USER REQUIREMENTS IN THE DESIGN OF MULTI-STOREY RESIDENTIAL BUILDINGS, IN LAGOS STATE.

By

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DEPARTMENT OF ARCHITECTURE,

FACULTY OF ENVIRONMENTAL DESIGN

AHMADU BELLO UNIVERSITY, ZARIA

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NIGERIA

April, 2018

Declaration

I declare that the work in this Thesis entitled '**USER REQUIREMENTS IN THE DESIGN OF MULTI-STOREY RESIDENTIAL BUILDINGS, IN LAGOS STATE.**' has been carried out by me in the Department of Architecture under the supervision of Prof. M. L. Sagada. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at this or any other institution.

Oluwatosin A. Iselowo February 2016

Certification

This dissertation entitled 'USER REQUIREMENTS IN THE DESIGN OF MULTI-STOREY RESIDENTIAL BUILDINGS, IN LAGOS STATE.' by Oluwatosin Aminu ISELOWO meets the regulations governing the award of the degree of Master of Science Architecture of the Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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Dedication

I dedicate this research work to my Mum, Olabisi Funmilayo Selowo. Her steady encouragement motivated me to finish this work, and to my Dad for his financial support.

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Abstract

In the last decade (2006 - 2016) the problems of housing provision remain recurrent and is often characterised by rapid population growth beyond the means to provide one; the need for better designs and housing deficits especially in urban areas. Proffered solutions have included mass housing estates, storey buildings and low-cost housing schemes. Most of these schemes recorded little or no success as the intended end users, people better suited to provide valuable information about their required housing needs being left out of the process, giving rise to post-occupancy reconstruction and abandonment problems. This research is an investigation into the design requirements (i.e. spaces, functions and services) of multi-storey residential buildings gotten from the questionnaire survey conducted on current occupants of two multi-storey buildings in Ikoyi, Lagos state, and the integrating the findings from this research into the design of a proposed multi-storey residential building in Lekki, Lagos State, The methodology for this research involves descriptive analysis of responses from 55 respondents (74% retrieval rate) of a 75 numbered questionnaire survey administered to respondents in two locations in Ikoyi, Lagos. Results show functions and services rating higher than the conventional residential spaces, however 30.9% showed the need for more bedrooms, which revalidates the need for closer prior consultation with would-be beneficiaries of mass housing scheme.

1.0 INTRODUCTION

1.1 Background of Study

Recent studies have shown that housing delivery is a highly contentious and politicized issue that is of great concern to administrators, scholars and the public in Nigeria (Sule, 2006). Housing deficiency is one of the major social issue Nigeria currently faces. Nigeria suffers an eighteen million deficit in housing units (Onwuemenyi, 2008). Despite numerous government intervention policies and programs towards remedying the worsening housing problem in Nigeria, the situation has persisted unabated (Anunike, 2011). Contributing factors to these gross amounts in housing deficiency can be attributed to the following:

High cost of housing units

High cost of land

Quality of housing units and

User preferential satisfaction with the housing prototypes provided for them.

The design of a multi-apartment Schemes is most times targeted at an unknown set of users, and considers only immediate needs (Okopi, 2010). Exploring user design requirements of houses to be provided for them, will explore user participation in design and implementation works, in management and maintenance works and in social relations activities as researched by (Ammar, 2013).

Finding out what users actually want for a home and what they are willing to pay for will hopefully curb the issue of available but unoccupied houses (Umar, 2015) as is observed in Abuja.

Different housing schemes have been adopted in tackling the housing issues observed in Nigeria. Though little cognizance has been given to the actual targeted users design requirements and typology of housing they actually want provided for them.

Some of the housing schemes adopted since the Gowon administration have included; Federal mortgage bank scenario; Government Owned Housing Development Agencies; and in recent times the Private Estate Developers, are being undertaken to better the current housing deficit situation. Studies have shown that successive administrations in Nigeria had launched a minimum of seven public housing programmes in the last few decades in a bid to address increasing housing challenges in the country (Onibokun, 1985; Awotona, 1990; Ogu, 1999; Ogu and Ogbuozobe, 2001; Ajanlekoko, 2002; UN-HABITAT, 2006a; Akinmoladun and Oluwoye, 2007; Ademiluyi and Raji, 2008).

Most of the housing schemes that have been planned for the Nigerian people have failed to tackle the issue of housing deficiency (Fadason, 2015). The 3rd National Development plan of 1975-1980 showed how government tried to provide houses in large quantities throughout the country regardless of location, climate and culture. This same mistake was continued in the National Housing policy of 2002, the mistake of providing same house types around the country has been suggested as a major reason for the failure of the policies (Aribigbola, 2008).

The implementation of this ideology through public housing in Nigeria has been beset by many problems (Maina & Haruna, 2014), These include disjointedness in policy implementation by successive governments (Adejumo, 2009; Jinadu, 2007; Matazu 2008); top-bottom approach to policy formulation (FGN, 1991); inadequate professional input and coordination at Local Government (LG) level (Maina, 2009); centralized designs, scope and

construction for housing Schemes; inconsistent standardization of housing units; poor integration of housing with the communities they are meant to serve (Popoola, 1984); poor location of prototype units (Maina, 2013b); problems accessing land, finance and an inefficient housing market; poor knowledge and enlightenment of the public on issues regarding funding options for housing; poor coverage of Primary Mortgage Institutions (PMIs); high cost of building materials and poor encouragement of locally available building materials (FGN, 1991). Issues affecting public housing delivery in Nigeria can largely be attributed to the lack of political will by successive Nigerian governments (FGN 2006; Adejumo, 2008) and inadequate implementation in a totally different socio-cultural and economic environment from the UK where it was imported. The latter is partly responsible for the poor involvement of citizenry in the overall schema of public housing in the country until of late (Maina & Haruna, 2014).

It can be assumed that the realisation of the failure of the policies led the government to call for the private sector to play active role in mass housing provision. It is safe to say that an assumption of user needs was made or User requirement were not put into consideration during the development process. In organisation development, Barrett (1995) explains that Users participation encourages Users to make decision about their own environment. Barrett further states that if users are involved in the design of their building it can contribute to their understanding and acceptance of the final product.

To avoid same mistakes of the past it is important for user participation to be explored, to Figure out User design requirements. A noticeable research gap common in the business of providing mass housing in a bid to tackling housing deficiency, is the need to seek feedback from Users of residential buildings, to see if Users design requirement are met, if not, possibly

Figure out what Users of residential buildings want and need. This research will seek to Figure out the design requirement for Users of multi-storey residential buildings which seems to be a new trend to the Nigerian housing scheme projects

In line with these past housing scheme, most recent to the list is the mass high-rise residential building apartments upcoming in Nigeria's commercial centres like Lagos and Port Harcourt. The present ongoing development of the Eko Atlantic city project in Victoria Island Lagos, is an example of multi-storey high-rise housing. The average price for a two bedroom apartments in one of the high-rise towers currently under construction is about US$853,750 (₦168,188,750), and a three bedroom in the same tower US$1,010,000 (₦198,970,000), (Uwaegbulam, 2015). Cost wise this apartment are too expensive for the middle and low-income earners but the question remains, will it meet user requirement of the homes they actually want?

"Look before you leap" is a popular admonition for those who want to act, without first weighing the possible long-term consequences of their actions. It speaks to a wide segment, if not all of human actions, that we may not rush into taking decisions that are likely to have far-reaching implications at a later date. The reason why individuals, groups and organizations need to look carefully before they leap is to save them from feelings of guilt and regrets, this could involve business partnerships, or even political associations, entered into by individuals and groups." (Alabi, 2015). This being said, Nigerians might be known for their jump in head first, Figure it out later attitude when it comes to housing provision to tackling housing deficiency, we often adopt architecture from other cultures and countries without modifying to suit our particular architectural preferences. In Nigeria, government initiative in fulfilling campaign promises of housing provision underscores the significance

of users' satisfaction evaluation; what is important is to have their promises fulfilled in any form of design, at any location and with whatever facilities they can lay their hand on at the time of construction (Fadason, 2015).

Multi-storey residential housing is somewhat new to Nigeria. To prevent another failed housing scheme, it is essential to Figure out user design requirements for any specific residential typology to be undertaken especially in Nigeria due to different economic levels and Nigeria's ethno-cultural vastness.

1.2 Problem Statement

It is unclear what the specific user needs and requirements for housing in Nigeria are, which in part due to the vast cultural diversity of Nigerian ethnic groups.

Post occupancy reconstruction, poor user satisfaction during post occupancy evaluation, housing abandonment and the need for better housing with change in economic class, are all issues which are core problems in housing development, which further stresses the need for the provision of precise housing needs of users of residential multi-storey building in this case.

Sarnoff (2000), opines that the involvement of users becomes vital where housing units are to be adequately occupied.

1.3 Aim and Objectives

1.3.1 Aim

The aim of this research is to determine user design requirements in the design of residential multi-storey buildings in Lekki, Lagos State.

1.3.2 Objective

1. To identify user design requirements for multi-storeyed residential buildings established from literature review.
2. To assess through local case studies on multi-storeyed residential buildings in Lagos state to see if user design requirements have been met.
3. To establish the specific user needs and requirements for Multi-storey residential buildings in Lagos State.
4. To execute findings from the study in the design of a multi-storeyed residential building capable of satisfying user design needs.

1.4 Research Questions

1. What is the level of acceptability of residential multi-storey as a typology by the current occupants in Lagos State?
2. What are the design requirements for users of multi-storey residential buildings in Lagos State?

1.5 Justification

Housing still remains a major social issue in Nigeria this can be seen in the estimated eighteen million housing unit deficit currently observed in the country, showing housing issues are a current problem in Nigeria.

Past failed housing schemes; issues of unoccupied or abandoned houses and expensive unaffordable housing units and the need for better housing with change in economic class justifies the need to explore user design requirements in the new trend of multi-storey residential housing schemes. Findings from this dissertation would also help economist better manage funds for the tackling of Nigeria's eighteen million housing deficit.

1.6 Scope of Study

The vast diversity of the Nigerian culture and ethnicity hampers a broader and more generalised research. The scope of this study is limited to users of multi-storey residential typology in Lagos State, where the research has been conducted.

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter explores further, the background of study to this dissertation. An in-depth literature review of works done in this field will be reviewed, definitions of key variables would be used to guide understanding of readers to the specifics of what the gap in the research are, the researcher opinions and other opinions alike.

2.2 Users

According to Merriam-Webster dictionary a user is one that uses. This dissertation explores users design needs in multi-storey buildings. This dissertation is a research that aimed to Figure out the design requirements for users of multi-storeyed residential building. User design requirement can be said to be a type, under the broader scheme of user participation. These Users' participation can be classified into three types of participation.

1. The design which includes its space organization, layout and facilities provided,
2. In management and maintenance works and
3. In social relations activities. (Francescato, Weidemann, and Anderson, 1987); (Ammar, 2013)

The reason for the lack of sustainable housing schemes vary from the type of housing design, materials, construction method and participation of end-users of the housing scheme (Adedayo, 2012). Also stating that it was possible to solve the problem of construction materials and method, the issue of the house design and users are closely related and dependent and it is these two issues that clearly affect sustainability from housing design of the housing schemes.

User survey can be carried out in different forms among which are;

1. Collaborative; where the user works hand in hand with the architect and design team to accomplish what the user wants.
2. Pre-design survey; which involves interviewing the users with high prospects of living in these homes so as to be able to have an idea what their actual desire is, this is often times termed as the "transparent" means of survey.
3. Cosmetic; this involves a pre- design survey also, but in this case, they are not aware of the results and different methods of attaining the users desires are approached by actually offering home designs in different and miscellaneous ways.
4. Other outstanding methods that will improve the user-architect interaction should be explored in order to have a successive procedure of the design, even after the complete construction of the homes, due to permanence in change of individuals. These recommendations are also bound to be implemented if government, developers and housing authorities enforce user participatory process in housing developments.

2.3 The Definition and Importance of User Participation

User Participation in design and implementation is a major concept that is worth investigating for several reasons. Users' participation is a good way to improve the quality of residents' life but it needs willingness and ability to participate (Geary, 1994). It is essential to find residents who are willing to offer time and effort to participate (Coit, 1984). Residents should be encouraged and not forced to participate. Creating the enthusiasm and motivation of residents to participate is difficult while it is easy to kill it (Reinhard, 1984). Residents who participate in the design process will not obstruct the implementation but they may participate voluntarily in implementation process and maintenance works in the future (Reinhard, 1984).

When a user participated, he carried the responsibility with the architect and cannot blame him for any design problems (Saleh, 2006) Moreover, the user will defend about the design in front of others. Participation is the right of users as they support the construction costs (Coit, 1984). The owners should participate in the design process to achieve a sustainable design which meets the users' needs and desire (Adedayo, 2012). Participation is the residents' right since its outcome will affect their life after residing (Reich, 1996). Participation has its roots in the Latin words "pars" and "capere" which mean "part" and "to take." The meanings of the word in English dictionaries often include the following; partaking in something, association with others in a relationship, social interaction in a group and taking part with others in an activity (Dijkers, 2010). Fredrik (1986) defined participation as a general concept covering different forms of decision making by a number of involved parties. It can be active or passive depending on the level of residents' involvements. In this study, users' participation means taking part with others, mainly the designers to get a proper quality of houses.

It is however sad that the houses often times do not get to the proposed users because the housing process did not start by identifying them (Adedayo, 2012). It is observed in Nigeria, that developers put up laws restricting house owners from making changes rather than understanding the needs for these changes and adopting a method that meets both parties.

Qusoiri, Bambang, & Johnny, (2010), Stated the significance of User participation in housing schemes as one which gives a better end product than the designer working on his own, reflecting the needs and desire of the residents.

Figure 2.1, shows a summary about the importance of user participation, how User participation leads to housing quality and ultimately the user satisfaction.



Figure 2.1:Attaining User Satisfaction.
Source: (Deniz Emine, & Ömer, 2010

2.3.1 Problems of Non-User Participation

The problems of not allowing users to participate in housing designs in mass housing schemes as is the case with individually designed houses have been enumerated by (Adedayo, 2010). These problems include

1. Post Constructional changes, in the form of addition of fences; addition of outdoor kitchens; addition of shops;
2. Maintenance problems due to post constructional changes without the consultation of professionals like housing providers and architects.
3. Abandonment of buildings

Users carrying out changes to their individual housing units can be seen as attempts by the users to personalise the houses so as to meet their needs and equally create an identity for their homes. This implies that the method applied in the provision of these housing estates do not often meet the needs and aspirations of the owners. (Adedayo, 2010).

It is these problems that make the housing designs unsustainable and promote the need for participation in housing designs by users.

2.4 Sustainability and User Design Requirements

In Nigeria, design requirements are often subjected to the Architects decisions. Final home designs drafted only retain communal space, with other designs types, especially in residential cases. Most modification and differences appear in space sizes, arrangement and finishes (Adedayo, Ayuba, Audu, & Oyetola, 2013). The basic design consideration for luxury homes has been space, materials and aesthetics; much attention has not been paid to user's requirement, this has led to continuous post-constructional transformation of these buildings (Adedayo, Ayuba, Audu, & Oyetola, 2013) . Landis (2008) stated that the basic responsibility of the architect or designers apart from creation of drawings and specification for homes designs is that they should also endeavour basic design requirement are provided by final homeowners, by using these information buildings requirements are met ranging from the site to the primary interior spaces.

Design requirements refers to a particular quality or performance demanded of a design in agreement with certain fixed regulations, these requirements are often not enforced from the outside; it is a factor which is judged according to the nature or circumstance of a building design. Meeting up these fundamentals are important to what is being designed and where the design is to be located. Residential designs in most cases have a recurring requirement type basically the living, sleeping and service zones. Leif (2012), stated that the holistic approach of meeting up client's requirement in home designs is by creating a platform where they can fill up a form stating the family needs, the kind of architectural style (say; contemporary, Mediterranean, modern/ultra-modern, Victorian) all the way to declaring the different kind of spaces required in the home to be built. Future planning will therefore

include information obtained from the users themselves, adapting the houses to the end-users is far more preferred than forcing the end-users to adapt to the houses.

According to (Azevedo, Maciel & Rego, 2007) where it quoted Brundtland report WCED of 1987, sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs. It can be deduced from this view that sustainability is not a permanent event and that it is expected to meet the current needs of the people. In determining the sustainability of any housing design there are issues which the design is expected to address. According to Hadjri and Onyango (2007), sustainable designs are expected to address the issues of carrying capacity of the natural resources, ecosystems, aesthetic qualities, human, built, economic social capitals and diversities. It is just not enough to provide a housing design or estate that meets all the other issues adequately without reference to the humans that will occupy it. (Adedayo, 2012), and when people participate in these housing designs you are bound to see differences in the design which are a reflection of personal needs and aspirations. (Adedayo, 2012)

The inability of many people not being able to engage the services of an architect according to Larson, Intille, Mcleish, Beaudin, & Williams (2004), is what makes people to choose a generic house produced by a housing developer.

2.4.1 Factors to be Considered for a Sustainable User Design

Apart from the need for the provision of housing to tackle the need for shelter and housing deficiency, Users' satisfaction cannot be down played in the entire process of housing provision. From the listed problems of not allowing User participation by (Adedayo, 2010), the following factors can be highlight to be of paramount importance when housing are to be provided for users. Proper study of these areas of interest will mitigate post

constructional changes and lead to more sustainable housing and user satisfaction. Some of these factors are listed below.

2.4.1.1 Family size

A common factor that is easily noticeable is the changes in family size. The family sizes of house owners often are never the same but a common housing design is often provided for them. It is possible for individuals to be at the same cadre in office and yet have different family sizes which could be as a result of the number of kids or even number of wives. A family with a large size would simply alter the house by either converting a garage to a bedroom or building additional boy's quarter.

2.4.1.2 House security

The issue of security is of great concern to home owners in housing estates regardless if the entire estate is fenced. Individuals always seek out ways of providing extra security for themselves and this they do through the provision of fences. These fences are often not designed by any architect and as such they often do not complement the house design.

2.4.1.3 Improved finance and expansion

Improved finance of the owners is a major factor that affects the nature and extent of the post-constructional changes in these housing estates. It is common to find changes taking place when the financial capability of the house owner improves which could be as a result of either a promotion, increase in salary or inheritance. Whichever the case is it simply means that when house owners have more money to spend they are most likely going to try to improve their house.

2.4.1.4 Identity creation

Human beings usually like to be different from each other, however the housing designs in mass housing does not reflect this. It is therefore common to find house owner within the estate trying to differentiate themselves from others so as to create an identity for them, this identity they seek to create is a key factor in post-constructional changes. The changes could be as little as painting the house a different colour or as much as structural changes.

In conclusion it can be said that it is always easier to adapt homes designs to style and desire of individuals rather than to make individuals adapt to any built home.

2.4.2 User Design Requirements in Residential Buildings

Users, may not be technically inclined design wise, but it is obvious that they will have preference for certain housing design features; housing location choices; housing policies and implementations (Fadason, 2015). It is recommended that residential buildings should not only be fit for the purpose of the users but must be able to perform functions relative to resident's satisfaction (Liu, 1999).

The design phase includes, its space organization, layout and facilities provided, (Francescato, Weidemann, and Anderson, 1987). The living, sleeping and service zones, according (Leif, 2012) are the basic residential requirements, based on these, all other design requirements would be categorized under these three zonings as the dependent variables.

In the multi-storey residential typology, such design requirements include

2.4.2.1 Space requirement

Bedrooms, Living room, Toilets, Kitchen, Gym etc.

2.4.2.2 Functionality

Expansion, Space Correlation, Accessibility, Security, Access, Size, Circulation, Functionality, Ventilation, Orientation.

2.4.2.3 Service zone

Access, Size, Functionality, Safety, Fire, Location, Security, Maintenance, Parking, Auxiliary Facilities, Shops, Location, Water Supply, Refuse Disposal, Maintenance, Power Supply, Vehicular Parking etc.

This would be the variable for this study.

2.5 Multi-Storey Building

British Regulation 1807 introduces a new definition for a multi-storey residential building. A multi-storey residential building is a building that has a rise in storeys of more than three, and contains two or more separate dwellings. The number of storeys contained in a building can differ from the rise in storeys (Victorian Building Authority, 2014)

The first England local authority housing was built between 1863 and 1869 (Heritage Protection Department (HPD) 2006). The houses that were provided were of repetitive form of storeyed blocks around squares.

2.6 The Choice for the Use of Multi-Storey Typology Building

In Gaza, according to (Ammar, 2013), "The use of multi-storey residential buildings is related to several factors; such as

1. The limitation of land and high price of real estate.
2. The massive increase in population.
3. The desire to decrease the consumption of land.

4. The technological progress in the construction industry.
5. The invention of vertical lifts and
6. The new generation trends towards living far from the family's house after marriage."

When population grows the demand for buildings as shelters increases, which in turn leads societies to choose high rise buildings as a solution (Tsui, 1999).

Yeang (1999) stated that Skyscrapers are becoming more necessary, according to the effective use that they make of the available limited land, this in recent times was also stated by Ammar (2013) as one of the reasons for the choice of using of multi-storey buildings.

In Nigeria, Lagos to be precise, the use of multi-storey residential building is due to limited space for the traditional single family detached units (Uwaegbulam, 2015). This gives merit, further justifying the use of multi-storey buildings as a typology for residential use, and the need to know more about them as it relates to the Users.

2.7 Qualities of a Modern Multi-Storey Building

According to Ede (2014), "there are features that play major role for a high-rise building to function effectively". The functionality of a high-rise building is based on many provisions which are non-structural and structural and are meant to guarantee maximum safety for the occupants in cases of accidents. The structural decisions are made during design process. In combating the occurrence of accidents, especially fire, the expected non-structural features of a high-rise building as published in the Upland Municipal code (Section 8.28.180) are automatic sprinkler system, alarm and communication system, smoke detection system, smoke control, elevators and emergency exits, standby and emergency power and lighting

system, firefighting provisions, fire control centre, seismic considerations, emergency helicopter facility.

Regarding the environmental issues these structures should be ‘environment friendly’ and substitute fossil fuels with renewable energies. But unfortunately, the first built sky scrapers neglected this vital issue and considered their functional efficiency instead (Thomas, 2006).

It is our duty as architects to ensure we contribute our quota, through user specific design, sustainable specification of material, and the practice the right construction methods, in the race for sustainability in its entirety.

2.8 Some Advantages of Multi-Storey Buildings are as Follows:

1. Material saving because of repetitive type plans.
2. Observing standards and efficient contractors, especially in large quantities, lead to lower costs. This aspect, research has shown is based on any particulars country’s GDP. (Samaratunga, 2013)
3. More potential to reduce energy and material waste by using sustainable materials in elevations. (Yeang, 1999, 2011).

2.9 Problems Associated with Multi-Storey Buildings

According to Ede (2014), despite the many advantages of High-rise buildings, it also has its disadvantages, like any other structure, high-rise buildings are faced with several problems and experience accidents that endanger the lives of its occupants, destroy facilities and equipment within them, and affect other neighbouring structures.

1. Include absence of community life, as it is always a situation of “every man for himself”,

2. Lack of children's play area, causing a possibility of children having hindered development,
3. Being prime targets for terrorist attacks (for example the case of Twin towers of New York in 2001),
4. Inadequate number of lifts and parking spaces,
5. High risk of spread of communicable diseases,
6. Heighted traffic problems and great burden on services and infrastructure.
7. The most feared hazards of tall buildings around the world are fire
8. Building collapse.

2.10 Conceptual Framework

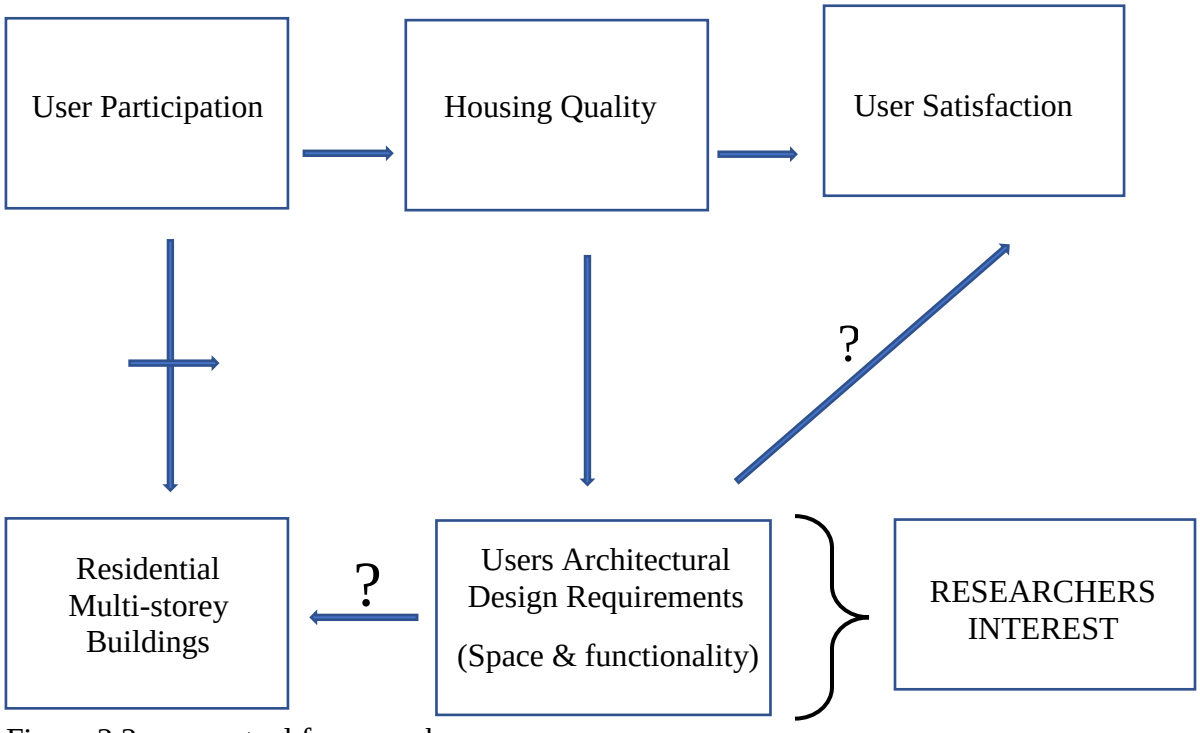


Figure 2.2: conceptual framework
Source: Author, 2016

Figure 2.2, shows a summary of this dissertation, it explores user participation its influence on housing quality, and the level of user satisfaction achieved. The links without the question

marks have already been established through literature review, and those with the question marks are yet to be answered and are expected to be answered after field work is completed. However, the important part of Figure 2.2 is from the design aspect of User participation in multi-storey residential building as shown with the link. Then the need to find out Users architectural design requirements in multi-storey buildings, level of acceptable of multi-storey residential typology by the users, these two form the research questions for this dissertation.

3.0 RESEARCH METHODOLOGY

3.1 Research Design

This research used the questionnaire survey method to investigate a population study of users of multi-storey residential buildings units in, Lagos State.

Pilot Study

First, a pilot study was carried out in Ahmadu Bello University (ABU), to test the questionnaires effectiveness as a method of data collection.

For this pilot study and the main dissertation research, mixed methods which has been used in similar housing studies Maina, Abba, & Abba (2016) where used. This provided quantitative and qualitative data for the results analysis.

