Proposed Community Shopping Mall for Moniya, Ibadan, Oyo State, Nigeria. (Sustainability Relevance of Eco-friendly Materials in Construction)

Adeola Abidemi OLABODE
LCU/PG/005070

Being a MSc Thesis Submitted to the Department of Architecture, Faculty of Environmental Design and Management, Lead City University, Ibadan, Oyo State, Nigeria

In partial fulfilment of the Requirements of the Award of Master Degree (MSc) in Architecture

2024

Certification

This is to certify that Adeola Abidemi OLABODE, with matriculation number LG/PG/005070 carried out this research work titled 'Sustainability Relevance of Eco-friendly Materials in Construction' in the Department of Architecture, Faculty of Environmental Design and Management, Lead City University, Ibadan, for the award of Master Degree (M.Sc) in Architecture and this has not been previously submitted.

…… ……

Arc. Ademola ADEOLA **Date**
(Supervisor**)**

…… ……

Arc. Dr. Oludare OBALEYE **Date**
(Head of Department)

Dedication

This work is dedicated to GOD Almighty; my Sufficiency.

Acknowledgement

I appreciate the Management of the Lead City University Ibadan for the opportunity to learn and carry out this research.

Also, I'm grateful to all the staff of the Post Graduate College for promptness with processes relating to my admission, registrations and clearance. May GOD reward you all!

Deep gratitude goes to my Supervisor Arc Ademola Adeola for guiding me through the course of the research work, his constructive criticism and enlightenment worked for the success of this thesis. Likewise, all of my department lecturers who willingly shared their knowledge with me and taught me in the course of the programme: Arc. (Dr) Ajijola K; Arc. Afolabi A; Arc, Aseyan B; Arc Fasehun Motesho J; Arc. Gegeleso B; Arc. (Dr.) Obaleye O; Arc. Oguntunde D; Arc. Olaniyan M; Arc. Olugbesan N and Mrs. Adebiyi. The LORD promotes you all!

Special mark of appreciation to all my class members; they were never tired of explaining to me many times before I would understand. GOD bless you all!

Profound gratitude to my parents; my late Dad (Prof.) Afolabi OLABODE whose dream for me to attain the ladder of successes is still alive till date, and my actively strong Mum whose lifestyle has always propelled me to make progress. Also, to all my family members and friends who supported me financially and emotionally throughout the programme, may the LORD support you all too!

Though, the above-mentioned institution and persons assisted in the realization of the success of the research, I, am absolutely (as the researcher) responsible for the errors, if any be found in this work.

Abstract

This research focuses on how eco-friendly material utilization in construction can be substantially relevant to environmental sustainability in multiple ways simultaneously and investigates why buildings are still partially and not absolutely sustainable yet. In the development of a Proposed Community Shopping Mall in Moniya, Ibadan, Nigeria, six case studies were investigated to identify materials required for a standard home-based mall design and how they function in achieving environmental sustainability. Also, it helped to realize some avoidable mistakes so they could be prevented in the proposal. The research concluded that utilizing eco-friendly material for the proposal would have diverse benefits and advantages on the biosphere, building, business, Community and all users by measuring with the expectations of the sustainable development goals. It further recommends that eco-friendly materials should sufficiently be made available so that when used in construction, their impact can holistically salvage the already distressed earth.

Keywords: Biosphere, Community, Eco-friendly, Environmental Sustainability.

Word count: 147 words.

Table of Contents

List of Tables

List of Figures

List of Figures

Chapter One

Introduction

The earth of no doubt has been very cooperative to man, his various activities and other living organisms' existence. According to Karen Ellis, "The natural world is an incredible wonder that inspires us all. It underpins our economy, our society indeed our existence". Despite the benevolent nature of the earth, man's habitual careless practices have been responsible for the degradation of his habitation, giving rise to various categories of environmental challenges. 'The health of planet earth is in jeopardy' (Awake Vol. 104, No. 1 2023;{16}).

Overcoming the earth's environmental challenges requires identifying strategic intervention points on which a value chain approach is adopted in order to achieve multiple sustainability objectives simultaneously. Sustainability which implies the enablement of an equipment, facility or material to extend its period of use with less or no negative impact on the environment is recommended by various campaigns, conferences and sensitizations as an antidote to the already distressed earth. 'The idea of sustainability can guide decisions at the global, national, organizational and individual levels' – Wikipedia.

This research considers the use of eco-friendly materials as a strategic point on which environmental sustainability approach can be engaged. It employs the Construction Industry and its processes as a way of implementing this and the modalities of the Sustainable Developments Goals (SDGs) as a scale of impact or measure of relevance. As a major determinant of the built environment on which all economies and people's daily lives are founded, the construction industry provides and maintains accommodation, plants and infrastructures. "In construction, we use eco-friendly building materials in areas such as production and maintenance" (Sivarethinamohan and Sujatha, 2021). The materiality of sustainability from the ambience architecture is depicted in providing building solutions that help

reduce carbon footprints, create value with renewable resources, maintain healthy and safe environment and utilize materials that have positive or neural impact on the environment. With all these tenets merged in a proposed shopping mall, the sustainability relevance will in the long run, heavily influence the altruistic (community), biosphere (physical), egoistic (individual) and the hedonistic (visitors) environment at large. This research work therefore examines the sustainability relevance of eco-friendly materials advocating their continuous utilization in building construction and finishes.

1.1 Background to the Study

The current environmental challenges of our planet today such as climate change, resource shortage, increased population, expansion of the universe (due to aggravated electromagnetic effect), biodiversity loss and so on and so forth have been largely attributed to lack of pro-active approach to developments and continuous pollution of the environment.

Big cities with important large industries contribute greatly to the contamination of the atmosphere, soil and water. Some processes in big factories including shopping centres, release large amounts of toxic gases into the atmosphere and the environment and thereby degrade them.

Over the recent years, researches on addressing the unhealthy state of the earth have found a solution in environmental sustainability of the built environment. 'The key nature content of sustainability is continuity, openness to or docility modification amidst of human civilization, without which there is no sustainability'. (Njar and Enuagu D). It is the mutual and responsible interaction with the environment to the degree of which there is no depletion or degradation of its natural resources and maintenance and preservation of the quality of the environment with actors and factors that account for them included. Despite innovations, advancements and increasing public awareness about the need for greener building practices, sustainable architecture still represents a small portion of overall global

construction. For example, in Nigeria, where the imported conventional building materials despite the huge costs, are preferred to and exchanged for the local ones for the excuse of their unreliability (because they are yet to be certified standard by the related professional bodies) and unpopularity (because they are believed to be archaic), even though much more sustainable many times over the imported conventional ones; changing from the conventional materials cannot be achieved overnight except the government support in appealing ways and implement some laws to that effect. 'Nigeria has been slow to embrace the green economy because she has not strategically positioned herself as a green economy by addressing its current economic and environmental challenges from a sustainable point of view, this has continually questioned her ability to thrive in green buildings'. (Business Day 7/4/2014).

'In Nigeria, green buildings are not essentially new as most traditional building methods were very sustainable in their design and functionality. However, the inability of the country to develop these traditional systems over time through innovative technologies has become one of her greatest undoing. 'It's quite worrisome that despite the prevalence of green buildings in the World, Nigeria's government private real estate developers and homeowners still struggle with the need to go green with their buildings. "In Nigeria, adoption of green building standards is still low" (www.julius_berger.com).

Decreasing atmospheric and surface level pollution is essential to conserving natural resources and meeting sustainability goals like the "Paris Agreement". Countries are targeting the Construction Industry in their pursuit to prevent pollution. Regulating materials and heavy machines, requiring that builders utilize eco-friendly construction materials, equipment and principles. According to findings, buildings' construction and operation processes produce 35% of global greenhouse gas emissions. Professionals that adopt sustainable building practices reap major benefits. One common ecological

challenge of building is both emission rates of material manufacturing practices and heavy machines. One of the most notable advantages of engaging in eco-friendly construction practices is shrinking the carbon footprint.

Much urban and rural viscidity in Nigeria is beset by terrific health challenges due to environmental abuse. Illnesses such as malaria, typhoid, cholera, diarrhoea, cancer etc. are emanates of environmental abuse (Federal Ministry of Environment Nigeria).

Sustainability, therefore is key when building an eco-home and the aim is to construct a home that lasts and has little effect on the surrounding environment as much as possible. As the climate continues to change with several impacts on the environment, there is the need for sustainability in every sphere of life; even building inclusive. “Sustainability is today’s standard”.

1.2 Statement of the Problem

The World’s biggest challenge today is climate change. This is an effect of frequent practices of environmental pollution, exploitation of resources and nonchalant disposition towards development which had inevitably resulted in degradations that had made the environment vulnerable to natural disasters. While these are largely attributed to the occurrence of greenhouse gas effect owing to the carbon emissions by various polluting processes, the Construction Industry has its own fair contributions too forming a 35% of total world pollution, 23% of air pollution, 40% of drinking water contamination, 40% of landfill waste, 38% global energy -related carbon emissions, 40% utilization of raw materials and 50% climatic change. “Construction is a critical contributor to resource depletion and environmental degradation” (Farhadi F).

Conventional buildings which may be residential, commercial or industrial release large amounts of toxic gases into the atmosphere and the environment due to the nature of some of the materials used for

their construction, processes involved in their production and methods of application (majorly heavy machines). According to the UNEP, the production and the use of materials such as cement, steel and aluminium have a significant carbon footprint stemming to about 37% of global emission (UNEP Report; 2023). The daily operations involved with them and their non-biodegradability in their tiring state also contribute to environmental degradation thereby invariably resulting in serious hazards affecting the air, water and soil making them horrendous to humans.

Moreover, rapid urbanization characterized by increased housing provision with the lack of evapotranspiration makes the urban cities to lose the shade and the evaporative cooling effects of trees. "There are unhelpful interactions between heat and built infrastructure; these interactions increase the risk the risk of heat stress for people living in cities" (Climate Change Report 2022).

Evidently, every stage of development ranging from citing to decommission has a quota responsible in this regard; hence, demanding an approach by which the climate could be protected for continuity of life and all activities associated with it. Though, the idea of sustainable design has become a basic criterion of architectural design, however, many buildings claimed as sustainable are only so in terms of design. The discriminative citing, excessive topography alteration, importation of orthodox concepts (especially in areas of material utilization), the regular operational practices involved with them (in terms of energy generation and usage, solid, liquid or gaseous wastes disposal) and their retirement in the long run would constitute a bare to sustainability thereby having huge implications on the environmental values.

Breathing in polluted air increases a construction professional and resident's risk of cancer, stroke, heart attacks and other health conditions. It also enhances an individual's risk of asthma attacks, chest pain and shortness of breath. Minimizing these building emissions decreases adverse health effects associated with air pollution.

It is worthy of note that all buildings materials basically, have their prospective and consequential aspects when used for construction. All building materials whether indigenous or conventional, when evaluated, present their various abilities ranging from availability and performability (functionality) to durability and significance. However, each of them has its unique challenges attributed to maintainability, techniques and technology demands and biodegradability. “Building materials impact the built environment and can influence health outcomes” (Khoshnava et al., 2020).

The stereotypical attachment to conventional materials eliminating the sustainability of the milieu on which the realization of the project purpose (continuity) is based, often times lead to draw backs. This therefore, demands for a sustainable building which is capable of protecting the environment and preserving the business for continuity.

The building of industries most of which are in non-strategic locations, emitting and producing wastes ranging from carbon and some indecomposable substances that can neither be reused nor be recycled. Nigeria is now beset by unimaginable environmental pollution and hazard which has terrifically degraded our environment. Some of these include gas flares, fire disasters, floods, erosion, toxic waste, etc. (Njar and Enagu 47).

1.3 Aim and Objectives of the Study

The aim of this research is “To assess the sustainability relevance of eco-friendly materials on the environmental values in the construction of a community shopping mall”.

Notably, selling and buying mannerism are not the same everywhere and so their architecture varies with geographical differences, shopping mall development being not indigenous to our culture, demands that its architecture be incorporated in a manner that fits into our geographical zone. The best way to integrate a foreign idea into any real environment is to relate it with the nature of that

environment such that the environmental values are not hampered and end goal is achieved. Therefore, one reasonable way of making architecture preserve the environment and still make for business profit maximization through the tenet of 'Sustainability' finds expression in the use of eco-friendly materials. Eco-friendly waste reduction and management, maintained outdoor and indoor air quality, site optimization, maximization of renewable resources, minimization of non-renewable energy consumption and waste, protection and conservation of water, enhanced operational and maintenance practices, creating a healthy and productive environment.

Since development is majorly environmentally dependent, it is pellucid important and necessary to consider the factors and actors that account for environmental stability before embarking on any developmental project. The construction industry is currently incorporating the sustainable concept into building materials operations to limit building impact on the environment (Hoisington et al., 2019; Lundgren Kownacki et al., 2019).

As the world battles with a climate emergency caused in large parts from the carbon emissions generated by buildings, there is a top concern of growing movement to green existing buildings and demand greener buildings, with smart energy usage and reduced consumption – 2021 Global Status Report for Buildings and Construction; Global Alliance for Building and Construction. With this emanating as a sustainable goal, the sustainability relevance however, is material when multiple goals can be achieved simultaneously.

Having known that the shopping mall is a public facility upon which a sustainable approach could be engaged, the means of achieving a relevant sustainable architecture includes:

- Identifying the eco-friendly materials.
- Reviewing their sustainability in production, utilization and decomposition stages.

- Highlighting their benefits with respect to three aspects of environmental values.
- Assessing their advantages in conformity with Sustainable Development Goals (SDGs).

1.4 Research Questions

The link between building materials and human wellbeing is increasingly evident as moods and wellbeing are affected by various elements of the built environment as spatial allocations, lighting, access to nature, colour, indoor air quality, noise, thermal comfort, user control of space and preferred settings. Sustainable building materials will significantly contribute to a healthy indoor environment and promote wellbeing. Research has also alluded that a relationship exists between building material quality and human wellbeing (Lomas, 2019). The shopping mall project is of good advantage when it continues to fulfil its purposes with less negative impacts and minimal operational costs. However, in the realizing this by focusing on the use of eco-friendly materials, the researcher sought to answer the following questions:

Which eco-friendly building materials are available in Nigeria at present?

How does their utilization in construction harness a high environmental value?

Why are they not in frequent use despite their advantages over the conventional ones?

1.5 Significance of the Study

According to the U.S Environmental Protection Agency, approximately 30% of the energy used in commercial buildings is wasted. The construction industry has a huge responsibility for effective change. Due to the effect that the construction industry has on the environment, regulatory assessors look for opportunities that would prevent further damage. The lifecycle of a building is supposed to work in harmony with a sustainable net zero future. The holistic approach aligns with the construction industry's potential to not only to build structures but also foster resilient communities and drive

economic growth. “Constructing healthy buildings has a positive impact on the end-user of the building and the environment” (Minett 2021). The following are the general benefits derivable from construction processes:

To the Environment, it will offer stability against natural disasters like erosion or flooding because the site was optimized, not felling all trees but retaining some for beauty, shade and stability. Also, quality outdoor air is achieved because carbon emissions are controlled this bringing about the air quality most ideal for inhaling for a healthy living since the resources used are not pollutants of the environment. Preservation of ecosystem through waste control to aid the continuous cycle of nature and life is another advantage. It will also give no room for pests and viruses which are hosts of sicknesses and diseases.

To the Building, it will offer stability, safety and aesthetics; hazard, sickness and disease-free for itself or the users. Also, durability because it is maintainable thereby making the building newer every time and more so high chances of tenement rate. It will as well offer beauty through aesthetic designs of materials and adaptability because it keeps the future in view.

To the Business, it will offer attraction thereby aiding foot traffic, this in turn aids business growth and continuity, income generation, reduced cost of operation and the establishment of purpose.

To the Community, it is going to bring about improved outlook; job provision; local industry promotion; a place to socialize; a place of convenience where needs are met.

To the Users, it will offer health; convenience; comfort; economic value; safety and security of properties; a place to relax, a place train and or trade for business opportunities.

Notably, the term sustainability connotes the ability of a society or ecosystem to continue in adequate functionality into the infinite future without being forced into decline through exhaustion of key

resources. Ugboma averred that environmental sustainability allows for the needs of man to be met without jeopardizing the ability of future generations to meet their needs. More so, it is the responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long-term environmental quality (52).

Without any doubt when the environment is healthy, there would be physical health for the people to run their various businesses thereon making them wealthy and in turn bringing a good development to the society. When these practices continue on the value chain then the balance of wealth and development is maintained and the future is secured for continuity.

1.6 Scope of the Study

Relating to architecture, there are several tenets of sustainability that would be of positive impact to the environment generally. Examples of such approaches according to Buildpass; are the passive designs, energy efficiency, air quality maintenance, carbon emission reduction, waste management, utilization of eco-friendly materials, water harvesting etcetera. Out of all these tenets, the research will focus on the use of eco-friendly material in the construction of a proposed shopping mall, it will study some existing shopping malls to understand how the same approaches were employed and drawing from the ideals, how their sustainability relates to the entire environment.

1.7 Limitation of the Study

The limitation of the research is how impactful construction with eco-friendly materials could be in achieving the Sustainable Development Goals in a proposed shopping mall project in Moniya, Ibadan, Oyo State of Nigeria.

1.8 Operational Definitions of Terms

1). **BUA** (Built Up Area): - summation of the retail and common areas. The common areas such as corridors, washrooms, service areas.

2). **Construction Industry**: - the various professionalism or skills involved in building the environment to achieve sustainability goal through various processes and the product.

3). **Degradation**: - a condition of low quality or insufficiency of standard requirement for maximum performance.

4). **Department Store**: - A collection of several shops under one roof.

5). **Eco-friendly**: - this is a material that does not harm the environment, whether in its production, use or disposal and can easily be recycled.

6). **Environment**: - our surrounding elements that make the earth habitable in terms of air, water and land.

7). **GLA** (Gross Leasable Area): - the sum total of all area which is available for rent to tenants. It is also known as (NLA- Net Leasable Area).

8). **Market**: - A series of stalls and booths arranged in rows in open or closed spaces. Is the oldest form of physical facility from a shopping place.

9). **Shopping Centre**: - A building or shopping complex that consists of shop stands that are rented or sold.

10). **Shopping Mall**: - Buildings or shopping complexes that choose a breezeway system or one main corridor along continuous shops.

11). **Shopping Precinct**: - Shops that form a circle that is free of vehicles, and specifically for pedestrians.

12). **Shopping Street**: - Shops line up on both sides of the road, with achievements directly from the main road.

13). **Supermarket Stores**: - with spacious rooms and sell various items arranged in groups with a self-service system.

14). **Sustainability Approach**: - a process that tends towards making a process or products of neutral or positive impact on the environment.

Chapter Two

Literature Review

2.1 Conceptual Review

The 'Market' is a world of commercial activities where goods and services are sold and bought, the place where goods or services are displayed for selling which could be a stall, shop or a store. While a stall is a small area set off for displaying articles for sale, a shop is a sectionalized room to display goods to be sold, a store is a bigger room to display and keep more of those goods for different choices and future sales. The act of going to look for what to buy is what is referred to as 'shopping' and that we do it habitually is the reason why shopping facilities are inevitably provided for in any area of settlement, so that an individual's short- or long-term needs may be met and within reach.

