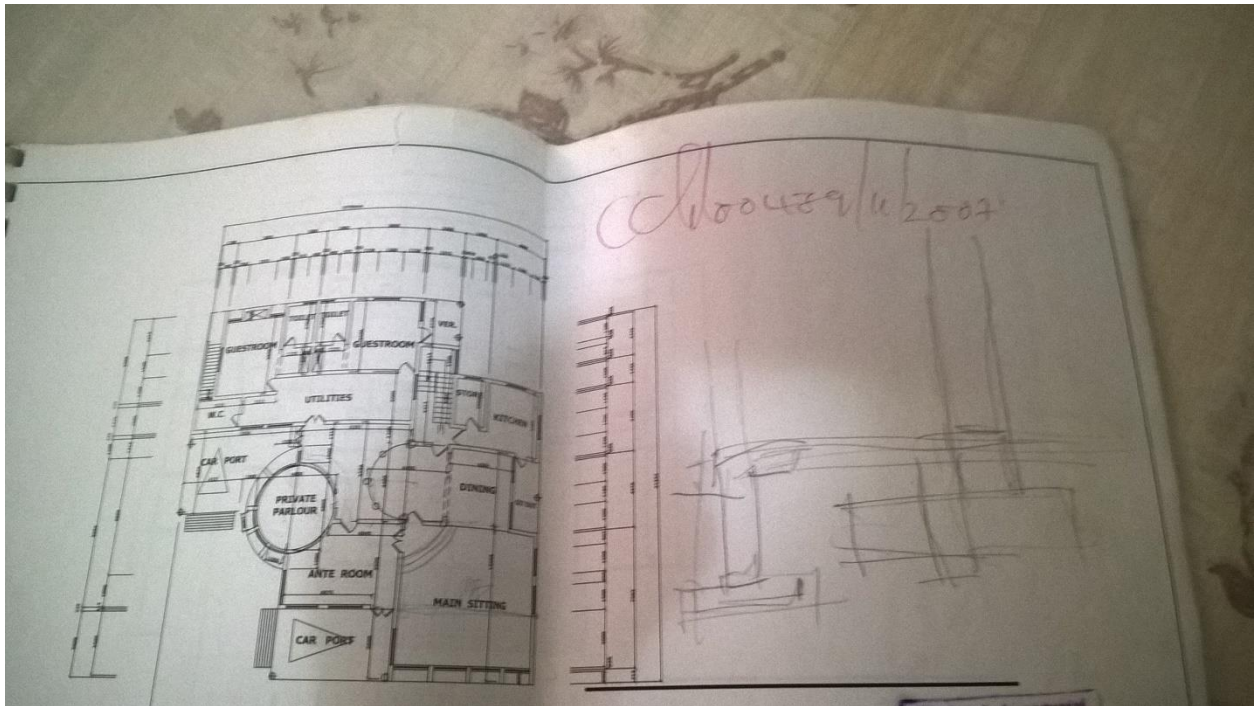




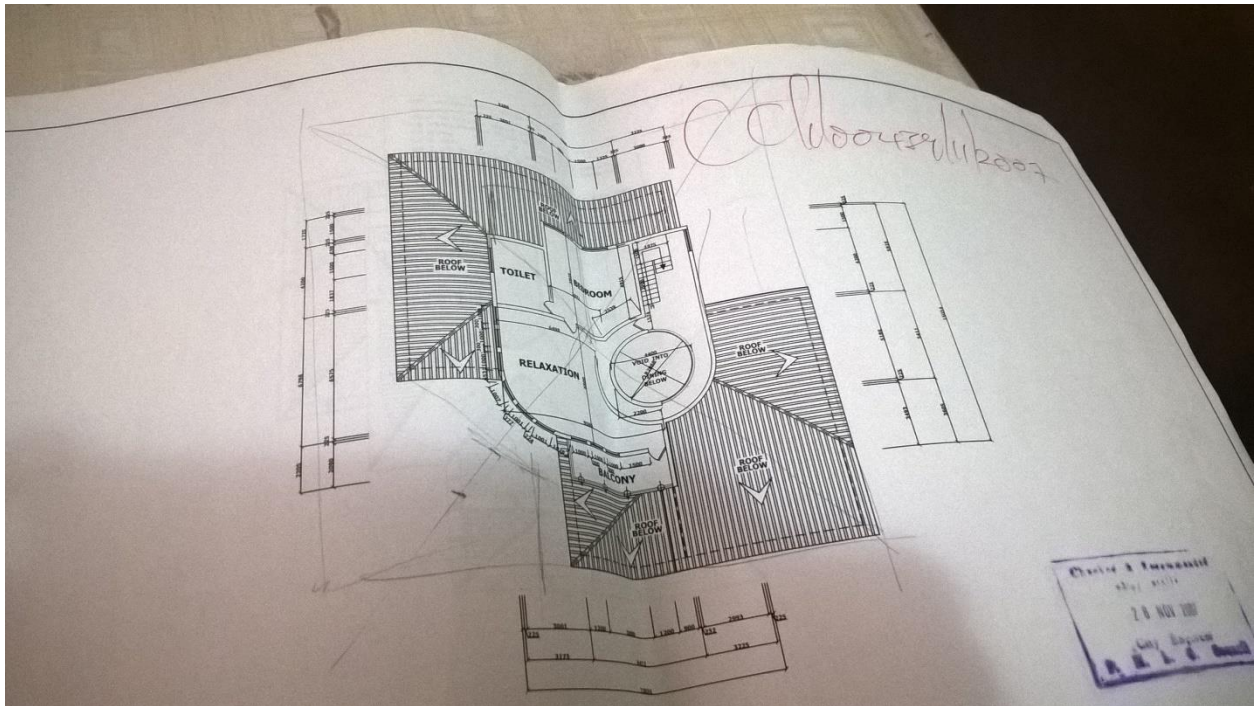
Developmental projects without standards approval drawings



Some standards Approved drawings with corrections without site follow-up inspections for enforcement



No site follow-up inspections for enforcement



FOCUS GROUP DISCUSSION PICTURES

Research professional discussion



Source: Field work survey (2015)