Quantitative data provides objective data and hard fact, Maina, Abba, & Abba, (2016), while the Qualitative data provides a more in-depth explanation and reasons behind established phenomena. Qualitative methods were used to establish, through extensive literature review, a background bordering this pilot study research; establish a research gap; review and document past works in this field, and to get schematic sketches of the apartments floor plans of this storey residential buildings block of flats in Area A, Catering flats in Area A, and Block of Nine Flats in Area F through user participation seeking permission from heads of households.

Quantitative analyses were employed in form of survey questionnaires seeking demographic information on gender of household head, state of origin, house ownership, income, length of stay; type of occupancy, satisfaction with housing typology; satisfaction with functionality, spaces and services.

The latter employed 5 scale Likert response questions. 15, 15, 20 questionnaires were distributed in storey residential buildings Block of flats in Area A, Block of Nine Flats in Area F, and Catering flats in Area A for the pilot survey respectively. 11 valid questionnaires were returned in Block of flats in Area A with a 73.3% retrieval rate, 10 valid questionnaires were retrieved from, Block of Nine Flats in Area F with a 66.6% retrieval rate whilst 16 were retrieved from Catering flats in Area A with an 80% retrieval rate, producing average retrieval rates of 73.2%.

The following statistical procedure was employed to answer the research question, with results being presented as frequencies and percentages.

T**o** determine the design requirements residential spaces, functions and services (R.S.F.S) required by users (mainly staff) of storey residential buildings in ABU a checklist of all possible residential spaces, functions and services were provided for the residents to select. To answer the research question: What are the design requirements R.S.F.S needed by users of Storey residential buildings in A.B.U?

Any R.S.F.S rating 50% and above which is often the start of the pass mark of a percentage totalling 100% will be considered a very important design requirement for residential storey buildings in ABU.

Analysis of a set of 5-point Likert questions (1 Very low – 5 Very high), to get the Relative Importance Index (R. I. I), the occupants attached to these R.S.F.S was obtained, as it affects their decision to live in a storey residential building. The Relative Importance Index (R. I. I) which is a ratio of the sum of the total attained Importance scores (AI_{at}) by the maximum attainable Importance score (MI_{at}) for each of the R. S. F. S. The maximum attainable score for any space on a 5-point Likert scale used for the research for each R. S. F. S is a

multiplication of the highest attainable score of 5 (Very High) and the number of questionnaires analysed, 3 in this case.

$(i.e, 5 \times 37 = 185)$

Mathematically, the Relative Importance Index for each R. S. F. S is derived using the formula: $\boldsymbol{R.I.I = \sum AI_{at} \div \sum MI_{at}}$

For this study, R. S. F. S are only considered Important if their $R.I.I \geq 0.5$

Data obtained from responses across these 3 buildings were computed and descriptively analysed in SPSS v. 21

Dissertation

After analysis of the pilot survey, corrections and modifications were made on the questionnaires to some of the questions, and made ready to be issued for the main research in Lagos state.

The questionnaire for the dissertation research study, mixed methods were also used, just as applied in the pilot survey, to provide quantitative and qualitative data for the results analysis.

Quantitative data to provide objective data and hard fact, while the Qualitative data provides a more in-depth explanation and reasons behind established phenomena.

Qualitative methods were used to establish, through extensive literature review, a background bordering this pilot study research, establish a research gap, review and document past works in this field, and to get schematic sketches of the apartments floor plans of Multi-storey residential building in Eko court House Lagos and 1004 Housing Estate Lagos state through user participation seeking permission from heads of households.

Eko court House Lagos which was selected based on the selection criteria of it being the highest Multi-storey residential building in Lagos State, with 22 floors, and the criteria it is government owned. and 1004 Housing Estate Lagos state selected because it is privately owned, and the highest floor being just 14 floors.

Quantitative analyses were employed in form of survey questionnaires seeking demographic information on gender of household head, state of origin, house ownership, income, length of stay; type of occupancy, satisfaction with housing typology; satisfaction with functionality, spaces and services.

The cross-sectional survey will be best for this research because it covers a wider and more generalized survey. Anybody can be a possible user of residential multi-storey buildings so present users of these typology will be the major people of interest.

Case studies of multi-storey residential buildings selected from Lagos State, based on height of the buildings, and by ownership: government owned and privately owned multi-storey residential buildings, were investigated for the design phase of these research through visual survey and observation.

3.2 Population of Study

The population of study for this research is the presently occupied residential multi-storey buildings in Lagos state. There are 68 identifiable multi-storey residential buildings in Lagos state, from the emporis website (www.emporis.com).

Of this population, two buildings Eko Court Towers and 1004 Housing Estate, where selected based on the selection criteria of;

- Building height, the tallest available was Eko court towers of 22 floors and 1004 housing estate of 14 floors
- Ownership of the multi-storey residential building structure, that is privately owned and government owned. Eko court tower is government owned and 1004 housing estate is privately owned.

3.3 Sample and Sampling Procedure

Purposeful sampling which is the process of identifying a population of interest and developing a systematic way of selecting cases that are not based on advanced knowledge of how the outcomes would appear, will be used to select the multi-storey building because it is the typology of the research, this increases credibility. This selective process covers the selection criteria based on height of the buildings and by ownership: government owned and privately owned multi-storey residential buildings. The 22-floor storey building in Eko court tower was selected because it is the tallest multi-storey residential building in Lagos state that is government owned, and the 14-floor building in 1004 housing estate was selected because it is the tallest privately owned multi-storey residential building.

3.4 Instruments for Data Collection

Data was obtained from the respondents with the use of structured closed-ended questionnaires. The questionnaire was designed to seek information from the occupants of multi-storey residential housing units who for the purpose of this research are considered as the Users. The method was the questionnaire survey. Systematic random approach was employed in selection of respondents. The questionnaire sought responses on issues relating to user housing design requirements based on the three basic zoning of a residential building;

living zone and sleeping zone in relation to their spaces, functional and service requirements in the multi-storey residential typology, such design requirements includes

1. **Space requirement**; Bedrooms, Living room, Toilets, Kitchen, Gym etc.
2. **Functionality**; Expansion, Space Correlation, Accessibility, Security, Access, Size, Circulation, Functionality, Ventilation, Orientation.
3. **Service zone**; Access, Size, Functionality, Safety, Fire, Location, Security, Maintenance, Parking, Auxiliary Facilities, Shops, Location, Water Supply, Refuse Disposal, Maintenance, Power Supply, Vehicular Parking etc.

Using these variables, the Residential Spaces, Functions and Services (R. S. F. S) established from literature reviews, questions were structured to answer the early stated research questions. The research employed 5 scale Likert response questions in the questionnaires. A total of 74 questionnaires were distributed in the selected two, multi-storey residential building of which 55 questionnaires were retrieved a 74% retrieval rate. A limiting factor to the questionnaire distribution was the high privacy rate and security control at the entrances, limited access to apartments of the users and the questionnaires had to be distributed at the reception desk to the passing users this also affected the speed of distribution and retrieval. In the 14-floor multi-storey residential building, 1004 housing estate, 30 questionnaires were distributed and 25 questionnaires were retrieved an 83% retrieval rate.

In the 22-floor multi-storey residential building, Eko court towers, 44 questionnaires were distributed and 30 questionnaires were retrieved a 75% retrieval rate.

House to house survey would have been the most effective as there is a better chance of meeting the home owner for their response and they would be more comfortable and more at

ease and responsive, but this was not possible due to high security and the privacy of the residents. Questionnaires had to be distributed at the reception and entrance to the residents of the building.

The two methods of administering questionnaires involved was based on the educational level of the home owner. These two methods were

1. Interview-completed method; this will involve the researcher reading out the questions and filling in the respondents answers to the questions.
2. Respondent-completed method; this respondents in this case the users will actually read and fill in answers themselves.

3.5 Procedures for Administration of Instrument

Letter of introduction was from the department and addressed to facility managers of 1004 housing estate and Eko court towers, seeking permission to distribute questionnaires to the residents.

3.6 Data Analysis / Presentation

Data analysis is a technique used to reduce, organize, and to give meaning to the data (Burns and Grove, 2007). The data collected with the questionnaire from the respondent was analysed using Statistical Package for Social Sciences (SPSS v.21), for the purpose of this study.

The following statistical procedure was employed to answer the research questions, with results being presented as frequencies and percentages.

To determine the design requirements R.S.F.S required by users of multi-storey residential buildings in Ikoyi, Lagos State a checklist of all possible residential spaces, functions and

services were provided for the residents to select. To answer $R_{1,}$ any R.S.F.S rating 50% and above will be considered a very important design requirement for Multi-storey residential buildings in Lagos State.

Analysis of a set of 5-point Likert questions (1 Very low – 5 Very high), to get the Relative Importance Index (R. I. I), the occupants attached to these R.S.F.S was obtained, as it affects their decision to live in a storey residential building. The Relative Importance Index (R. I. I) which is a ratio of the sum of the total attained Importance scores (AI_{at}) by the maximum attainable Importance score (MI_{at}) for each of the R. S. F. S. The maximum attainable score for any space on a 5-point Likert scale used for the research for each R. S. F. S is a multiplication of the highest attainable score of 5 (Very High) and the number of questionnaires analysed, 55 in this case.

$(i.e, 5 \times 55 = 275)$

Mathematically, the Relative Importance Index for each R. S. F. S is derived using the formula: $R.I.I = \sum AI_{at} \div \sum MI_{at}$

For this study, R. S. F. S are only considered Important if their $R.I.I \geq 0.5$

Data obtained from responses across these 3 buildings were computed and descriptively analysed in Statistical Package for Social Sciences (SPSS v. 21), and Cross tabulation methods, charts and tables was chosen for the result discussion, and charts generated through the use of MS. Excel.

4.0 DATA ANALYSIS AND DISCUSSION

4.1 Case Study Selection Criteria

The selection criteria for the case studies on this research were based on purposively selected building types that satisfy the following criteria;

1. Building Ownership: Based on this, governmentally owned Eko court Towers and privately owned 1004 estate multi-storey residential buildings were selected.
2. Based on height of the building: Eko court Towers the highest known multi-storey residential building of 22 floors, and 1004 estate of 14 floors and lower were selected.
3. Must be within the geopolitical area under study which is Lagos state.

Each case study was analysed basically for design purposes mainly

4.2 Case Studies

4.2.1 Case study one

4.2.1.1 *Facility name**:** - 1004 housing estate*

1004 Housing Estate are a group of High-Rise residential buildings each 14 storey High. It is mainly occupied by expatriates, entertainment stars and business executives.



Plate I: Street view 1004 housing Estate
Source: 1004estates.org/wp-content/uploads/2014/11/banner3.jpg



Plate II: Parking lot of cluster A. in 1004 housing Estate.
Source: Author, January 2016

4.2.1.2 Height: 50.81 m

4.2.1.3 Floors (above ground): 14

4.2.1.4 Location: -- Ozumba Mbadiwe street, Victoria Island, Lagos State.

Plate III shows the location of 1004 Housing Estates.

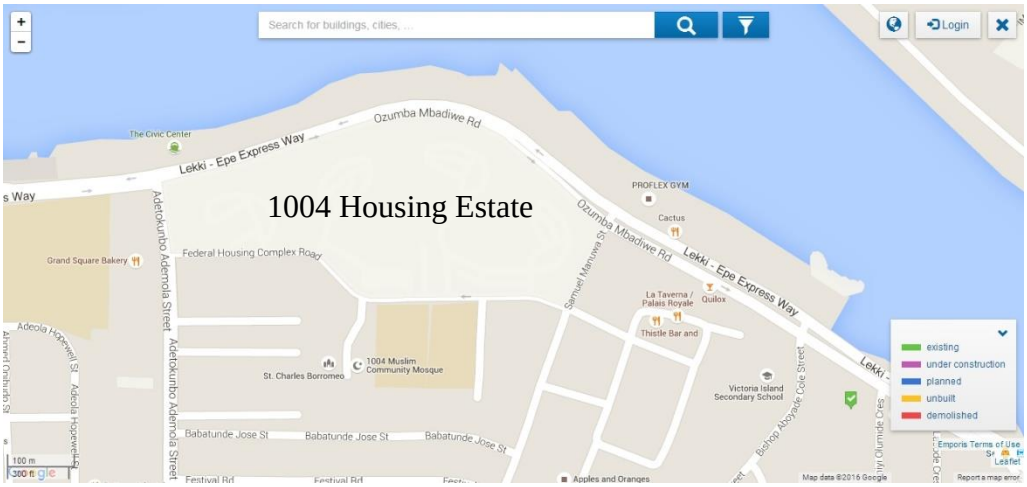


Plate III: World map site location 1004 housing estate
Source; Emporis.com

4.2.1.5 *Year of Construction: this was built in the years 1979.*

4.2.1.6 Architects: Modulor Group Architects is an architecture based company with its headquarters located in Lagos state Nigeria. Their works in Lagos include union bank house, Eko court tower A, B, C, and Elephant house.

4.2.1.7 Architectural Style: Modernism, simple facades no ornamentations.

4.2.1.8 Building Type: High-Rise Building

4.2.1.9 Main Usage: Rental Apartment

4.2.1.10 Client/ Sponsor: - Federal Government, now Federal Government of Nigeria.

4.2.2 Case study two

4.2.2.1 Facility name: - Eko court towers

Eko court Tower are a group of High-Rise residential buildings each 22 storey High. It is the tallest existing multi-storey residential building in Lagos state Nigeria, and is mainly occupied by expatriates working in Lagos for the Federal Government.



Plate IV: Eko court towers
Source: skyscraper.com



Plate V: Street view Eko court towers at night
Source: www.modamo.com

4.2.2.2 Height: 87.11 m

4.2.2.3 Floors: 22

4.2.2.4 *Location:* -- Kofo Abayomi street, Victoria Island, Lagos State.

Plate VI shows the location of Eko Court House l.

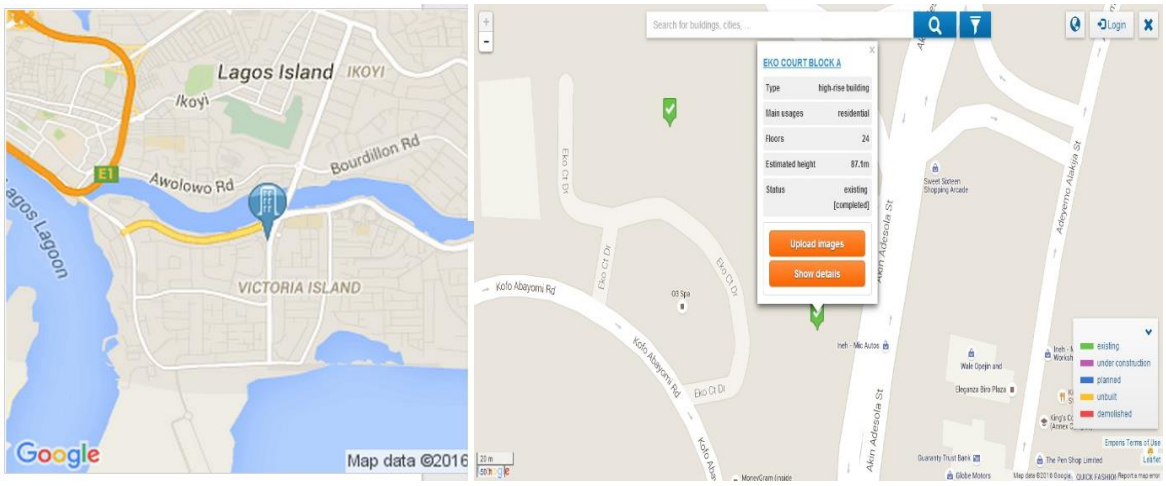


Plate VI: Site Location of Eko Court Towers.
Source; Emporis.com

4.2.2.5 Year of Construction: this was built in the years 1969.

4.2.2.6 *Architects:* Modulor Group Architects is an architecture based company with its headquarters located in Lagos state Nigeria. Their works in Lagos include union bank house, Eko court tower A, B, C, and Elephant house.

4.2.2.7 Architectural Style: Modernism

4.2.2.8 Building Type: High-Rise Building

4.2.2.9 Main Usage: Residential

4.2.2.10 Client/ Sponsor: - Federal Government, now Federal Government of Nigeria.

4.3 Questionnaire Analysis

This chapter analyses questionnaires used for this study, these questionnaires were administered to residents of two estates in Lagos state residing in residential multi-storey buildings; Eko Court Tower and 1004 housing estates both in Victoria Island. The questionnaires were administered in the region for the design proposal so the variable of changing needs and family sizes of residents tested in the questionnaire survey could be accessed. Information from the questionnaire analysis would provide data to answer the two research questions asked to guide the study, and provide additional data that would be useful in the design of apartments for the proposed residential multi-storey building.

4.4 Part I: Respondent Bio-Data

This section analyses cumulatively, information pertaining the personal information of respondents Gender, State of origin, Marital Status, Age, Occupation, Average monthly income, and Educational Qualification.

Figure 4.1, below shows the gender distribution of the respondents with 61.8% responding to the question being male and 38.2% female respondents.

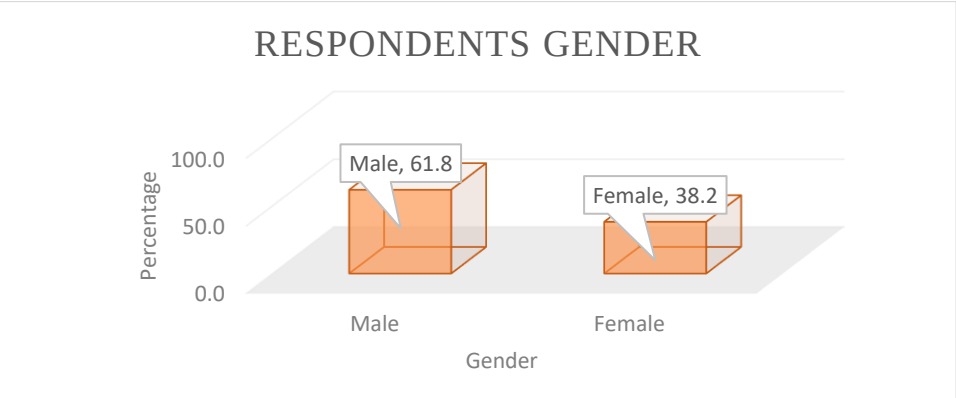


Figure 4.1: Respondent Gender
Source: Author, 2016

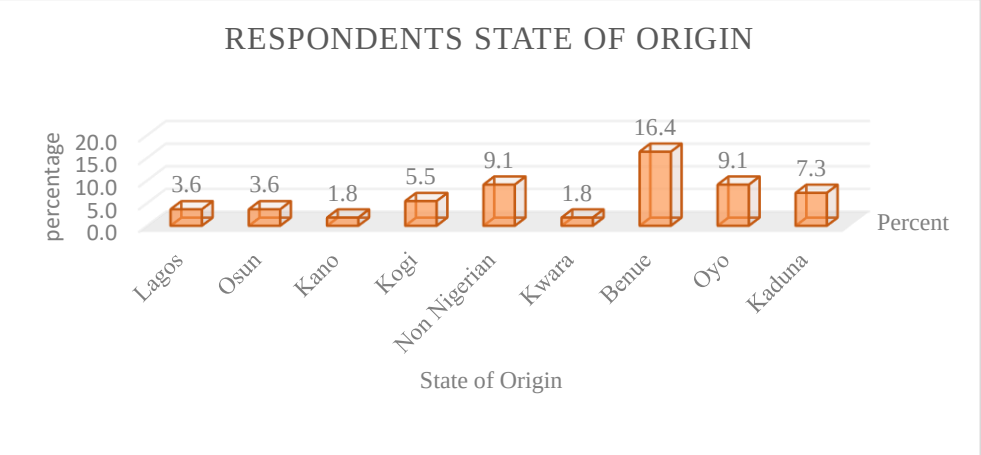


Figure 4.2: Respondents State of Origin
Source: Author, 2016

Figure 4.2 shows that 48.1% failed to answer this question, with the remaining 58.2% that answered this question distributed amongst 8 different states and non-Nigerians. Though the questionnaires were issued in Lagos, respondents from Benue had the highest percentage of 16.4%.

Figure 4.3 shows results for respondent's marital status of the respondents with 52.7% of the respondents were married, and 41.8 % single. There was a 100% level of reply to this question by the respondent.

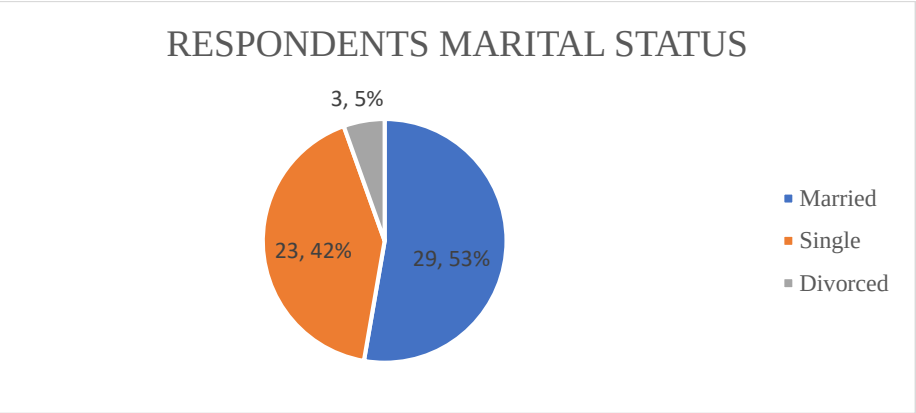


Figure 4.3: Respondents Marital Status
Source: Author, 2016

Results from the cumulative percentage column in Table 4.1, of the Age profiling shows that 78.8% of the respondents are 40 years of age and younger. 50% of this fall under the age group of 31 – 40 years. 5.5% of the respondents failed to respond to this question.

Table 4.1: Demographics of Respondents Showing Age

Respondent Age	Frequency	Percent	Valid Percent	Cumulative Percent
18-25	6	10.9	11.5	11.5
26-30	9	16.4	17.3	28.8
31-40	26	47.3	50.0	78.8
41-50	7	12.7	13.5	92.3
50 Years and Above	4	7.3	7.7	100.0
Total	52	94.5	100.0	
Missing	3	5.5		
Total	55	100.0		

Source: Author, 2016

Figure 4.4, is a representation of respondent's occupations with a cumulative percentage of 72.7% being civil servants and self-employed respondent being split in a 32.7% and 40% respectively.

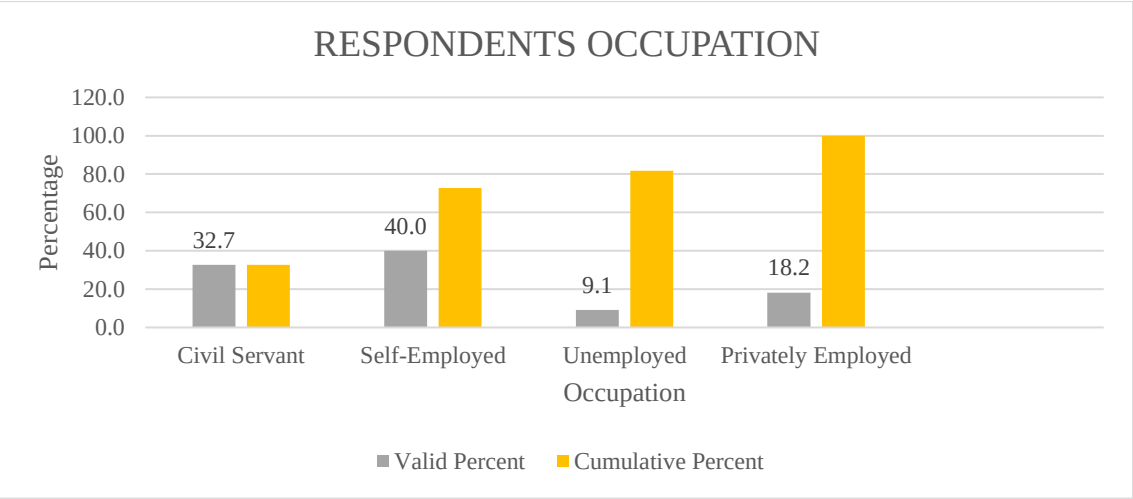


Figure 4.4: Respondents Occupation
Source: Author, 2016

A cross tabulation in Table 4.2, showing the comparison of the Respondents occupation type with the ownership of the building in which the questionnaires were distributed, shows 77.8% of civil servants in the government owned building and 80% of privately employed respondents in the building owned by private persons. This classification will help in identifying the proposed user target that are otherwise difficult to identify

Table 4.2: Cross Tabulation of Building Ownership with regards to Occupation

Building Ownership		Occupation				
		Civil Servant	**Self-Employed**	**Unemployed**	**Privately Employed**	**Total**
Government	Count	14	14	0	2	30
	% within Occupation	77.8%	63.6%	0.0%	20.0%	
Private Persons	Count	4	8	5	8	25
	% within Occupation	22.2%	36.4%	100.0%	80.0%	
Total	Count	18	22	5	10	55
	% within Occupation	100.0%	100.0%	100.0%	100.0%	

Source: Author, 2016

Average monthly income of the respondents in Figure 4.5, shows 50.9% of the respondents earn above 145 thousand and above 500 thousand Naira monthly 27% of this earning above 500 thousand Naira per month there was a 90.9% reply rate to this question. The degree to which the architect can design for the respondent is easier defined, as an idea of how much the respondent are willing to pay for an apartment can be estimated.