The traditional market is common to any settlement but as population increases, shopping centres and complexes feature to augment the market facility. However, when the community develops with more amenities and infrastructures with change in level of life quality, upgraded forms of markets like the shopping malls emanate creating a keen competitive patronage with the traditional market which in its crude state thrives on its meagre profit and operating costs.

What is a shopping mall?

A shopping mall is a large indoor shopping centre in an appealing environment that can accommodate many shop outlets and adequate car park for user's convenience and vehicular circulation.

'A Shopping Mall is a very large building or buildings containing a lot of stores and restaurants, usually with space outside for parking. It was originally conceived of as a Community Centre where people would converge for shopping, cultural activity and social interaction' (Gruel & Smith, 1960).

A large indoor shopping centre consisting of independent retails and anchored by a Departmental Store.

A mall or shopping centre is a large building that is full of many smaller shops and stores. It is different from earlier markets or bazaars because most of the shops are not booths or stalls in one big open area. Each store has its own space with walls. Most of their entrances face a central walking area inside the building… Wilkipedia.org

A shopping mall is a convenient, comforting and safe place of health and human flourishing offering facilities and services corporately meeting all daily needs.

A shopping mall concentrates and rationalizes the time and activities of the community so that it becomes the centre of social activity and acculturation, a place for the formation of self-image and existence, a source of knowledge, information, values and morals. "Shopping malls have developed into a centre for the formation of lifestyles" Pilliang et al., 1998.

A shopping mall is a place of Socio-economic interaction maintained by a Management Firm.

A shopping mall is a very large building or buildings containing a lot of stores and restaurants, usually with space outside for parking. It is no longer just a place to go and buy something, it's a community and entertainment centre… www.cambridge dictionary.com.

A shopping mall is large retail complex containing a variety of stores and often restaurants and other business establishments housed in a series of connected or adjacent buildings or in a single large building. – Thesaurus.com.

A shopping mall has everything under one roof including shopping retails, food court, entertainment, cosmetics, fashion, decor and so on. Best shopping malls are a place of fun for everyone as it has good activities for the whole family.

A shopping mall is a large indoor shopping centre, usually anchored by departmental stores, it can be referred to as a shopping centre, shopping precinct or a shopping arcade depending on the country where it is situated… Wikipedia

According to Rubenstein Mall; 'Shopping centres are defined as 'a linear movement area in a central city business area that is more pedestrian-shaped, with a combination of plazas and interactional spaces.

It is integrated with some side attractions for sightseeing without the interference of traffic facilities in a location that keeps attracting people to visit and thereby shop and patronize. According to Bloch, Ridgway he places the 'Mall' as a hedonic lifestyle phenomenon (in the context of consumer place) where its location is a source of pleasant experiences for visitors to consume.

Shopping malls are big commercial buildings beautifully designed with required functions incorporated with legible landscape and operated technologically.

According to Lynda and Wing 'shopping centres are a group of retail and other commercial businesses that are planned, developed, owned, and managed as a single property'.

Anyone can enjoy shopping malls, whether money or not, to shop or just look (window shopping) without having to buy any items.

Mall is a public place that is used by certain groups or social classes for shopping and activities related to recreation and providing experience to customers. Although over time, the shape of the space that is present may change based on the consumerism behaviours, it is therefore imperative that an existing mall that wants to survive will adapt to evolving generational trends.

Therefore, a shopping mall can be defined as an enclosed or open retail structure, usually anchored by department stores with other independently owned retail stores but managed as a single property and operated technologically.

A shopping mall is a type of shopping centre, a North American term originally meaning a pedestrian promenade with shops along it, but in the late 1960s, began to be used as a generic term for large shopping centres anchored by department stores, especially enclosed centres.

History of shopping mall

Historically, all shopping facilities today originated from the traditional markets before metamorphosizing into shopping centres, complexes and malls we celebrate today. The idea began with creating a place strictly for business activities upon which some people's source of livelihood depends. Generally, all markets in various settlements whether in older times or at present have some doctrines on which some regulations are laid out for the smooth running and continuity of business activities for the end users both as sellers and buyers.

In the ancient times, market places were like fairs opened at regular intervals for the exchange of goods and services. In Greece for instance, the "Agora" served as a market place where merchants kept stalls or stop to sell their goods. The Romans called their own point "Forum" and an example was the Trajan Forum built around 100-110 CE. It was a very large building of four levels having multiple buildings with a "Tabernae" serving as a collection of retail shops with shop fronts.

In the Middle Ages, the British were not so fully given to the act of buying and selling, however, by the late Middle Ages, turned to markets to purchase fresh produce, meat and fish and periodic fairs where non-perishable and luxury goods could be obtained. By thirteenth century, a small number of shops began to surface such as mercers and haberdashers who were specialist retailers in London back

then. In the Medieval period, these shops later metamorphosed to what was referred to as "rude booths" having dark interiors giving no allowance for shoppers to view their goods properly and make a choice before buying. This worked to the advantage of the retailers and resulted in their criticism.

By seventeenth century, produce markets gradually gave way to shops and shopping centres changing the consumers' shopping experience. This was when these centres became a place to meet and socialize. As people's standard of living started increasing, consumer self-interest gathered momentum, a new status symbol in goods relating to change in fashion and desire for aesthetic appeal emanated and that was by eighteenth century.

By the late eighteenth century, grand shopping "Arcades" began to emerge across Britain, Europe and in the Antipodes. These "Arcades" are enclosed buildings with glass roofs over them to allow for natural light and also with long glass exterior windows reducing the need for artificial lighting and enabling window shoppers to indulge in the fantasies.

In Europe, the Palais -Royal opened in 1784 and was the model of the new style of shopping arcade designed with the intent of lasting shopping experience in the form of mixed development. Later, the concept of display window came up by a retailer called 'Francis Place' who fitted his shop front with large plate of glass window.

In the second half of the nineteenth century, shops transitioned from "single -function" shops to department store, where a large variety of goods were sold. Though originated from the United States of America, they were called "Emporia" or "Warehouse shops" in England. Examples of these were Harrod's of London (1834); Macy's of New York (1858); Len Bon Marche of France (1852).

Harding, Howell &Co was the first reliably dated department store to be established opened in 1796 on Pall Mall, London, the term mall originally meant a place where people played pall-mall, a game

similar to croquet and later transformed to a tree-lined park where people meet to socialize by mid 1700s. In the 1790s, the Commissioners of the District of Columbia and Andrew Ellicott used the term to refer to the L'Enfant's planned "Grand Avenue" between the Capitol and the Potomac. During the 1800s, it was sometimes called a "mall" but also just "the public grounds". The term "Mall" became the accepted name in the 1900s.

Shopping mall was invented by Victor Gruen whose office designed over fifty shopping malls in the United States of America during the mid-1970s.

The first shopping mall was the Country Club Plaza founded by J.C Nicholas Company and opened near Kansas City, Mo in 1922 as a business district for a large-scale residential development with the concept of developing a shopping district away from a downtown. It featured a unified architecture characterized by a paved and lighted parking lots and was managed and operated as a single unit. The advent of industrialization, birthed the Grandview Avenue Shopping Centre which was opened in Columbus, Ohio in 1928. Having thirty shops and four hundred parking lots and later evolving into a revolutionary design whereby planned shopping centres like the Highland Park Shopping Village in Dallas, Texas emanated. Developed by Hugh Prather in 1931and characterized by a unified image, occupying a single site, not bisected by public streets, having its storefronts inward faced away from the streets and managed under a single owner.

Entertainment was first introduced into the shopping mall concept in the 1940s, when Developer Don Casto hired Grandma Carver to perform her act of diving from a ninety-foot perch into a four-foot pool of flaming water in the lighted parking lot of the large free-standing Town and Country shopping centre in Columbus, Ohio. The 1950s were characterized by shopping malls of two strip centres facing each other with a pedestrian walkway in between or two-level structure like in Shoppers World in Framingham, Massachusetts. The first cluster-layout concept was introduced in 1954 when Northland

Centre was built with parking lot surrounding it and a central temperature control device installation. Southdale Centre in Edina followed but fully enclosed with central air-conditioning and adding a comfortable common area with two competitive department stores as Anchors. This is why it is considered to be the first modern regional mall.

The World War II had a great impact on the construction industry as the aftermath created the need for more housing and more convenient retail shopping, suburban development due to population growth. By 1964, there were about 7600 shopping centres and by 1972, they have doubled serving the new housing developments. By this period, the convenience and pleasure of shopping mall dawned and thereby new formats of shopping centre types evolved. Between 1989 and 1993, investment in new shopping centre development dropped due to the 'Savings and Loans' crisis which precipitated a severe credit crunch. This made shopping centres the most attractive but least performing real estate which eventually led to the transition of several privately held firmly run shopping centre development companies into Real Estate Investment Trusts (REITs).

The bicentennial year marked the debut of the vertical malls like Water Tower Place which opened in Chicago III; on Michigan Avenue. Foot traffic in shopping centres increased drastically and Super-regional malls became popular and Power Centres too as well. Technological advances transformed the shopping mall developments allowing for the integration of entertainment leading to a thrilling experience to customers and hence increasing foot traffic.

Many malls in the US are currently in severe decline (dead malls) or have closed. Successful exceptions have added entertainment and experiential features, added big-box stores as anchor tenants, or specialized formats: power centres, lifestyle centres, factory outlet centres and festival market places. Smaller types of shopping centres in the North America include neighbourhood shopping centres and even smaller strip malls. Pedestrian malls in the US have been less common and less successful than in

Europe. In Canada, underground passages in Montreal and Toronto link large adjacent downtown retail spaces.

In the United Kingdom and Europe shopping malls/centres continue to grow and thrive. In the region distinction is made between shopping centres (shops under one roof), shopping precincts (pedestrianized zones of a town or city where many retail stores are located), the High Street (street pedestrianized or not with a high concentration of retail shops) and retail parks (usually out of the city centre, 5000sqm or larger and anchored by big-box stores or supermarkets, rather than department stores.

In UK, a centre for shopping is commonly a centre for a settlement. More recent shopping dedicated areas outside the main centre are knowns as shopping centres (with understanding of the synonymous shopping mall) shopping villages or retail parks.

According to author Richard Longstreth, before 1920s-1930s, the term shopping centre in the US was loosely applied to a group of adjacent retail businesses. A city's downtown might be called a shopping centre. By 1940s, the term shopping centre implied if not always a single owner at least a place sharing comprehensive design planning, including layout, signs, exterior lighting and parking; and shared business planning that covered the target market, types of stores and store mix.

Therefore, the Concept of a shopping mall is to procure all that one may need in the same place so as to rationalize time and cost; incorporating other services for convenience, comfort, safety and security which can be enjoyed by prospective users.

Forms of Shopping Centres

The form a shopping centre may take can be divided into three namely:

i. Open shopping centre

A naturally ventilated shopping centre, most suitable for temperate climates whereby walking through the corridor is pleasurable for fair weather and saving more energy that should be used for heating and cooling.

ii. Shopping Centre Composites

This is a shopping centre having a section of it open and another closed where the closed section houses the attractor boosting the centre's foot traffic.

iii. Closed Shopping Centre

The closed shopping centre is a mall with a roof top wherewith the convenience of climate control is required for convenience at the expense of huge energy cost.

2.2 Design Considerations

The design of a shopping centre is a complex task focusing on the needs and desires of the end users and incorporating sustainable practices, technology and spaces that encourage community engagements, architects and designers must create vibrant, functional and sustainable shopping centres that serve as valuable additions to the urban fabric.

According to Nadine Beddington (Design for shopping centre), there are 3 important design elements that determine the quality of a shopping mall building. They are:

The Hardware:

Hardware in simple terms connotes how a shopping mall building is easily identified when perceived by an observer in its location. This could also imply how appealing it is to customers. It has to do with

the physical outlook of the building and the quality of the environment where it is cited. The hardware element is hinged on two main factors which are: easy access and architecture.

A). Accessibility

This considers how integrated the site is with public transport. A shopping mall must be strategically located where it would be easy to access by car or any other form of metro line and as well in a mixed-use layout not too far from settlements and centres of attraction such as recreation, business and transportation centres, proximity to facilities and facilities so that customers are encouraged to visit and hence patronize. A site where alternative roads could be employed in case of traffic jam is a remarkable advantage in terms of selection.

B). Architecture

This has to do with the how outstanding the building looks amongst others in the environment and the distinguishing features noticed compared to other trading centres when perceived by an observer or when explored by a visitor. It is often depicted in aesthetic beauty, balance mix of tenants, the circulation flow and safety.

Software

Software has to do with the amenities offered for the satisfaction of intended users of the shopping mall. This aspect is very broad as satisfaction varies with individuals. Generally, the mall pulls a crowd of people of various classes and personnel, the basic amenities that support their satisfaction range from mechanical to manual through integration of technology supporting facilities for comfort and convenience, the anchor tenant, quality of goods, variety of stores and so on. Examples of these include the uninterrupted electricity, escalators, ATMs, bank, climate-control devices, toilets, elevators, parking and others.

Brainware

Basically, this can be interpreted as the strong marketing strategies harnessed to sell goods in a business competitive environment. This usually applies to the mall Managers in order to strengthen their business image. These could take the form of facility, personnel and marketing managements. This is in order to maintain the management mission and corporate culture, basically through recruiting responsible staff, establishing relationship with tenants, running smooth operations supporting visitor's comfort. Also, they may have to incorporate large events and exhibition, promotion programmes, community development, social media adverts, on-line shopping, awareness programmes and so on and so forth. This can be chieved when community spaces are integrated as functions of the shopping mall.

Elements of a shopping mall

Today, shopping malls are a public facility whose function extends to become a kind of 'urban community centre', where people can enjoy lifestyle through the consumption of goods and services that are in accordance with their status symbols. The three elements that form a mall community are:

The Anchor: - which could be likened to a 'node', the landmark in this context. It is the Magnet attract people from all across the community as we have in malls and plazas in various communities. **The Retail**: - which could be likened to a 'district' in this context. It is secondary and supporting for items which may not be found in the anchor, well planned sizeable rooms for stores and utilities.

Mall Street: -which could be likened to a 'path' in this context. It is the pedestrian connecting routes leading to or out of the Anchor.

Types of shopping mall

The International Council of Shopping Centres classifies (ICSC) {Asia-Pacific, European, US and Canadian) shopping centres into the following types:

A Superregional-scale Centre: - it is commonly called a City Centre. It is over 74,000sqm of gross leasable area. Characterized by three or more anchors, mass and varied merchant trade and serves as the dominant venue for the region up to 160km in which it is located. An example of this is the Sawgrass Mills Mall near Miami; it has 220,237sqm of retail selling space with over 329 retail outlets

However, the International Council of Shopping Centres (ICSC) defines indoor centres above 74000sqm NLA in Asia-Pacific as Mega-Malls. The tabular form of its classification is as follows:

A Regional-scale Centre: - it is also called a Town Centre, typically larger with 37000sqm to 74000sqm GLA with at least two anchor stores and offers a wider selection of stores. Given about 32km radius service area, these tend to have higher-end stores (department stores) that a need a larger area in order for their services to be profitable. Regional centres have tourist attractions, education and hospitality areas.

Community-scale Centres: - are commonly called Main Streets, High Streets or Town squares in wider centres or English-speaking Europe as retail parks for certain centres, these offer a wide range of goods and has two anchor supermarkets or discount department stores. They may also follow parallel configuration, that is L or U-shaped. Community centres always feature a retail area of 9300-32500sqm and serve a primary area of 3-6 miles (5-10km).

Local-scale Centres: - these usually have a retail area of 2800-13900sqm and serve a primary area in a 5km radius. They typically have a supermarket as an anchor or large convenience shop and commonly serve large villages or as secondary centres to towns.

Figure 2.1: Table showing classification of different types of malls. (Source: goggle search; 2024)

Key Differences Between Different Types of Malls

Type	GLA (sft)	No. of Anchors	Type of Anchors	Anchor Area	Primary Trade Area (kms)
Neighbourhood Centre	42,000 to 210,000	1	Supermarket	30-50%	2 to 3 km
Community Centre	140,000 to 490,000	2 or more	Discount Dept Store, Supermarket, Home, Large Speciality, Discount Apparel	40-60%	3 to 5 km
Regional Mall	500,000 to 1,120,000	2 or more	Full/Jr. Dept Store, Discount Dept Store, Hypermarket, Fashion Apparel	50-70%	4 to 12 km
Super Mall	1,120,000+	3 or more	Full/Jr. Dept Store, Discount Dept Store, Hypermarket, Fashion Apparel	50-70%	6 to 25 km
Fashion/ Speciality Mall	110,000 to 350,000	N/A	N/A	N/A	6 to 15 km
Power Centre	350,000 to 840,000	3 or more	Category Killer, Home Improvement, Hypermarket, Discount Dept Store, Off Price Superstores	75-90%	6 to 10 km
Outlet Mall	70,000 to 560,000	N/A	N/A	N/A	15 to 50 km

Car-dependent Centres: - in the UK and Europe, if larger than 5000sqm can be termed a small "Retail Park", while in the US and some other countries it is known as a "Neighbourhood Shopping Centre".

Convenience-scale Centres: - they are centres that are independent of other centres are known as strip malls or as Shopping Parades. These Centres are less than 2800sqm of gross leasable space and

commonly serve villages or as parts of larger centres commonly called small squares, plazas or indoor markets. They are also called Strip centres or Convenience centres.

Sector-focused (Power centres and Retail parks)

Power Centres (North America) are open-air single-level shopping centres that almost exclusively feature several big-box retailers as their anchors (although newer urban power centres have adopted enclosed and/or vertical formats while retaining the strong big-box emphasis). They usually have a retail area of 23000-56000sqm and a primary trade area of 8-16km.

A Retail Park (UK and Europe) is a type of shopping centre found on the fringes of most large towns and cities in the UK and some (not all) other European countries.

In Europe, any shopping centre with mostly retail warehouse units 5000sqm or larger is a RP-Cushman & Wakefield. This would be considered in North America either a Power Centre or a Neighbourhood Shopping Centre, depending on the size.

Indoor centres: - are commonly called shopping malls in the US or Shopping Centres in the Commonwealth English.

Lifestyle Centre (American/Commonwealth English): - is a shopping centre or mixed-used commercial development that combines traditional retail functions of a shopping mall with leisure amenities oriented towards upscale consumers.

2.3 Empirical Review

Shopping is so much a part of man's daily affairs that it has become an auxiliary activity that is practiced by everyone irrespective of age, gender, or status. Everybody buys something every day; although, what each one buys depends on his or her need or want yet, how it is done is a function

where it is done. Basically, selling entails displaying of goods intended to be sold, upon which any prospective buyer sees and buys. That we do shop habitually necessitates the importance of creating a functional space where trading profession can be effectively carried out and process of buying may be conveniently achieved.

The provision of a market facility entails a number of factors to be considered and even more so, an in-depth consideration is required in the design of a shopping mall. Since climates and culture vary from one place to another, so will the architecture of any building facility too. In designing a shopping mall, while the open form is ideal for some regions (temperate) or goods, the closed form is most ideal for some (tropics) and even some combine both to form a composite style. Howbeit, the materials selected for construction of a shopping mall are of valuable importance because almost all other sustainable requirements depend on them ranging from stability to durability, safety, cost efficiency, aesthetic and flexibility.

A retail industry that must be discreetly cited, considerably developed and succinctly managed, after the area of location, the materials used in the construction and finishes are crucial to its aesthetics which further function for its attraction. Although not indigenous to our culture but for urbanization, a shopping mall facility could be developed without being horrendous when the right sustainable approaches that align with our own environment are being adopted.