Research professional discussion



Source: Field work survey (2015)

Focus group, Builder's cross-section



Focus group mixed professionals discussion



Source: Field work survey (2015)

Focus group small professional section discussion



Source: Field work survey (2015)

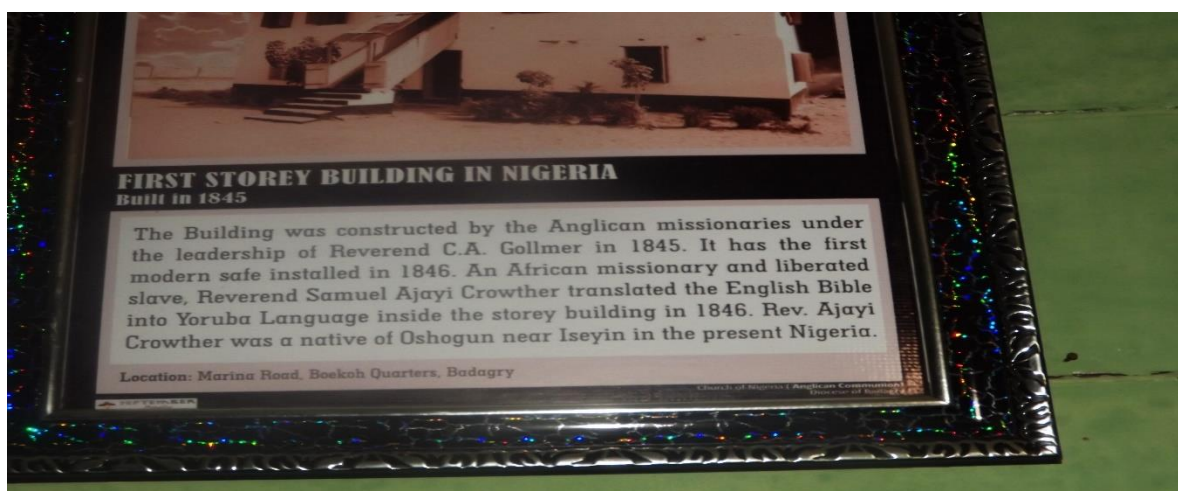
AGM/Annual conference questionnaire survey distribution and contribution



Source: Field work survey (2015)