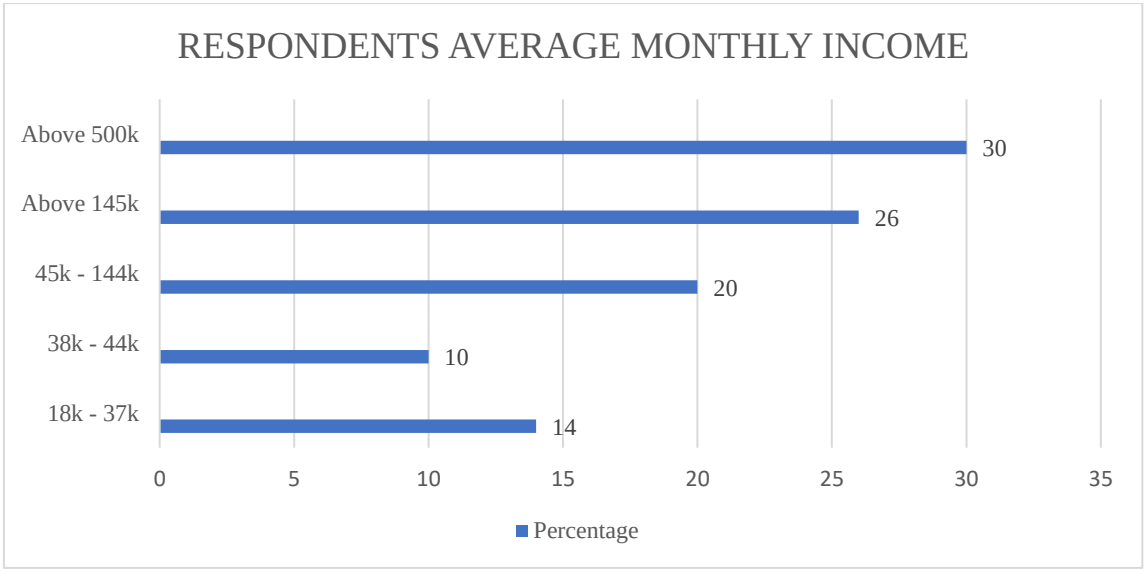


Figure 4.5: Respondents Average Monthly Income
Source: Author, 2016

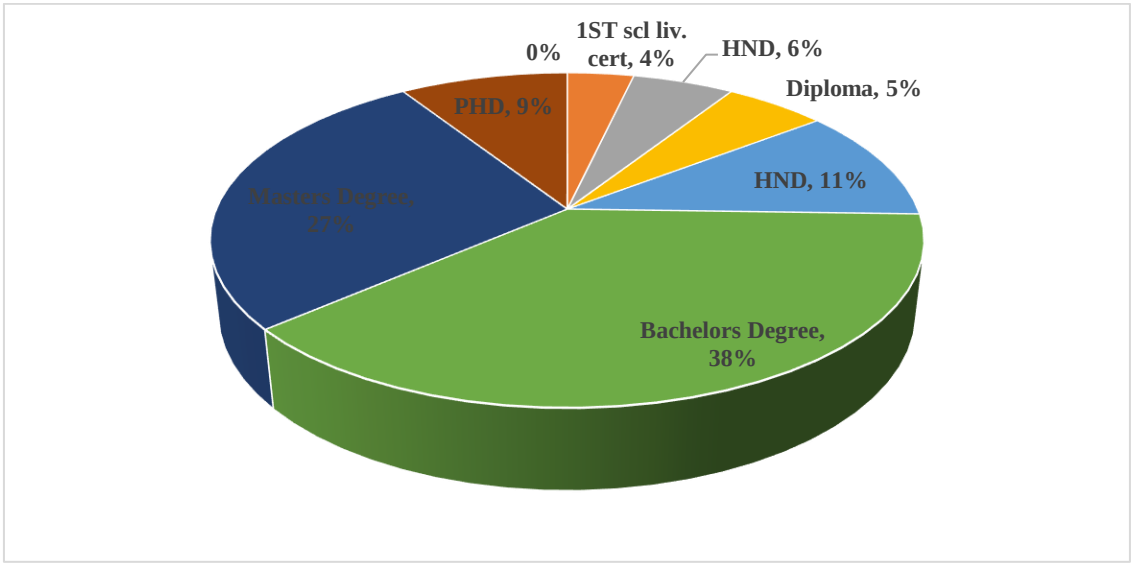


Figure 4.6: Respondents Educational Level
Source: Author, 2016

Figure 4.6, shows the percentages of the respondents' educational qualification Bachelor's degree holders carry the highest percentage with 38.2%. Showing the proposed design will be for educated persons capable of providing adequate information on their housing requirements.

4.5 Part II: General Information

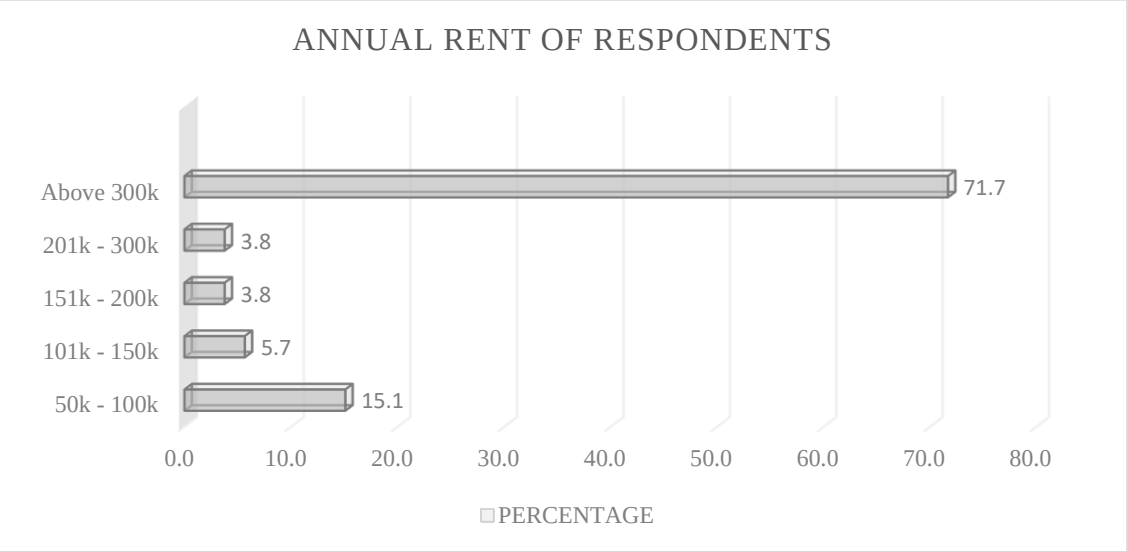


Figure 4.7: Annual Rent of Respondents
Source: Author, 2016

Figure 4.7, shows 71.7% of respondents pay above 300 thousand Naira per annum for rent and also earn well above this shows a direct relationship between the income of user and the amount they are willing to pay for accommodation.

Table 4.3: Cross Tabulation of Annual Rent payment to the Number of Bedroom

Annual Rent Payment		Nos of bedroom in apartment				Total
		1 BDR	**2 BDR**	**3 BDR**	**4 BDR**	
50k - 100k	Count	0	2	6	0	8
	%	0.0%	3.8%	11.3%	0.0%	15.1%
101k - 150k	Count	1	2	0	0	3
	%	1.9%	3.8%	0.0%	0.0%	5.7%
151k - 200k	Count	2	0	0	0	2
	%	3.8%	0.0%	0.0%	0.0%	3.8%
201k - 300k	Count	0	0	2	0	2
	%	0.0%	0.0%	3.8%	0.0%	3.8%
Above 300k	Count	0	6	25	7	38
	%	0.0%	11.3%	47.2%	13.2%	71.7%
Total	Count	3	10	33	7	53
	%	5.7%	18.9%	62.3%	13.2%	100.0%

Source: Author, 2016

In Table 4.3, 47.2% of this occupy 3-bedroom flats and 4-bedroom flats occupied by 13.2% shows a comparison of the rent per annum to the number of bedrooms in the respondent's apartment. The implication of this shows that with higher income comfort level increases with need for more bedroom options.

Respondent Prior Multi-Storey Experience

Table 4.4, shows that 49.1% of the respondents had stayed in other multi-storey building prior to their present accommodation, the remaining 50.9% were just living in multi-storey for the first time.

Table 4.4: Respondent Prior Multi-Storey Experience

	Frequency	Percent	Cumulative Percent
YES	28	50.9	50.9
NO	27	49.1	100.0
Total	55	100.0	

Source: Author, 2016

Table 4.5: Respondent Choice to Multi-Storey Living

RESPONDENTS CHOICE TO MULTI-STOREY LIVING				
Choices	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Personal preference	17	30.9	30.9	30.9
Convenient location	27	49.1	49.1	80.0
Familiar neighbourhood	7	12.7	12.7	92.7
Affordability	2	3.6	3.6	96.4
Security & Sports facilities	2	3.6	3.6	100.0
Total	55	100.0	100.0	

Source: Author, 2016

In Table 4.5, 49.1% of respondents selected convenient location as reason for living in multi-storey residential building, while based on personal preference, 30.9%. Which means selecting a favourable location is of paramount importance in housing provision.

In Table 4.6, 32.7% of the respondent have stayed in their apartment for between 3 - 5 years. In a cross tabulation of the respondents length of stay and the respondents choice to live in multi-storey residential buildings, respondents that selected convenient location have stayed longest in their apartments with a cumulative 29% having stayed 3 - above 6 years. Respondents with personal preference follow in length of stay with 18.2% having stayed 3 – above 6 years, pointing to the fact that with user requirement and satisfaction being met, this apartment will be occupied for long term periods of time by the same tenants.

Table 4.6: Respondents Length of Stay in Apartment

LENGTH OF STAY IN APARTMENT				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Less than a year	9	16.4	16.4	16.4
1-2 years	15	27.3	27.3	43.6
3-5 years	18	32.7	32.7	76.4
6 years & above	13	23.6	23.6	100.0
Total	55	100.0	100.0	

Source: Author, 2016

Number of Family Members Staying with Respondent

A cumulative of 54% of the respondent had family members living with them as can be seen in Figure 4.8. Five respondents declined to answer this question. A projection of expected family growth sizes which can lead to post occupancy reconstruction or abandonment if provisions for housing flexibility are not met.

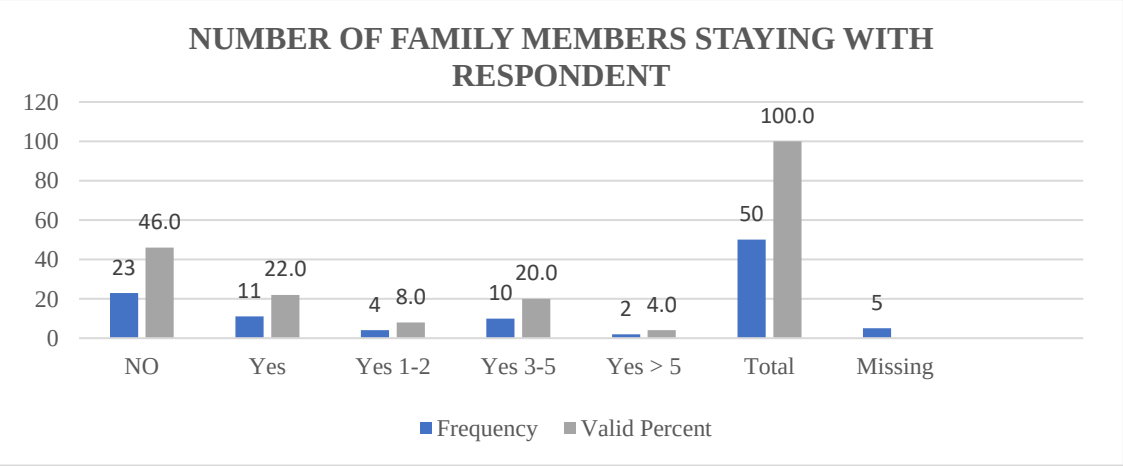


Figure 4.8: Respondents Family Size
Source: Author, 2016

The analysis in Table 4.7 is vital in answering research question one (R1), which is to Figure out respondent of Lagos acceptability of residential multi-storey buildings as typology. It shows an 85.2% acceptability rate when respondents were asked if they enjoyed multi-storey

living. Just one respondent failed to answer this question giving a 98.2% response to this question.

Table 4.7: Respondents Acceptability of Residential Multi-Storey Buildings

RESPONDENTS ACCEPTABILITY OF RESIDENTIAL MULTI-STOREY BUILDINGS				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
YES	46	83.6	85.2	85.2
NO	8	14.5	14.8	100.0
Total	54	98.2	100.0	
Missing	1	1.8		
Total	55	100.0		

Source: Author, 2016

In a Table 4.8, a cross-tabulation of the respondents acceptability of multi-storey building against respondents gender and respondents prior stay in multi-storey building, there is a 55.6% acceptability amongst the male respondents and 29.6% acceptability with the female respondents. There is 44.4% acceptability from respondents who had stayed in multi-storey buildings before and 40.7% from those just living in multi-storey building for the first time, this indicates that there is an influence of the respondent prior stay in multi-storey residential building as it affect their acceptability of this typology the is a 3.7% difference showing that prior stays in multi-storey buildings can affect the acceptability of this building typology.

Table 4.8: Cross Tabulation of Respondents acceptability of multi-storey living, against Cross Tabulation of Gender of CH and Respondent Prior Multi-Storey Experience

Respondents Acceptability of Multi-Storey Living		Gender of CH		Total	Respondent Prior Multi-Storey Experience		Total
		Male	**Female**		**YES**	**NO**	
YES	Count	30	16	46	24	22	46
	% of Total	55.6%	29.6%	85.2%	44.4%	40.7%	85.2%
NO	Count	4	4	8	4	4	8
	% of Total	7.4%	7.4%	14.8%	7.4%	7.4%	14.8%
Total	Count	34	20	54	28	26	54
	% of Total	63.0%	37.0%	100.0%	51.9%	48.1%	100.0%

Source: Author, 2016

A cumulative of 29.0% of the respondents stayed on the 1st and 2nd floor, 22.2% on the 5th – 8th floor. 16.7% stay on the 9th – 11th and 7.4% from the 16th floor and above. This can be seen in Figure 4.9. This will help determine how high the building will go.

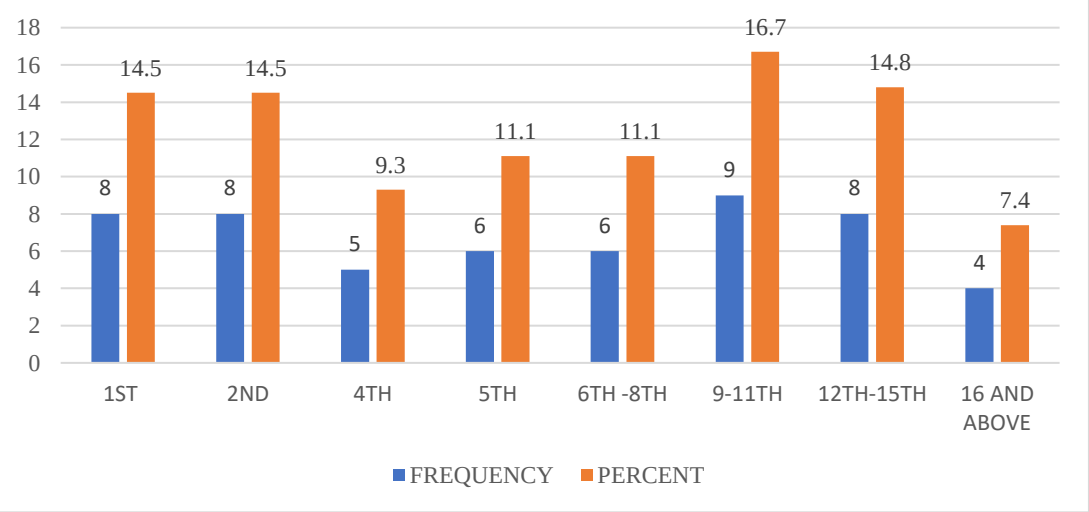


Figure 4.9: Respondents Floor Levels
Source: Author, 2016

Figure 4.10, shows an 83.6% satisfaction of respondents to the floors in which they stay. This shows variation in floor level during design will be considered.

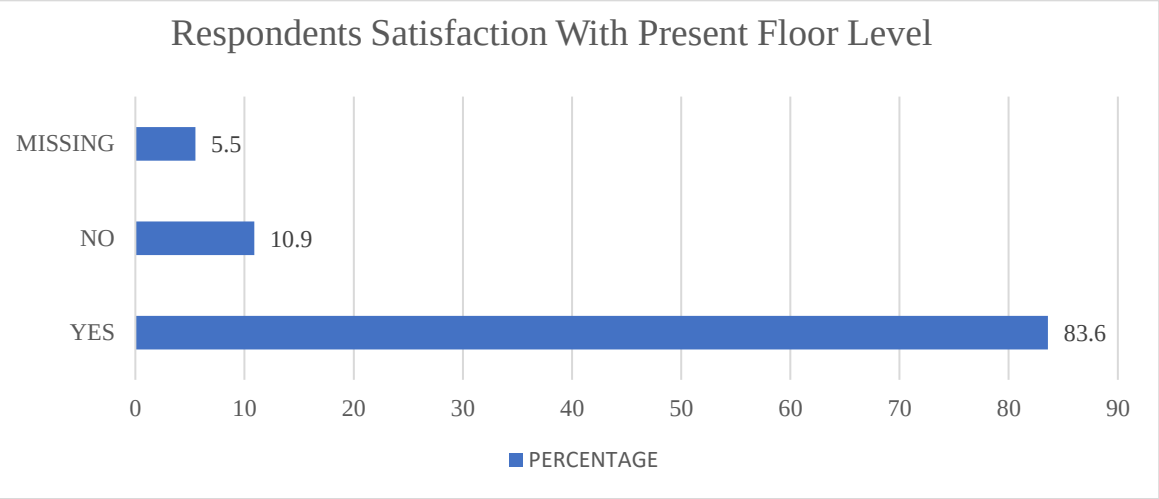


Figure 4.10: Respondents Satisfaction with Present Floor Level
Source: Author, 2016

Table 4.9 shows a cross-tabulation of respondents' acceptability of multi-storey buildings with the satisfaction of their floor level, it showed an 80.3% acceptability amongst these 83.6% respondents that where satisfied with their present floor level.

Table 4.9: Cross Tabulation of Respondents Acceptability of Multi-Storey Living against satisfaction with present floor level

Respondents Acceptability of Multi-Storey Living		Satisfaction with Present Floor Level		Total
		YES	**NO**	
YES	Count	42	2	44
	%	80.8%	3.8%	84.6%
NO	Count	4	4	8
	%	7.7%	7.7%	15.4%
Total	Count	46	6	52
	%	88.5%	11.5%	100.0%

Source: Author, 2016

Table 4.10: Cross Tabulation of Respondents' floor level against Satisfaction with Present Floor Level

Respondents' floor level		Satisfaction with Present Floor Level		Total
		YES	**NO**	
1st	Count	8	0	8
	% of Total	15.4%	0.0%	15.4%
2nd	Count	7	1	8
	% of Total	13.5%	1.9%	15.4%
4th	Count	5	0	5
	% of Total	9.6%	0.0%	9.6%
5th	Count	3	3	6
	% of Total	5.8%	5.8%	11.5%
6th - 8th	Count	6	0	6
	% of Total	11.5%	0.0%	11.5%
9th - 11th	Count	5	2	7
	% of Total	9.6%	3.8%	13.5%
12th - 15th	Count	8	0	8
	% of Total	15.4%	0.0%	15.4%
16th and	Count	4	0	4
Above	% of Total	7.7%	0.0%	7.7%
Total	Count	46	6	52
	% of Total	88.5%	11.5%	100.0%

Source: Author, 2016

Table 4.10, shows a cross-tabulation of respondents' satisfaction with present floor levels and the respondents' floor level it shows a total of 11.5% of the respondents were dissatisfied, 1.9% was recorded amongst the 2nd floor respondents; 5.8% from the 5th floor and 3.8% amongst respondents within the 9th – 11th floor.

Figure 4.11, shows a cumulative of 82.2% of the respondents preferred to reside within the 1st -11th the remaining 17.8% would rather reside within the 12th -16th floor an above. The implication of this result will be to design proposed multi-storey building and placing more of these 3-bedroom apartments which happens to be preferred apartment type, within the 1st – 11th floor.

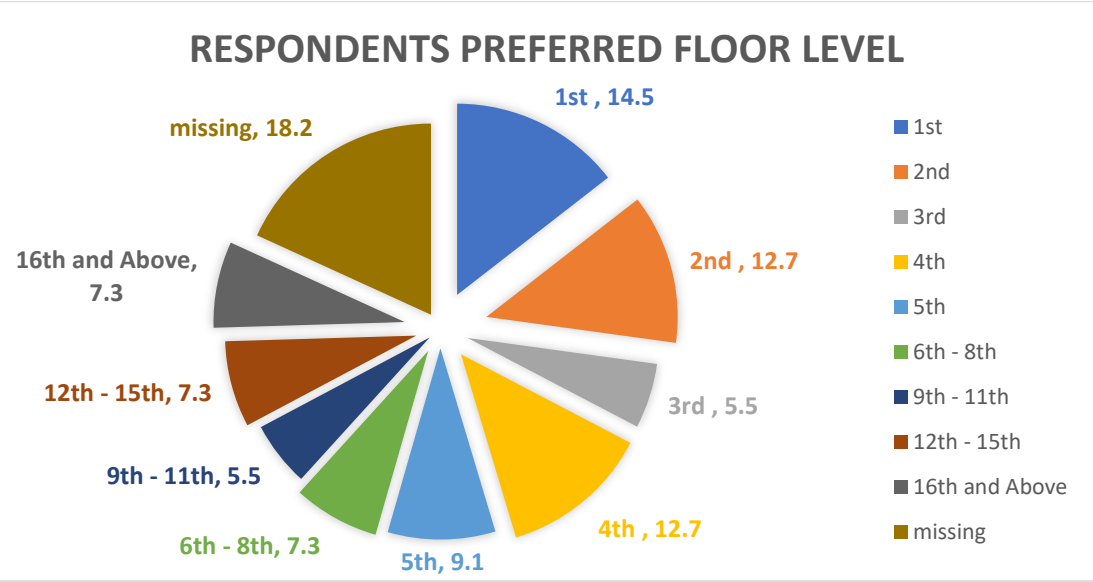


Figure 4.11: Respondents preferred floor level
Source: Author, 2016

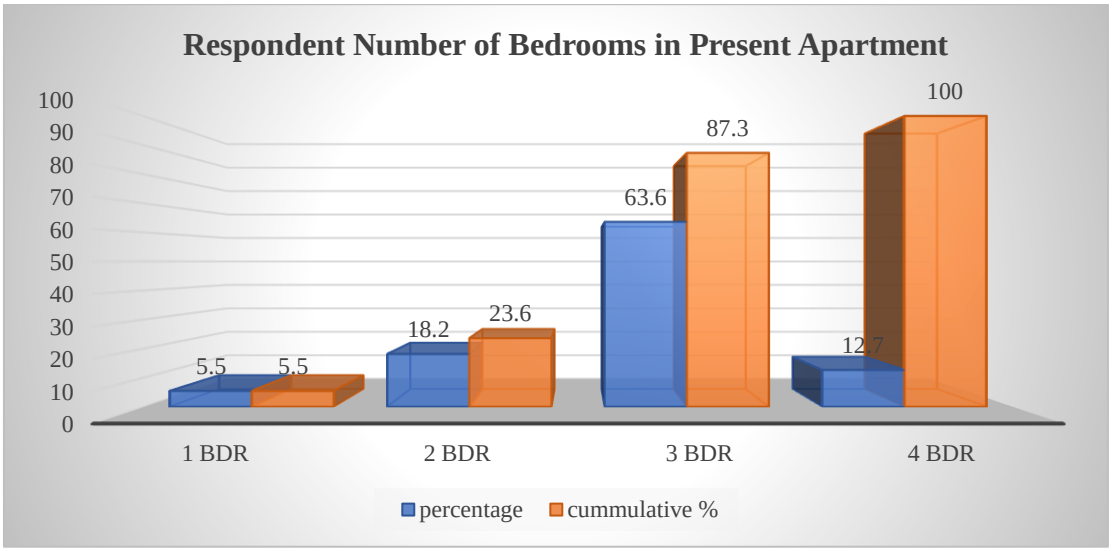


Figure 4.12: Respondent Number of Bedrooms in Present Apartment
Source: Author, 2016

Figure 4.12, shows 63.6% of respondents reside in 3 Bedroom apartments and 12.7% stay in the 4 Bedroom apartment. Supporting other findings that 3bedroom is the preferred bedroom type.

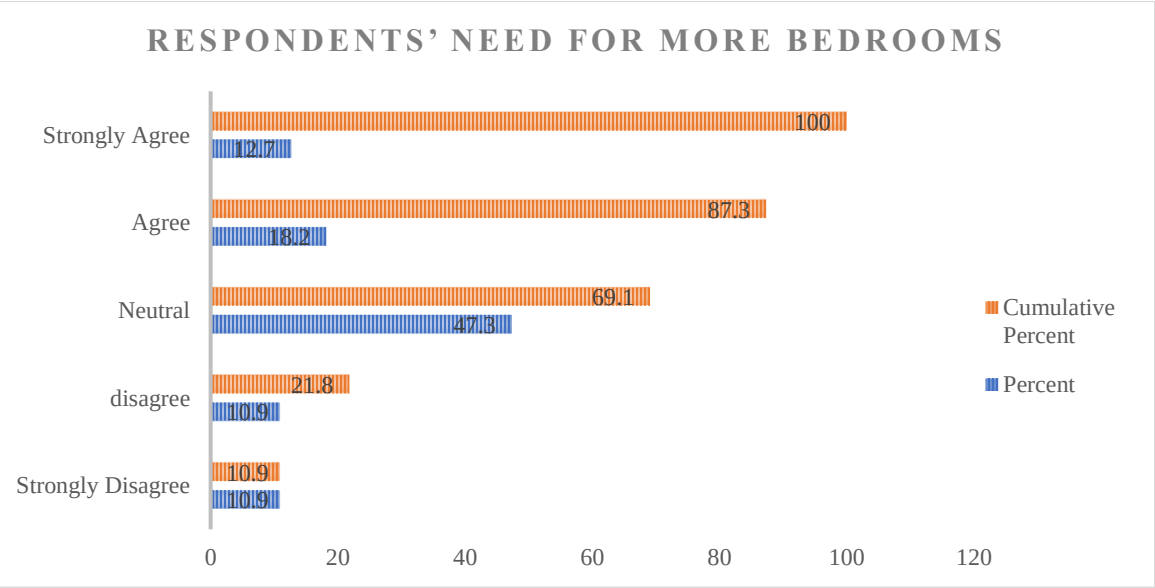


Figure 4.13: Respondents' Need for more bedrooms
Source: Author, 2016

In Figure 4.13, a cumulative of 30.9% of the respondents Agree to the need for extra bedrooms this supports findings from other recent studies such as Aduwo (2011), Maina (2013). 47.3% remain neutral this is due to the fact that 26% of these neutral respondents don't have family members living with them. And 12% of the cumulative 21.8% that disagree don't have family members living with them. Thus, the need for more bedrooms can be attributed to the increase in family size.

Analysing respondents need for more bedrooms with their Ideal number of bedrooms, it can be seen in Table 4.11, that in almost all instance there is a higher percentage for more rooms by respondent. For example, it can be seen that of the 18.2% staying in 2 bedrooms, 10.9% of these had 3 bedrooms as their ideal number of bedroom; and 1.8% each for 4 bedrooms and 5 bedrooms. For the 63.6% respondents staying in the 3bedroom apartment, 21.8% selected the 4 bedrooms as their ideal number of bedrooms; 1.8% selected the 5 bedrooms. 5.5% that selected 5 bedrooms where residents of 4-bedroom flats. There is a clear demonstration of the human need for more and hint at the fact that user participation might

just be a temporary solution the user satisfaction. This is proof for a need of further research and a more permanent approach.

Table 4.11: Cross Tabulation Nos of bedroom in apartment against Ideal number of bedrooms

Respondent Number of Bedrooms in Present Apartment		Ideal number of bedrooms				Total
		2 BDRM	**3 BDRM**	**4 BDRM**	**5 BDRM and Above**	
1 BDRM	Count	1	2	0	0	3
	% of Total	1.8%	3.6%	0.0%	0.0%	5.5%
2 BDRM	Count	2	6	1	1	10
	% of Total	3.6%	10.9%	1.8%	1.8%	18.2%
3 BDRM	Count	1	21	12	1	35
	% of Total	1.8%	38.2%	21.8%	1.8%	63.6%
4 BDRM	Count	2	0	2	3	7
	% of Total	3.6%	0.0%	3.6%	5.5%	12.7%
Total	Count	6	29	15	5	55
	% of Total	10.9%	52.7%	27.3%	9.1%	100.0%

Source: Author, 2016

Table 4.12, shows the respondents' methods of waste disposal 65.5% use refuse bins, 21.8% use refuse chutes these two forms a cumulative of 87.3%. Making the major methods of waste disposal.

Table 4.12: Respondents Methods of Waste Disposal

Respondents methods of waste disposal	Frequency	Percent	Valid Percent	Cumulative Percent
Refuse bins	36	65.5	65.5	65.5
Refuse chutes	12	21.8	21.8	87.3
Throw over the fence	5	9.1	9.1	96.4
Dump in gutter	2	3.6	3.6	100.0
Total	55	100.0	100.0	

Source: Author, 2016

The respondents preferred means of waste disposal still remained refuse bins and refuse chutes. However, there is an increment in in the percentage of respondents that would rather dispose their refuse with refuse chutes it is 37.0%. This can be seen in Table 4.13.