With the knowledge of the concept of a shopping mall and the design required to develop one, the researcher gathered that the philosophy in the development of any shopping mall must be anchored on nine basic design requirements among others which are:

Accessibility: the citing of a shopping mall is important to the consumers, business owner and the environment. The best location is the area of crowd attraction, where there are roads where all forms of transportation means could ply whether trucks or cars or bicycles and even trekking.

Aesthetics: this is the function that has to do with the outlook of the building. It is the force of attraction in any community especially when made very distinguished.

Cost implication: this is funding required to develop the shopping mall. It entails the overall cost of preambles, materials and labour of which the middle factor carries the highest percentage.

Circulation: the movements within and without the mall is of crucial importance as human and vehicular movement collisions can result in an accident of irreparable loss. "In shopping mall designs, the movement and circulation pattern adopted is one of the numerous factors that determines the success and failure of that design" (Ndukwe, A., et al).

Functionality: the shopping mall is a modern market that is not just all about retailing, it has to entail some side attractions which would make the visitors and staff relax and nourish the soul. "Shopping malls are unique retail environments offering individual consumption experiences within a holistic retail ecosystem" (Krey N., et al).

Safety: the activities of any shopping mall entail a lot of valuables ranging from human life to expensive goods and materials, therefore the building should offer adequate protection of all to avoid losses.

Services: all building units require services to perform their various functions. The shopping mall is not an exemption as modern retailing entails the use of gadgets 24/7 and some side attractions like entertainment need telecom networks and electricity to operate them.

Structure: this is the ability of the building to stay stabilized irrespective of stress, strain or pressure from within or without. Since it is a public facility, it must be designed to accommodate people and their weights. “The selection of materials plays a crucial role in determining the structure’s strength” (mcneilengineering.com).

Sustainability: this is the trending building modality. Its advantages cuts across every aspect of the environmental values.

Incidentally, only accessibility out all the nine factors does not have to do with building materials. It shows how much value materials carry in the construction of any building project.

Features of a Shopping Mall

1. All-in-one convenience store where various needs could be procured close by and hence saving time and costs.

2. Wide selection and varieties offered therein allows for customers to compare and choose products that best meet their preferences.

3. Entertainment and leisure facilities that can be enjoyed alone or with family when or not doing purposeful shopping.

4. Comfort and climate control for customers and tenants through the use of air conditioning or heating systems where and when applicable.

5. Social hub of a safe and welcoming space for social activities such as meetings, mingling, interactions enjoyable to friends, families and associates.

6. Business prospect and professional exposure which in turn result in increase in customer base.

7. Advertisements which more often than not will enhance brand's image and popularity.

8. Operational support provisions meant for maintaining a good upkeep of premises thereby offering jobs to able, interested citizens.

9. Marketing and promotional assistance to attract an ambience of customers for patronage. This is to the advantage of various tenants occupying space therein.

10. Networking and collaboration opportunities through valuable partnership by joint marketing and clientele sharing which will definitely promote the local industry.

Challenges of a Shopping Mall

The shopping mall is an important commercial centre and as well a function of urban development, fast becoming one of the most visited public spaces globally. Since they are normally located close to main roads in urban cities, vehicles exhausts, dusts, concentrations of carbon dioxides and several other pollutants affect the quality of air in malls. Hence, low indoor air quality is associated with malls. Some other negative impacts a shopping mall can have on the environment are noise pollution, excessive waste, fossil fuelled energy impacts and safety measures.

A Shopping Mall is a public facility whose architecture demands a 'Modernist approach' to serve as a community landmark drawing indigenes and as well attracting pilgrims of the destination to boost foot traffic and patronage will thereby create a sense of civic pride for the community and satisfaction for visitors. However, modernism should not be allowed to override the sustainability character, so it doesn't become horrendous to users whether as tenants or customers or visitors.

Generally, a major challenge of the shopping mall is the indoor air quality maintenance owing to closeness to access roads which makes it prone to dust pollution which inhaled continuously for a

period of time can lead to respiratory issues and health conditions. For any tropical country like Nigeria, with temperatures of 24C - 34C, for the sake of protection (from inclement weather) and security, most shopping centres are enclosed and temperature controlled with air conditioners at about a 12-16^C. Eco-buildings construction is quite a hassle in the Tropics owing to the fact that the region has not been totally subscribed to the practice.

Another challenge is waste management issues. Any form of market will always generate wastes and excess waste always leads to degradation of the environments giving rise to offensive odours, irritable landfills, vermin contaminations, pests and hosts harmful to the ecosystem; however, sustainability stands for the management of these waste by reusing, recycling and repurposing them to benefit the ecosystem.

Furthermore, the energy cost of running amenities of comfort in the shopping mall is always huge. The 24/7 electricity supply needed to power movements, stay connected on-line, light up, sometimes give sounds, run many services will culminate a high level of cost and cannot be sufficiently supplied by the local grid.

Chapter Three

Research Methodology

3.1 Research Design

The researcher engaged the qualitative research method using the field survey and case study techniques as the research design. To generate primary qualitative non-metric data, a focus group and observation was used through a semi-constructed interview guide drawn from the objectives and research questions of this study. On the other hand, secondary data were sourced from collection of existing published documents and reviewed to derive a list of eco-friendly materials, their application and advantages. Having derived the list of the eco-friendly materials, the researcher surveyed the ones that could be found within our geographics and used content and narrative analyses methods to analyze data. Using the case study technique, the researcher selected five shopping malls and one commercial centre based on established parameters like their functions, locations, properties, contextual similarities with the subject study and used photo-production method to compare the data collected from each mall to further develop a proposal of a relevant function based on architectural features and eco-friendly building materials as applicable to the sustainability target. The six case study facilities selected are: The Palms Mall Ibadan, Oyo, Nigeria; Ikeja City Mall Alausa, Lagos, Nigeria; The Heritage Place Ikoyi, Lagos, Nigeria; The Mall@ Wellington Green, Florida, USA; The Mall of America Minnesota, USA and Green Pea Turin, Italy.

3.2 Case Study Method

The shopping mall facility has the same primary function of retailing and always features the same traditional building elements of which there may be variations in terms of materials, forms and secondary functions. The least of shopping mall types has a range that requires a standard of stability acquirable through a framed structure. Therefore, the basic knowledge of the construction elements was first established before incorporating other standard requirements.

3.2.1 Case Study Selection Criteria

Citing: the location chosen for the site with respect to the Urban concept.

Physical form: the form chosen for the mall whether open or enclosed or both.

Structure: built up area; indicating the number of floors and tenants.

Sustainability: the features of the facility that makes for eco-friendliness.

Popularity: how famous it is in relation to foot traffic.

Anchor Tenants: the major magnets pulling crowds in for shopping.

Materials: as they function in diverse applications in conjunction with safety measures and standard codes.

Security: Types of security facilities adopted in order to secure the lives and properties of users.

Mall type: depending on the range of Gross Leasable Area, range of coverage and number of outlets.

Side Attractions: Entertainment, hedonism style, convenience, circulation, accommodation and other factors that will heighten shoppers' experience for return.

3.3 Case Study Analysis

A number of Six different shopping malls were selected as case studies; three from the local geographical region and three from the foreign geographical region.

3.3.1 Case Study I

Palms Mall Ibadan.

Figure 3.1:

The Palms Mall Ibadan food court foyer showing high levl window shielded with patterned steel serving as sunscreen

Source: goggglesearch ; February 2024

.

Figure 3.2 : ThePalms Mall Ibadan Bakery section wall finihed with bricks.

Source: goggle search; February 2024.

Figure 3.3:

The parking lot and walk area of interlocking paving

Source: wwww.goggle.com; February 2024

.

Figure 3.4:

The interior showing ceramic tile flooring cladding so as to regulates room temperature

Source: wwww.goggle.com; February 2024.

Description:

Palms Mall is a regional class mall located in Ibadan, Nigeria's third largest city in terms of population and the largest by geographical spread. It was opened in June 2014, presenting a high-quality family-friendly environment for major branded outlets, food, fashion and entertainment. Ibadan as the capital city of Oyo State in the Southwest of the country is a prominent transit point between the Coast and the North of the country. The mall's pivotal location and proximity to a special international facility (Liberty Stadium now Obafemi Awolowo Stadium) and state public service building (Federal and State High Courts) affords her to serve up to ten kilometres of its area of location. Situated in a Renowned City. Located at close proximity with some other State and Federal Government facilities. Cited at a cross destination of both Trunk B and C roads.

Site Planning and Landscape:

The Palms Mall building is a of a total of 21000sqm retail area space on 18 acres of land. Featuring a children's amusement park, food court arena, cinema, newly incorporated entertainment arena with a carparking space of two hundred and fifty altogether. It is a family friendly mall and an outlet for patronage of branded goods both local and international. Its anchor tenant is the ShopRite supermarket and the largest at that in Nigeria. It is owned by the Persianas Properties and was designed by Actis and opened in June 2014.

It is located in Ibadan, Nigeria's third largest city in terms of population and the largest in terms of geographical spread and as well a prominent transit point between the Coast and the North. The Palms Mall Ibadan is strategically situated at the corner of Liberty Stadium Road, MKO Abiola way, Ring Road, Ibadan Southwest, Ibadan. Its easily accessible through the Challenge-Ring Road major road (at the front) or Liberty-Oke Ado main road (at the left side). That it is at the centre of a number of public

facilities is an advantage to attracting a reasonable foot traffic to the mall. Directly at the opposite is the Oni and sons building, adjacent to it is the Federal and State High Courts of Justice, at the rear is the popular Jogor Centre (a renowned event centre with unique state-of- the -art facilities), very close to it is the first Stadium in Nigeria (Obafemi Awolowo Stadium), to the right side is a mix of residential layout, thereby making it a mix use cited centre. The site topography depresses down the front main road and slants towards the right side affording an optimization that resulted in draining running waters from the approach and left side area of the site to the depressed area in order to prevent site flooding.

Building Envelope and Material types:

Reflecting a modern architecture of framed building constructed with the conventional masonry wall, plastered with the conventional material (cement) and finished with painted boards of aluminium cladding (ambiguous of the type whether low voc or not). The main entrance foyer overhead slab is cladded with a sequence of patterned metals fins for aesthetics and sun shading purposes. The ceilings are perfected with glued POP slab boards incorporating artificial LED lights finished with white vinyl paint. The high-level windows at the approach are as well shaded by the sequence of patterned metal fins while that of the rear of is left bare. The atrium is a transparent plastic material at the centre of the mall where variation in level is achieved and demarcation between the mall retail area and the food court area. Asphalt felting was utilized for vehicular movement and parking area demarcated by enclosed kerbs filled with concrete hard core while interlocking paving stones are used for the pedestrian walk ways.

Building and Forms:

The Palms Mall Ibadan is an open composite mall. Having three entrances whereby two are at the approach of the building (purposing the middle one for general use and an exit beside it) and the other at the extreme left of the building as the staff entry and exit in the form of a non-celebrated double door like the general access doors. Characterized by a number of fenestrations to provide cooling in the rooms through sun shading. The third entrance is through the food court arena from which the general entrance reception could be accessed by a lift or manual staircase. There are two emergency exit doors in between each set of convenient rooms leading to the rear of the mall. Invariably, the street mall layout is adopted for the mall's circulation system following the shape of the mall in a store facing store arrangement concept.

3.3.2. Case Study II

Ikeja City Mall.

Figure 3.5: One of the Mall entrances.

Source: (goggle search); February 2024.

Figure 3.6: The 1,000-car park facility of Ikeja City Mall.

Source: (goggle search); February 2024.

Figure 3.7: The LED bill board in the Ikeja City Mall passage.

Figure 3.8: Outdoor LED in between two cladded columns.

Source: www.goggle.com; February 2024.

Description:

Ikeja City Mall is situated in Alausa, Ikeja, Lagos State, Nigeria. It is known to be Nigeria's first modern-style shopping mall and the busiest serving about 800,000 visitors per month. A building of

two floors of forty-five shops each with one anchor tenant spanning over 21000sqm retail area. It has a five screen Silverbird cinemas confirmed as the first cinema then in Ikeja as at when constructed and anchored by a ShopRite supermarket. It also includes specialist facilities for department stores, banks, cafes, bars, restaurants, hairdressing/beauty salon, retail stores and so on and so forth. The Mall is family friendly entertainment oriented. It has a food court with many restaurants ranging from local to international tastes. Anchor stores are located at the rear with small shops at the frontage. Staircases are located at the entrance so visitors can easily access the upper floors. The facility currently has 94 tenants with a car parking of about 1,000 spaces.

Site planning and Landscape:

It is located on the mainland of metropolitan Lagos right at the heart of the City having 22645sqm of retail and entertainment space on 5.14 hectares of land, with 1000 car parking lot. Serving as a meeting point or recreational spot for friends, family and business people, it is remarkable for its ability to accommodate two thousand car parking lots. Its orientation is of a good advantage as a destination to both indigenes and visitors alike being quite accessible to all public means of transportation. It was developed by Actis and mixed in the same layout with other developments in the area like AHCN Towers, SIDMACH Office Building and Zippy Logistics Warehouse.

Building Envelope and Material types:

Ikeja City Mall is a framed built structure around a number of masonry walls finished with pastel coloured paint. The building provides chimney canals that allow the opening to draw air which is directed up through ducts in the centre to assist fans for the ventilation of the lobbies.

Building and Forms: Enclosed

Address: 174/194, Obafemi Awolowo way, Alausa, Ikeja, Lagos State.

Citing: Mixed use layout zoning easily accessible to local public transport systems.

Coordinates: 6.5833dN; 3.3333dE.

Form: Open composite. **Mall Type**: Regional. **Security**: Manual and Digital.

Materials: Concrete, bricks, Steel, Masonry walls,

Structure: Two floors of forty-five shops with one anchor tenant spanning over 21000sqm retail area.

Sustainability: Natural Lighting, Waste management, Water conservation, Energy efficiency.

Opening date: December 14 2011. **Architects**: James Cubbitt and Cappa and D'Alberto Plc.

Anchor tenants: Shoprite.

Sustainability:

Practices that conserve energy and minimize the development's environmental impact where the centre is designed to supply cold water, only geysers provide the hot water limiting overall energy consumption.

Figure 3.9: **The 1000 car parking lot of Ikeja City Mall**

Source: (goggle search); February 2024.

Figure 3.10: **The Ikeja City Mall Layout plan of the Ground floor.**

Source: (goggle search); February 2024.

Figure 3.11: **Interior building service systems of the anchor store.**

Source: (goggle search); February 2024.

Figure 3.12: **Ikeja City Mall interior floor and ceiling, lighting.**

Source: (goggle search); February 2024.

3.3.3 CASE STUDY III:

The Heritage Place Ikoyi

The entrance porch of the heritage place Ikoyi.

Figure 3.13: Entrance door showing able and wheel chair accesses.

Source: (goggle search); February 2024.

Figure 3.14: The 3D view showing the carparking lots

Source: (goggle search); February 2024.

Figure 3.15: A lettable office space within the building.

Source: (goggle search); February 2024.

Description:

Location: Alfred Rewane (Kingsway) Road, Ikoyi, Lagos. **Floors**: 14.

Purpose: Commercial office. Citing: Cross roads of Lugard Avenue and Kingsway Road.

Architect: Capita Symonds and ECAD. **Owner**: First Concepts and Properties Limited.

The Heritage Place is a 14-storey office building in Alfred Rewane Road, Ikoyi, Lagos and the first LEED certified building in Nigeria. It is situated on 15, 376sqm of office space and 350 parking bays over 6 floors and a ground floor lobby with meeting rooms and cafe. It was completed on February 15, 2016 and currently having a tenancy level of 91%. It is a world class ultra-modern, eco-friendly development building employing the latest building principles and state o the art finishes. Comprising of 15,376 sqm total lettable space on eight floors at 1,823 sqm per floor going at the rate of $1,500/sqm net of tax. The building has a serene environment with accommodating staff at the environment. A high-tech, high-end building. Smart and digital security check in access card is required to access any of the floors. The building was designed around the needs of the end users. A modern building with attractive work space that would facilitate collaborative styles of working as well as sustainability features to help them meet their own carbon footprint targets. From the outset, a strong emphasis was placed on the building's ESG (Environmental, Social and Governance) credentials with the health and safety environmental impact at the top of priority list.

Site planning and Landscape:

The edifice is in close proximity with Kingsway Tower, on the same road as other developments like Alliance Place, BAT, Rising Sun, Chelsea Group Hotel and a Temple Tower. The form and layout were developed in response to the brief and planning requirements and the relatively constrained site geometry.it is strategically located in Ikoyi, just some buildings away from Southern Sun hotels and

Golden gate. The tenants include: Oracle, Pfizer, Veod Capita Management and many other multinational companies with offices in Nigeria.

Building envelope and Material type:

The design features a vertical framing members of curtain walls cladded with aluminium boards installed to protect the glass walls, it has a double height reception and incorporates both suspended ceiling and raised floor to enhance flexibility of the space for the tenants. The facades with double glazing and wall insulations contributes to its eco-friendly nature. The building is an example of Classical Colonial architecture with deep verandahs used as parking spaces and overhanging eaves, built with timber and prefabricated materials.

Building and Forms:

The variations in length along the storeys increase. The fenestrations that allow for pattern and configuration form openings and shading devices which help to keep out sun and wind or allow them into the building cooling the entire carpark due to heat emitted from cars parked on arrival. Since the carpark is incorporated into the building excess heat form these cars are eliminated by the openings in between the aluminium cladded frame of curtain walls. Appropriate design of these fenestrations also allow for natural ventilation into the building office rooms.

Sustainability:

The Heritage Place was the first commercial building in Nigeria to achieve the internationally recognized LEED certification status. This was the result of detailed planning in the design and construction of the building where sustainable materials were used where possible. Energy efficiency method included motion sensor lighting and the use of cladding that minimizes heat gain and maximizes light entry to the building and water recycling features. Construction naturally involves

elements of wastes and planning ensured that waste disposal met sustainability standards. The building's sustainable feature includes a 30-40% reduction in energy use, a valuable asset considering high power and energy cost in Nigeria. The facilities and amenities to achieve this are:

Double volume reception space.

Suspended ceilings.

Flexible floor plate sizes from 450sqm up to 2000sqm

Café-coffee Shop.

Plaza

3.3.4. Case Study IV

The Mall at Wellington Green Florida, USA.

Description:

A two-level enclosed superregional shopping mall of more than 180 specialty shops and a wide variety of restaurants. It is a beautiful blend of Mediterranean style and local architecture traditions.

Site Planning and Landscape:

The Mall is located in the heart of Palm Beach County and is the premier year-round shopping destination for both residents and visitors of South Florida.

Figure 3.16: **Site plan of the mall at Wellington Green, South Florida, USA.**

Source: (goggle search; February 2024)

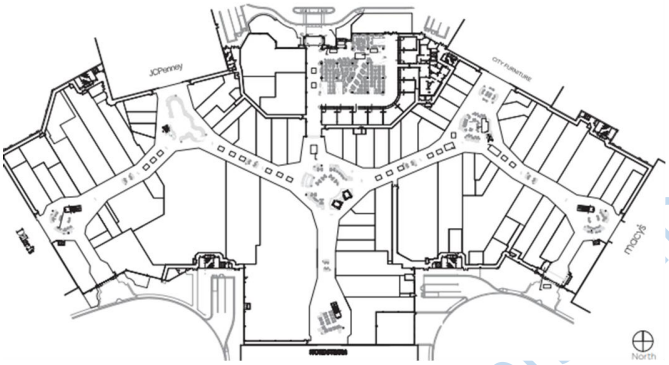


Figure 3.17: Mall layout of the mall at Wellington Green, South Florida, USA

Source: (goggle search); February 2024.