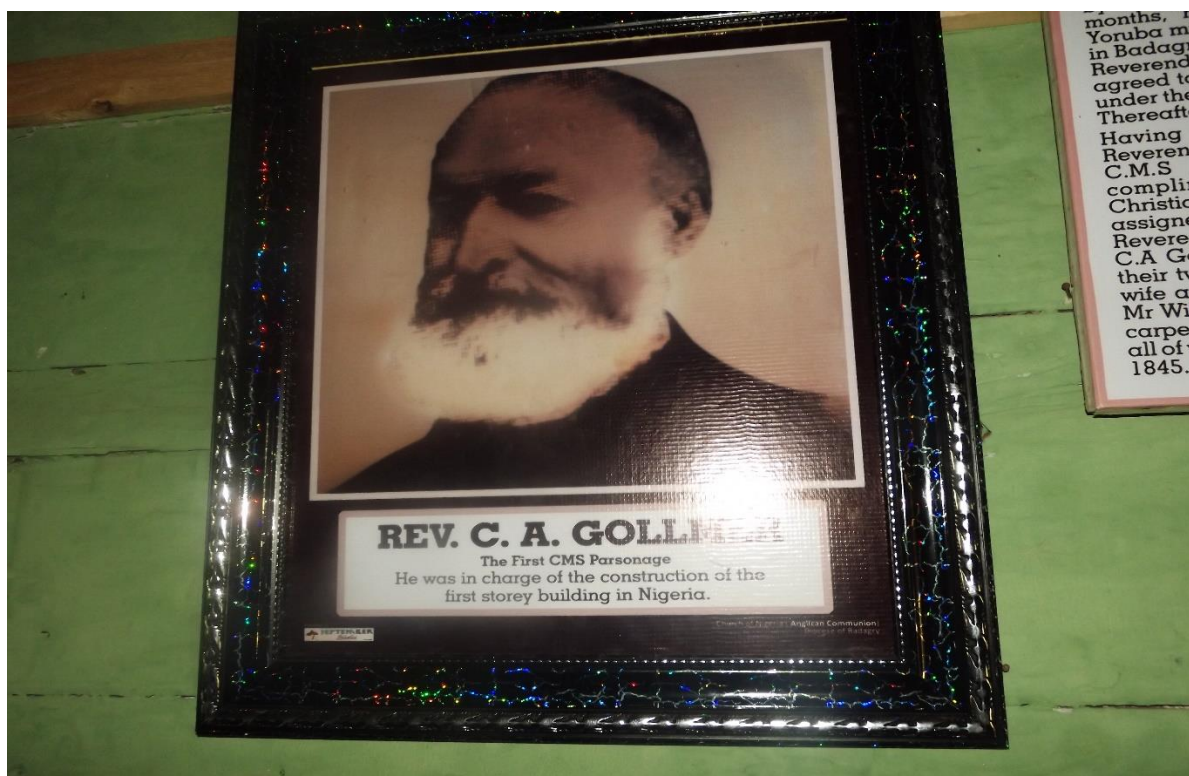
First storey building in Nigeria at Badagry. Built in 1845 by Anglican missionary Rev C. A Gollmer.

6 bedrooms, 2 sitting rooms, 3 stores and kitchen, toilets & bath are outside the building. 44ft length and 26ft in breath at the cost of £325



Source: Field work survey (2015)

Displayed frame within the building



Source: Field work survey (2015)

Displayed picture frame of Rev. Gollmer, the supervisor of the first storey building in Nigeria.



Source: Field work survey (2015)

Wooden Staircase with Minor repairs since 1845.



Source: Field work survey (2015)

Floor of the 1st storey building

Standard Materials



Source: Field work survey (2015)



Source: Field work survey (2015)

Roofing sheet displayed by the museum curator. It was heavy and very thick compare to what we have today.



Source: Field work survey (2015)

The galvanized roofing nail. Far thicker, longer and heavier than the current nails in the market



Source: Field work survey (2015)

Quality hinges since 1842. What we have now are substandard to this



Source: Field work survey (2015)

Displayed burnt bricks since 1842



Source: Field work survey (2015)



Source: Field work survey (2015)

The first storey building in Northern Nigeria called the “Watch Man’s Tower or Lugard Gate” from where the prisoners were monitored. Built in 1901