Table 4.13: Respondents Preferred Waste Disposal Method

Respondents preferred waste disposal method	Frequency	Percent	Valid Percent	Cumulative Percent
Refuse bins	31	56.4	57.4	57.4
Refuse chutes	20	36.4	37.0	94.4
Throw over the fence	2	3.6	3.7	98.1
Dump in gutter	1	1.8	1.9	100.0
Total	54	98.2	100.0	
Missing	1	1.8		
Total	55	100.0		

Source: Author, 2016

Table 4.14 show respondents' methods of doing laundry the highest percentage of 54.7% are with respondents that use the washing machine, the respondents that use hand washing and the dry cleaners have a 17.0% each. 11.3% of the respondents use both washing machine and hand washing.

Table 4.14: Respondents Laundry Methods

Laundry Methods	Frequency	Percent	Valid Percent	Cumulative Percent
washing machine	29	52.7	54.7	54.7
hand washing	9	16.4	17.0	71.7
dry cleaning	9	16.4	17.0	88.7
Washing machine & hand washing	6	10.9	11.3	100.0
Total	53	96.4	100.0	
Missing	2	3.6		
Total	55	100.0		

Source: Author, 2016

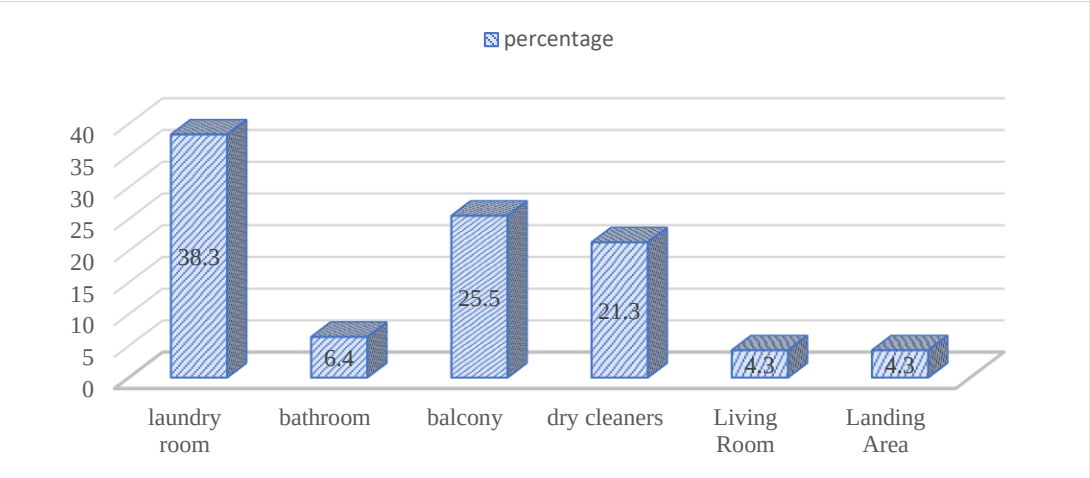


Figure 4.14: Respondents laundry space
Source: Author, 2016

Figure 4.14, shows 38.3% of the respondents perform their laundry operation in the laundry; 25% perform this function on the balcony; 21.3% have the dry cleaners perform this function for them. Other spaces respondents do their laundry include the living room, bathroom, and the landing of the staircase.

Table 4.15 is a cross tabulation of table 4.14 and Figure 16, and it shows the various spaces where respondents perform laundry operation as it relates to their method of performing laundry. For respondents using washing machine for laundry function, 19.1% performed this task in the laundry room, 23.45% in the balcony, and 6.4% used the dry cleaners. 14.9% of respondents washing with hand performed this in the laundry room, 2.1 in the balcony. The most used spaces for laundry by the respondents is the laundry room with 38.3% and the balcony with 25.5%. The in-depth research into the respondents' laundry habits is to obtain valuable information on how to tackle the problem of residents spoiling facades of residential multi-storey buildings with their clothing when they dry them.

Table 4.15: Cross Tabulation of Respondents method of laundry against Respondents laundry space

Respondents Laundry Methods	Respondents laundry space						Total
	laundry room	**bathroom**	**balcony**	**dry cleaner**	**Living Room**	**Landing Area**	
washing machine	19.1%	0.0%	23.4%	6.4%	0.0%	0.0%	48.9%
hand washing	14.9%	2.1%	2.1%	0.0%	0.0%	0.0%	19.1%
dry cleaning	4.3%	0.0%	0.0%	14.9%	0.0%	0.0%	19.1%
Washing machine & hand washing	0.0%	4.3%	0.0%	0.0%	4.3%	4.3%	12.8%
Total	38.3%	6.4%	25.5%	21.3%	4.3%	4.3%	100%

Source: Author, 2016

Respondents laundry drying space

In Figure 4.15; 37% of the respondent dry their laundry in the laundry room 29% dry on the balcony rail, this high percentage of respondents that dry clothes on the balcony rail do so because the required space to perform this function hasn't been provided for them, because it can be seen that the most used place is actually a space associated with this function i.e. the laundry room 22.4% Dry on lines outside. 4 respondents declined to respond to this question.

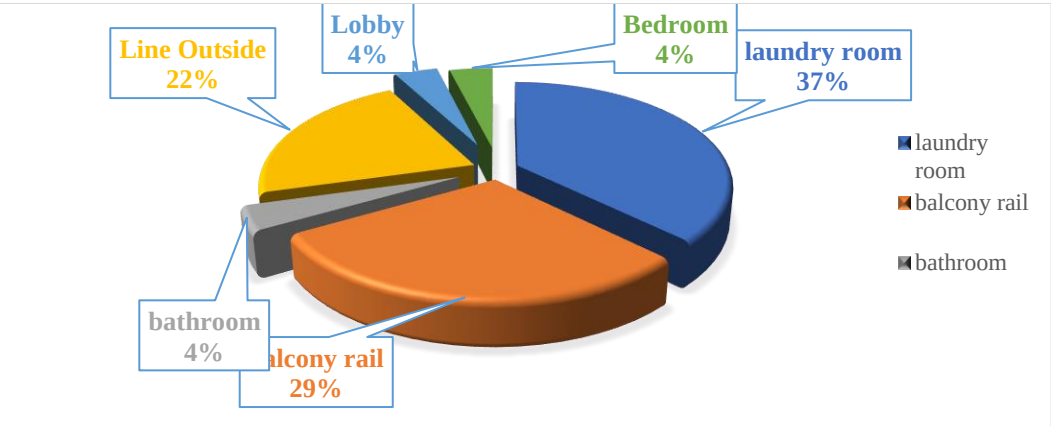


Figure 4.15: Respondents laundry drying space
Source: Author, 2016

Table 4.16, shows There is a cumulative percentage of 52.9% of the respondents that agree to the need for a dedicated space for laundry and drying, 33.3% remain neutral meaning the can fall either ways, for the design stage of this study, these neutral respondents would be calculated with the respondents that agree.

Providing a space for washing and drying would definitely solve the problems of clothes been dried on facades of buildings.

Table 4.16: Respondents need for a dedicated laundry and drying space

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly Disagree	5	9.1	9.8	9.8
disagree	2	3.6	3.9	13.7
Neutral	17	30.9	33.3	47.1
Agree	18	32.7	35.3	82.4
Strongly Agree	9	16.4	17.6	100.0
Total	51	92.7	100.0	
Missing	4	7.3		
Total	55	100.0		

Source: Author, 2016

Table 4.17 and 4.18, shows the level of satisfaction of respondents with means of access to their flat floor. This includes the Relative Satisfaction Index (R. S. I) which is a ratio of the sum of the total attained Satisfaction scores (ASat) and the maximum attainable Satisfaction score (MSat) for each means of floor access. The maximum attainable score for any space on a 5-point Likert scale used for the research for each access method is a multiplication of the highest attainable score of 5 (strongly agree) and the number of questionnaires analysed, 55 in this case.

$(i.e, 5 \times 55 = 275)$

Mathematically, the Relative Satisfaction Index for each access method, is derived using the formula: $R.S.I = \sum ASat \div \sum MSat$

For this study, access methods are only considered satisfactory if their $R.S.I \geq 0.1$

Spaces scoring below this would be because often times this method are not often used in multi-storey residential building.

A cumulative percentage of 90.5% of the respondents in Table 4.17, use the stairs and the lifts. 56.6% of these respondents use just the lifts to access their floor. The satisfactory means of access are therefore the stairs and the lift with the lift having the highest satisfaction index of 0.36.

Table 4.17: Respondents Access to Floor Level

	Frequency	Percent	Valid Percent	Cumulative Percent	N	RSI
stairs	13	23.6	24.5	24.5	29	0.105
elevator and lift	30	54.5	56.6	81.1	99	0.360
ramp	2	3.6	3.8	84.9	8	0.029
ladder	3	5.5	5.7	90.6	9	0.033
stairs & elevators	5	9.1	9.4	100.0	24	0.087
Total	53	96.4	100.0			
Missing	2	3.6				
Total	55	100.0				

Source: Author, 2016

A cumulative percentage of 49.1 Agree to being satisfied with their present means of floor access.

When the sum of the total attained Satisfaction scores (ASat) =175, and maximum attainable Satisfaction score (MSat) for each means of floor access, then the cumulative relative satisfaction index of all the respondents means of access is: $R.S.I = \sum ASat \div \sum MSat$

=> R. S. I= 175/275= 0.636

For this question, access methods are only considered satisfactory if their $R.S.I \geq 0.5$

Table 4.18: Respondents Satisfaction with Means of Floor Access

	Frequency	Percent	Valid Percent	Cumulative Percent
Strongly disagree	4	7.3	7.8	7.8
Disagree	6	10.9	11.8	19.6
Neutral	14	25.5	27.5	47.1
Agree	18	32.7	35.3	82.4
Strongly Agree	9	16.4	17.6	100.0
Total	51	92.7	100.0	
Missing	4	7.3		
Total	55	100.0		

Source: Author, 2016

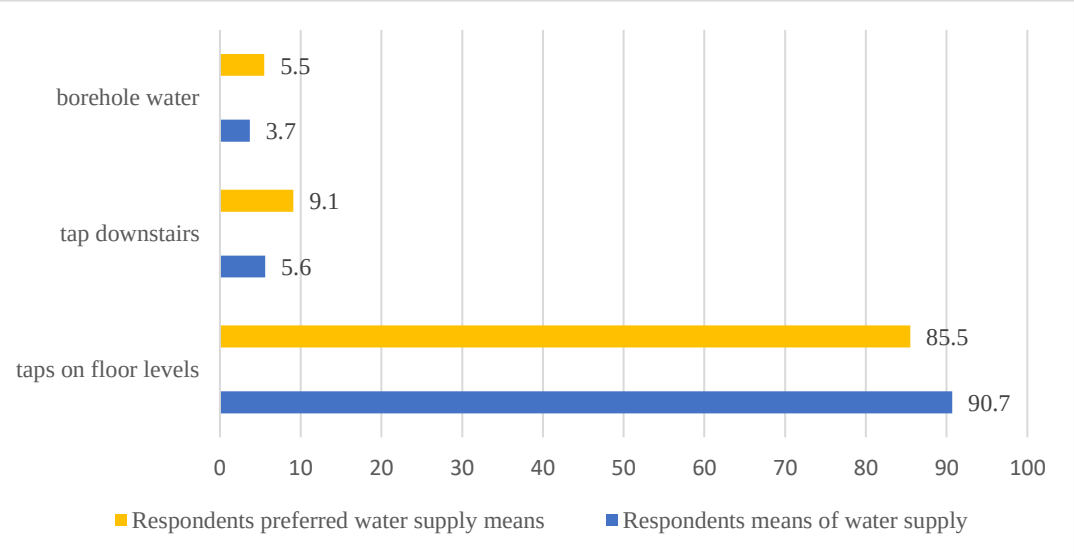


Figure 4.16: Respondents Source Water Supply and Respondents Preferred Water Supply Means

Source: Author, 2016

Figure 4.16, shows respondents source of water in blue and their preferred source of water supply in yellow. 90.7% of the respondent get water on their floor levels, 85% of these respondents still preferred this same means as their preferred means of water supply. This minor decrease of 5.7% is an indication the respondents are quite satisfied with this means

of water supply. A Cumulative 96.3% and 94.5% get their water from taps and preferred getting water from taps respectively.

Table 4.19, 92.7% of the respondents are paying tenant of their current apartments just 7.3% own their apartment. However, 30.9% would rather they owned their apartments rather than rent this can be seen in Table 4.20

Table 4.19: Respondents Rental or Ownership

	Frequency	Percent	Valid Percent	Cumulative Percent
Rent	51	92.7	92.7	92.7
Own	4	7.3	7.3	100.0
Total	55	100.0	100.0	

Source: Author, 2016

Table 4.20: Respondents Choice to Rent or Own Their Apartment

	Frequency	Percent	Valid Percent	Cumulative Percent
Rent	38	69.1	69.1	69.1
Own	17	30.9	30.9	100.0
Total	55	100.0	100.0	

Source: Author, 2016

Table 4.21 shows the cross tabulation of respondents in the privately owned and government owned buildings results show that 40% of the respondents in the privately owned building 1004 estate, are tenant of their current apartments while in government owned Eko court towers, 52.7% of the respondents are renting tenants. Just 7.3% own the apartments they stay in. It should be noted that 55.5% of respondents in the privately owned estate declined to answer this question.

There is an increase in the percentage of respondent who would rather they owned their current apartments than rent. A cumulative percentage of 30.9%, (14.5% and 16.4% in the privately owned 1004 estate and the government owned Eko court Towers respectively) this can be seen in Table 4.21.

Table 4.21: Cross Tabulation of Building Name against Owner or Tenant & You will rather Own or Rent

Building Name		Owner or Tenant			You will rather Own or Rent		
		Rent	**Own**	**Total**	**Rent**	**Own**	**Total**
1004	Count	22	3	25	17	8	25
ESTATE	%	40.0%	5.5%	45.5%	30.9%	14.5%	45.5%
EKO COURT	Count	29	1	30	21	9	30
TOWERS	% o	52.7%	1.8%	54.5%	38.2%	16.4%	54.5%
Total	Count	51	4	55	38	17	55
	%	92.7%	7.3%	100.0%	69.1%	30.9%	100.0%

Source: Author, 2016

4.6 Part III: Respondent Design Preference to Multi-Storey Residential Living

This question is asked for a second time, to test the reliability and reliability of the test for the respondents' acceptability level. In Figure 4.17, a cumulative of 70.9% Agree to enjoy multi-storey living this is a measure of the degree of acceptability of multi-storey residential building as a typology by the respondents. Previously, In Table 4.22 the respondents of Lagos acceptability of multi-storey residential buildings as typology showed an 85.2% acceptability rate. An average of this two percentages will answer research question one R1. Therefore, the acceptability of multi-storey residential building is gotten to be (70.9 + 85.2) / 2 = 78.05%.

There is a 78.05% acceptability of multi-storey residential building by Lagos residents of multi-storey building

Using a Likert scale of 1 for (strongly disagree) – 5 for (strongly Agree), a Respondent's Acceptability Index (R. A. I) of 0.623 was recorded by getting attained respondent acceptability level for the cumulative respondents that Agree ($_{ag}$) and Strong Agree ($_{sag}$) $\sum$ (Frequency [F] x the scale number [Sn]). $\sum [(F_{ag} \text{ X } Sn_{ag}) + (F_{sag} \text{ X } Sn_{sag})] = 171$, and dividing by the Maximum Attainable Acceptability level (MaAL) which is 5 X 55 = 275

Mathematically, R. A. I= $\sum [(F_{ag} X Sn_{ag}) + (F_{sag} X Sn_{sag})] / MaAL = 0.623$

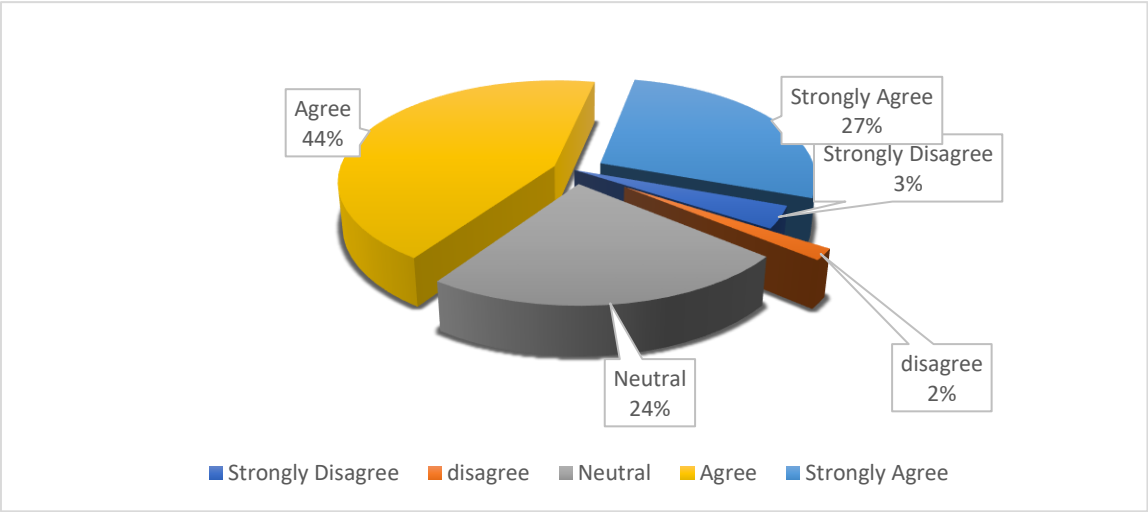


Figure 4.17: Comfort living in multi-storey buildings
Source: Author, 2016

Testing respondents' choice to live in other building typologies, the multi-storey typology recorded higher percentages amongst the various listed typologies. 51.1% of the respondents selected the multi-storey building, 29.8% selected the duplex, and 17% selected the low-rise storey building. Just 2.1% selected the bungalow though this is the most popular typology in Nigeria. This further supports findings of high acceptability of multi-storey residential buildings. This result can be seen in Table 4.22.

Table 4.22: Respondents choice of other housing typology

Respondents choice of other housing typology

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Bungalow	1	1.8	2.1	2.1
Duplex	14	25.5	29.8	31.9
Low rise storey building	8	14.5	17.0	48.9
Multi-storey building	24	43.6	51.1	100.0
Total	47	85.5	100.0	
Missing	8	14.5		
Total	55	100.0		

Source: Author, 2016

Table 4.23: How high respondents can reside

	Frequency	Percent	Valid Percent	Cumulative Percent
1st	2	3.6	3.7	3.7
2nd	7	12.7	13.0	16.7
3rd	9	16.4	16.7	33.3
4th	7	12.7	13.0	46.3
5th	6	10.9	11.1	57.4
6th - 8th	5	9.1	9.3	66.7
9th - 11th	2	3.6	3.7	70.4
12th - 15th	3	5.5	5.6	75.9
16th and Above	13	23.6	24.1	100.0
Total	54	98.2	100.0	
Missing	1	1.8		
Total	55	100.0		

Source: Author, 2016

The need to find out how high the respondents are willing to go in Table 4.23, is to Figure out how high the proposed design of the multi-storey for the design phase of this dissertation will go. It can be seen that a cumulative of 57.4% can go as 5th floor, and a cumulative of 42.6% can go as high as the 16 floors and above. 24.1% of this willing to goas high as 16 floors and above. This is twice the 11.1% of the respondents willing to go as high as the 5th floor. With this result, the proposed design would have a minimum floor of 16 floor

It is of high consequence for the respondents to choose the floor on which they stay, as a cumulative of 83.3% of the respondents, Table 4.24 Agree to prefer choosing the floor level on which they would reside. This option should be provided to interested users for better and greater user satisfaction.

Table 4.24: Respondents Preference at choosing their own floor level

Respondents Preference at choosing their own floor level				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Strongly Disagree	5	9.1	9.3	9.3
Neutral	4	7.3	7.4	16.7
Agree	19	34.5	35.2	51.9
Strongly Agree	26	47.3	48.1	100.0
Total	54	98.2	100.0	
Missing	1	1.8		
Total	55	100.0		

Source: Author, 2016

Figure 4.18, shows the 3 bedrooms to be the most ideal number of bedrooms for the respondents with 53%. The 4 bedrooms was second most ideal of the respondents with 27%. The ratio gotten from this result would be used in determining the number of each 1 bedroom, 2 bedrooms, 3 bedrooms, and 4 bedrooms to be provided for the proposed multi-storey residential building for the design phase of this research.

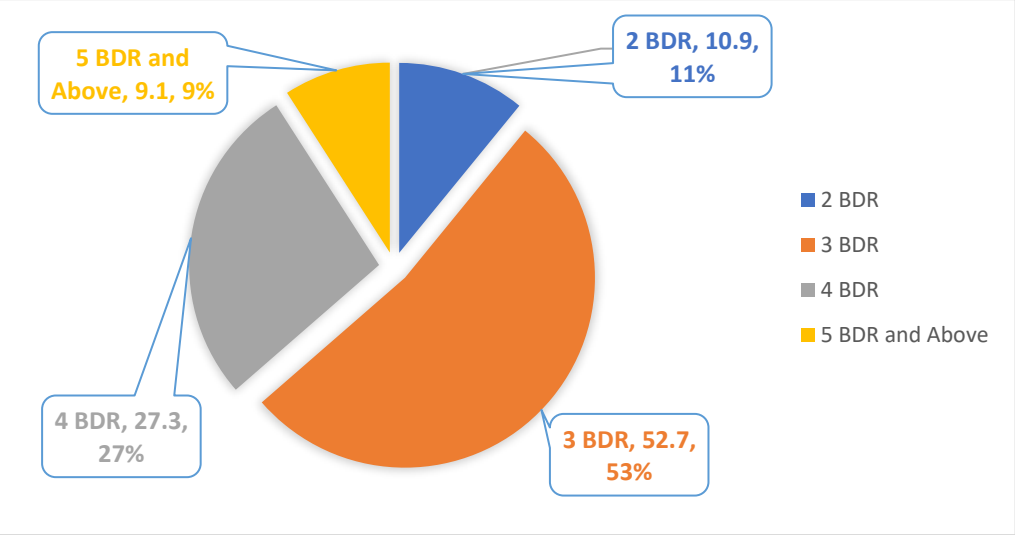


Figure 4.18: Respondents Ideal number of bedrooms
Source: Author, 2016

According to Architects Registration Council of Nigeria, (ARCON), in Abuja Development Control Manual, the basic minimum square meter (Sq.M) of a bedroom 10Sq.M, 17. 7Sq.M for medium bedroom, and 26Sq.M for large bedroom.

The percentages of the respondents' preferred Bedroom sizes can be seen in Table 4.25.

Table 4.25: Respondents preferred bedroom size

Respondents preferred bedroom size

	Frequency	Percent	Valid Percent	Cumulative Percent
10.5SqrM	7	12.7	14.0	14.0
12SqrM	5	9.1	10.0	24.0
16SqrM	10	18.2	20.0	44.0
Above 16SqrM	8	14.5	16.0	60.0
Small	4	7.3	8.0	68.0
medium	6	10.9	12.0	80.0
Large	10	18.2	20.0	100.0
Total	50	90.9	100.0	
Missing	5	9.1		
Total	55	100.0		

Source: Author, 2016

According to Architects Registration Council of Nigeria, (ARCON), in Abuja Development Minimum square meter for Bathrooms 3. 6Sq.M, 6. 5Sq.M, 11Sq.M for large bathrooms. The percentages of the respondents' preferred bathroom sizes can be seen in Figure 4.19.

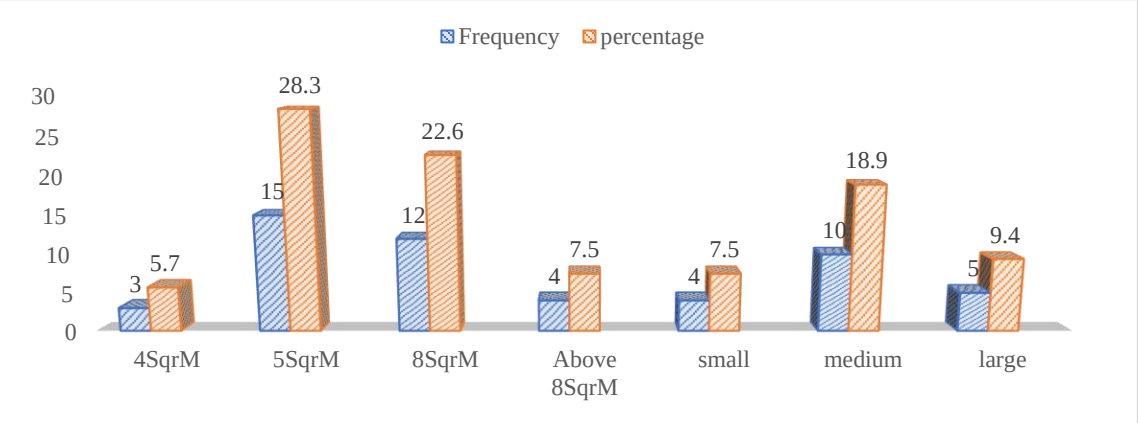


Figure 4.19: Respondents preferred bathroom size
Source: Author, 2016

Table 4.26: Respondents preferred living room size

Respondents preferred living room size				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
25SqrM	2	3.6	3.8	3.8
30SqrM	7	12.7	13.2	17.0
35SqrM	14	25.5	26.4	43.4
Above 35SqrM	9	16.4	17.0	60.4
Medium	6	10.9	11.3	71.7
Large	15	27.3	28.3	100.0
Total	53	96.4	100.0	
Missing	2	3.6		
Total	55	100.0		

Source: Author, 2016.

Abuja development manual list the Minimum Living room as 12Sq.M, 29. 7Sq.M for medium living room the size of a large living room can go as large as 57Sq.M depending on the client preferences. For this study, the results obtained for respondents preferred living sizes can be seen in Table 4.26.

Table 4.27 shows the respondents level of importance to residential spaces, function and services (r. s. f. s) as it affects their decision to live in a multi-storey residential building.

The cumulative percentage “High” from the Likert scale question asked the respondents through the questionnaire has been calculated. Location of the multi-storey residential building a percentage of importance of 96.3%, power supply 92.7%, refuse disposal 96.3, noise control had 96.3%, and others can be seen in Table 4.27.

Table 4.27: Respondents Level of Importance to Residential Spaces, Function and Services (R. S. F. S) As It Affect Their Decision to Live in a Multi-Storey Residential Building

Level of Importance	Percentage %
location	96.3
power supply	92.7
refuse disposal	96.3
size of living room	76.3
Safety	100
security	92.7
water supply	96.3
noise control	96.3
privacy	76.3
Cost	96.3
size of room	89.0
size of bathroom	81.8
bedrooms	100
aesthetics of building	78.0
elevator/ lifts	92.7
living room	98.2
access to building	92.7
landscaping	80.0
Nos of rooms	81.5
recreational park	85.0
Nos of bathrooms	96.3
parking space	98.2
Stairs	94.5
balcony	92.7
building name	96.3
building colour	92.7
shops outside building	89.0
shops/kiosk	85.0
height of building	96.3
outdoor play area	96.3
corridor/ lobby	90.9
shops in building	92.7
dining room	100
home gym	92.7
public gym	87.0
laundry	98.2
box room	90.9
outdoor kitchen	90.9

Source: Author, 2016

It can be observed that respondents rated functions and services higher than architectural spaces this could mean that achieving user satisfaction is not solely based on provision of this architectural spaces but also ensuring services and functionality of the whole building system. Perhaps this can be an area of further research. The most important architectural space to the respondent happens to be the bedroom with 74.5%, supporting findings of the bedroom having a relative importance index of 0.855 in Table 4.28. No apartment will be designed without this space.