Figure 3.18: **The Atrium area with transparent roof for natural lighting.**

Source: (goggle search); February 2024.

Figure 3.19: **Entrance foyer showing the interlocking floor finish.**

Source: www.goggle.com; February 2024.

Building Envelope and Material type:

Tenant storefronts are required to be 90% minimum transparent with direct views into display areas and/or store interiors. Excessive use of continuous full height length opaque material will not be permitted. dynamic display areas offer the Tenant an opportunity to visually bring their store interior beyond the lease line and present the customer with vibrant and innovative merchandising that changes through the seasons.

Structural: Solid masonry walls. Brick veneer walls are attached to the structural backup walls and are not structural.

Costs: solid masonry walls are more expensive to make than brick veneer cavity walls.

Types: Load-bearing; Reinforced; Hollow/Cavity; Composite; Post-tensioned.

Advantages of Masonry walls:

Extremely strong and durable; fireproof; good sound insulation; easy to maintain; can be constructed in a variety of ways.

Disadvantages of Masonry walls:

Expensive to construct; difficult to repair if damaged; not suitable for all climates; susceptible to mold and mildew growth.

Masonry walls are the strongest component of any building or structure, providing strength and durability and helping in the control of temperature indoors and out and also keeping indoors and outdoors separate. The history of mankind considers masonry together with wood as the most important building materials. It has been used for construction materials and still in use till date. In recent decades, concrete and steel bars have replaced masonry walls as structural materials which is a remarkable situation in countries where reinforced concrete is used for almost all new constructions.

Figure 3.20: The second level showing atrium, floor and ceiling finishes.

Source: www.goggle.com; February 2024.

Figure 3.21

Figure 3.22

The children amusement park, biophilic greenery and the seating area for parents.

Source: www.goggle.com; February 2024.

Figure 3.23: Interior passage showing signage andadvert.

Figure 3.24:: **The biophilic greenery and steel balustrade with timber hand rail.**

Source: (Goggle search; February 2024).

3.3.5 Case Study V

Mall of America (MoA).

Figure 3.25:**The logo of the Mall of America made of patterned steel work as an aesthetic envelope**.

Source: Goggle search; 2024.

Figure 3.26: The interior of the Mall of America showing the steel balustrade railings and ceramic floor finish, atrium and technology operated escalators.

Source: Goggle search; february 2024.

Figure 3.27: **The front view of the Mall of America, Minnesota, Minneapolis, USA.**

Source : (Goggle search; February 2024).

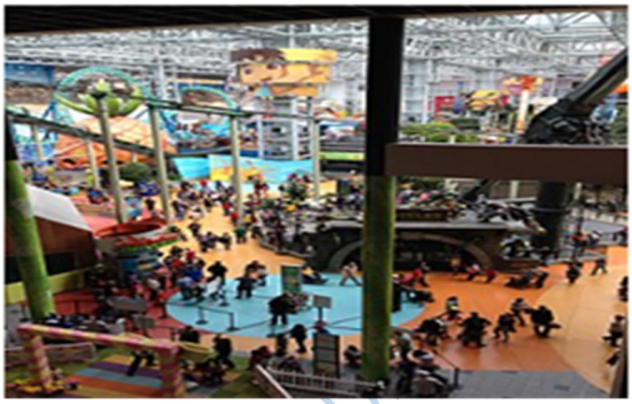


Figure 3.28: **The amusement park views from the third floor.**

Source: (Goggle search; February 2024).

The Mall concept was designed by the triple Five Group in conjunction with floral design from DLR Group. Owned by the Ghermezian brothers, who also own the largest shopping mall in North America, the West Edmonton Mall.

Location: MoA is located on the site of the former Metropolitan Stadium, where the Minnesota Vikings and Minnesota Twins played until the Hubert H. Humphrey Metro dome opened in 1982. A plaque in the Mall's Amusement Park commemorates the former location of 'home plate' and one seat

from Met Stadium was placed in Mall of America at the exact location it occupied in the Stadium, commemorating a 160m home run hit by hall-of-fame Harmon Killebrew on June 3, 1967. In 1986, the Bloomington Port Authority signed an agreement with the Ghermezian organization.

Ground breaking for the Mall took place on June 14, 1989. Organization involved include Melvin Simon and Associates, Teachers Insurance and Annuity and the office of Architect Jon Jerde. MoA opened its doors to the public on August 11, 1992. Its anchors were:

Nordstrom, Macy's, Bloomingdale and Sears, even before opening, the Mall had earned several nicknames including the 'megamall', 'Sprawl of America', 'Hugedale' in reference to the four major 'dale' shopping malls within the twin cities: rosedale, southdale, ridgedale and the now defunct brookdale. MoA became the largest mall in total area and largest in total store vendors in the United States when it opened. The MoA's 42 million annual visitors equal roughly eight times the population of the State of Minnesota. As of 2015, the mall employed over eleven thousand (11000) workers year-round and thirteen thousand during peak seasons.

In early 2020, MoA closed for a period of twelve weeks in response to the COVID-19 pandemic, closing on March 17 and reopening on June 10 with only 150 tenants open for the business. The mall was originally scheduled to reopen on June 1, but civil unrest in the Twin Cities around this time caused the mall to postpone the reopening.

Expansion

On May 18, 2008 the MoA received a tax break for a proposed two billion expansion. The bill gave the city of Bloomington the ability to increase taxes sales, lodging and food and beverages to finance a park ramp at the mall. On March 24 2012, the Triple Five Group partnered with architectural firm DLR Group, announced the first $200million expansion that would build into the North parking lot of

the mall. The plans called for additional hotel and an additional 19,000sqm of retail space. The project broke ground in the fall of 2013 and began opening in stages in the summer of 2015. In March 2014, ground was broken on the mall's northside for $104million 14-storey JW Marriott hotel owned and financed by the Shakopee Mdewakanton Sioux Community. In 2018, it was announced that MoA had proposed to build an indoor water park, with a cost between $150 & $200 million for the project. In March 2022, the plan was approved by Bloomington City Council.

3.3.6. CASE STUDY VI

Green Pea Building Lingotto, Italy.

Figure 3.29: The 3-D view showing the building external envelope of wooden sunshade slat supported by steel ribs to form a technical treillage acting as a filter between inside and outside.

Source: goggle search; February 2024.

Figure 3.30: The interior view showing the parquet made of wood and suspended ceiling with conducted services connections and LED lamps.

Source: goggle search; February 2024.

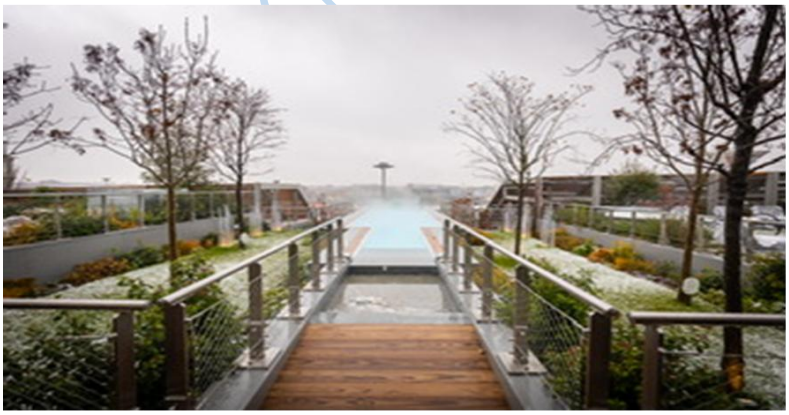


Figure 3.31: The infinity pool of Otium Club.

Source: goggle search; February 2024.

Description:

A Futuristic Structure imagined as the most sustainable and beautiful building ever seen. It is located in Turin, Italy; conveying the values believed and making them tangible and welcoming to the people. A five-floor mall termed as an organic volume with a particular multi-faceted shape and a height of twenty-five metres in continuity with the existing building line and extending the façade of Eataly. It houses foods and clothing brands with sustainable character balancing between architecture and environment.

Site planning and Landscape:

Redeveloped from former Carpano Lingotto Industrial area, a pivotal project in the regenerated process; it was designed by Architect Cristiano Catino with Carlo Grometto who created a place with the features of a natural organism bringing nature back to a former industrial area of Turin. Developed on 15000sqm expanse of land, the innovative and resilient building by sustainability allows building to breath in harmony with human beings and with natural elements. It is eco-sustainable building in every detail.

Building Envelope and Material types:

The building's shell is made up of steel ribs and wooden sunshade slats filtering the interior and exterior of the building thereby allowing it to breathe, and serving as a sunscreen. A weft of organic architectural fabric created into the vegetation bringing nature back to the industrial area.

Building and Forms:

Sustainability details:

The entire building is built from sustainable materials, recycled parts and innovative sustainable solutions. Recycling natural resources like rain water or energy from the sun through solar panels, which features over the entire construction.

Piezo electric floors at all entrances that uses the floor kinetic energy from footsteps to generate electricity which is used for all Green Peas activities that require electric energy.

The North-South orientation and the flared shape of the top floor are designed to adapt to climatic and environmental conditions so ensuring the best of solar radiation.

Also having an additional facade of a roof garden, reducing the building's environmental impact bringing nature back to the industrial area.

B. Appraisal Of Buildings

Table 3.1.1: Merits and Demerits of Palms Mall Ibadan.

Palms Mall Ibadan	**Merits**	**Demerits**
	Easy accessibility landscape.	Dominant hard
	Topography aligned design to allow for water drain.	No traces of biophilia.
	Beautifully cladded with aluminum insulating boards.	Artificial ventilation.
	Sun screened with fancifully patterned steel plates work.	No smoke detectors.
	Naturally and artificially lighted to reduce incurring bills.	Painted interior walls.
	Air vents embedded in the conduits over suspended ceiling	
	Sustainable floor and ceiling finishes.	
	Hidden waste disposal centres.	

	Water conserving conveniences.
	Alternative solar energy source

Table 3.1.2: Merits and Demerits of Ikeja City Mall.

Ikeja City Mall		
	Merits	**Demerits**
	Centrally located.	Inadequate lifts
	Adequate entrance/exit points	Artificial lighting
	Proper waste management	Artificial ventilation
	Strategic fire extinguishers	Excessive hard landscape
	Sustainable floor and ceilings	No trace of biophilia.
	Conduit building services	
	Sun screened with translucent glass material to prevent glare.	
	Aluminum cladded exterior walls providing weather protection.	
	Abated traffic noise pollution	

	Sun pattern driven building orientation

Table 3.1.3: Merits and Demerits of The Heritage Place Ikoyi.

Heritage Place Ikoyi		
	Merits	**Demerits**
	Primely located in Ikoyi.	Constrained site geometry.
	Constructed on raised floors.	Noise pollution.
	Ample indoor car parking.	Interior wall painting.
	Natural lighting and ventilation	Restricted entry.
	Highly efficient thermal glazing envelope	Purely office complex.
	Façade of wall insulation and double glazing.	
	Large shaded public areas.	
	Tenant dedicated external terraces.	
	Building orientation maximizes natural light and ventilation.	

Table 3.1.4: Merits and Demerits of Mall at Wellington Green, Florida, USA.

Wellington Green Mall		
	Merits	**Demerits**
	Low Carbon Electricity	Strict regulations to services
	Energy efficiency	DIY installation method.
	Water management	Non-uniform ceiling types.
	Low carbon transport	Enclosed.
	Resilient infrastructure	Non-renewable energy use.
	Masonry wall construction	
	Natural light adoption	
	Light coloured floors and ceils	
	Sustainable products sale	

Table 3.1.5: Merits and Demerits of the Mall of America, Minneapolis, USA.

Mall Of America, Minneapolis, USA.		
	Merits	**Demerits**
	A Destination adoption	Non-renewable energy
	Strong staff strength	Security issues.
	Excellent circulation	Lack of biophilic.
	Façade incorporating sun screen.	Low indoor air quality.
	Variety of spaces	Repurposing may be difficult.
	Future expansion allowance	
	Distinguished anchor stores	
	Topography maximization	
	Redeveloped site	

Table 3.1.6: Merits and Demerits of the Green Pea, Lingotto, Turin, Italy.

Green Pea, Turin, Italy		
	Merits	**Demerits**
	Centrally location	Expensive to maintain.
	Double level external envelope	
	Sustainable interior	
	Bioclimate garden roof	
	Several renewable energy alternatives	
	Eco interior painting	
	Active and passive environmental design	
	Sustainable product sale	
	Periodic sustainability review	

3.4 Case Study Synthesis

3.4.1 Common Spaces and Facilities

These are spaces and facilities within the project that are not designated by the landlord for the exclusive use of the Tenants. Examples of such are:

A) **Parking Facility**: - this is a space allotted for parking vehicles. It must be legible enough to allow visitor identify boundaries and offer an ability to steer their way through within their limits without traffic or accident. For a succinct vehicular circulation in a shopping mall, there should be three definite parking area namely:

General parking: this parking lot is for all visitors. It must be larger than all and must commensurate to the mall's gross leasable area.

Administrative parking: this a special parking lot set aside for the tenants of the mall.

Service parking: this is the parking separated from others and usually has a different vehicular access into the mall premises. It is majorly for large vehicles (trucks) for offloading and haulage.

B) **Access and Perimeter Roads**: - the access road is a motorable approach road required to be built or already built extending from provincial highway to provide an ingress and egress into a

shopping mall premises; while perimeter road is the road that follows the approximate perimeter (outside edge) of the shopping mall building.

C) **Pedestrian Sidewalks**: - a prepared exterior surface of paved way separated from the roadway for walking into the shopping mall. They are often constructed to formal standards.

D) **Landscape areas**: - this connotes the part of a site earmarked for growing plants, grasses and trees but does not include any building, structure or hard paved area.

E) **Architecture**: - this connotes the mall's character of functionality, stability and aesthetics. While the functionality is based on the purpose for which the building was designed in terms of its intended use; stability is factored by its safety and durability; and aesthetics the beauty of the building that makes for attraction.

F) **Security hubs**: - especially in the local cases so that properties of shoppers within the mall could be kept safe for the confidence and convenience of shoppers with huge purchases.

3.4.2. Special Spaces and Facilities

These are the static models of an architectural space of the shopping mall. They are usually designed restrictedly for their purpose by the landlord so they are not convertible. Examples are the recreation and the entertainment spaces.

A) **Food Court Area**: the mannerism of shop mall users these days tends toward the hedonistic lifestyle given to travelling, eating in restaurants, enjoying foods and beverages. Since the primary aim of the shopping mall is to provide all a customer may need in just a place for their convenience, a shopping mall being an all-in-one place. This is why a space such as the food court is available for foodies to have a food tour and for famished shoppers after a long tour of shopping.

B) **Entertainment spot(s)**: the shopping mall should not just be about retailing alone; since it's a place of doing one's general hobby, there should be allowances for other hobbies there too, in order to make some time-out for relaxation or recreation or window shopping. This will definitely enhance foot traffic as it would give any visitor a memorable experience of a come again feedback.

C) **Anchor store**: this serves as the main attraction to the mall, which may be one or more. Usually much more outstanding than others and having gained popularity through guaranteed quality high branded goods, it is taken as a trend to follow when it comes to retailing.

D) **Retail stores**: these are stores where consumables relating to everyday use are being sold. They are usually leased out in areas (per sqm).

E) **Recreation areas**: - this is the area where one can relax, rejuvenate one's physical and psychological health. Training and mastering one's hobby to proficiency.

F) **Service area**: - this is the engineering and maintenance hub. Since a shopping mall always basically comprise an integration of technological devices which undoubtedly will require servicing and maintenance, there would be a need for immediate intervention of the workshop at occasions when any of these devices get faulty.

3.4.3 Case Study Deductions

There are a number of facts unveiled from the case study in order to develop a state-of-the-art Mall and such are:

Accessibility: - the location of each case study was implemented on how easy it is to be reached or found, this is to in the long run aid foot traffic and patronage.

Environment: - the attractive features of the area of location are important factors for convenient delivery and purchasing of goods, competition and comparation finding expression in centrality and traffic rate, proximity to services and amenities.

Parking: - this is an essential requirement of any shopping mall as it is a place of heavy purchase and delivery in order to save time and sometimes costs. Suppliers and Customers would need a place to park their means of transportation to convey their goods for the period of time they would do their shopping.

Building Structure: - the ability of the mall to hold all its elements together for durability, aesthetics and safety and as well announcing itself upon any observer's glance for identification.

Layout: - this heavily depends on the interior legibility of the mall. Shoppers should be able steer their way around the mall without any hassle

Comfortability: - which connotes how strong it is to hold all elements together and function or serve it purpose for a long period of time without collapsing. Concrete structures of masonry wall applied to all the cases studied.

Services: - which implies how the electrical and mechanical services are employed to function and. The lighting, hvac systems and finishes all applied based on the environmental climate and mode of temperature regulation.

Safety: - this has to do with how each system of service runs when measures to mitigate common risks and accidents have been factored in the process of development within and without the mall.

Security: - the valuables of huge cost that make up the shopping mall building and expensive brands sold within them mandate a sense of security on and across the building.

Ancillary: - this unit is part of the service rendering units whose function helps the primary service units to function for example the refuse collectors, traffic/crowd control, maintenance etcetera.

Chapter Four

Site Analysis and Design Synthesis

4.1 Study Area (Moniya, Ibadan, Oyo State, Nigeria)

Moniya is a suburb town of Ibadan City, the capital of Oyo State in Nigeria, West Arica. It is the Headquarters of Akinyele Local Government named after an old century Ibadan Leader. The Local Government is bounded in the East by Lagelu Local Government, in the North by Afijio Local Government, in the South by Ibadan North Local Government and in the West Iddo Local Government. This makes it a junction connecting four other local governments. It is 222sqkm in area and comprises of historic and ancient settlements of Yoruba origins established by ancient warlords like IKEREKU, IROKO, IJAYE and AKINYELE of Oyo and Ile-Ife descendants who were reckoned with in the history of Yorubaland.

Being a major junction and easiest entrance to Ibadan City, the largest by geographical spread in West Africa; Moniya is characterized by a number of roads and transportation networks such as the Federal Highway (Trunk A) road that conveys from Ibadan to Oyo and Ilorin; the State Highway (Trunk B) road that conveys from Ibadan to Iseyin a popular Town in the State known for the production of the local fabric industry. The Local Government (Trunk C) roads are many serving several streets and estate developments within the Community. This is why the citing of major garages are established at different junctions ranging from bus terminals, trailer parks and Lagos-Kano/Sokoto (Obafemi Awolowo) railway station.

4.1.1 Site Location

The Site is located at Akonko area; Molarere bus stop, off Ibadan-Iseyin Road, along the Obafemi Awolowo Train Station way, Moniya, Ibadan, Oyo State, Nigeria, West Africa. It is also at a Latitude of 7.5523911 and a Longitude of 3.8917556 with Coordinates 7d33’13”N 3d53’32”E.

Figure 4.1: The proposed site location photo showing the nearest bus stop.

Source: www.goggle earth.com. February 2024.

Figure 4.2: The proposed site location photo showing the proximity to the Train Station in Moniya.

Source: www.goggle earth.com February 2024.