Also, Table 4.28, shows the level of Importance to respondents, the Residential Spaces, Function and Services (R. S. F. S) as it affects their decision to live in a multi-storey residential building. This includes the Relative Importance Index (R. I. I) which is a ratio of the sum of the total attained Importance scores (AIat) and the maximum attainable Importance score (MIat) for each of the (R. S. F. S). The maximum attainable score for any space on a 5-point Likert scale used for the research for each (R. S. F. S) is a multiplication of the highest attainable score of 5 (Very High) and the number of questionnaires analysed, 55 in this case.

$(i.e, 5 \times 55 = 27\ 5)$

Mathematically, the Relative Importance Index for each (R. S. F. S) is derived using the formula: $R.I.I = \sum AIat \div \sum MIat$

For this study, (R. S. F. S) are only considered Important if their $R.I.I \geq 0.5$

Using the formula above, the requirements have been sorted from most important to least important based on the R.I.I.

Table 4.28: Respondents level of importance to R. S. F. S

Level of Importance	Mean	Std. Deviation	R. I. I
Level of Importance refuse disposal	4.58	0.770	0.884
Level of Importance water supply	4.57	0.866	0.880
Level of Importance safety	4.35	1.004	0.869
Level of Importance power supply	4.63	0.692	0.858
Level of Importance bedrooms	4.27	0.849	0.855
Level of Importance location	4.43	0.721	0.855
Level of Importance noise control	4.42	0.770	0.851
Level of Importance security	4.47	0.703	0.829
Level of Importance cost	4.26	0.984	0.822
Level of Importance elevator/ lifts	4.20	1.040	0.778
Level of Importance Nos of bathroom	3.79	1.116	0.731
Level of Importance living room	3.69	1.241	0.724
Level of Importance size of rooms	4.00	0.913	0.713
Level of Importance access to building	3.67	1.089	0.680
Level of Importance Parking space	3.44	1.160	0.676
Level of Importance privacy	4.33	0.786	0.662
Level of Importance size of bathroom	4.00	0.879	0.655
Level of Importance size of living room	4.26	0.767	0.651
Level of Importance recreational parks	3.77	1.005	0.644
Level of Importance Nos of rooms	3.87	0.944	0.633
Level of Importance height of building	3.26	1.129	0.629
Level of Importance landscaping	3.89	1.146	0.622
Level of Importance stairs	3.27	1.206	0.618
Level of Importance building name	3.21	1.350	0.618
Level of Importance aesthetics of building	3.91	0.971	0.611
Level of Importance dining room	2.91	1.127	0.582
Level of Importance balcony	3.08	1.055	0.571
Level of Importance building colour	3.04	1.232	0.564
Level of Importance shops outside building	3.14	1.061	0.560
Level of Importance shops/kiosk	3.11	0.938	0.531
Level of Importance outdoor play area	2.72	1.336	0.524
Level of Importance shops in building	2.78	1.137	0.516
Level of Importance corridor/lobby	2.76	1.098	0.502
Level of Importance laundry	2.45	1.202	0.473
Level of Importance home gym	2.49	1.447	0.462
Level of Importance box room	2.18	1.044	0.396
Level of Importance public gym	2.27	1.364	0.396
Level of Importance outdoor kitchen	1.90	1.035	0.345

Source: Author, 2016

4.7 Part IV: Respondents Space Preference with Residential Multi-Storey Living

This part of the questionnaire is designed to answer research question two (R2), which is what is the design requirements (spaces, services and function) for users of multi-storey residential buildings in Ikoyi, Lagos State?

To answer this, any space, function, and services that has 50% and above, which is half of a percent and is conventionally accepted as a pass score, qualifies as a design requirement for the respondents of multi-storey residential buildings in Lagos State.

These (spaces, services and function) are requirements that would have to be provided for in the respondents proposed apartments. The highest selections were recorded for Bedroom, toilet and kitchen with a 100% for each. This suggests they are the most important spaces to the respondent.

The below listed spaces, functions and Services as seen in Table 4.29, are the preferred design requirements for a multi-storey residential building in Lagos state.

Bedroom, Toilet, Kitchen, Vehicular Park, Dining Room, Living Room, Kitchen Store, Balcony, Gardens, Private Laundry, Recreational Areas, Sporting Facility, Outdoor Children Park, Outdoor Space, Private Gym, Study, Corridor/Lobby, Shops Outside Building, Family Room.

Table 4.29: Respondents required spaces, functions and services

S/N	SPACE REQUIRED	YES %	NO %
1	bedroom	100	0
2	toilet	100	0
3	kitchen	100	0
4	vehicular park	94.5	5.5
5	dining room	92.7	7.3
6	living room	87.3	12.7
7	kitchen store	85.5	14.5
8	balcony	80	20
9	gardens	80	20
10	private laundry	72.7	27.3
11	recreational areas	70.9	29.1
12	sporting facility	67.3	32.7
13	outdoor children park	63.6	36.4
14	outdoor space	63.6	36.4
15	private gym	60	40
16	study	56.4	43.6
17	corridor/lobby	54.5	45.5
18	shops outside building	52.7	47.3
19	family room	47.3	52.7
20	box room	43.6	56.4
21	public gym	34.5	65.5
22	shops inside building	34.5	65.5
23	outdoor kitchen	30.9	69.1
24	waiting room	29.1	70.9
25	basement	23.6	76.4
26	public laundry	23.6	76.4

Source: Author, 2016

In Table 4.30, more male 36.4% respondents than the female 27.3% respondent went for the provision of outdoor children play areas this can be an implication of the fact that the female respondents prefer to have their children closer. Placing this space in an area close to the building where these female respondents can keep an eye on their kids would be a way of applying this result to the design.

Table 4.30: Cross Tabulation of Gender of CH, Against the Space Requirement outdoor children parks

Gender of CH		Space Requirement outdoor children parks		Total
		YES	**NO**	
Male	Count	20	14	34
	% of Total	36.4%	25.5%	61.8%
Female	Count	15	6	21
	% of Total	27.3%	10.9%	38.2%
Total	Count	35	20	55
	% of Total	63.6%	36.4%	100.0%

Source: Author, 2016

4.8 General summary

- Results from the pilot study showed a 73.1% acceptability of Multi-storey Residential buildings in Ahmadu Bello University.
- Results showed an 85.2% acceptability rate of multi-Storey Residential building in Ikoyi, Lagos.
- There is an 80.3% acceptability amongst the 83 .6% respondents satisfied with present floor level.
- Acceptability of a building typology is hugely based on User satisfaction.
- A 3.7% difference showing that prior stays in multi-storey buildings can affect the acceptability of this building typology
- The 3 bedrooms to be the most ideal number of bedrooms for the respondents with 53%.
- Bedroom, toilets, Kitchen, Vehicular parking, Dining room, Living room, Kitchen store, Balcony, Gardens, Private laundry, Recreational areas, Sporting facilities,

Outdoor children park, Outdoor space, Private gym, Study, Corridors / lobbies, Shops outside buildings

- The most important space is the Bedrooms this supports findings from other recent studies such as Aduwo (2011), Maina (2013)
- It can be observed that respondents rated functions and services higher than architectural spaces this could mean that achieving user satisfaction is not solely based on provision of this architectural spaces but also ensuring services and functionality of the whole building system.

5.0 SITE (LOCATION AND SELECTION CRITERIA

This chapter discusses and analysis the proposed site, analysis of its location and an in-depth study into the reasons for the selection of the particular site for the design. Site analysis of the proposed site was carried out to show suitability of the proposed site for the design of the multi-storey residential building.

5.1 Site location

The location for the proposed design is Lagos state, specifically the phase one of the Lekki free trade zone (LFZ), located in Lekki Peninsula to the south-east of Lagos State. LFZ is described as a modern Ecology-oriented Coastal city to be developed. It was launched in early 2006 by the China-Africa Lekki investment Ltd., and the Lagos State Government.

Lagos is located in the southwest of Nigeria, covering 3,345 km2 and with the population of more than 15 million. It is the economic, financial and trade hub of Nigeria as well as the centre of the country's marine transportation and aviation. Lagos is the home of over 60% of Nigerian business enterprises and accounts for 90% of the country's total trade volume of import and export

Lagos state was chosen because it is home to some of Nigeria's most impressive architecture both past and presently on going, like the Eko Atlantic City, case studies for this research also fell in this location based on the selection criteria of height, and ownership. Lagos is also home to 90% of the county's total trade volume of import and export. This qualities lead to influx of migrants from all parts of the world. This is not without its downsides as overcrowding and housing shortages becomes ever more so evident.

The LFZ layout covers a planned area of 30km^2, and is located on the tip of Lekki peninsula to the southeast of Lagos State. It borders Lekki Lagoon in the North and faces the Atlantic in the south with a beautiful coastline of about 5km stretch. Lekki is one of the fastest growing areas in Nigeria in recent years and is on its way to becoming a modern satellite township metropolis.



Plate VII: Overall site layout of the four Phases of Lekki Free Trade Zones
Source: Lekki Free Zone Investment Guide

Plate VII shows four phase of the LFZ project. Presently the phase one is the only one undergoing construction.

Plate VIII: A blowout of the phase one layout can be seen below.

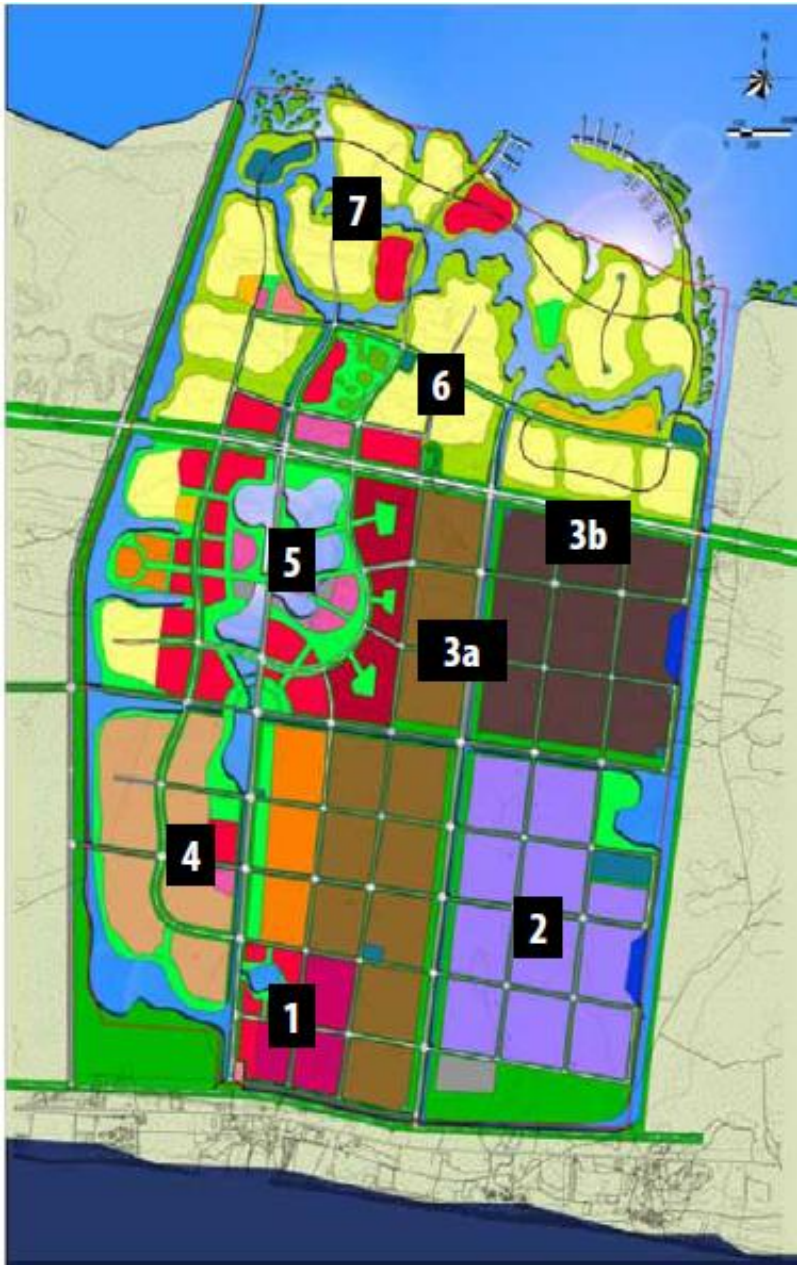


Plate VIII: Layout for Phase 1 of Lekki Free Trade Zone
Source: Lekki Free Zone Investment Guide

Location of Merits of Investing in Each Category the Lekki Free Zone of Investment within the First Phase

1. Exhibition and Duty Free Retail Trading (Start-Up Area of 1.5 sq.km)
2. Petroleum Products Storage Facility
3. Manufacturing (light and heavy)
4. Entertainment and Culture Creation
5. Central Business District
6. Residential

5.2 Site Selection Criteria

Table 5.1: Site selection criteria

CRITERIA	SITE1 Lekki	SITE2 Ikoyi	REMARKS
Location/accessibility	5	5	Site 1 is centrally located but both sites have good access road
Land-use compliance	5	3	Site 1 is indicated for resort and tourism in the land-use plan
Proximity to basic amenities	5	3	Site 1 has proximity to basic amenities compared to site2
Expansion possibility/ size of site	5	1	Both sites are large enough to accommodate the resort
Soil type/ topography/ vegetation of the site	5	3	The soil in site1 has good bearing capacity
Drainage & waste disposal potential	5	4	Site 1 has a drainage in front & good access to waste disposal
Commercial potential of surrounding area	5	2	Good access to commercial area because most commercial activities are centrally located
Total	35	21	

Key rating: Excellent 5, Very good 4, Good 3, Fairly good 2, Poor 1

Source: Author, 2016

Table 5.1 shows the criteria that was considered in selection of the site for proposed design. From the analysis of the criteria, site 1 has been selected based on the fact that it has more advantages, fulfils the selection criteria and located on a site specifically reserved for high rise buildings. Site one is also already provided for in the layout of Lekki free trade zone.

5.3 Proposed Site

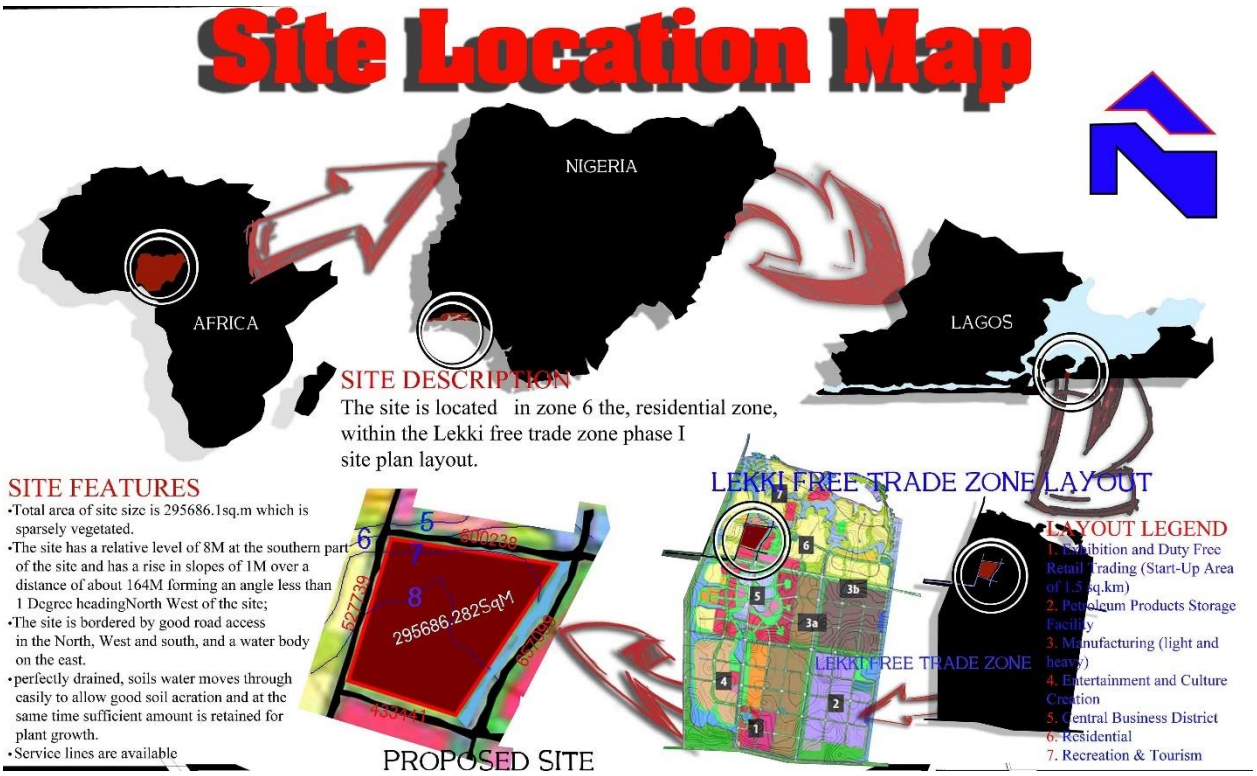


Plate IX: Site location of the proposed site
Source: Author, 2016

Plate IX is an actual map out to the exact proposed site located in the residential zone of the phase one layout with an overall area of 295686.3SqM.

This site will occupy the proposed multi-storey residential apartment to be designed with information obtained from the research

5.3.1 Site Features

- Total area of site size is 295686. 1sq.m and is sparsely vegetated.
- The site has a relative level of 8 meter at the southern part of the site and has a deep in slopes of 1 meter over a distance of about 164 meters forming an angle less than 1 Degree heading North West of the site.

- The site is bordered by good road access in the North, West and south, and a water body on the east.
- Perfectly drained, soils water moves through easily to allow good soil aeration and at the same time sufficient amount is retained for plant growth.
- Service lines are available

5.3.2 Site Analysis

A site analysis involves an in-depth study of the site, it takes into consideration natural and man-made components present about the site, as well as climatic conditions present in and around the site. For a comprehensive site study; a macro and micro site analysis is carried out, which the former takes into consideration environmental factors affecting a larger area than the site, such as a region, state or zone. For this study, the entire Lagos State is considered for this macro analysis. Plate X show a schematic summary of the proposed site.

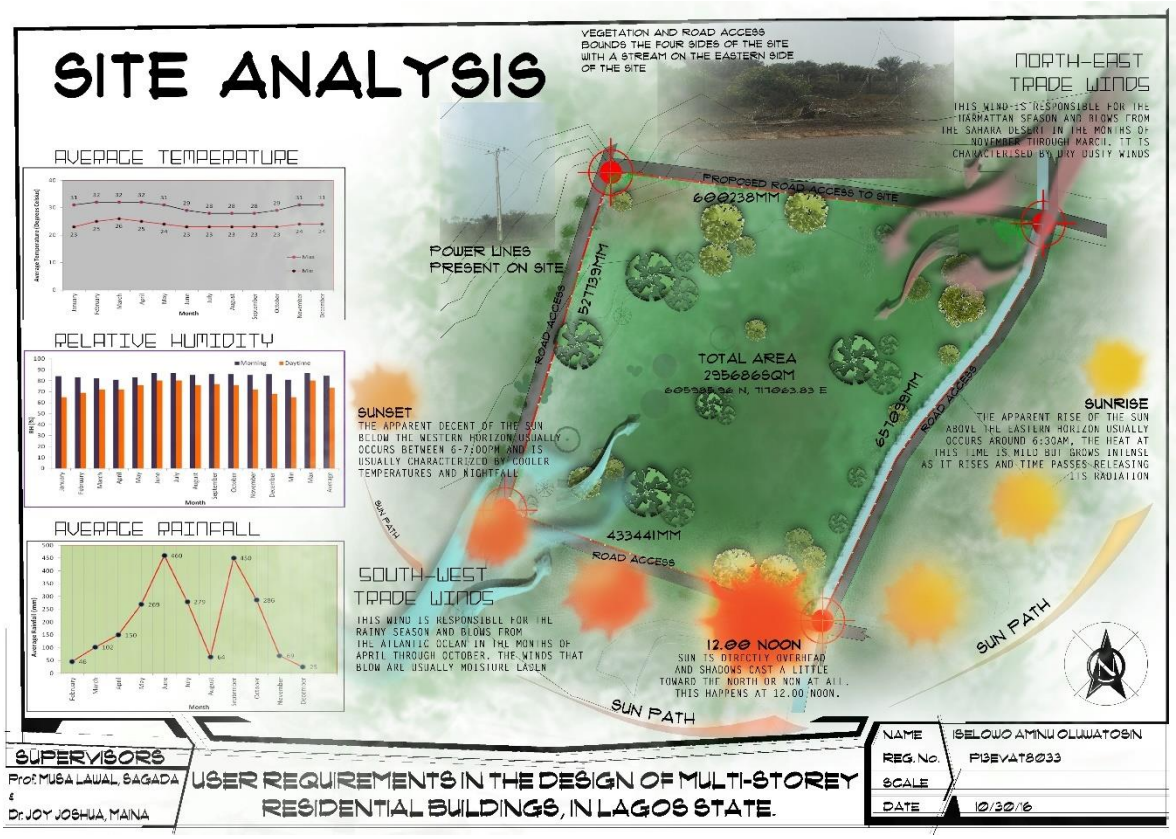


Plate X: Site analysis of the proposed site 1
Source: Author, 2016

5.3.3 Weather and Climate

Lagos has a tropical wet and dry climate with two distinct rainy seasons; the more intense one occurs between April and July, with a milder one from October to November. At the peak of the rainy season the weather in Lagos is wet about half the time. Lagos experiences a dry season (when it rains less than two days per month) during August and September, as well as between December and March, accompanied by harmattan winds from the Sahara Desert, which are at their strongest from December to early February. The temperature range in Lagos is fairly small, generally staying between a high of 33°C and lows of 21°C. The hottest month is March, when average daytime temperatures reach 29°C, while July is the coldest month with an average temperature of 25°C.

5.3.4 Vegetation

Vegetation of the Lagos state is the tropical swamp forest consisting the fresh water and mangrove swamp forests and are both influenced by the rainfall pattern observed in the state.

5.3.5 Climate:

The micro climate of the site is slightly different from general climatic factors of the rest of Lagos due to the effects of the physical properties on and around the site. Sites proximity to the Atlantic Ocean, trees, shrubs and green area.

5.3.6 Temperature

Figure 5.1, show the temperature of the site. The average highest temperature occurs in March at about 32^{o}c. The cold season lasts from June to September with an average daily temperature of about 25^{o}c. temperature may vary significantly due the proximity of the site to the Atlantic Ocean.

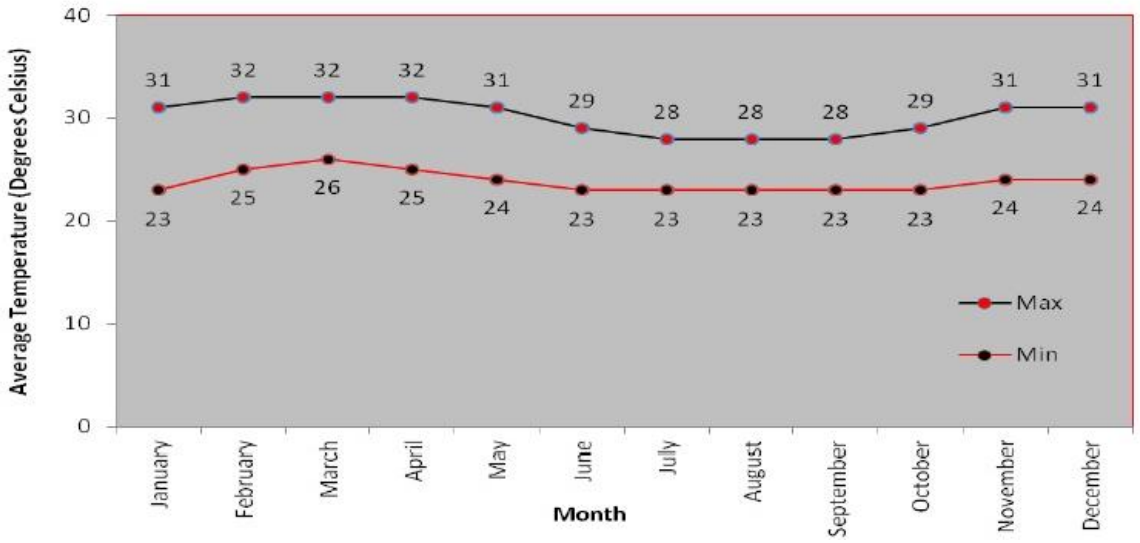


Figure 5.1: Shows the average annual temperature of Lagos state
Source: myweather2, 2015

5.3.7 Humidity

Figure 5.2, is a chart of the humidity of Lagos. The site humidity is higher due to its proximity to the Atlantic Ocean.

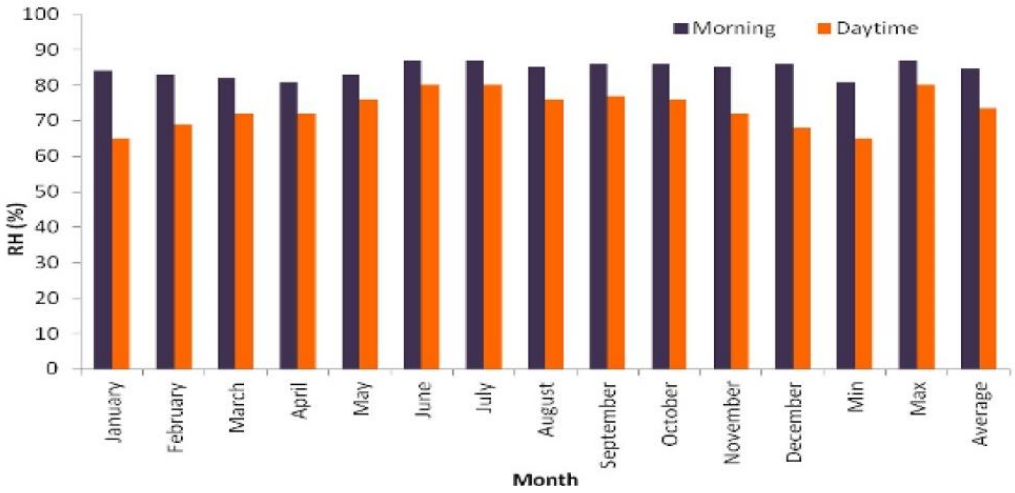


Figure 5.2: Shows the annual humidity averages at about 82%
Source: myweather2, 2015

5.3.8 Rainfall



Figure 5.3: Peak rainfall is achieved in the month of June and lowest at December.
Source: myweather2, 2015

The frequency and amount of rainfall over the site is the same with that of the Lagos Mainland. Rainfall occurs almost throughout the year although it achieves its peak between

April and October as shown in Figure 5.3 below. High roof pitch would be used to drain water.

5.3.9 Wind

Trees in the Vicinity, act as wind breakers, wind speeds are decreased by approximately 20% relative to other places which have no wind breakers. The average wind speed is about 4.8 knots and the highest occurs in the month of August which is about 6.2 knots. As shown in Figure 5.4 below.

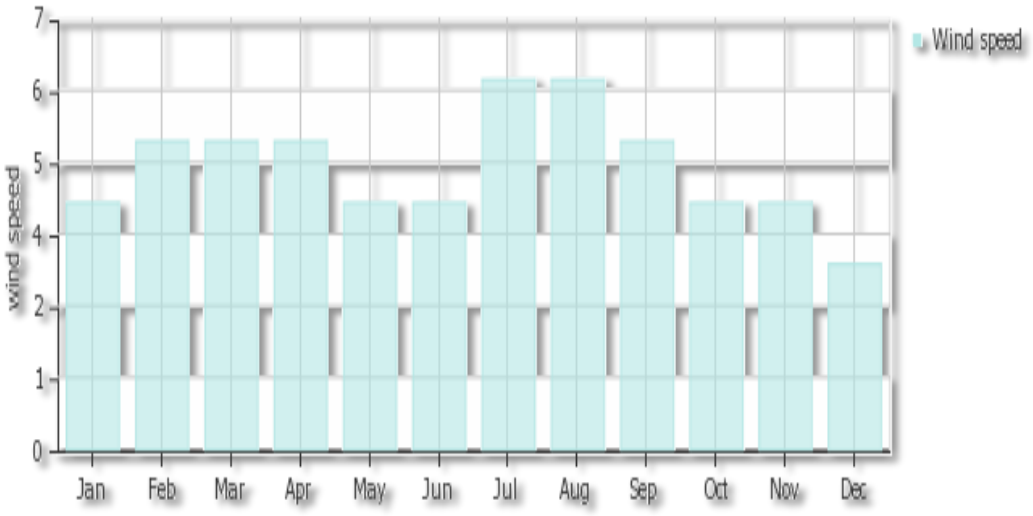


Figure 5.4: Wind speed chart showing annual wind speed.
Source: myweather2, 2015

5.3.10 Sunlight and Cloud-Cover

Figure 5.5 below shows that November has the highest amount of sunshine hour averaging its highest peak in November of about of 160 hours. And its lowest recorded between June and July averaging 140hours.

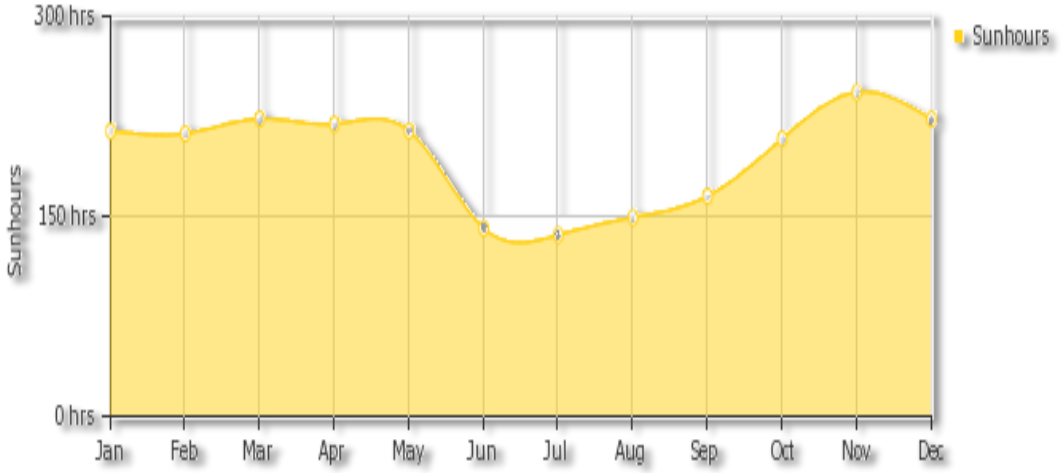


Figure 5.5: Sunshine hours is shown for a whole year.
Source: myweather2, 2015

6.0 DESIGN REPORT

6.1 Brief Development

This project was initiated in 2006 by the China-Africa Lekki investment Ltd., and the Lagos State Government. The residential aspect of this project is just a part a much larger project of the Lekki Free Trade Zone. This residential unit comprises of high-rise buildings mainly due to land constraint and it's targeted at creating a wide range of residential unit to accommodate tourist, investors expatriates and to ease the burden of overpopulation in Victoria island which is currently like a hub for this targeted client. These apartments will be rented out to the occupants with the options of selling the apartments open to them.

Design proposal should take advantage of various sustainable criteria as possible in an attempt to achieve a self-sustaining building.

6.2 Concept Development

The concept adopted for the proposed multi-storey residential building is a combination of three different ideas for a final composite form. These three ideas involved

6.2.1 Form Concept

The form concept adopted is the rain boot. From the site analysis of the soil it was observed that the soil had high water level due to its closeness to the Atlantic Ocean. Therefore, the rain boot showing the soil type has been taken into consideration for the proposed design.

The sole of the boot serving as the podium of the building and the tower the skin cover of the boot rising from the ankle up to the knee.

6.2.2 Wind Channelling

Lagos State is known for high wind speeds up to 31 - 60m/s. To take full advantage of this, the tower is split in two and the path in the middle oriented towards the south-west and north-east orientation so wind turbines mounted between this tower can get the full power of the channelled and increased wind speed on their blades which turns the rotors. This electricity generated will be a supplement energy needed to power the elevators and a few lighting points.

6.2.3 Streamlining

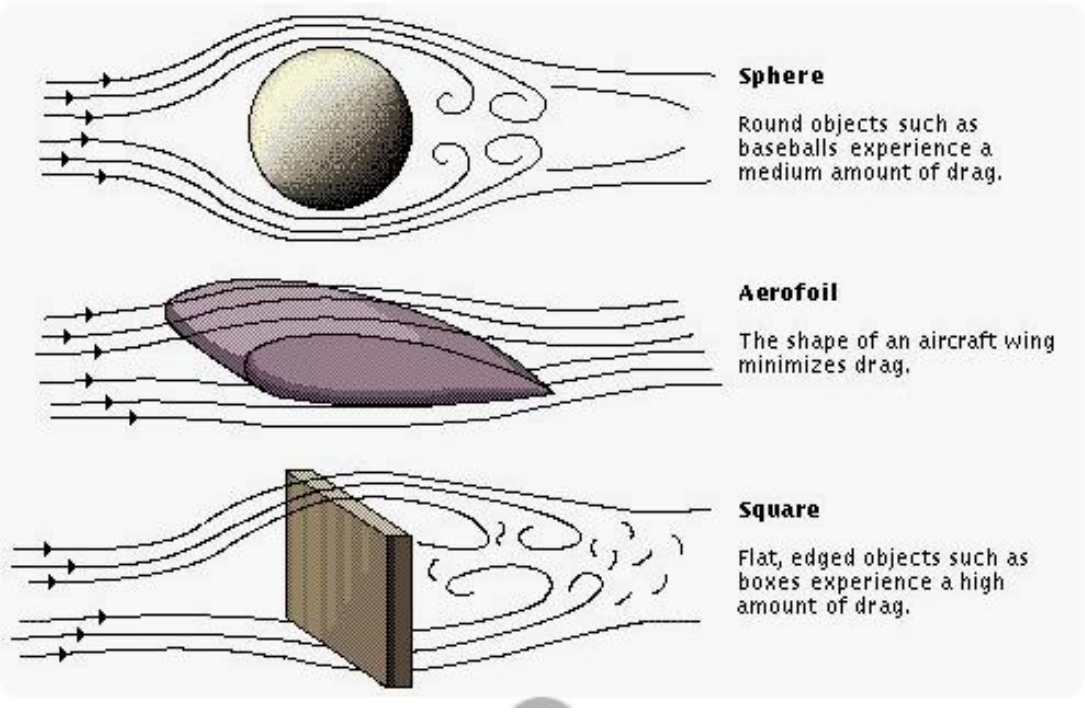


Figure 6.1: Wind effects on shapes, a demonstration of streamlining
Source: Pinterest

To negate and reduce the effect of the wind on the building, the skin of the building takes and elliptical shape this has been proven to be the best form against wind resistance as seen in Figure 6.1, the elliptical form allows wind pass without generation of wind drag. Aeroplane

and high-speed automobile manufacturer use streamlining to reduce friction of the wind against designs made. The skin is also designed to guide the wind towards the wind turbines in the middle of the building and increased wind speed by about 20m/s.

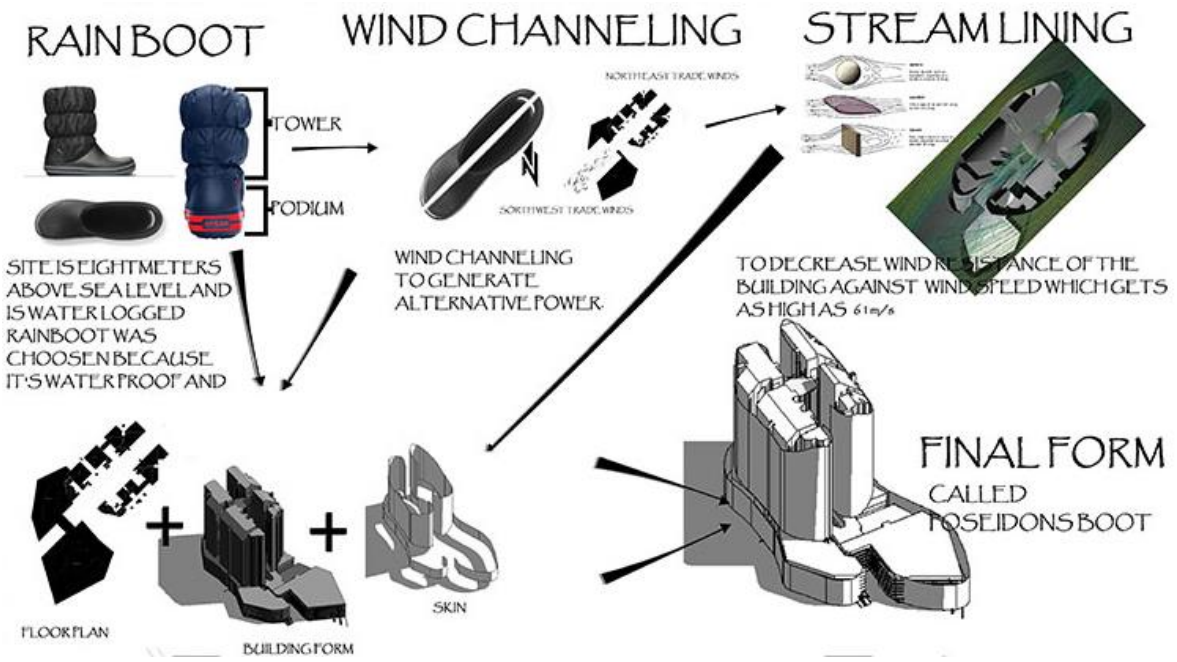


Plate XI: Concept Development Sheet
Source: Author, 2016

Plate XI is a schematic representation of the ideas to achieve the final conceptualization of the form. The final form has three sky bridges on which three wind turbines each capable of generating 20KW of electricity a total of 60kw.

6.3 Architectural Philosophy

The architectural philosophy of this design is sustainability. To achieve an aesthetically good building capable of sufficiently running itself, in terms of generating funds for its maintenance, reducing reliance on grid services by generating its own. Overall findings from research will be applied to the design to achieve maximum user satisfaction.

High-tech architectural style is adopted for the building design especially in the building form. Planning of the interior floor spaces is based on feedback (user design requirements) generated from the users familiar with such building prototypes through the questionnaire survey.

6.4 Design Considerations

The design consideration for this design will be discussed under two, based on the general design consideration for residential and multi-storey building, and the design consideration obtained from the research findings.

6.4.1 General Design Consideration

6.4.1.1 Active fire control strategies

Extinguishing Fire by water is an effective means of controlling the spread of fire and can be achieved in a variety of ways. Small fires can be dealt with by hand-held extinguishers and the use of hose reels. In covered and enclosed building like multi-storey building, sprinkler systems are the preferred method of controlling fire outbreaks

- Automated water sprinkler system
- Stand-by power system
- Fire hydrant system
- Smoke and heat detectors
- Smoke exhaust systems

In the multi-storey designs, active fire control measures are also taken into consideration in other to control the spread of fire in case of emergency. Smoke detectors raises alarm

in slightest situation which triggers the water sprinkler system to distribute water throughout the affected space the sprinklers get water from the overhead tank.

6.4.1.2 Fire escapes

In multi-storey building, it is always advisable to place the clearest exit leading outside in close proximity to crowded space and free of obstructions. Provisions for the fireman's lift/stairs should be considered, in this design, fire escape stairs have been provided for every apartment. Refuge spaces is a temporary space provided which is free from fire and smoke to accommodate visitors and tenant in case of emergency as It is practically impossible to evacuate all the visitors and tenants at the same time in case of emergency. The refuge has a self-closing fire door which is 2500mm wide. The refuge links the emergency lift and stairs directly.

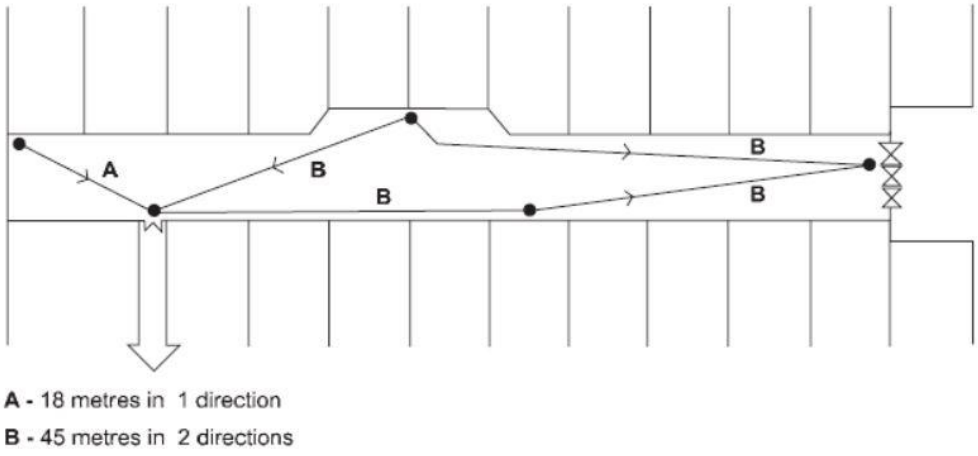


Figure 6.2: Showing the maximum travel distance for emergency exit.
Source: Peter, 2006

Factors to consider when placing fire escapes in residential multi-storey buildings includes

- The population to evacuate the building (GLA=12304/Floor area per person=6m^2)=2000 (Figure 6.2).

- The distance of travel (<45m from any point of the building)
- The time taken to evacuate the building (2.5m)

6.4.1.3 Spatial arrangement

The whole facility is designed to relate with each other with proper zoning consideration based on privacy. This makes accessibility easy and quick. The parking space is the first point of contact on arrival to the site from which golf carts are used to move through the site through the reception. The events centre has a separate entrance due to the high amount of traffic it generates at its peak period. The common shared facilities are easily accessed from the parking area for visitors who just come to recreate themselves and leave.

6.4.1.4 Circulation (within and out)

Conscious design efforts were made to separate pedestrian and vehicular traffic. Circulation forms an important aspect of the design and can be achieved through the following ways:

- Vehicular traffic: The site is very accessible based on its strategic location and it's bordered on the south, by an access road. Vehicular Access to the site is restricted to the car park area, except for service and delivery trucks so as to reduce conflict between pedestrian and vehicles.
- Pedestrian traffic: Walkways form an integral aspect of the external and internal circulation scheme there 2m wide walkways have been provide. Also, walkways link the building to the parking lots and gardens, outdoor play areas, recreation and gaming facilities.
- Vertical Circulation: the main form of vertical circulation is by means of lifts and stairs to the entrance lobby of the apartments.

6.4.1.5 Site planning and landscaping

Environmentally aware decisions such as retaining most trees on site, use of earth friendly techniques and materials, in order to conserve the natural terrain all helps to get a sustainable design. The bye-laws, rules and regulations governing the design have also been put into consideration in proper allocation of spaces and building codes and standards e.g. fire standards, setbacks and also functional requirements have been adhered to in the design.

The site plan was designed in regards with consideration to the key elements carefully discussed below.

6.4.1.5.1 Service Entrance:

The multi-storey building has entrances at the north-east; north-west; south-west and south-east part of the site, which enables firefighters and delivery vans to access with ease.

6.4.1.5.2 Emergency Escape path:

Emergency escape path is one of the key features of evacuation plan in case of emergency. This path is well designed to direct occupants and visitors to safety points in case of emergency. The escape path is 2500mm wide and a setback of 3200mm away from the main building

6.4.1.5.3 Firefighters service point/Delivery point:

Firefighter's service point is very vital in the site plan design in other to ease free movement of the firefighting van within the premises. The delivery point is connected close to the service entrance thereby making loading and offloading a lot easier as seen in Figure 6.3 and Figure 6.4

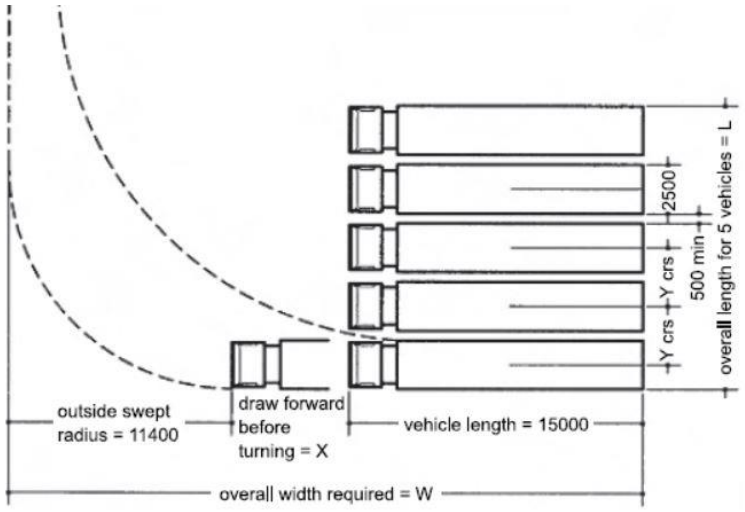


Figure 6.3: Showing the parking and loading bay
Source: Architects data

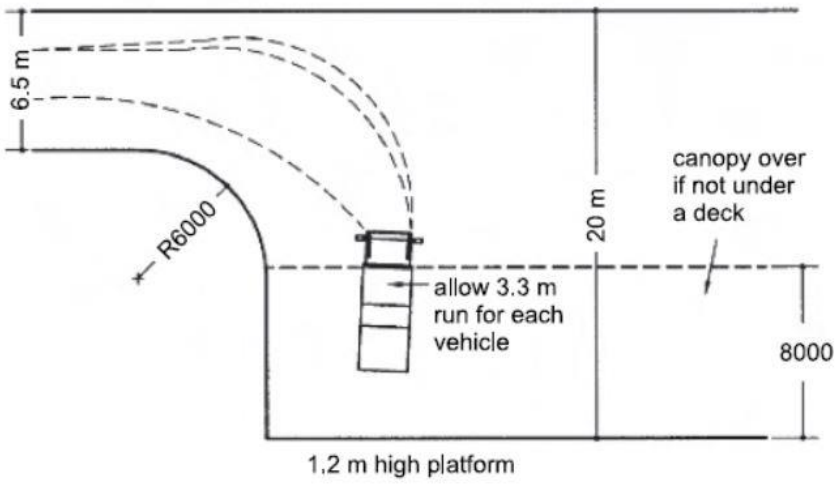


Figure 6.4: Showing the turning radius of a service vehicle.
Source: Architects data.

6.4.1.5.4 Parking:

The multi-storey design has three (3) categories of parking. A multi-level parking of 450 parking spaces attached to the building mainly for the building residents and 100 parking lots outside for the shopper and visitors are provided in accordance with the standards (ICSC) with dimension of 2500mm by 5000mm for customers. And 6 parking lots for services

6.4.2 Design Consideration Based on Findings from Research

These findings form the research have been applied in the design in the following ways

- Provision of large entrances to serve as children play areas
- Privacy in the arrangement of the apartments
- Using a ratio of the present occupants desired number of bedroom to determine the number apartment for each bedroom type.
- Using the building to channel wind to generate electricity to power lift and escalators so as to enhance occupant's satisfaction with services and functionality of the building as findings proved services and functionality to be the most important requirements to the respondents
- Providing a dry room to tackle problems of occupant destroying the façade of the buildings with their laundry. It was established that 70% wanted this space provided
- It was established the 3 bedroom is the most common type of bedroom desired by the occupant so 2 prototypes been provided.
- Provision of leasable spaces and office sized spaces as a higher percentage of self-employed in comparison to other occupations was established up to 40% to be more specific.
- Provision of hotel rooms, event centres, cinemas, as a means of generating income for maintenance of building

6.5 Floor Description

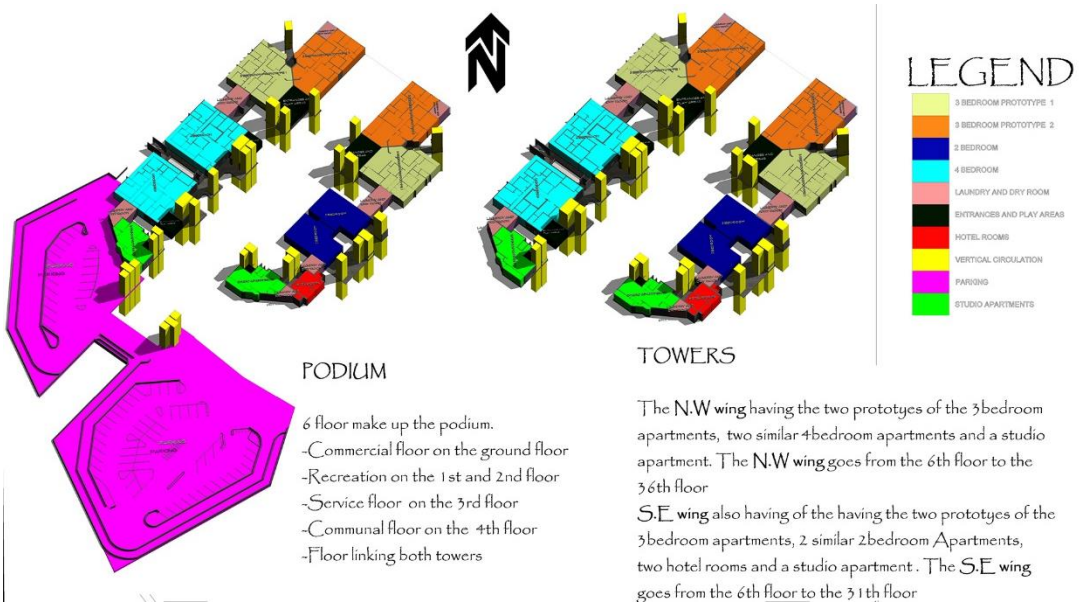


Plate XII: Schematic representation of the floor description in colours and legends
Source: Author, 2016

In plate XII, a breakdown of activities available in the podiums and the tower segments of the multi-storey building is shown.

6.5.1 Podium

6 Floors make up the podium.

- Commercial floor on the ground floor
- Recreation on the 1st and 2nd floor
- Service floor on the 3rd floor
- Communal floor on the 4th floor
- Floor linking both towers

6.5.2 Tower

The building has two towers, the North-West (**N. W**) wing and the South-East (**S. E.**) wing connected by three sky bridges

The **N.W wing** having the two prototypes of the 3bedroom apartments, two similar 4bedroom apartments and a studio apartment. The **N.W wing** goes from the 6th floor to the 36th floor

S.E wing also having of the having the two prototypes of the 3bedroom apartments, 2 similar 2bedroom Apartments, two hotel rooms and a studio apartment. The **S.E wing** goes from the 6th floor to the 31th floor.

6.6 New Innovation to the Design

This describes the new architectural feature in this design that is not common to most Nigerian residential multi-storey buildings. For this design it is the provision of what I call the dry room. This Room is bordered by screen walls on at least 2 sides to allow air pass through to allow the drying. This dry rooms are located between apartments and at the corners of apartments, so air flows freely. This place will serve as a laundry and a space to dry clothing. This will tackle the problem of drying clothes on the façade of the building as is commonly seen in high rise building all around the world. Plate XIII shows the location of this dry rooms and the working process of it.

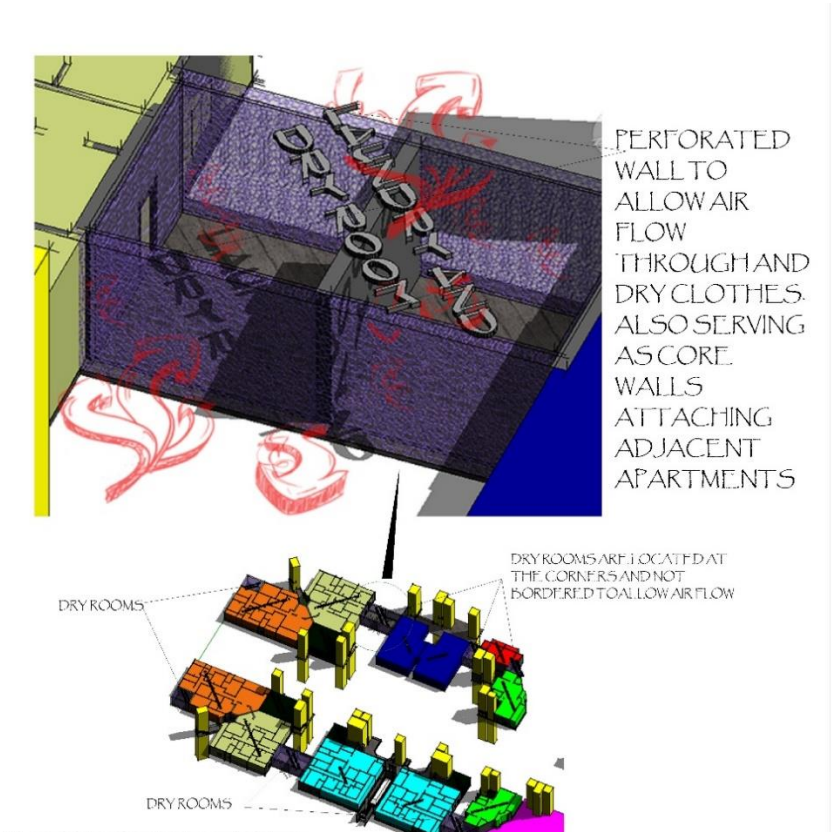


Plate XIII: New innovation about the design
Source: Author, 2016

6.7 Materials

The materials intended for use in the proposed design includes Steel, Teflon, Concrete, Fibre glass and Glass. The choice of these materials is hinged on the following;

6.7.1 Concrete

Reinforced Concrete will be the major material for the structural support system of the building, this columns and cores will be constructed with a system called jump forming where the form work is made then the reinforced concrete is cast in it after 12 hours of drying and setting, the form work is then shifted up and the next bout of concrete is poured in. 900mm sized columns are used at the base for the podiums and 600mm sized column for the towers.

6.7.2 Steel

Ribbed Steel bars which is durably strong, and extremely flexible in design will be used for the reinforcement in the beams, columns and lintels. It is also cost effective.

6.7.3 Glass

To shield the structure from wind, rain and dust, the major application glass will be on the windows and skylight mainly. Special reinforced glass with silver coating outside to deflect UV rays and titanium coating on the inside to capture infra-red rays will be used on the eastern and western facades.