4.1.2 Site Selection Criteria

For the favourable choice of site for the proposed project, factors considered are as follows:

Topography: - a relatively plain structure that will permit the good view of any development and the construction at a lower cost.

Accessibility: - the proposed site is accessible through Ibadan-Iseyin State Highway and as well surrounded at the four sides by the Local trunk C roads by any means of public transportation.

Social Amenities: - a number of social amenities such as telecommunication masts, electricity power stations are at close proximity to the proposed site affording a reasonable installation cost.

Infrastructure: - Obafemi Awolowo Train Station Moniya, Ibadan and more or less the Dry Port is at close proximity to the proposed site. This will aid goods delivery and distribution for the business.

Centrality: - the proposed site is at a cross road junction of the Train Station Road with the State highway leading to Iseyin (a prominent Town within the State internationally recognised for the production of the indigenous Yoruba fabric).

Climate: - one of the advantages of the proposed site is a good weather condition characterized by moderate temperature and rainfall as with other South-West Nigerian States.

Location: - is favourable to a mixed-use layout citing as the proposed site is amidst housing estates, school, some mushroom shopping buildings.

4.2 Project Analysis and Design Synthesis

4.2.1. Brief Analysis

Foodco is a renown departmental store that started business in Ibadan, the largest City of West Africa by geographical spread over forty-two ago. Her commitment to guarantee over the years has bagged her a number of awards even to the West African level and as well enabled her expansion across the city and other States within the South-West region of the Country. She recently opened a quick shop in Bovas Gas Station Akingbola, Moniya adjacent the prestigious IITA (International Institute of Tropical Agriculture) along Old Ibadan-Oyo Expressway. Despite the high competition in the area, she roughly could meet up with the demands of her services to her customers due to space and regulation restraints. The pull of customers, need for expansion to measure up to the demands and aspiration to own a place for herself has made the Management Board to propose an upgraded outlet in which she could operate at a maximum capacity with less restraint and trending state-of-the-art architecture that would aid

business continuity and be very friendly to the environment. A body of several companies who rebate their merchandise to her, are willing to make an investment in the Project. Although super marketing is her core business, a number of departments when included would extend her services upgrading her to the standard of a mall. Where competitors are not so pronounced with a vast land area availability and a franchise from eager manufacturing companies and some other investors willing to supply some goods or let or sublet spaces for their products.

4.2.2. Brief Development

Considering the available site area, the demography of the location of less than 500,000 people, the projected number of visitors and the local based tenant (FoodCo); a community mall is best suited to determinant factors.

A Community mall is a type of shopping centre designed to foster a sense of community and social interaction among its visitors. It aims to go beyond traditional consumer focused spaces and provide opportunities for people to connect with each other in a social and cultural level. It offers to serve as a community space where the community people rely on for social reproduction and recreation. Today, Sustainable architecture is basically the trending key in keeping pace with the global perspective of climate protection. It is an expedient criterion in the design of any architectural facility because of its various benefit to the environment, facility (building) and users, incorporating this in the design implies that the mall is of a global standard where any visitor around the world could feel safe to purchase goods of quality standard, of which this also will aid the business continuity quest of the intending Client.

4.2.3. Design Criteria

Factors for consideration such as accessibility, available site size, demography, available facilities or proximity to these facilities, buyer's strength and potential sales. This is to aim towards the viability of the shopping mall business project.

The entire lifecycle of a building hangs on its construction and being the phase where all virtual becomes a reality and the point where most materials are integrated to define the building quality and aesthetics. This explains why the phase should be professionally planned and succinctly guided and by this, the quality of the shopping mall aimed is achieved.

Accessibility

Must be efficient, accessible and user friendly with a clear circulation pattern that guides customers from store to store. Easy access to public transport can significantly impact a shopping mall's success. The mall should be accessible from all directions with clear and visible signs, pedestrian crossings and parking facilities. Design considerations should include direct connections to nearby transit stations; adequate parking for bicycles and cars and pedestrian-friendly approaches to encourage foot traffic from surrounding areas.

Functionality

Shopping malls must be designed to have a distinctive architectural identity that makes it stand out creating a memorable landmark. Moreover, there must be a perfect balance between aesthetic beauty, functionality, safety and environment sense. The ultimate goal is to create a space that not only attracts and retains shoppers but also enhances their experience, promote sustainability and contributes positively to the urban landscape. In a shopping mall, functionality is as important as creativity. This involves innovative use of shapes, materials and façade treatments. The design should reflect the brand's ethos or cultural context of its location.

Circulation

The layout of a shopping centre should facilitate smooth flow of foot traffic ensuring easy navigation through stores, amenities and common areas. This includes the strategic placement of the anchor stores, wide aisles, accessible facilities for differently abled persons, efficient use of signage and consideration of sightlines to encourage exploration and discovery. Size and Types of stores, location of common areas such as restroom and other amenities and overall flow of mall.

Sustainability

This is increasingly critical in modern architecture. Shopping malls should incorporate green practices such as energy efficient lighting, natural ventilation, rainwater harvesting and use of sustainable materials. Green spaces both indoor and outdoor can enhance air quality and provide serene environments for shoppers to relax.

Integration of Technology

Technology can significantly enhance the shopping experience. From interactive directions to augmented reality experiences to efficient parking solutions and personalized shopping assistance, integrating the latest technologies can streamline operations and engage customers.

Community Spaces

A shopping centre should not only be about retail. Incorporating community spaces such as events arena, exhibition halls, food courts, sport courts can turn a shopping centre into a social hub attracting more visitors for various activities beyond shopping.

Natural Light and Ventilation

These play a significant role in creating pleasant and inviting atmosphere in a shopping mall. Large windows, skylight and aria can provide natural light and ventilation while also creating a connection with the outside environment. Designers should also consider the orientation and location of the mall; taking into account the sunpath and prevailing winds to maximize natural light and ventilation.

Branding and Signage

These help to create a unique and memorable identity. The mall's logo, colour scheme and layout should be consistent throughout and signs should be clear, visible and easy to read. The design should also take into account the type of tenants and the target market with signage that appeals to the demographic and promotes the mall's overall brand.

Customer Experience and Comfort

These are critical design elements in a shopping mall. The mall should be designed to provide a comfortable and welcoming environment with comfortable sitting areas, well-lit walkways and clean and well-maintained common areas. Designers should consider the type of customers, the climate and the cultural context creating an environment that is appropriate and inviting for the target market.

Retail and Tenant mix

The mall should offer diverse and balanced mix of tenants; including anchor stores, speciality stores, restaurant and entertainment venues. The tenant mix should also reflect the local market and demographic offering products and services that appeal to the target market.

Sustainability and Energy efficiency

The mall should minimize environmental impact, using sustainable materials reducing energy consumption and promoting recycling and waste management. The mall should also adapt to change in climate conditions with shading and cooling systems that reduce heat gains and improve comfort.

Building Systems and Materials

The mall should be durable, safe and secure with high quality building systems and materials that meet local building codes and standards. The mall should also be designed to be flexible with the ability to adapt to changing tenants needs and evolve overtime, without sacrificing its overall aesthetic or functionality.

Security and Safety

Designers should incorporate safety and security measures for users of the shopping mall tenants and customers with a comprehensive fire and life safety system, surveillance cameras and adequate emergency exit. The design should also take into account the potential risks and hazards associated with large public spaces and implement measures to mitigate these risks and ensure the safety of all occupants. This includes adequate emergency exits well-lit pathways. Robust security measures to create a safe shopping environment.

Integration with Outside Environment

The mall should be designed to be a positive addition to the community creating a sense of place and identity and fostering a connection with the surrounding urban environment. The mall should also be designed to be accessible to local population with a variety of transportation options including bicycle facilities and pedestrian access. Buildings are meant to relate to the natural landscape surrounding them.

Conclusively, the design of a shopping mall creates a memorable shopping experience, attracting customers and establishing strong brand identity. Architects and designers must create a shopping mall that are not only functional and attractive, but also safe, sustainable and successful.

4.2.4 Conceptual Development

The researcher's philosophy on the proposed sustainable community mall project is centred on elimination of carbon footprints which degrades the air quality of the environment. From the urban conceptual view of the mall, whereby the anchor store indicates the node and the retail stores the district and the mall layout the path, the sustainability approach towards climate protection demands a collaborative responsibility of all parties involved, carved out of a community-oriented paradigm such as collaborative consumption and slow movement depicted in a design concept of face-to-face spaces that link people together and create a sense of community. This in the long run will be of tremendous value to the Biospheric, Altruistic, Egoistic and Hedonistic environments. Depicted by the instrument of the mall layout connecting all of each function together to make up the Mall Project design. With the eco-friendly materials consuming the carbon prints which could apparently be emitted in the course of construction or operation activities of the shopping mall while the air quality is maintained thereon fostering the health of the host community, users and the business by attracting more customers and minimizing operational running cost.

4.2.5 Functional Relationship

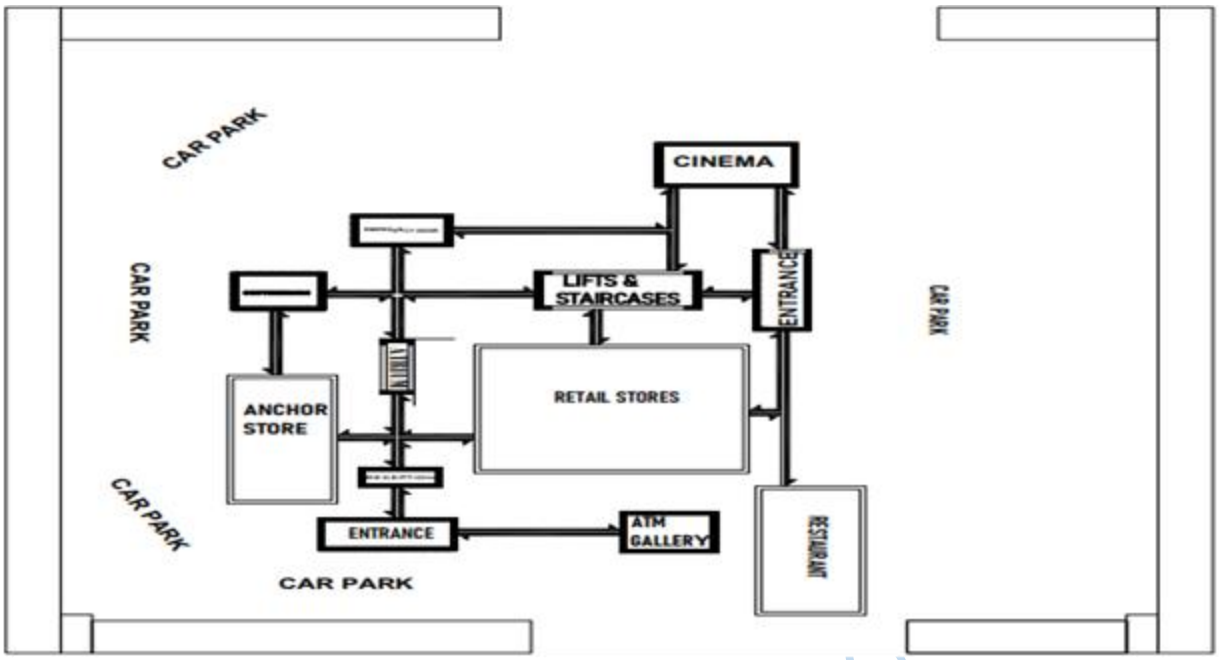


Figure 4.3: the flow chart of the ground floor plan.

4.2.6 Space Allocation/ Schedule of Accommodations

Table 4.1: The Space Allocation.

Commercial Space	Area (Sqm)	Recreation Space	Area (Sqm)
FoodCo Anchor Store	707	Cinema hall	372.32
Retail Store Typology 1	29.7	Ticket room	9.67
Retail Store Typology 2	27.5	Projection room	15
		Drinks & Snacks	59
		Games Arcade	90
		Basketball court	707

Ancillary Spaces	Area (Sqm)	Restaurant Spaces	Area (Sqm)
Parking (Cars)	998	Eatery	345
Parking (Trunks)	1208	Servery	38
Conveniences	144	Kitchen	36
ATM Gallery	56.7	Changing room	9
Reception	998	Dry Store	8
Security post	12	Cold store	8
Delivery and Loading	157.3	Winery	33
Refuse Chamber	72	Bakery	36
Stair hall	33	Atrium 1	157

Lift	9	Atrium 2	164
Elevator	18	Atrium 3	136
M&E room	12	Greenery	
Security/Control room	29.4		

Table 4.2: The Schedule of Accommodations.

Function (%)	**Spatial Area (Sqm)**	**Capacity**	**Percentage**
Anchor Store	707	21	13
ATM Gallery	207	6	3.8
Atria	339	8	
Cinema Building	501	13	9.4
Conveniences	144	4.2	4.46
Restaurant	670	14.4	12.6
Retail	679	15.2	40

4.2.7 Construction Methods

The construction phase of any building is the stage at which all virtual are brought to reality. It entails a number of skilful workmanship as it is the point where the design is interpreted by the professionals and labourers to the layman. Sustainable construction methods involve designing, constructing and operating buildings and infrastructures in an environmentally responsible way.

As affirmed by Sarah Jones, "Sustainable construction methods span a lot of Ps: products, practices, processes and policies. They begin in a project design phase and carry through to operation". The sustainable construction methods applied to this proposed project are:

1. **Site potential optimization**: - this is when the characters and features of the site are deployed to create a resilient environment. It involves taking advantage of the sun path and wind direction and site topography and contextual features applying them to design an environmentally responsible architectural facility. Building orientation is a vital consideration in the design of any shopping mall as this determines the mall layout and energy recipient potential and comfort associated with it. Some of its criteria used in the course of this research includes: -

I. Locating close to transportation.

II. Maximizing natural light and ventilation

III. Closeness to physical and mental health amenities.

IV. Appropriating building size

V. Soil testing

Advantage: this would reduce energy needs through natural lighting and ventilation; it will also make for easy accessibility of the mall and installation of services at an optimal cost.

2. **Renewable energy system**: - this has to do with alternating renewable energy to the energy storage system will mitigate reliance on fossil fuels and thus preventing additional carbon footprints. This could be in the form of wind turbines, solar panels, water turbines and so on. In a shopping mall, the comfort and convenience level must not be compromised as they are required for smooth running operations that would facilitate a mall experience and aid comeback feedback. In Nigeria, where the local energy supply is unpredictable, fossil-fuel energy source is utilized as an alternative. The one applied to this project is the renewable energy generated from the sun through solar panels.

Advantage: it would reduce carbon footprints, save energy cost thereby lowering operational cost, maintain mall image keeping all services efficient.

3. **Air quality maintenance**: - this has to do with keeping the quality of air required for sound health at the standard level. It involves getting rid of pollutants that combine with the air to affect the health of man when inhaled and the ecosystem. The common challenge of any shopping mall is the indoor air quality maintenance birthed out of excessive indoor heat, carbon dioxide exhaled by users and the emissions of the building through the materials used for construction or finishes. During the dry season in Nigeria, the outdoor temperature usually increases the indoor temperature thereby requiring for temperature control, although, comfort level varies with a number of factors. Therefore, the air quality maintenance approach applied to this project are the provision of air-vent, air-conditioning systems in construction and indoor biophilic designs.

Advantage: this would keep the mall at a reasonable comfort level, boost humane air exchange and make for aesthetics of the mall interior.

4. **Waste reduction**: - this has to do with making provision for exhausted and unwanted bye or end products in any system of operation. Generally, shopping malls are waste associated even from the

stage of construction through to operation and deconstruction. In this proposal, the waste management provision made is the utilization of eco-friendly materials and the integration of dumpster chamber whereby segregation of waste is set as the regular operation.

Advantage: it would aid re-use or recycling of waste products; bring about regenerated sustainable products; serve as compost manure, ingredients for some agro-allied industries thereby generating income and boosting the local economy.

5. **3D Printing Components**: - this is a sustainable technology used to manufacture and produce raw materials on site. Its process of additive manufacturing adds successive layers of material to create products, only using what's required. It however removes material to create a product through its subtractive process.

Advantage: it eliminates wastes by making project building materials concise, cost and time effective.

4.2.8. Construction Materials

Basically, the construction phase comprises of two important stages which are the substructure and the super structure. All materials specified at each stage of the construction works of the proposed shopping mall project are eco-friendly and expected to deliver the sustainable objectives in view. They are selected according to their properties based on their sustainable requirements:

A) **Substructure**: - this comprises of the foundation, foundation walls and damp-proof course.

Foundation: - is the bearer of the loads imposed on any building as it is responsible for transferring the total loads to the earth. It is therefore imperative that the foundation of a building be strong so as to be able to withstand all loads imposed on it. The structural elements required for a strong foundation are the concrete beams, columns and slabs from which framing, supporting and bearing structures are

constructed. In the proposed two-floor shopping mall, the foundation has to be strong enough to withstand the total loads (dead and imposed) on the building. The concrete material may be in the form of mass or reinforced depending on the designed purpose, for instance, while mass concrete is preferable for foundation footing and oversite slab, reinforced concrete is best for the framing wall columns and the supporting beams and as well the raised (upper) floors slabs and the lintel.

The mass concrete is produced when a measure each of cement, sand and aggregates at 1:3:6 ratio is mixed with water and allowed to set at the desired form while the reinforced concrete is built when the traditional steel is entrenched to or combined with the concrete mix at 1:2:4 ratio conforming it to the shape of the steel as prefabricated. The concrete material may be alternated with cross laminated timber (CLT) or gross laminated timber (GLT or Gulam), which are strong, light-weight and carbon-sequestering. This could be used in the construction of multi-storey buildings, a practice often referred to as 'mass timber construction'.

Foundation footing: - this is the area of the foundation that is in direct contact with the ground. It is the structural that distributes the load of the superstructure to the soil beneath. The building base built of mass concrete. They are accommodated in the excavated trenches.

Foundation walls: - they are masonry wall of sandcrete blocks courses from the foundation footing up to or slightly above the natural ground level. The support the building weight so that the footing may be able to bar the load effectively without crashing.

Damp Proof Course: - this is a layer of water proofing material applied on the basement level to prevent the rise of surface water into the walls.

Plinth: - this is the base or platform upon which the superstructure is erected serving as the transition between the foundation and the building proper. It is usually built of mass concrete structure either at or above ground level to take up the load of building coming over it.

Eco-Friendly Construction Process

The eco-friendly materials suitable to the substructure construction of the proposed shopping mall to achieve sustainability relevance are:

Green cement, locally sourced sand and aggregates, clean water, damp proof membrane and or reinforced concrete.

Recycled steel (which has the same strength but a lower environmental impact), locally sourced sand and aggregates with clean water and pulverized fly ash instead of the traditional cement. They are also used in structural applications.

(I) **Recycled steel**: - this is the carefully sorted virgin steel scraps collected from residual offcuts from large scale manufacturing processes of electronics, sheet metals of electronics, residual in-house leftovers of manufacturing processes or scrap appliances of household items, used automotive parts and other products no longer in use that taken to a sustainable recycling facility and processed by a green energy method with the product tested for quality grading and assessment before being introduced for sale hence, reuse.

Uses: on site framing structures of reinforced concrete columns, glass shield device, beam and lintel structures construction.