6.7.4 Fibre Glass

Application of this will be used as layers, covering balcony floors and for concrete roofs in attempt at preventing water from passing through. Preventive measures for leaks and reflecting solar rays.

6.7.5 Teflon

PTFE (Teflon) • PTFE, or polytetrafluoroethylene, is a Teflon-coated woven fiberglass membrane that is extremely durable and weather resistant. The woven fiberglass gives the PTFE fiberglass membrane its mechanical strength. These filaments, known as beta glass, are the smallest diameter available and provide the membrane with maximum flexibility. Polycarbonate panels are used mainly for facade glazing and cladding, as an alternative to glass or GRP (glass reinforced plastic) curtain walling and cladding. The skin of the façade will be made of polycarbonate façade system. Its translucency which can be coated with foil if not needed will allow light pass through it and lighten up space between building and the façade.

Teflon is lighter than glass or solid wall systems in weight this will reduce the over imposed dead load on the building. Its thermoplastic ability allows it to be moulded into desired forms and shapes, which then returns to its solid form after it cools. Installing polycarbonate facades system will involve the use of a framing system

6.8 Services

The basic amenities the residents will need ease of living and comfort.

6.8.1 Water supply

A permanent water plant with a daily capacity of 60,000 tons of purified water is the major source of water supply for the entire phase one of this project. Special motor will be used to supply water to an overhead storage tank at the top of the building towers so supply to the apartment can be strictly based on the action of gravity.

6.8.2 Power supply

An Independent Power Plant (IPP) of 12 MW completed December 2012 meets the initial requirement of the investors for power consumption in the Zone. An additional power of about 100KW will be generated from the three wind mill mounted on the sky bridges. This power will be used to power the lift elevators and a few major lighting points.

6.8.3 Heating Ventilation and Air Conditioning System (HVAC)

HVAC system will play in major part in the ventilation of the podiums especially the service floor. And minor application of the system in other areas of the podium in which a degree of deep planning has been employed.

7.0 SUMMARY, CONCLUSION, AND RECOMMENDATION

7.1 Summary

The Problems with housing in Nigeria based on literature review was studied in chapter one, and issues with past housing schemes and why they failed led to the discovery of research gap and two research questions that had to be answered. Housing deficiency and Nigeria's vast cultural differences is a major problem affecting user satisfaction in public and mass housing. How User participation can be explored as a means of addressing the issues of mass housing, most of which are a result of our vast cultural differences and the social issues normally associated with housing provision.

The majority of the findings can be summarised from chapter four and is a report of results and findings from the field work. It covers results from analysis of the questionnaires and a report of the case studies which were selected based on the height of the building tallest and medium rise and the ownership of the building either government owned or privately owned. The research questions were answered and an acceptability of 78.05% of multi-storey residential buildings in Lagos State, and a 73.1% acceptability from the pilot study conducted in Ahmadu Bello University Zaria. Non-conventional spaces, usually not provided like the laundry space, gardens, children parks and gyms were also established as spaces of importance to the residents of multi-storey buildings in Lagos State.

The 3 bedrooms was observed to be the most preferred bedroom type. A clear demonstration of the human need for more can also be established from the trend observed where the respondents in present apartments choose a higher number of bedroom as their ideal number of bedrooms. This hints at the fact that user participation might just be a temporary solution

to user satisfaction, a proof of the need for further research into a more permanent approach to achieving user satisfaction.

It was also established that prior stay in multi-storey typology influences the acceptability of the typology. Satisfaction with a typology also affects the acceptability of the typology.

7.2 Conclusion

Multi-storey residential buildings are large building typologies, usually associated with mass housing provision in areas of land scarcity, or when the need arises for the provision of bulk accommodation units. Multi-storey residential building has its problems not so different from conventional housing issues. Some of the major issues lie in user dissatisfaction off\ten resulting in building abandonment.

Exploring literature, established that Housing provision, is a hugely cultural thing, and in a country like Nigeria where our cultural diversity is very vast, it becomes difficult to achieve user satisfaction in mass housing projects.

For the purposes of exploring objective three, user's preference for their architectural design requirements was explored through a questionnaire survey, to try and find a common ground or a generalised design process for the resident or proposed residents of multi-storey residential buildings in Lagos State.

Based on the findings, contrary to the assumed ideology that the key factor to user satisfaction lies in the provision of the architectural spaces, it was discovered that functions and services were of higher importance to the respondents in determining their level of satisfaction. This was finding was applied in the proposed design as stated in objective four.

7.3 Recommendation

In order to achieve a safe multi-storey residential building that has a high acceptability rate amongst proposed occupant, and with maximum user satisfaction with the proposed multi-storey residential buildings in Lagos state, the following must be taken into consideration.

1. Identifying and including the proposed users in the building process is one sure way to negate building abandonment and achieve user satisfaction.
2. The assumption that the provision of non-conventional spaces in residential designs is of no consequence should be reconsidered. As the research established that some of this non-conventional like the laundry spaces rated very important to the respondents as high as 70% in some cases.
3. A little room should be allowed for post constructional changes this will increase flexibility of design and likely be a better solution to user satisfaction when combined with user satisfaction.
4. More attention needs to be placed on the services and functionality of the entire building than just the architectural spaces.
5. If user participation might just be a temporary solution to user satisfaction, this is proof of the need for further research into a more permanent approach to achieving user satisfaction.

7.4 Contributions to Knowledge

1. This study established from the respondents a mean of 4.04 for functionality and services recorded as against a mean of 2.90 for architectural spaces by the respondents. This is a clear indication that achieving user satisfaction is not solely

based on the provision of just the architectural spaces as is commonly practiced, but also ensuring quality services and functionality of the entire building system.

2. The research established that of the 5.5%, 18.2%, 63.6%, and 12.7% of the respondents currently occupy the 1, 2, 3, & 4 bedrooms respectively. 52.7% of respondents prefer the 3bedroom typology as their ideal bedroom need.
3. A clear demonstration of the human need for more can also be established from the trend observed where the respondents in present apartments choose a higher number of bedroom as their ideal number of bedrooms. This hints at the fact that user participation might just be a temporary solution to user satisfaction, a proof of the need for further research into a more permanent approach to achieving user satisfaction.
4. This research established 70% of the respondent required laundry and drying space. This is a non-conventional space often left out of residential building designs in Nigeria. Other non-conventional spaces with high levels of importance amongst the respondent of multi-storey residential building in Ikoyi, Lagos State are Balcony (80%), Gardens (80%), Private laundry (72.2%), Recreational areas (70.9%), Sporting facilities (67.3%), Outdoor children park (63.6%), Outdoor space (63.6%), Private gym (60%), Study (56.4%), Corridors / lobbies (54.5%) as well as shops outside buildings (52.7%).

   The lack of provision for laundry spaces is a notable factor responsible for the destruction of building facades in residential multi-storey buildings in Ikoyi. Results showed that 70% of respondents want a special space for washing and drying. It was also established that acceptability of a building typology is hugely based on User satisfaction

5. There is 80.3% acceptability rate amongst the respondents satisfied with their present floor level.
6. A 3.7% difference though not so high indicates that prior stays in multi-storey buildings can affect the acceptability of this building typology from the sample.
7. Research established that for a multi-storey residential building to achieve a higher acceptability rate by respondents, the following listed spaces have to be provided: Bedroom, toilets, Kitchen, Vehicular parking, dining room, Living room, Kitchen store, Balcony, Gardens, Private laundry, Recreational areas, Sporting facilities, Outdoor children park, Outdoor space, Private gym, Study, Corridors / lobbies, Shops outside buildings.

7.5 Areas of Further Research

This research was conducted in Ikoyi, Lagos state with only a portion of Nigeria's Multi-storey residential buildings. Further research can be carried out in other parts of Lagos State, and other Nigerian States.

Further research should be carried out on possibilities of designing to accommodate and support post occupancy constructional changes using flexibility, so as to consider the human ever evolving need for more.

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APPENDICES

QUESTIONNAIRE USED FOR DATA COLLECTION

AHMADU BELLO UNIVERSITY, ZARIA DEPARTMENT OF ARCHITECTURE

Questionnaire for users, on the design requirements in multi-storey buildings

Hello. I am O. A. Iselowo, A Masters student from the Dept. of Architecture, ABU. This questionnaire is set up to determine the current Users design requirements in multi-storey residential buildings. Your individual participation in this survey is voluntary and strictly for research. Kindly append your signature/ date in the spaces provided as a mark of consent for this research. Thank you.

Signature----------Date---------- contact:tatyarcdreamz@yahoo.com, 08097703434)

PART 1: RESPONDENT BIO-DATA

1. Gender: **[ ] Male [ ] Female** **2.** State of origin: **[ ] Lagos [ ] others**_____
3. Marital status: **[ ] Married [ ] Single [ ] Divorced [ ] Widowed**
4. Age: **[ ]** 18-25 **[ ]** 26-30 **[ ]** 31-40 **[ ]** 41-50 **[ ]** 50 **years and above**
5. Occupation: **[ ] Civil Servant [ ] Self-Employed [ ] Retiree [ ] Unemployed [ ] Privately Employed [ ] Others**_____
6. Average Monthly Income: **[ ]** ₦18, 000 - ₦37, 000 [ ] ₦38, 000 - ₦44, 000 [ ] ₦45, 000 – ₦144, 000 **[ ] Above** ₦145, 000
7. Highest Educational qualification: **[ ] 1st Schl. Leaving Certificate [ ] WAEC [ ] Diploma [ ] OND [ ] NCE [ ] HND [ ] Bachelor's Degree [ ] Master's Degree [ ] PhD**

PART II: GENERAL INFORMATION (PLEASE TICK AND FILL-IN WHERE NECESSARY)

[1- Strongly Disagree; 2- Disagree; 3- Neutral; 4- Agree; 5- Strongly Agree]

1. **Name of this building** _____
2. **This building is owned by? [ ] the Government [ ] non-governmental body [ ] private persons [ ] others**_____
3. **What is your current rent payment per year? [ ]** ₦50, 000 – ₦100, 000 **[ ]** ₦101, 000 – ₦150, 000 **[ ]** ₦151, 000 – ₦200, 000 **[ ]** ₦201, 000 – ₦300, 000 **[ ] Above** ₦300, 000
4. **Is this your first experience in a multi-storey building? [ ] Yes [ ] No**
5. **What attracted you to multi-storey living? [ ] Personal preference [ ] Convenient location [ ] Familiar neighbourhood [ ] (near a family member) [ ] Affordability [ ] Allocated [ ] others (please list)** _____
6. **How long have you been living in this apartment? [ ] Less than a year [ ]** 1-2 **years [ ]** 3-5 **years [ ]** 6 **years & above**
7. **Do you have your family living with you? [ ] No [ ] Yes, If yes Please state your family size [ ]** 1-2 **[ ]** 3-5 **[ ] over** 5
8. **Do you enjoy living in multi-storey building? [ ] Yes [ ] No. Any Reasons for your answer?** _____
9. **How many floors in this building. [ ]** 1-3 **floors [ ]** 4-7 **floors [ ]** 8-11 **floors [ ]** 12-15 **floors [ ]** 16 **& above [ ] I don't know**
10. **Which floor do you occupy in the building? [ ]** 1st **[ ]** 2nd **[ ]** 3rd **[ ]** 4th **[ ]** 5th **[ ]** 6th - 8th **[ ]** 9th - 11th **[ ]** 12th - 15th **[ ]** 16th **& above**
11. **Are you happy with the floor you now occupy? [ ] Yes [ ] No Reasons** _____
12. **What floor would you rather reside on? [ ]** 1st **[ ]** 2nd **[ ]** 3rd **[ ]** 4th **[ ]** 5th **[ ]** 6th - 8th **[ ]** 9th -11th **[ ]** 12th - 15th **[ ]** 16th **& above**
13. **How many bedrooms in this apartment? [ ]** 1 **room [ ]** 2 **rooms [ ]** 3 **rooms [ ]** 4 **rooms [ ]** 5 **& above**
14. **There is need for more bedrooms? [ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree**
15. **How do you dispose your refuse waste? [ ] refuse bins [ ] refuse chutes [ ] throw over the fence [ ] dump in gutter [ ] throw downstairs [ ] others……**
16. **How would you rather dispose your waste? [ ] refuse bins [ ] refuse chutes [ ] throw over the fence [ ] dump in gutter [ ] throw downstairs [ ] others……**
17. **How do you do your laundry? [ ] washing machine [ ] hand washing [ ] buy new clothes [ ] dry cleaning [ ] others……**
18. **Where do you do your laundry? [ ] laundry room [ ] bathroom [ ] balcony [ ] dry cleaners [ ] outside [ ] others ……**
19. **You dry your laundry in the? [ ] laundry room [ ] balcony rail [ ] bathroom [ ] Lines outside [ ] kitchen [ ] others……**

20. Would you like to have a special space for laundry and drying? [ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

21. How do you access your floor level? [ ] stairs [ ] elevators and lifts [ ] Ramps [ ] ladder

22. You are satisfied with this means of access? [ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

23. How do you get your water supply? [ ] taps on this floor [ ] taps downstairs [ ] well water [ ] borehole water [ ] water sellers [ ] rainwater

24. How would you rather get your water? [ ] taps on this floor [ ] taps downstairs [ ] well water [ ] borehole water [ ] water sellers [ ] rainwater

25. You currently _____ this Apartment? [ ] Rent [ ] Own

26. You would rather _____ this Apartment? [ ] Rent [ ] Own

PART III: USER DESIGN PREFERENCE WITH LIVING IN MULTI-STOREY RESIDENTIAL BUILDING

[1- Strongly Disagree; 2- Disagree; 3- Neutral; 4- Agree; 5- Strongly Agree]

27. You enjoy living in multi-storey buildings? [ ] Strongly Disagree [ ] Disagree [ ] Neutral [ ] Agree [ ] Strongly Agree

28. Would you rather live in a [ ] bungalow [ ] Duplex [ ] low rise Storey Building [ ] Multi-storey building Reasons _____

PLEASE TURN OVER THE PAGE TO COMPLETE SURVEY

29. How high are you willing to go? [ ] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] 5th [ ] 6th - 8th [ ] 9th -11th [ ] 12th - 15th [ ] 16th & above

30. You prefer to choose the floor of your apartment? [ ] Strongly Agree [ ] Agree [ ] Neutral [ ] Disagree [ ] Strongly Disagree

31. What is your ideal number of bedrooms? [ ] 1 room [ ] 2 rooms [ ] 3 rooms [ ] 4 rooms [ ] 5 & above

32. What is your preferred approximate bedroom size? [ ] 9SqrM [ ] 10.5SqrM [ ] 12SqrM [ ] 16SqrM [ ] Above 16SqrM
[ ] small [ ] medium [ ] large

33. What is your preferred Bathroom size? [ ] 3SqrM [ ] 4SqrM [ ] 5SqrM [ ] 8SqrM [ ] Above 8SqrM
[ ] small [ ] medium [ ] large

34. What is your preferred Living room size? [ ] 25SqrM [ ] 30SqrM [ ] 35SqrM [ ] Above 35SqrM
[ ] small [ ] medium [ ] large

35. Indicate the level of importance you will attach to the following spaces, services and functions in your decision to or not to live in multi-storey building? [5- very high; 4- high; 3- Fair; 2-low; 1- very low]

S/N	VARIABLES	5	4	3	2	1		S/N	VARIABLE	5	4	3	2	1
1	Bedrooms							**20**	No of Bathrooms					
2	Living room							**21**	No of rooms					
3	Laundry							**22**	Size of rooms					
4	Dining room							**23**	Size of Bathroom					
5	Stairs							**24**	Size of living room					
6	Balcony							**25**	Security					
7	Outdoor Kitchen							**26**	Power supply					
8	Corridor/Lobby							**27**	Water Supply					
9	Parking Space							**28**	Refuse Disposal					
10	Box room							**29**	Building name					
11	Home gym							**30**	Elevators/Lifts					
12	Public gyms							**31**	Noise Control					
13	Outdoor Play Area							**32**	Location					
14	Box room							**33**	Privacy					
15	Shops/ kiosk							**34**	Height of building					
16	Shops in building							**35**	Access to Building					
17	Shops outside building							**36**	Cost					
18	Landscaping							**37**	Building Colour					
19	Recreational Parks							**38**	Aesthetics of building					

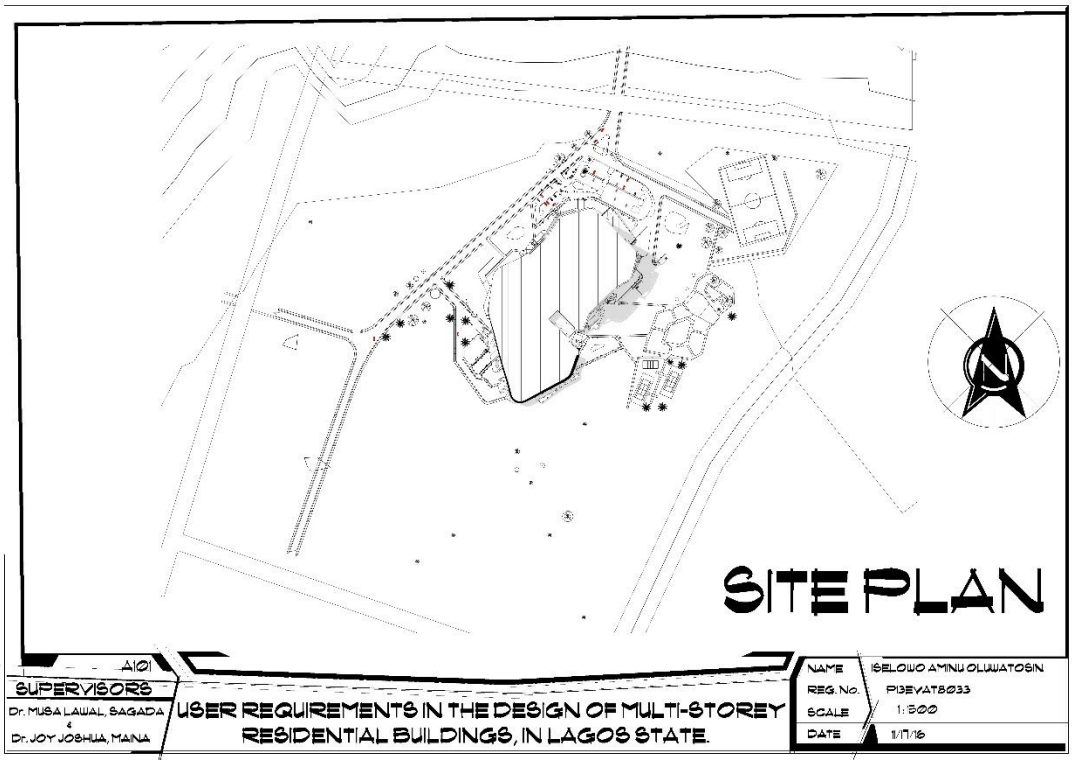
PART IV: USER SPACE PREFERENCE IN MULTI-STOREY RESIDENTIAL BUILDING

36. Please tick particular required spaces you would absolutely want in you apartments

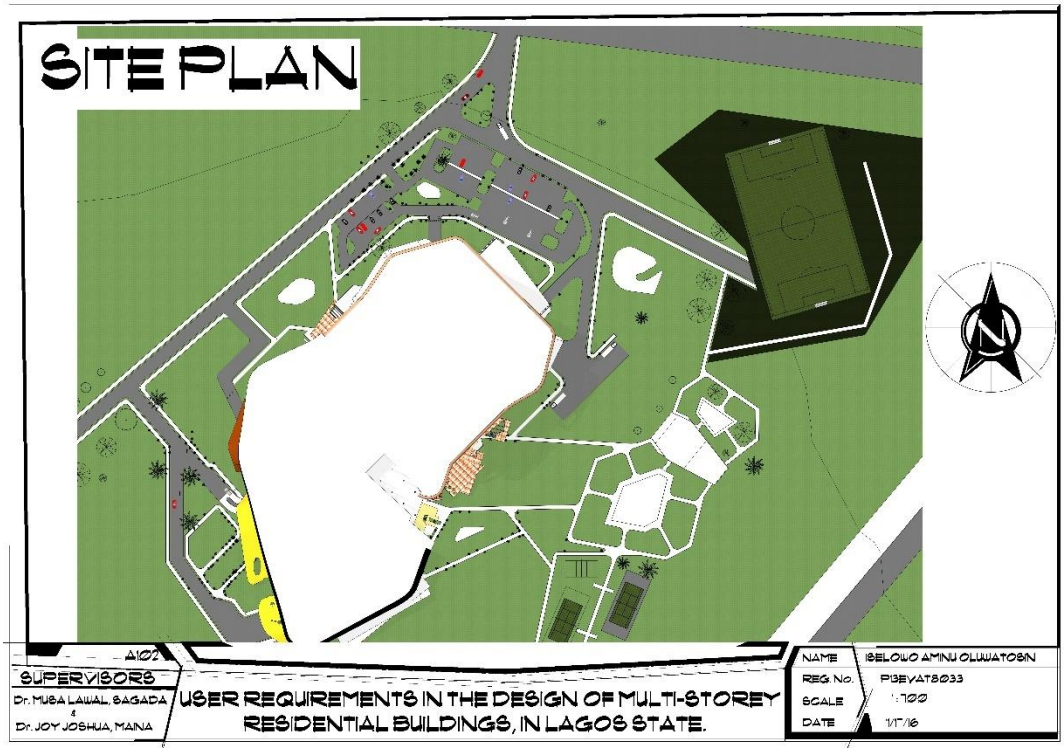
a. Bedroom [ ]
b. Living Room [ ]
c. Toilet [ ]
d. Study [ ]
e. Kitchen [ ]
f. Kitchen Store [ ]
g. Outdoor Kitchen [ ]
h. Dining Room [ ]
i. Box room [ ]
j. Waiting Room [ ]
k. Balcony [ ]
l. Basement [ ]
m. Family Room [ ]
n. Corridor/ Lobby [ ]
o. Private Gym [ ]
p. Public gym [ ]
q. Private Laundry [ ]
r. Public laundry [ ]

s.	Shops outside building	[ ]	**v.**	Recreational areas	[ ]	**y.**	Vehicular parking	[ ]
t.	Shops inside building	[ ]	**w.**	Sporting facility	[ ]	**z.**	Outdoor Spaces	[ ]
u.	Gardens	[ ]	**x.**	Outdoor children parks	[ ]			

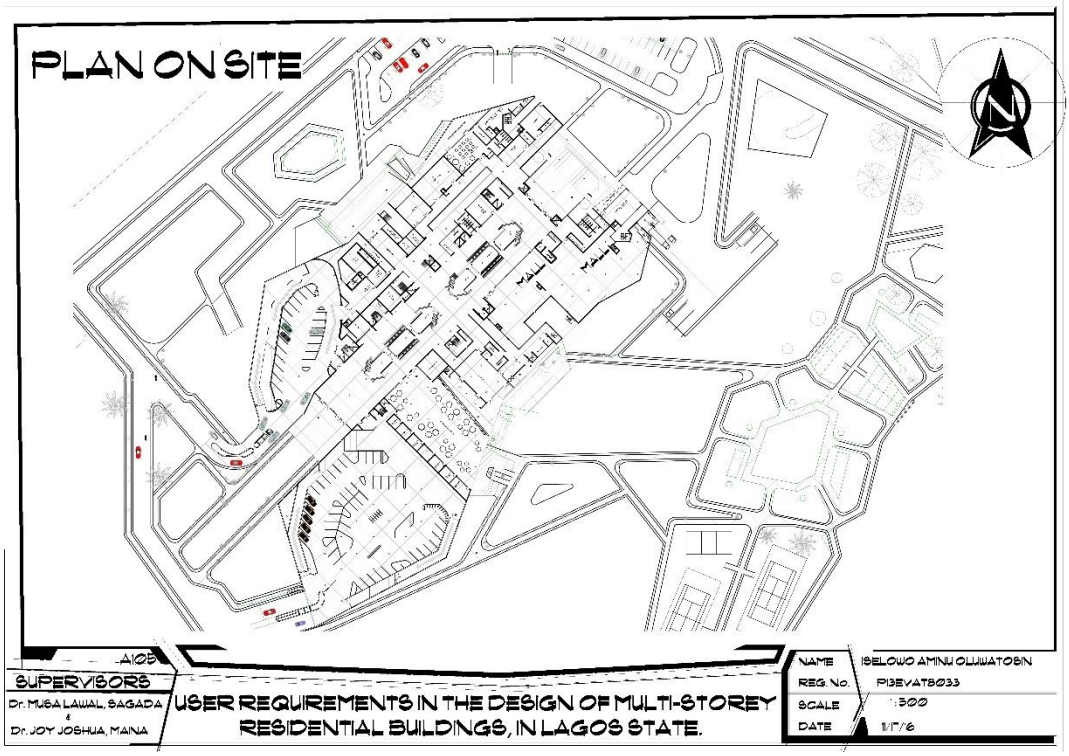
Thank you for your co-operation in completing this questionnaire.



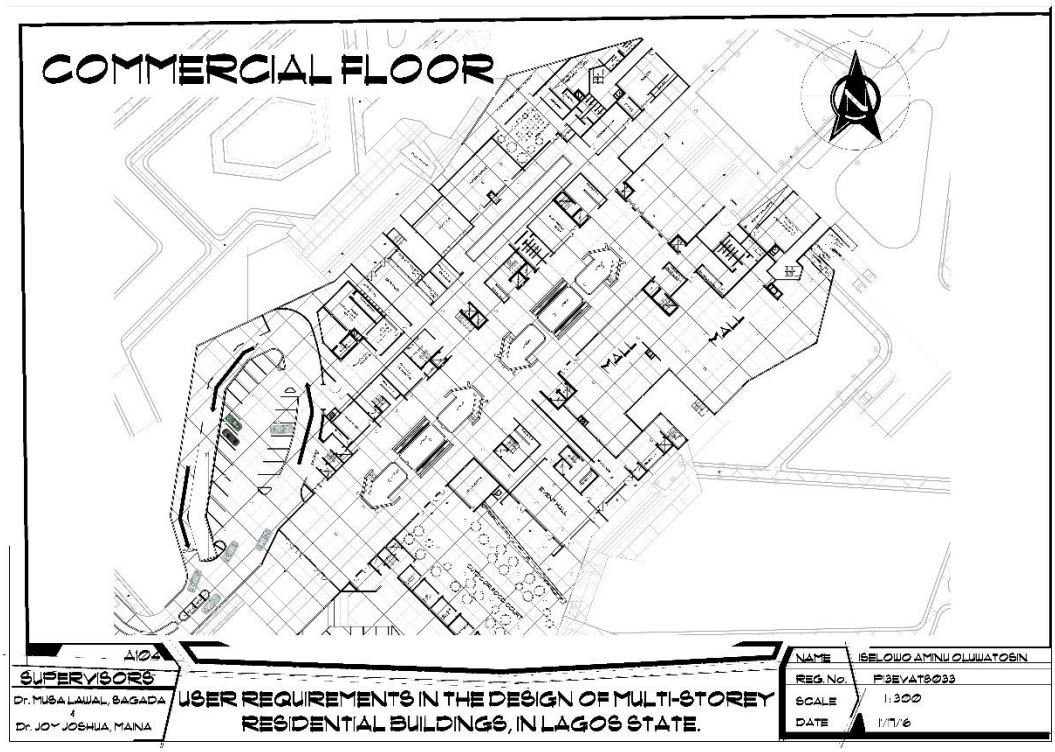
Appendix 1: Site Plan



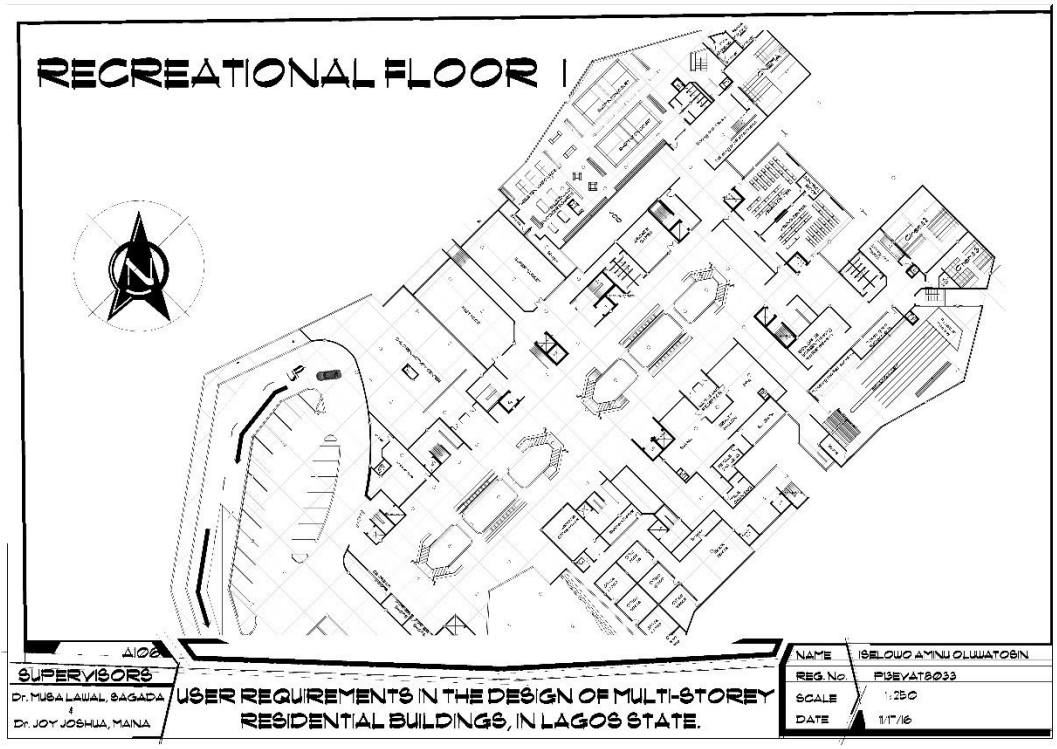
Appendix 2: Blowout of Site Plan



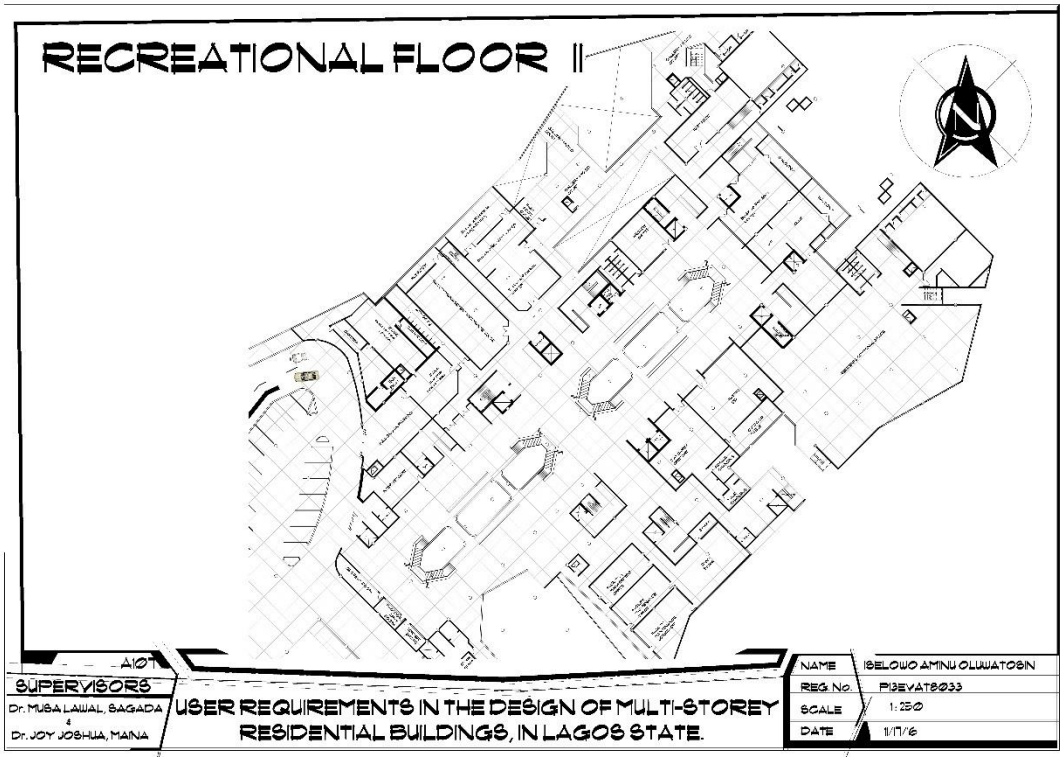
Appendix 3:Plan on Site



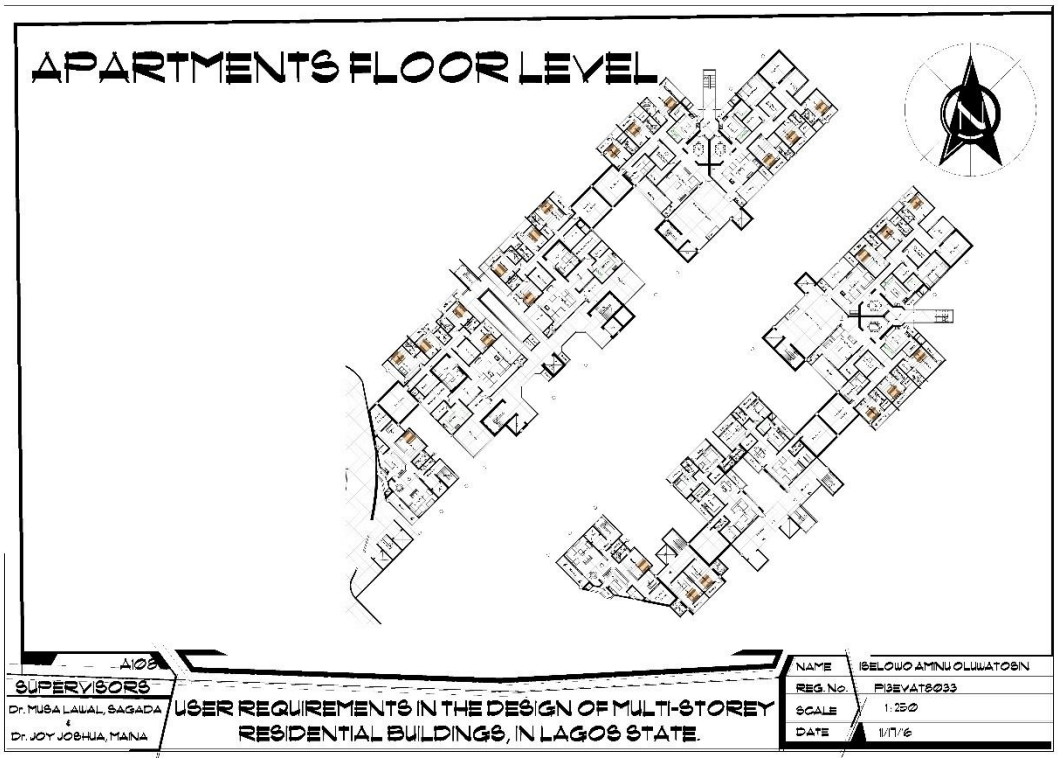
Appendix 4: Commercial Floor Ground Floor



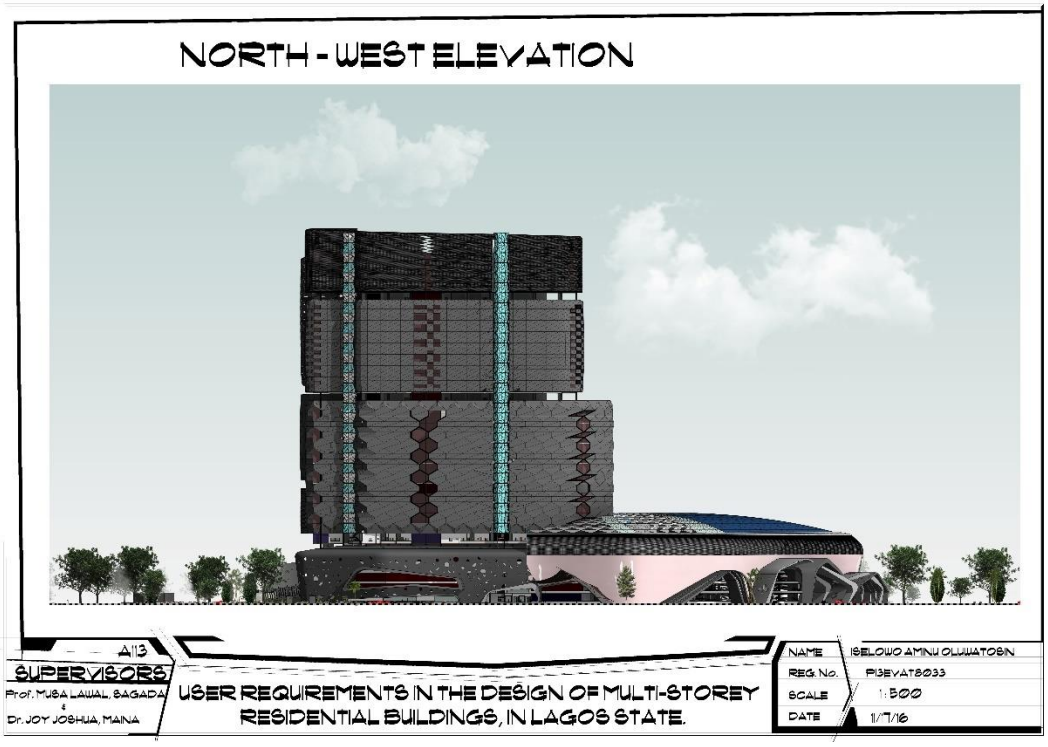
Appendix 5: Recreational Floor I First Floor



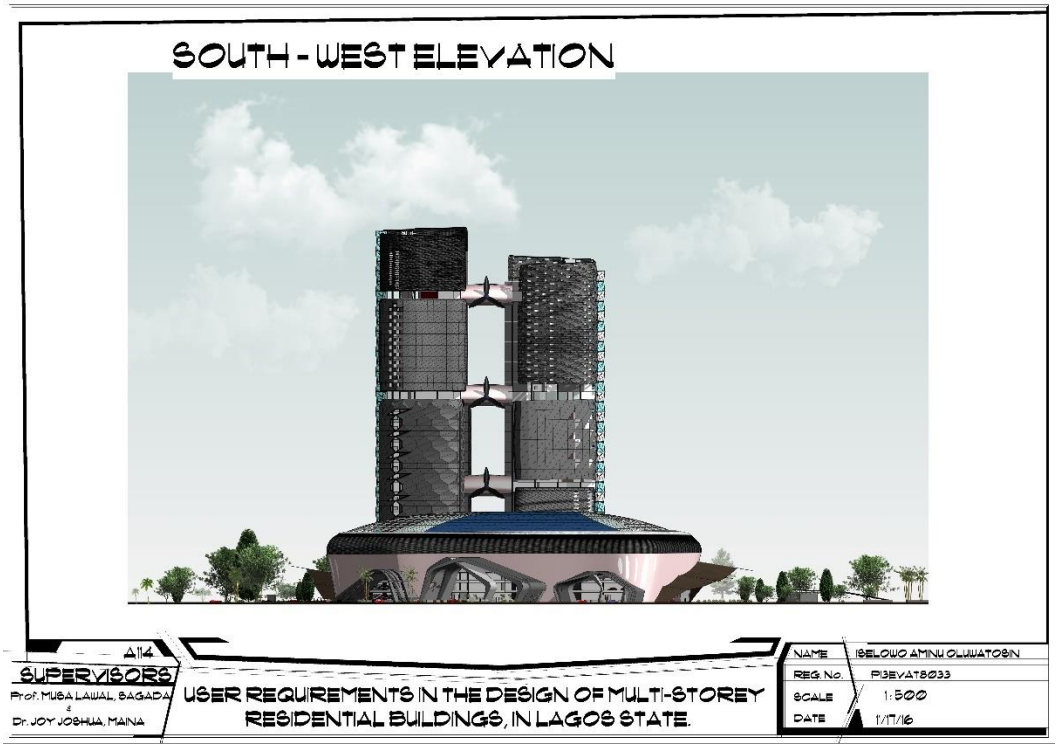
Appendix 6: Recreational Floor II Second Floor



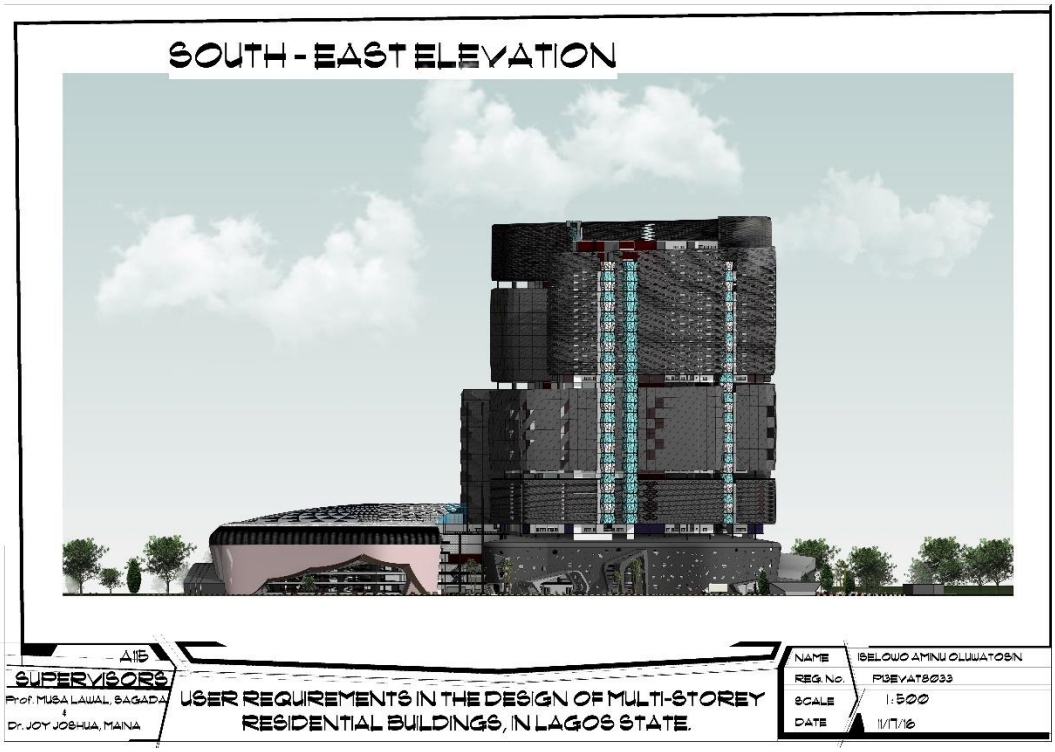
Appendix 7: Apartments Floor Plan



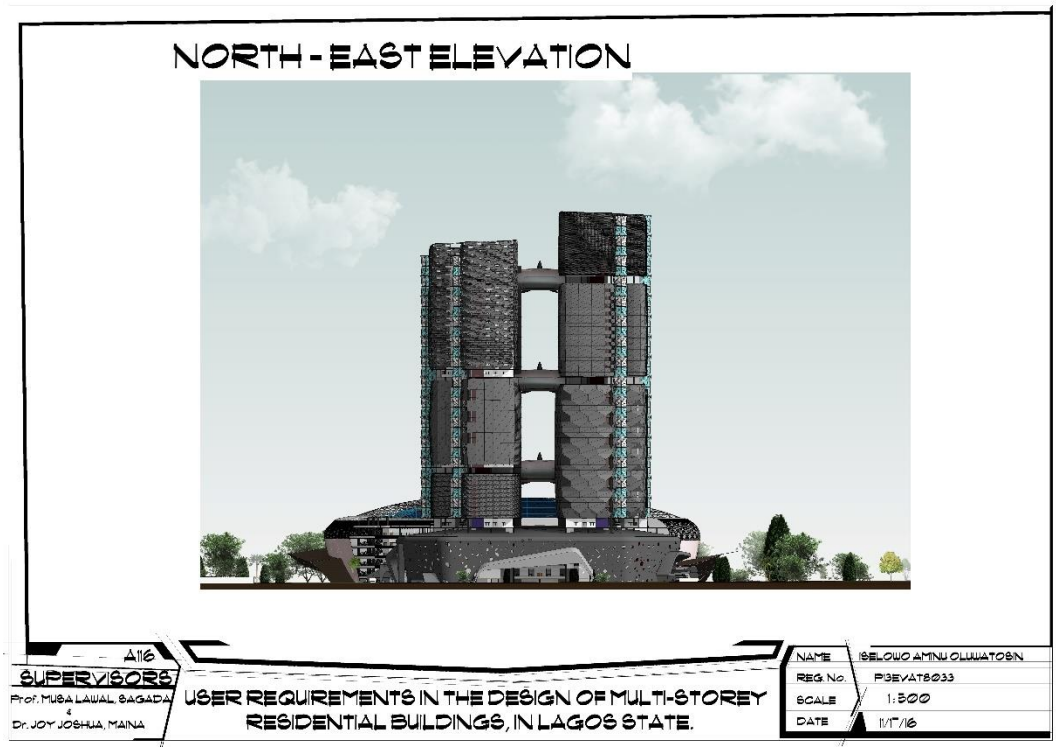
Appendix 8: North West Elevation



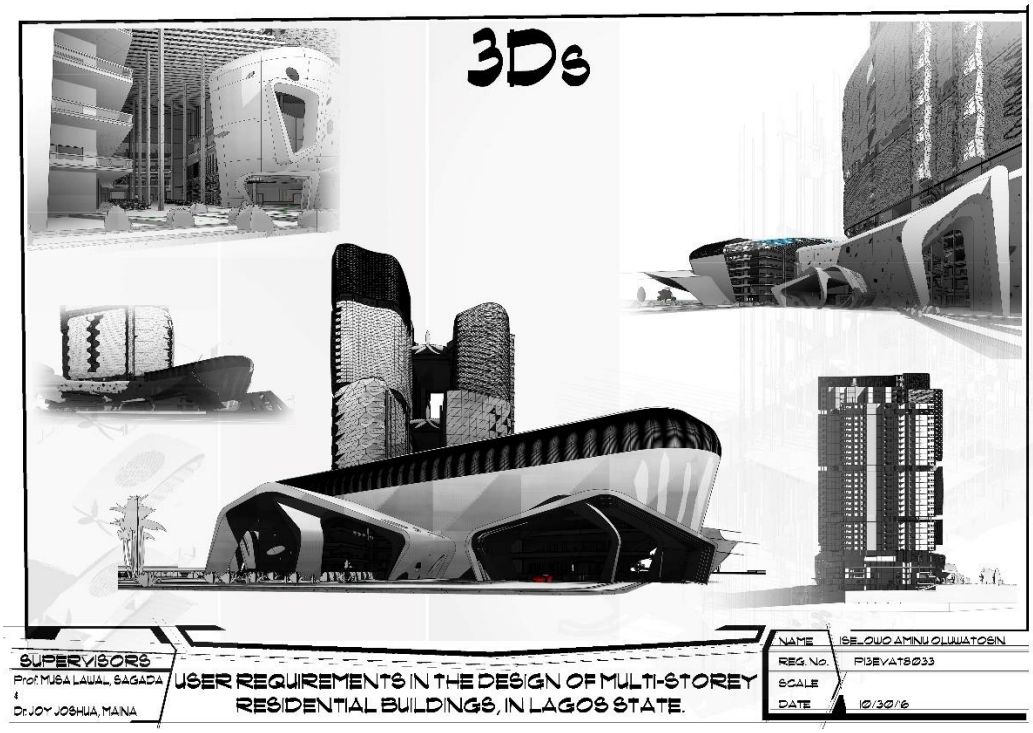
Appendix 9: South West Elevation



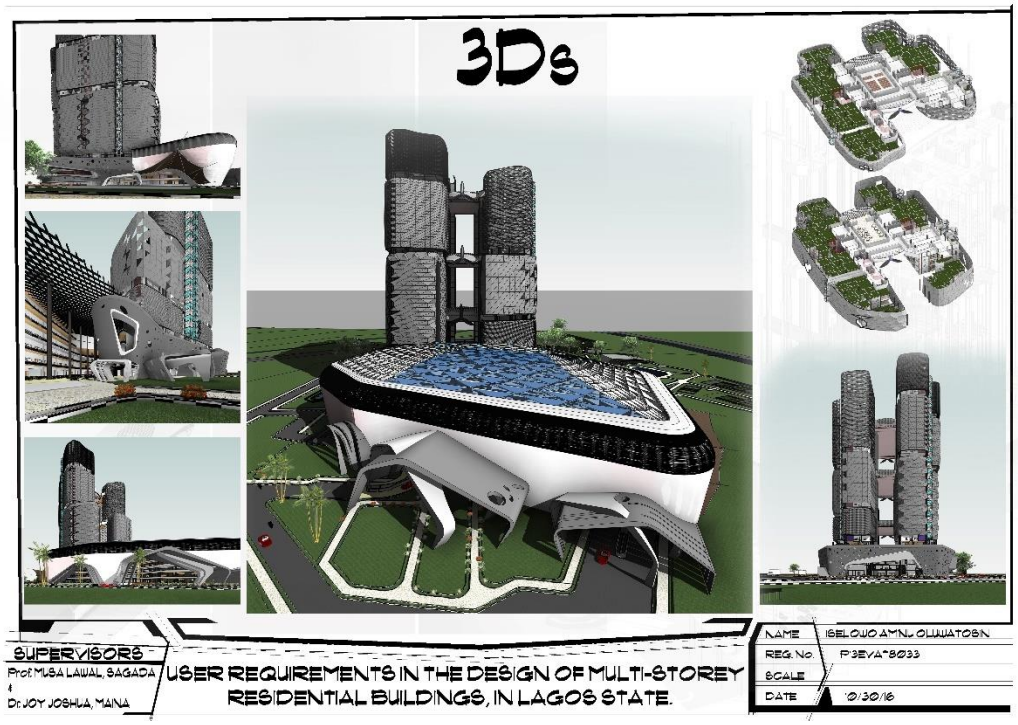
Appendix 10: South East Elevation



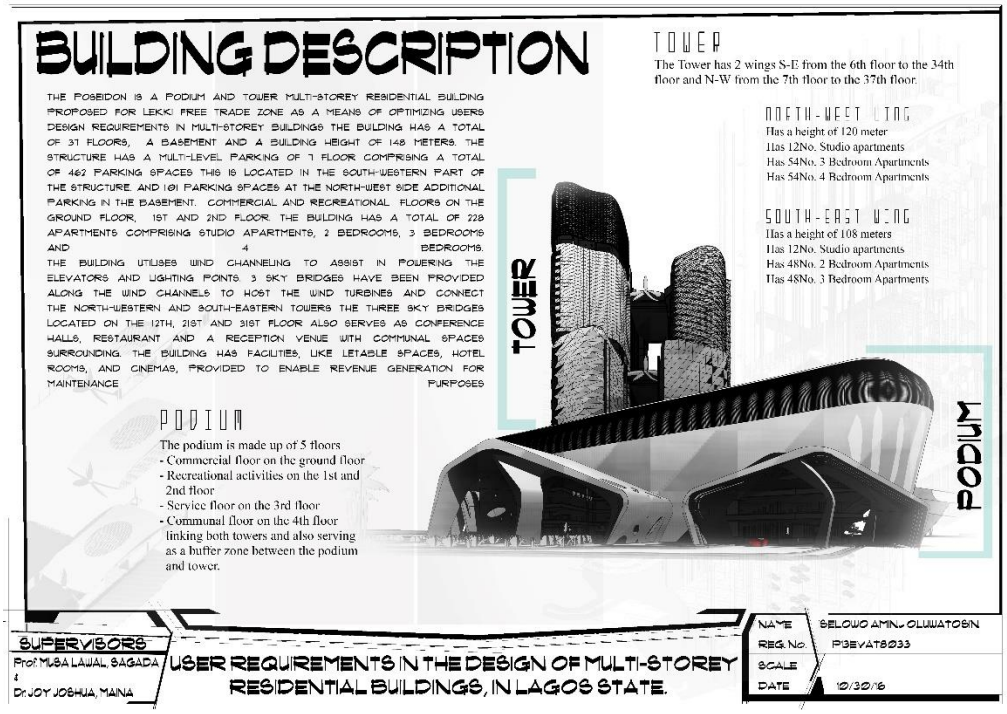
Appendix 11: North East Elevation



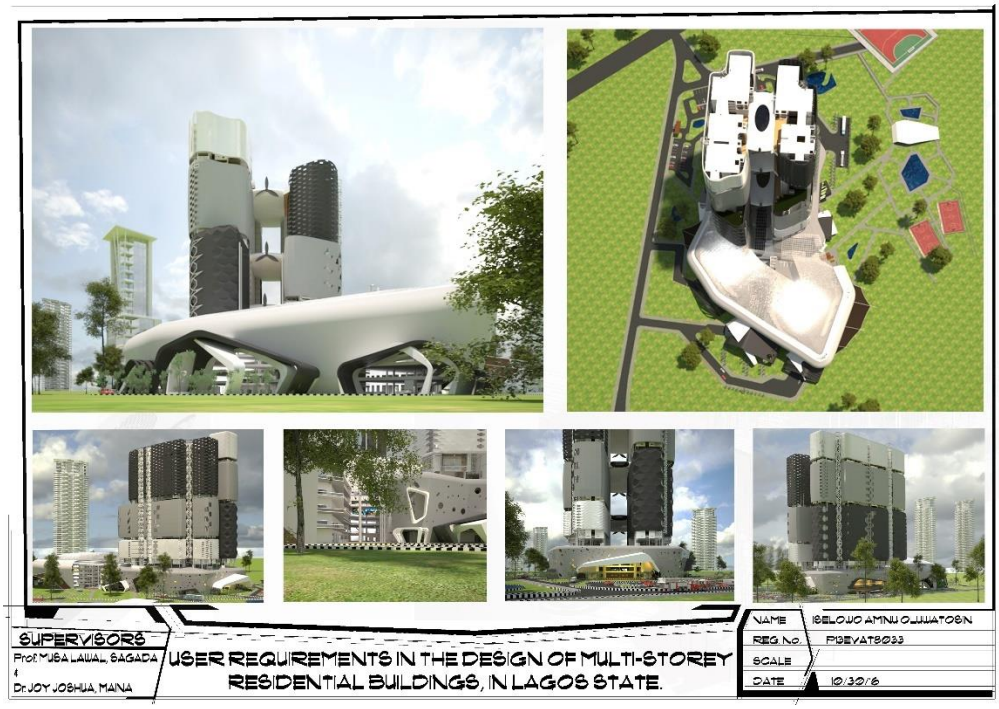
Appendix 12: 3d View



Appendix 13: 3d View



Appendix 14: Building Description



Appendix 15: Rendered 3d View