Advantages:

a) **Energy efficiency**: - offers 25-30% of energy required for virgin steel production; reduces carbon emissions and lowers environmental footprints.

b) **Reduced resource depletion**: - reducing the need to mine additional iron ore and other raw materials helping preserve natural resources.

c) **Waste reduction**: - reducing the amount of steel waste in landfills, helping mitigate the environmental impact of steel disposal and lessens other ecological disruptions.

d) **Versatility**: - allows for various use and the ingenuity which propels the promotion of the local industry.

Disadvantages:

a) **Contamination**: - some paints, coatings and other materials on steel products can complicate recycling so that much more energy is used up in the process.

b) **Limited availability**: - raw material steel scraps required for recycling may not be consistent may not be consistent thereby altering their availability.

c) **Quality variability**: - variation in quality and properties may debar their use in certain applications.

d) **Infrastructure and Technology**: - advanced technology and infrastructures are required for efficient steel recycling. This may not be affordable everywhere.

(II) **Green cement**: - a high quality of low carbon footprints cement mixed with locally sourced sand and stones to form a mix as strong as or more than concrete of Portland cement. It could be a re-engineered pozzolanic cement, a fly ash or clay lime cement.

Advantages:

a) 99% carbon emissions lower than Portland cement

b) 20% stronger in 28 days than Portland cement.

c) It requires no changes to current industry practice.

d) Standard and codes regulated.

Disadvantages:

a) Unavailability in market.

b) Takes a longer time to set than Portland cement.

(III) **Visqueen eco-membrane damp proof membrane**: - this is manufactured from 100% recycled polyethene making it suitable to the environment for sealing façade interfaces and construction joints.

Advantages:

(i) Reduces land fill waste

(ii) 200% elongation capacity

(iii) Watertight

(iv) Weather proofing

Disadvantages:

(i) Not suitable for wood floor coverings.

(ii) Expensive to install.

(B) Superstructure encompasses the portion of the building above the ground level serving the purpose of facilitating the intended use of the structure, it comprises of an array of components including the Floors, Walls, Roof and their Finishing.

(i) **Floors**: the element of the floor is the slab and the floor finish.

Slabs: they are usually built works of flat horizontal surfaces integrated into floors or ceilings supporting each of the load bearing walls upon or beside them. They may be built on site or pre cast by manufacturer as either mass concrete or reinforced concrete. The eco-friendly materials suitable to floors are the green cement, recycled steel slag and locally sourced sand and aggregates.

Finishes: they are materials applied to protect the floor surfaces and to make them appealing. The eco-friendly floor finishing materials used in flooring applications are recycled concrete and or rubber mixed with other binding materials for example terrazzo, ceramic or pvc tile. Terrazzo is a composite material used for flooring, counter tops and stairways. It is made from marble, granite, quartz, glass and other materials usually bind with cement or epoxy resin. It is eco-friendly because of its re-purposeful usage. Other eco-flooring materials are cork and bamboo; they sustainable alternatives to conventional hardwood flooring. Recycled concrete and recycled rubber are also being used in certain types of flooring.

(ii) **Walls**: the elements of the wall are columns, beams, lintels, framing and partitioning walls with their finishes.

Columns: vertical load bearing members designed to support the weight of the structure above.

Beams: horizontal member that distribute the load imparted by a super structure evenly across, supporting columns and walls.

Lintels: horizontal supports spanning openings such as doors and windows.

Parapets: low protective walls or barriers at the edge of a roof or balcony.

Finishes: the eco-friendly material applicable for protection or aesthetic purpose are usually paints with low voc or cladding materials like brick or ceramic tile or aluminum boards or wall papers. Wall painting neutralizes pollutants, prevents the growth of mold and microbes and eliminates germs for a healthier environment as befits a sustainable building.

(iii) **Roofs**: the structure and material comprising the overall covering of a building. The elements of the roof are the struct, trusses, tie beam, wall plate, purlins which can be of steel or lamina timber or plastic material (s) or a combination of any of them.

Requirements of a Roof:

It should be durable against the adverse effects of various agencies such as wind, rain, sun etcetera.

It should grant the desirable insulation against sound and heat.

It should be structurally stable and sound, capable of taking loads likely to come over it.

It should be well drained having efficient water proofing arrangement.

(iv) **Finishes**: the properties most sustainable to roof finishes are ultraviolet rays protective and water resistant, silicon roof coatings are best recommended. For metal roofing, Polyvinylidene Fluoride (PVDF) are considered as leaders.

Windows: low emissivity (Low-E) glass is being used in windows to reduce heat transfer, thereby reducing the energy needed for heating and cooling buildings. Another emerging application is the use of electrochromic glass which can change its light transmission properties based on the external conditions, thus improving the energy efficiency.

Doors: this is a hinged or otherwise moveable barrier that allows ingress (entry) and egress (exit) from an enclosure.

Roofs and Walls:

Green roofs and walls covered with vegetation are being used to provide insulation, reduce storm water runoff and improve the aesthetics of buildings. They also create habitat for urban wild-life promoting biodiversity.

Solar Panels: while not being a traditional material, they are being incorporated into the design and construction of buildings. Building integrated photovoltaics (BIPVs) can be used in roofs, facades and windows to generate renewable energy in building.

Cladding: various materials like aluminium, bricks, stones can be employed as eco facades.

Pavements and Roadways: recycled concrete and plastic are being used in the construction of pavements and roadways reducing the demand for virgin materials and the associated environmental impact. Their application clearly shows the versatility that sustainable materials have and their potentials to replace conventional materials in a wide range of construction applications. The adoption of these materials and techniques can play a significant role in transforming the construction industry and making it more sustainable.

Examples of Real Sustainable Projects

Power house, Brattorkaia, Trondheim, Norway.

Where solar energy and other sources of renewable energies to achieve a low energy building consumption.

The Edge, Amsterdam

The headquarters of Deloittee in the Zuidas business district. This building features an energy efficient design with passive temperature control. An aquifer thermal energy storage system generates energy from window solar panels, rain water collection are used throughout the building and smart lighting.

Bridges of Laminated Timber (BoLT) Amsterdam, Netherlands.

This timber bridge concept replaces the conventional concrete super structure with laminated timber resulting in the 75% of the superstructure's total weight being a renewable material.

4.2.9 Building Services

This encompasses a wide range of activities from site preparation and foundation laying to erecting walls, installing utilities and finishing interiors. It engineers design and implement essential systems and plays a key role in ensuring projects are energy efficient. It is responsible for the services that make a building function. Building services can be likened to the nervous system of the human body which though could not be seen or touched physically but its works cannot be downplayed as it performs tasks which cannot be denied.

"Building services metaphorically refers to the nervous system, though not visible or superficial but precisely controls numerous functions and specific tasks". It is a collective term for the systems required for safe, comfortable and efficient operation of the building environment. This includes

energy supply and distribution, heating, air conditioning, ventilation, refrigeration, lighting, lifts, escalators, IT networks, security, alarms, fire detection and fire protection.

All aspects of building services design must be regulated so as to ensure they meet the set standard, and components be carefully integrated so as not to clash with other building components so they don't pose a risk to the user and building alike. This is the reason why it is important to consult Building services engineers in complex projects like the proposed shopping mall so that they could design and assess based on the lifecycle of the building.

The Elements of Building Services employed in the proposed shopping mall includes:

1. **Energy generation, distribution and supply**: - the primary source of electricity to the proposed shopping mall is the renewable solar energy. It works when the solar panels collect and convert the solar energy derived from the sun to electrical energy which when passed into the domestic grid is used for the various electrically operated systems within and without the building. The alternative source is the local energy grid and the fossil fuel operated generator. This is necessary in the design and construction of a shopping mall as most operations for instance security, IT, HVAC and so on run and function under uninterrupted supply. Other sources of renewable energy are the wind, hydro and geothermal.

2. **Fire safety, distribution and protection**: - the proposed shopping mall is protected against fire incidents through the Engineer's specification who designs the connections and locations of the fire hydrants, fire tanks, sprinklers systems, alarm systems and delivery sensors for immediate action in the case of any incident. A communication device within reach for alerting the closest fire station is readily available so that lives and properties are kept safe and secured.

3. **HVAC**: - the proposed mall has two divisions to this namely the active and passive system to supply human comfort by regulating the temperature, humidity and air quality. The developers of the proposed consulted the HVAC Engineer for design, codes and specification in relation to the standard building regulations and requirements. The active system employs air transference between indoor and outdoor areas through a grid of ductworks installed in suspended ceilings and inside wall cavities for heating and cooling while the passive system takes advantage of the site natural ventilation through the use of atria within the building.

4. **Lighting**: - this service aids the visual perception of any user within the building. The developer of the proposed shopping mall consulted the Electrical Engineer to design in appropriation to the need at each room of the building according to the required building codes and regulation. The shopping mall design employs transparent glass windows (glare protected) for natural lighting during daytime and eco-friendly LED (Light-Emitting Diode) bulbs of artificial lighting during the night time. It additionally employs solar powered and photo-voltaic security lamps within the building premises to light up the surroundings at night time.

5. **Plumbing/ Drainage**: - water is distributed throughout the building from a roof mounted water tank through various pipes to supply water at strategic tap locations as designed by the Plumbing Engineer. Specifications are duly followed and inspection too so that pipe leakages when detected are repaired or replaced in order to prevent water wastage. Although, the water-catch or harvesting system is a sustainable practice which allows for storing up run off water for a latter use, it is not employed in this project because the scope of the proposed mall is limited to clean water provision which is ensured by taking cognizance of the material type used for the underground pipes connection to achieve the efficient water distribution. However sustainable water flush systems are employed in all conveniences.

Drainage is system involves the discharging of unwanted and waste water from the building to the local water treatment plant for treatment and reuse. Sometimes an onsite treatment plant could be introduced so that the building recycles and reuses its own water use every day, however, the scope of this proposed shopping mall does not extend to this as waste water is channelled from site to nearest water courses through on-site gutters and external drainages so waste water don't get stored up thereby breeding parasites and defecting the environment health.

6. **Security**: - this system applies to the protection of lives and properties of users and the equipment's, valuables and merchandise with the information related to the proposed shopping mall and its very self. The systems employed in the proposed shopping mall are in manual and mechanical terms. The manual deals with the employment of well-trained security personnel, while the mechanical aspect deals with installation of CCTV, intruder alarms at strategic locations connected by an information network recording and capturing all activities within and without the site to be viewed at the monitoring room.

7. **Transportation**: - this system is charged with the responsibility of movement within the proposed shopping mall. It allows for easy and faster circulation especially for the disabled, ambulant, aged to the intended destination, it also aids a safe movement of heavy loads through floors with no accident or wastage involved. It is employed in the proposed shopping mall in the form of Escalators, Lifts and Staircases.

8. **Acoustics**: - this connotes the property of a room space or building which has to do with how it responds to waves of sound transmission or insulation. A sound absorbing or insulating material like porous layers and micro-perforated panels are widely used throughout the building for noise reduction. It is the study of sound in buildings dealing with the control of sound transmission throughout the building, maintaining conditions for good speech intelligibility. the technologies used in acoustical

design include sound absorbing materials to reduce the reflection of sound waves, acoustic diffusers to scatter sound waves in different directions and the digital signal processing to adjust the sound quality in real time. The way sound travels and reverberates in a room can affect the clarity, volume and quality of sound. Most materials are better at reducing high frequency noise, the straw bale wall is an example of such. Several studies have indicated that straw bale walls can achieve a sound reduction. For the proposed shopping mall, the acoustic engineer is consulted to design the cinema theatre to enhance the sound quality carrying out sound assessment and ensuring building regulations are followed, whereby sound can travel effectively and the audience can enjoy an immersive and unforgettable experience, taking cognizance of the room shape, walls, floors and ceiling materials, the placement of audience and performers.

Chapter Five

Project Appraisal

According to the UNEP, the production and the use of materials such as cement, steel and aluminium have a significant carbon footprint stemming to about 37% of global emission (UNEP Report; 2023). These carbon emissions stem from heating, cooling and lighting. Adding to these is the deployment of these materials which requires a considerable amount of fossil fuel for transporting and thus increasing the carbon footprints. Comparing these three major building materials to their eco-friendly alternative materials, their impact value on the environment through their production, utilization and decomposition is the assessment of their sustainability relevance to construction

"Eco-friendly building materials are those that provide appropriate service and lifespan with minimum maintenance, while minimizing the extraction of raw materials, the pollution from and energy by manufacturing and use, and that have maximum potential for reuse or resource recovery". (Rousseau 2019).

Table 5.1: The Production, Utilization and Decomposition of Eco-friendly building materials.

Eco-friendly Material	Production	Utilization	Decomposition
Aluminium	The raw material is bauxite (a sedimentary rock), redefined to produce alumina, then smelted to extract pure aluminium	As roofing materials because it reflects light, is soft, ductile and non-magnetic. It is well tolerated	Recyclable severally losing its properties. Uses less energy. Waste product can be used as a filler in asphalt and in

	through the electrolytic reduction processes. It's not sustainable.	by plants and animals. It's Fairly sustainable.	concrete. It's sustainable.
Bricks			
	The raw material is ground clay and water. The processes include soil preparation, moulding, drying and burning. It's sustainable.	As pavements and masonry walls because of high strength and compressibility. It is also called artificial stone. It's sustainable	Recyclable whether still intact or broken up with same production process. It's sustainable.
Cob			
	The raw materials are subsoil, water, lime and fibrous organic mateial (long straw). It is sustainable.	As masonry walls and foundations. The natural insulation makes for energy efficiency. So, it's sustainable.	It lasts long and easily decomposes to soil. So, it is sustainable.
Composite ceiling boards.			
	The raw materials are, naturally occurring and amongst are lignocelluloses okra, waste paper, sawdust (rice, maize, coconut) husks, elephant grass, pawpaw pseudostem and calcium carbide residue replacing Portland cement.	Used as ceiling boards because of their insulative property. Also, they are fire, mould, pest and water resistant. It's sustainable.	Recyclable and it's agrarian. It's sustainable.
Concrete beam reinforcement			
	The raw materials are Bamboo (Bambusa vulgaris), rattan canes, (Cissus populnea) or oil palm (Elaeis guineensis). Agrarian in all. Formed when mixed with carbide waste as cement to form a compsite that can be manually operated. So, it's sustainable.	Used as replacement for steel in struts of a lintel and all other low load bearing structures. It is sustainable.	It's biodegradable so, it's sustainable.

Lumber and Timber	The raw materal is agrarian natural occurring. It can be harvested by manually operated machine. Sustainable	Used as furniture and roofing structures, they are versatile. It's sustainable.	They become compost or mulch enriching Soil for fertility. It is sustainable.
Cork	The raw material is agrarian; An oak tree. Its harvesting Increases the effects of global warming and so has to be replanted. It's fairly sustainable.	Used as ceiling panels, acoustic wall and floor finishes because of its vibration absorbing property. It's resistant to moisture and liquid. So it is sustainable.	It can be replanted It is sustainable.
ETFE Perspex	The raw material monomer TFE converted to polymer ETFE using polymerization. ETFE resin is melted and then extruded into thin, continuous sheets. It is fairly sustainable.	Used as roof atria and wherever natural lighting is required. It is sustainable.	Though recyclable but its purity at this stage is uncertain. Since energy is involved, it is fairly sustainable.
Ganache Boards	The raw materials are sawdust, fibre cloth and magnesium. It requires natural drying and processing to make. It is sustainable.	As ceiling boards and for cladding due to their Insulative property. It is sustainable. .	They are renewable and recyclable, so, It is sustainable.
Green Cement	The raw materials are borate, fly or bottom ash and clay with lime as cement. Processing requires less energy. It dries without rupture or fracture but slowly. It is sustainable.	Used in place of the Portland cement for mortar and concrete mix and plastering. Emits no carbon. It is sustainable.	The components are decomposable into soil. It is Sustainable.
Low Emissivity Glass	Its raw material is a Coated layer of Metal or oxide film And glass sheets. The Processing involves	As windows because of its transparency for absorbing natural light Highly heat resistant and cost efficient. So,	Minimizing infrared and ultraviolet light. It is last longing and maintainable. So, it's sustainable.

	A vacuum chamber Heating with much Energy involved. It's fairly sustainable.	it is sustainable.	
Low Volatile Paints			
	The raw materials water-based resins which are ceramic, stones, powder-coated metals anodized metal, glass, clay, concrete, bricks or unfinished solid wood and voc reducer. It is sustainable.	Used for aesthetics. It's climate resilient, moisture resistant and and mildew preventing. So, it's sustainable.	Reprocessed from municipal wastes. It is sustainable.
Natural fibre-reinforced floor and wall tiles			
	The raw materials are municipal and industrial wastes of ceramic and porcelain with a hard glaze or other materials such as glass, metal, cork or stone. It is sustainable.	Used as floor and wall tiles. It has lower water absorption capacity than typical ceramic tile but the same swelling of 3% It is sustainable.	It is recyclable and reduces landfills. It is sustainable.
Recycled Plastics			
	The raw material could natural or synthetic. It is fairly sustainable.	Highly resilient and tear resistant. Suitable as tile materials for playground and sport surfaces. It's sustainable.	They can be reclaimed and recycled. So, are they sustainable.
Recycled Steel			
	The raw materials are steel scraps, slags, water, gas and dust. Fed into mills and foundries and later melted down the furnace purified of contaminants. Energy required is 30% of the production of virgin steel. It's sustainable.	The crystalline structure that makes for the hardness of the material. Making it suitable as frame structural members. building construction. It is compressible and has high strength so does not break easily. Durability makes it sustainable.	Reducing steel waste in landfills, helping mitigate enviroment steel disposal impact and ecological disruptions. It is sustainable.
Rock			
	The raw material is natural and requires high energy and machinery to process It's fairly sustainable.	Used as stones, gravel, sand and pavers in landscapes, concrete and mortar mixes, foundation construction,	It biodegrades back as soil It is sustainable.

	aesthetics cladding. It is sustainable.	
POP		
Solar/Photovoltaic cells		
The raw material is crystalline silicon, cadmium telluride, thin film solar cells, floating glass coated anti reflective solar glass on both sides. This obstructs oxygen and guards against moisture and dirt.	They produce a maximum circuit voltage thereby providing alternative energy source. Transmits power and enduring extreme temperatures.	Manufactured from waste or residual materials from different industries. It reduces landfill. It is maintainable.

Sustainable Development is a way of development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs (Brundtland Report, 1987).

The achievement of Sustainable Development Goals requires three key elements: social inclusion, economic growth and environmental protection. These three elements reflect the pillars of sustainability including People, Prosperity and Planet. The sustainable development goals is a modality to measure the materiality of a process or product to determine its eco-friendliness. It cuts across all the three aspects of the environmental values. The sustainability Development Goals are as follows:

(i)No poverty; (ii)Zero hunger;(iii) Good Health and Wellbeing; (iv)Quality Education; (v)Gender equality; (vi)Clean water sanitation; (vii)Affordable and Clean Energy; (viii)Decent work and Economic growth;(ix)Reduced Inequality; (x) Industry, Innovation and Infrastructure; (xi)Sustainable Cities and Communities; (xii)Climate Action; (xiii) Responsible construction and Production; (xiv) Life below Water; (xv) Life in Land; (xvi) Partnership for the growth; (xvii) Peace, Justice and strong Institutions.

According to the U.S Environmental Protection Agency, approximately 30% of the energy used in commercial buildings is wasted. Other ways of making the construction of the proposed shopping mall sustainable apart from the use of eco-friendly materials include biophilic designs, renewable energy adoption, waste reduction and management so that cost efficiency could be achieved and building can last long and users can remain healthy.

Investors may be ambiguous of the possible prospect of a shopping mall project especially with the trending on-line shopping style present state of the economy and since it entails huge finances for construction and continuous operations.

To assess sustainability relevance, the three stages of the value chain is investigated from the reviews of the production, utilization and decomposition of the eco-friendly materials and findings tabulated as:

Table 5.2: The conformity of the impact value of each eco-material used to the SDGs.

Eco-material	Impact Value			SDGs attained
	Social	Economic	Environmental	
Aluminium panels	High	High	Moderate	3, 8, 9, 11
Aluminium roofing	High	High	Moderate	3, 11, 13
Dangote Cement	High	Moderate	Low	8
ETFE ✓	High	Moderate	High	3, 8, 10, 11, 12, 13
Low emissivity Glass	High	Moderate	High	3, 8, 13
Recycled Plastics	High	High	Moderate	3, 8, 11, 12
Recycled Steel	High	Moderate	High	10, 11, 12, 13
Sandcrete blocks	High	Moderate	Moderate	3, 7, 8, 10, 11
Solar inverter	High	High	High	3, 7, 8, 10, 11, 12, 13

Stabilized Bricks	High	Moderate	High	3, 8, 10, 11, 12, 13
Wood	High	Moderate	High	2, 3, 10, 11, 12, 13,14, 15

The choice of building materials in Nigeria is greatly influenced by several factors which include climate, availability, cost and cultural preferences.

In order to account for the sustainability relevance of the proposed shopping mall, the researcher surveyed the popular Iwo-road and Dugbe building materials markets in Ibadan and the Alaba international market in Lagos to get in detail available eco-friendly materials in the markets. Below is the outcome of the field work.

Table 5.3: **The percentage of availability of the eco-friendly materials in the market.**

Eco- friendly Material (%)	**Number of Enquiries**	**Availability**	**Percentage**
Green cement	15	-	-
Recycled steel	10	2	20
Bricks	12	12	100
Mass Timber	15	15	100
Low emissivity Glass	10	10	100
Low volatile paints	15	-	-

Ganache boards	15	10	66.7
Recycled Aluminium	15	-	-
Solar Panel	15	15	100
ETFE Acrylic Perspex	10	10	100

5.1 Conclusion

The analysis above indicates that the availability of some eco-friendly materials in Nigeria is still low or nil compared to the conventional ones. For instance, in as much as green cement is not in the market, the conventional cement which is proven to generate a 5% of the total greenhouse gas emissions is still being used for concrete, ceramics and mortar, sustainable buildings will still not be achievable. The few merchants that know about and from whom one can purchase them don't stock their stores with them because they are not common. Though a good number of engineering companies that deliver on request, they appear to be restricted to prefab concrete only leaving out other aspect of the green construction demands. Having a knowledge of how good a building material is may not be enough but its availability makes for its utilization thereby getting the best practice out of them and also making them available for more research work to ascertain their versatility and skill proficiency.

5.2 Recommendation

Generally, eco-friendly materials are of great advantage to humanity in every aspect of the environment value. "Their production conserves energy, preserves the environment and produces material of acceptable strength, sound, thermal and durability properties" (Olorunnisola 2019).

The design innovations applied to the proposed shopping mall coupled with technologies incorporated to achieve a material sustainability relevance applied low emissivity glass and recycled steel majorly in order to reduce embodied carbon emission which is an attribute of cement concrete. Moreover, the use of solar panels and photovoltaic cells as alternative source of energy for a 24/7 supply diffuses the operational carbon so that no carbon footprint is generated from the combustion which would result in pollution of the environment and thereby degrading the atmospheric air quality. Although fossil-fuel electric generator may be available to operate but would be in rare occasions when the batteries of the inverters have to be inevitably rebooted due to heavy rainfall or extremely cloudy weather. This makes for the consumption of renewable energy sources and thereby reducing wastes. Furthermore, an edifice such as a shopping mall (public, commercial one) designed for all classes of people with the intent of promoting the economic growth supposedly should engender an eco-friendly interaction between humans and their environment, so that as the quality of human lives continues, the economy of the community is sustained, in the light of this, it advocates a value chain approach from the design to the decommissioning stages where all processes involved are centred towards the benefit of all involved in the value chain ranging from the environment to the building and then to the business. It is of no doubt, that it has a relevant significance in any given economy, it will serve large number of people meeting their needs as and when due, creating jobs for others thereby enhancing the local industry and improving the standard of living. Visitors too would have their needs met as it would be anywhere else in the world, creating for them an opportunity to share values, learn and do commercial transactions thereby contributing massively to the GDP of individual nations.

Shopping malls built of eco-friendly materials will be durable, maintainable, healthy, safe and responsibly caring for the earth and preserving the health of users. These would keep the quality of the shopping mall in terms of aesthetics and structure stability. It will also work for its maintainability so

that foot patronage for business continuity will be established and thereby guarding against the event of a total close down factored by bankruptcy which is common to many dead malls today in North America.

With all these benefits and more, if we are to fully subscribe to sustainable buildings, there must be corporate laws on ground relating to the minimum percentage of carbon emitting materials that must be applied to any building which may be gradually reviewed from time to time until we can fully comply. Furthermore, all government development projects must strictly adhere to the implementation of these corporate laws relating to sustainable buildings so they could serve as leaders in the act for others to follow. Moreover, our government should aid in supporting to create awareness, support campaigns by granting aids to professional researchers to establish their regulatory demands for endorsement and educating stakeholders of the built environment on the construction methods applicable to each. Recruiting right people for the right positions who would enlighten on the right tools for the right jobs. Finally, sponsoring the mass production for the availability of these eco-friendly materials, making the cost of renewing energy cheaper and encouraging the private-partner developers willing to invest in the sustainable solutions.

References

Adebimpe, A.O., and Kayode E.P., (2018): Urban Growth Issues and Environmental Sustainability in Nigeria: *Covenant Journal of Research in the Built Environment* 6.2 2000–2008. Web.

Ahady, S., Dev, N., & Mandal, A. (2019). Toward Zero Energy: Active and passive design strategies to achieve net zero Energy Building. *International Journal of Advance Research and Innovation*, 7(1), 49–61. https://doi.org/10.51976/ijari.711908.

Awake! Vol. 104, No 1 2023: Can our planet survive? Reasons for Hope;16.

Bassey, S., &Thomas M., (2019). Enyimba's Notion of Madukaku and The Question of Anthropocentricism in African Environmental Ethics.

Beddington, Nadine. (1982). Shopping Centres: Retail Development, Design, and Management. London: Butterworth Architecture.

Bibri, S. E., Krogstie, J., & Kärrholm, M. (2020). Compact city planning and development: *Emerging practices and strategies for achieving the goals of sustainability*. Developments in the Built Environment, 4, 100021. https://doi.org/10.1016/j.dibe.2020.100021.

BusinessDay – (April 7, 2014).: Eco-friendly building: how feasible in Nigeria?

Black, J. T., (1996).: The Economics of Sprawl; Urban Land; 55(3), 52-53.

Cordero, A. S., Melgar, S. G., & Márquez, J. M. A. (2019). Green building rating systems and the new framework level(s): *A critical review of sustainability certification within Europe*. Energies, 13(1), 1–25. https://doi.org/10.3390/en13010066.

Edgar, L., (1976). Shopping centres: Planning development and administration. New York: John Wiley & Sons, Inc.

Eghosa, N. E., Onyedikachukwu O. N., (2023). Eco-friendly materials and health benefits in the design of an all-inclusive health resorts in Nigeria.

Eizenberg, E., & Jabareen, Y. (2017). Social sustainability: *A new conceptual framework. Sustainability* (Switzerland), 9(1). https://doi.org/10.3390/su9010068.

Ellis, K. (2024). Why it's important that we value nature. UK: naturepl.com.

Fariz H. S., Dara W., Suryani S., Saiful B., (2023). Study of Sustainable Architecture Concepts. DOI: https://doi.org/10.52403/ijrr.20230450.

Federal Ministry of Environment Nigeria. (N.p., 2019). About the Department of Climate Change. Department of Climate Change. Web.

Gibbert, F., (1959). -Town Design, London: The Architectural Press.

Giddings, B., Hopwood, B., & O'Brien, G. (2002). Environment, economy and society: *Fitting them together into sustainable development*. Sustainable Development, 10(4), 187–196. https://doi.org/10.1002/sd.199.

Gilham, O. and Maclean, A. S., (2002). The Limitless City: *A Primer on the Urban Sprawl Debate*; Island Press, Washington DC.

Heritage_Place_Bronchure (2013). www.heritageplaceikoyi.com: The Actis Group Permit

http://mjss@mcser.org/mjss.

hello@ buildpass (2021):7 principles of Sustainable Construction

Hyatko, D.L. and Baker, J.; - It's all at the mall: exploring adolescent girls' experiences.

Ignatova G., (2023): Core Values: A path to environmental consciousness and sustainability.

International Encyclopaedia of Human Geography – 2009.

Journal of Retailing, Vol. 80, Issue 1, Januari 2004 Pp. (67-83).

Knoshnava, S., Rostami, R., Mohamad Z., Streimkiene, D., Mardani, A., & Ismail M., (2020). The role of green building materials in reducing environmental and human health impacts. *Int. J. Environ. Res*. Public Health 17 (7), 2589. doi: 10.1149/1070.11215ecst.

Krey N., Picot-Coupey K., Cliquet G., (2022).: Shopping Mall Retailing: *A bibliometric analysis and systematic assessment of Chebat's contributions.*

Mannion A., (1997). Global Environmental Change: - *A Natural and Cultural Environmental History*, Longman Publication, Ibadan.

Marchi, L., Antonini, E., & Politi, S. (2021). Green Building Rating Systems (GBRSs). Encyclopedia, 1(4), 998–1009. https://doi.org/10.3390/encyclopedia1040076.

McGarry, H., Martin, B., and Winslow, P. (2022). Delivering low carbon concrete for network rail on the routemap to Net Zero, Case Stud. Constr. Mater. 17, e01343. Doi: 10.1016/j.cscm. 2022.e01343.

Njar, B., Enagu, D., (2019). Development and Environmental Sustainability in Nigeria: An African Perspective. GNOSI: *An Interdisciplinary Journal of Human Theory and Praxis*, Vol. 2(1) (2019) (DOI: https://doi.org/10.5281/zenodo.3534015). Department of Philosophy, University of Calabar, Calabar, Nigeria.

Ndukwe A., Paul U., (2022). Enhancing circulation and movement to optimize efficiency in shoppingmalls in Abakaliki.

Onokerhoraye, A., & Omuta, G., (2000): Urban Systems and Planning; *The Geography and Planning Series*, University of Benin, Nigeria.

Osborn, F.J. (1965): Preface in Garden Cities of Tomorrow; Cambridge Mass Press.

Pilliang, Yasraf Amir. (1998). Sebuah Dunia yang Dilipat: Realitas Kebudayaan Menjelang Milenium Ketiga dan Matinya Posmodernisme, Bandung: Mizan".

Ritchie & Roser, (2017).

Rubenstein, Harvey M., (1978).: Central City Mall. New York: A Willey – Interscience Publication.

S. Crooks, R.K. Turner. (1999). *Advances in Ecological Research*.

Sivarethinamohan and Sujatha, (2021). Broad-spectrum of sustainable living management using green building materials-an insights. *Recent Adv. Geotechnical Eng*. NCRAG'21 19, 1. doi:10.21741/9781644901618-1.

Ugboma, P. (2015). Environmental Degradation in Oil producing Areas of Niger Delta Region, Nigeria: The Need for Sustainable Development. AFFREV STECH: An international journal of science and technology (2015). Vol. 4, No. 2.

Whiting, P.: Streamflow Necessary for Environmental Maintenance. Annual Review of Earth and Planetary Sciences 30.1 (2002): 181–206. Web.

UN-Habitat (2002): Urbanization and Sustainable Development in the Third World: An Unrecognized Global Issue; UN- Habitat Centre for Human Settlement, Nairobi.

United Nations Development Programme (1995): Human Development Report; Oxford University Press.

Wee, Lynda Keng Neo and Tong, Kok Wing. (2005). The 4 Rs of Asian Shopping Centre Management (Business Studies). Jakarta: PT Bhuana Ilmu Populer.

Wellington Management. Company (2020). 7766_Sustainability-Report_BRO-15 WELLINGTON MANAGEMENT FUNDS., Wellington Group Holdings LLP.

www.autodesk.com, accessed on July 2024.

www.bafuture.org, accessed on July 2024.

www. buildpass.co.uk, accessed on August 2024.

www.behance.net, journal cafe on be hance, accessed on May 2019.

www.building materials.co.uk, accessed on July 2024.

www.bullionriseconsult.com, accessed on August 2024.

www.carbonherald,com, accessed on July 2024.

www.ecolodgeanywhere, accessed on July 2024.

www.linkedin.com, accessed on May 2024.

www.genevaenvironmentnetwork.org, accessed on August 2024.

www.google earth, accessed on May 2024.

www.impact day.eu (2023)., accessed on July 2024.

www.mcneilengineering.com (2023)., accessed August 2024.

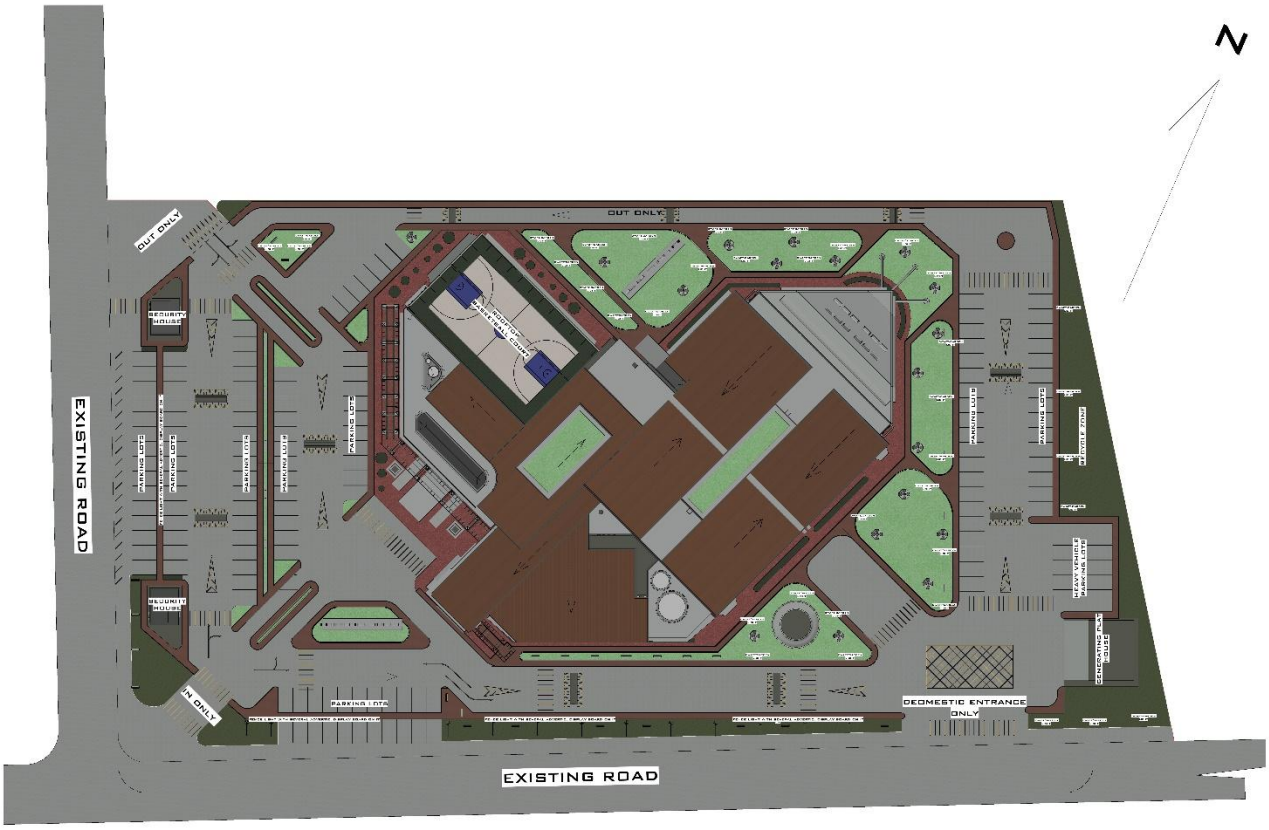
www.julius_berger .com., accessed on August 2024.

www.puriindahmall.co.id, Accessed on February 2024.

www.unesco.com, accessed on March 2024.

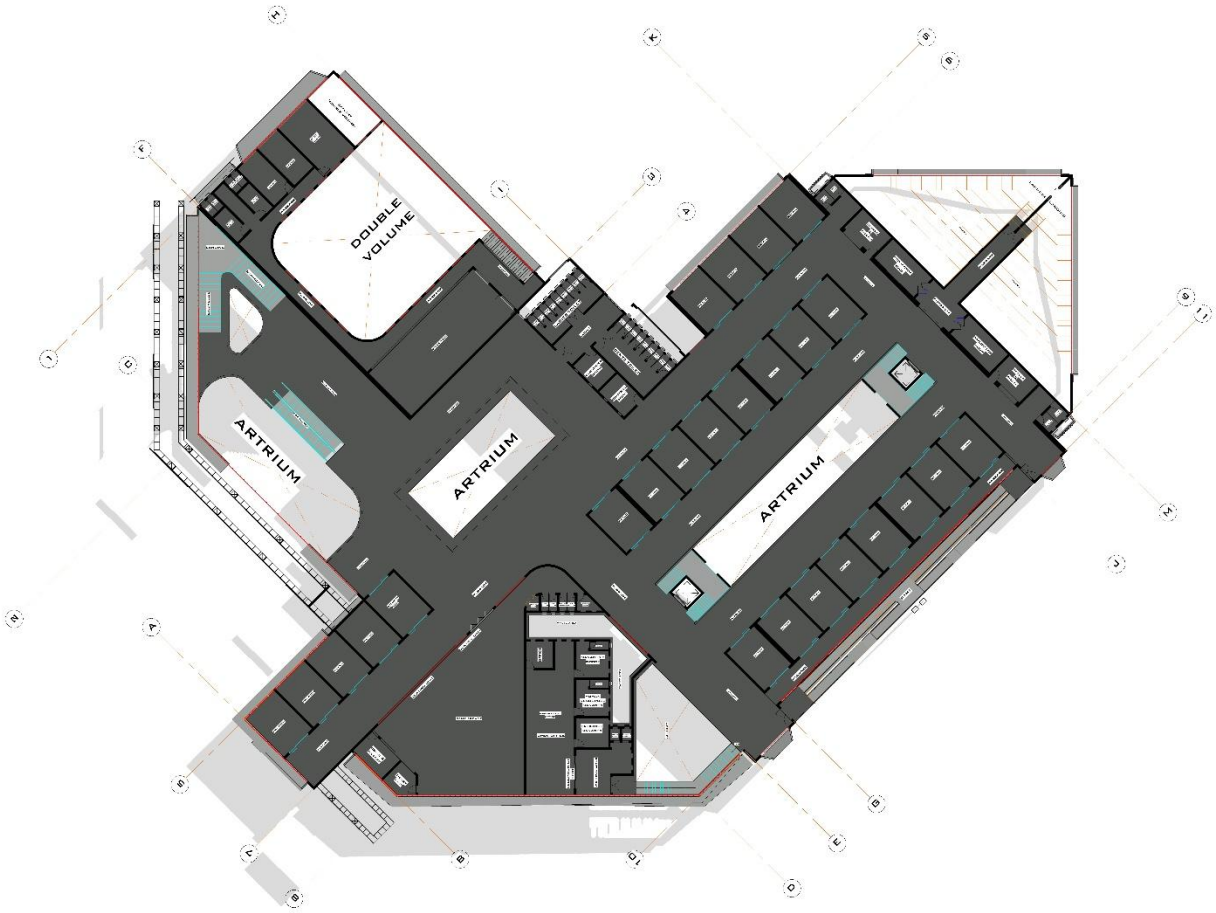
www.whatsnewindonesia.com, accessed on May 2024.

Appendices - Appendix 1 – Presentation Drawings



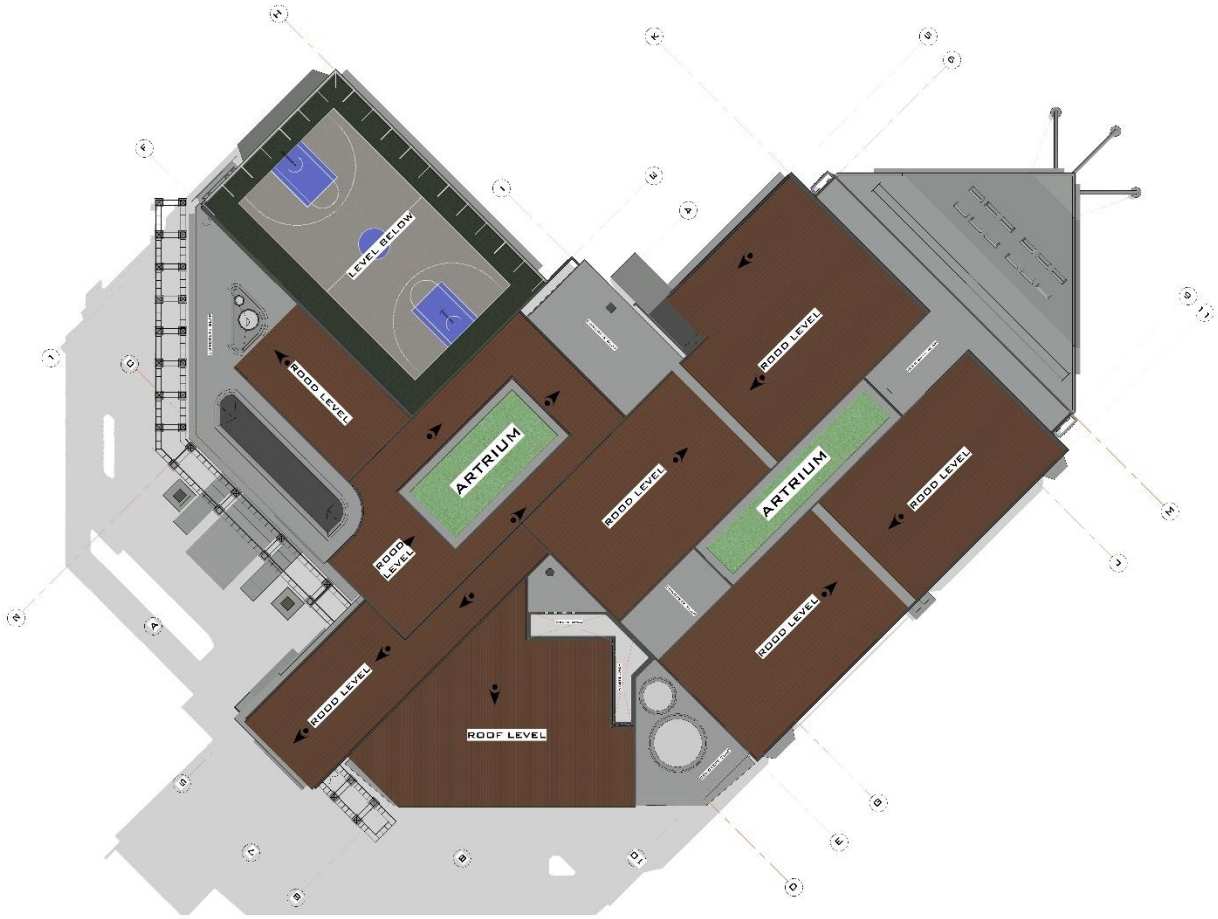
SITE PLAN

GROUND FLOOR PLAN

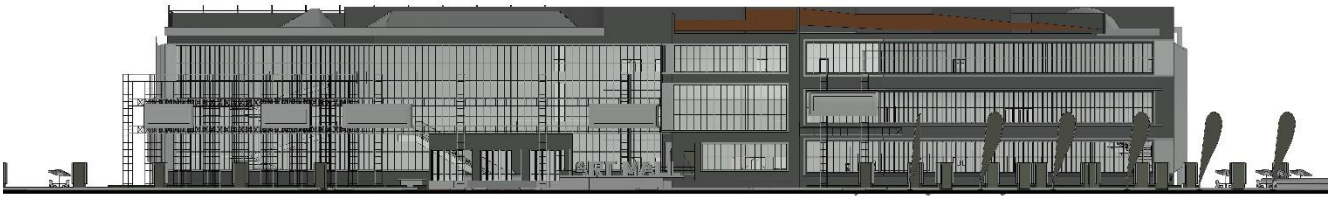


FIRST FLOOR PLAN

SECOND FLOOR PLAN



ROOF DRAINAGE PLAN



Section A-A

Section B-B

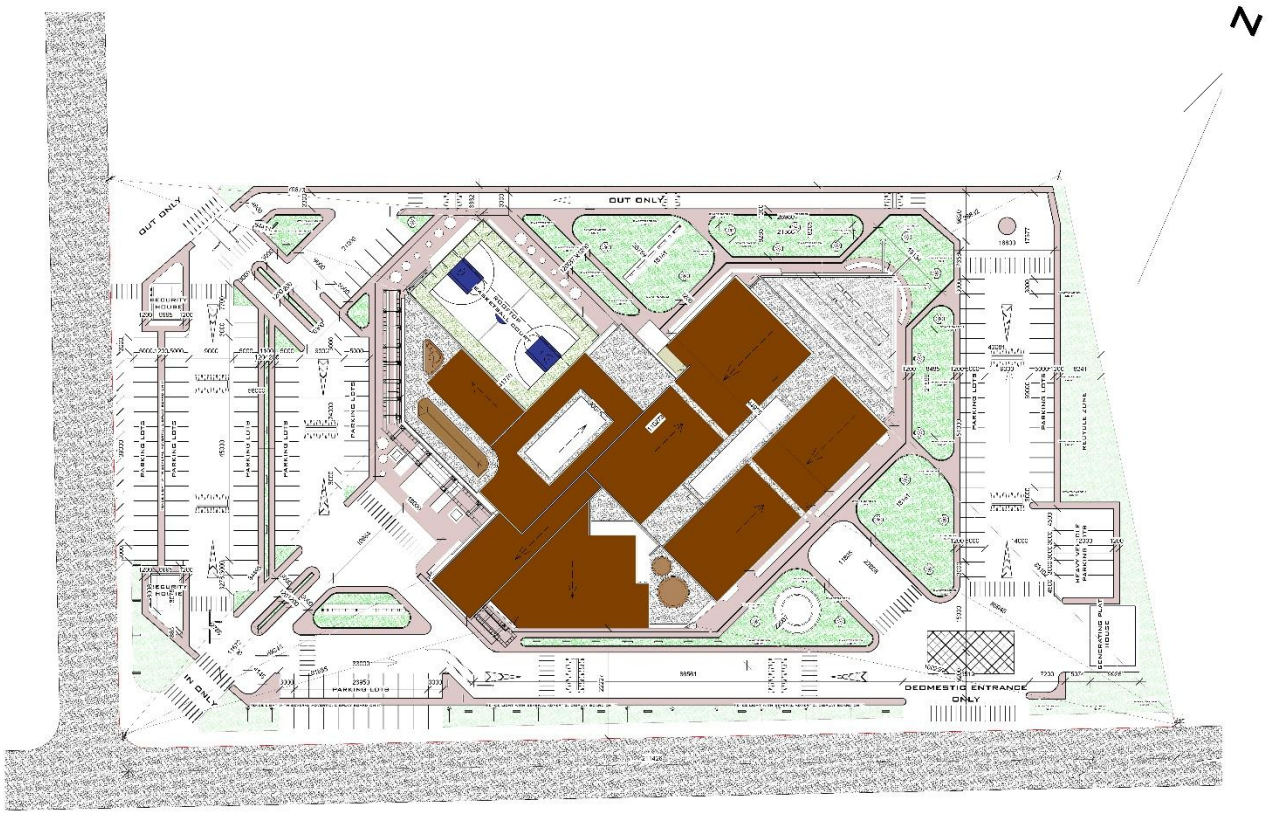
APPROACH ELEVATION

LEFT SIDE ELEVATION

RIGHT SIDE ELEVATION

3-D DIMENSION VIEW

Appendices - Appendix 2 – Working Drawings

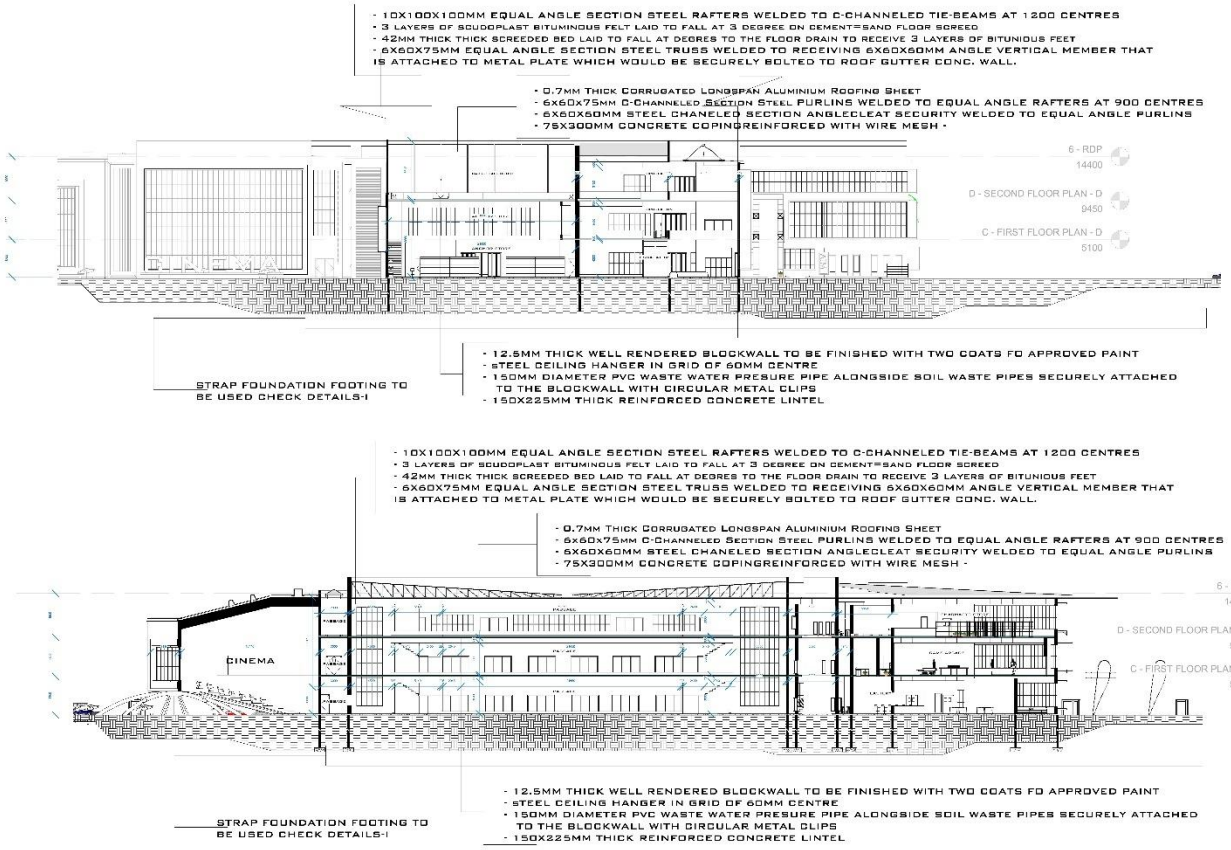


SITE PLAN

FIRST FLOOR PLAN

GROUND FLOOR PLAN

SECOND FLOOR PLAN



SECTIONS

Bio-data

A. Personal Data

1. Full Name:	**OLABODE Adeola Abidemi,**
2. Address:	**No 7 Akanbi Akinpelu Close, Basorun, Ibadan, Oyo State.**
3. Email Adress:	**adeolabeujimp82@gmail.com**
4. Phone Number:	**08137442223**
5. Date of Birth:	**30th December, 1976**
6. Place of Birth:	**Ibadan**
7. Nationality:	**Nigerian**
8. Marital Status:	**Single**
9. Name and Address of Next of Kin:	**Mrs. F.O. Echebiri** **Department of Chemistry, Faculty of Science,** **University of Lagos, Akoka, Lagos State.**

B. Educational Background

1. Educational Institutions Attended with Dates and Qualification:

Qualifications	Institution	Date
MSc Architecture	Lead City University Ibadan Oyo State.	2022 – Date
PGDAC. Architecture	Obafemi Awolowo University Ile-Ife, Osun State.	2006 – 2008
BSc Architecture	Ladoke Akintola University of Ogbomoso, Oyo State.	1996 – 2004
Secondary School Certificate	Bishop Phillips AcademyIwo-road Ibadan, Oyo State.	1987 – 1995
Primary School Leaving Certificate	St. Mary's Convent School I Oke-Are Ibadan, Oyo State.	1981 – 1981

C. Awards and Fellowships: **Nil**

D. Work Experience:

Company	Position	Date
NouveauxRich Limited	Assistant Architect	2008 - 2010
GOFAV Ventures	Deputy Director	2015 - Date

E. Publications – **Nil**

…… ……

Signature Date

The University Compliance Certification

This is to certify that the Thesis by Adeola Abidemi OLABODE, with the matriculation number LG/PG/005070 in the Department of Architecture, Faculty of Environmental Design and Management Lead City University, Ibadan, is in full compliance with the University format and style of Thesis.

…… ……

Signature Date

Lcu Library

Olabode_Adeola_Abidemi LCU Library

Quick Submit

Quick Submit

Lead City University

Document Details

Submission ID
trn:oid:::1:3037197628

Submission Date
Oct 10, 2024, 11:50 AM GMT+1

Download Date
Oct 10, 2024, 1:32 PM GMT+1

File Name
09_Olabode_Adeola_Abidemi.docx

File Size
4.8 MB

74 Pages

21,635 Words

118,503 Characters

12% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

Filtered from the Report

- Bibliography
- Quoted Text
- Submitted works

Match Groups

126 Not Cited or Quoted 12%
Matches with neither in-text citation nor quotation marks

4 Missing Quotations 0%
Matches that are still very similar to source material

0 Missing Citation 0%
Matches that have quotation marks, but no in-text citation

0 Cited and Quoted 0%
Matches with in-text citation present, but no quotation marks

Top Sources

11% Internet sources
2% Publications
0% Submitted works (Student Papers)

Integrity Flags

0 Integrity Flags for Review

No suspicious text manipulations found.

Our system's algorithms look deeply at a document for any inconsistencies that would set it apart from a normal submission. If we notice something strange, we flag it for you to review.

A Flag is not necessarily an indicator of a problem. However, we'd recommend you focus your attention there for further review.

Match Groups

- 126 Not Cited or Quoted 12%
  Matches with neither in-text citation nor quotation marks
- 4 Missing Quotations 0%
  Matches that are still very similar to source material
- 0 Missing Citation 0%
  Matches that have quotation marks, but no in-text citation
- 0 Cited and Quoted 0%
  Matches with in-text citation present, but no quotation marks

Top Sources

11% Internet sources
2% Publications
0% Submitted works (Student Papers)

Top Sources

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

1	Internet	alens.tistory.com 2%
2	Internet	en.wikipedia.org 2%
3	Internet	download.atlantis-press.com 1%
4	Internet	philpapers.org 1%
5	Internet	theconstructor.org 1%
6	Internet	www.frontiersin.org 1%
7	Internet	www.construction21.org 0%
8	Internet	pdfcoffee.com 0%
9	Internet	www.thespruce.com 0%
10	Internet	simple.m.wikipedia.org 0%

11	Internet	
www.gnosijournal.com		0%
12	Internet	
mallhistories.tumblr.com		0%
13	Internet	
dailyplanetdc.com		0%
14	Internet	
www.bsria.co.uk		0%
15	Publication	
Doris N. Omeokachie, Godson R.E.E. Ana, Temitope A. Laniyan, David B. Olawade, ...		0%
16	Internet	
simple.wikipedia.org		0%
17	Internet	
buildpartner.com		0%
18	Internet	
thenorthwalk.com		0%
19	Publication	
Jajoo, Dinesh. "A Study of Buying Decision Process in Malls.", Devi Ahilya Vishwavi...		0%
20	Internet	
www.nsbrc.co.uk		0%
21	Publication	
P. Walker, A. Thomson, D. Maskell. "Straw bale construction", Elsevier BV, 2016		0%
22	Internet	
architecture.uonbi.ac.ke		0%
23	Internet	
www.thehindubusinessline.com		0%
24	Internet	
brainwritings.com		0%

25	Internet	
www.matchpro.org		0%
26	Internet	
businessdayonline.com		0%
27	Internet	
dokumen.pub		0%
28	Internet	
www.rockwool.com		0%
29	Publication	
Francis DK Ching, Mark Mulville. "European Building Construction Illustrated", Wi...		0%
30	Internet	
first-law-comic.com		0%
31	Internet	
www.fountainuniversity.edu.ng		0%
32	Internet	
www.re-thinkingthefuture.com		0%
33	Internet	
assets.researchsquare.com		0%
34	Internet	
huggingface.co		0%
35	Internet	
www.daily-mail.co.zm		0%
36	Internet	
www.international-construction.com		0%
37	Internet	
www.idsemergencymanagement.com		0%
38	Internet	
bikehike.org		0%

25	Internet	
www.matchpro.org		0%
26	Internet	
businessdayonline.com		0%
27	Internet	
dokumen.pub		0%
28	Internet	
www.rockwool.com		0%
29	Publication	
Francis DK Ching, Mark Mulville. "European Building Construction Illustrated", Wi...		0%
30	Internet	
first-law-comic.com		0%
31	Internet	
www.fountainuniversity.edu.ng		0%
32	Internet	
www.re-thinkingthefuture.com		0%
33	Internet	
assets.researchsquare.com		0%
34	Internet	
huggingface.co		0%
35	Internet	
www.daily-mail.co.zm		0%
36	Internet	
www.international-construction.com		0%
37	Internet	
www.idsemergencymanagement.com		0%
38	Internet	
bikehike.org		0%

39	Publication	
O Ariyo, L Okojie, M Ariyo. "Villagers Willingness to Pay for Forest Conservation in...		0%
40	Internet	
docshare.tips		0%
41	Internet	
vital.seals.ac.za:8080		0%
42	Internet	
www.cambridgenigeriapub.com		0%
43	Publication	
Dare A. Fagbenro, Mathew O. Olasupo, Sadiat I. Alliu. "Do Demographic Factors I...		0%