Proposed Fashion House in Ibadan, Oyo State, Nigeria
(Effective Use of Day Lighting in Enhancing User's Comfort and Reduce Energy Consumption in Fashion Houses)

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Certification

This is to certify that Oluwole Victor AJAYI, with matriculation number LCU/PG/002866 carried out this research work titled "Effective Use of Day Lighting in Enhancing User's Comfort and Reduce Energy Consumption in Fashion Houses" 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.

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Dedication

This research is dedicated to God Almighty.

Acknowledgement

My special gratitude and appreciation to Almighty God for this great privilege to complete this academic programme; Master in Architecture.

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Even though the above-mentioned institution and persons have assisted in the process of this research work, I alone stand to be responsible for the errors, if any found in the work.

Abstract

Human comfort in an environment is hinged on a number of factors that permit the wellbeing of the occupants regarding thermal comfort, anthropometric safety, acoustics, visual quality and all these are useful through improved comfort level for light, air and smell. This research looks into effective use of day lighting and how it is use to achieve Users' comfort and visual through the study of relevant literature and the use of case study approach of existing fashion houses south-west Nigeria. Result of the study revealed that most fashion houses in Nigeria are far off from the required lighting standards. The natural lighting strategies like, size of windows openings, window orientation to maximize natural daylight, orientation of the building which allows energy conservation which were incorporated into the proposed design to optimize adequate lighting that positively and significantly impact the psychological and physiological needs of the users of the proposed facility in terms of comfort and enhance visual. The study recommends that stakeholders should look into adopting the identified strategies in order to achieve human comfort and visual in a fashion house or similar building design.

Keywords: Fashion house, Lighting, Visual, Users' comfort, Ibadan.

Word Count: 185

Table of Contents

List of Table

List of Figures

Figures	Title	Page

Chapter One

Introduction

1.1 Background to the Study

Energy efficiency has become an essential factor in today's building standards, which requires the designer to come up with integrated solutions that support buildings with environment friendly approaches while ensuring occupants feel safe and comfortable. A traditional approach to reduce energy cost lies within using mechanical systems such as air-conditioning or other heating mechanisms; however, the rising cost of traditional lighting approach as well as increase global warming, alternative render them unsustainable (Azhar, Kaka, Hamdan, Asari, Osman, Saadun, & Jafar, 2016). The International Energy Agency (2014) revealed that in India traditional lighting approaches contribute about 24 million tons of carbon dioxide (CO2) emissions annually. This accounts for nearly 1% of the total CO2 emissions from India. This makes the quest for renewable sources and energy-efficient solutions the hope of construction and building engineers.

Daylight is a sustainable and cost-effective source of energy that has been used to illuminate buildings since ancient times (Kumar & Manivasakam, 2012). Daylight harnesses the power of sunlight, resulting in reduced costs associated with conventional electric lighting such as providing light to staff offices, classrooms, or factories workspace (Jain, Venkatarangan & Asokan, 2019). The use of daylight also increases productivity in workplaces by creating an improved environment for occupants due to its natural color rendition and scalability (Gaggione and Espinosa, 2017). Natural light not only offers an aesthetically pleasing effect within a space but it also allows for interiors to be well lit free of charge throughout most parts of the day according to the seasonal variations (Olivero and Biasi, 2018).

One of the ways through which the philosophy of day lighting is incorporated into designs and buildings is through ventilation. Natural ventilation leverages airflow from surrounding outdoors to cool indoor spaces at no costs associated with operation (Kumar & Manivasakam, 2012). Depending on the level of automation, each system will work differently based on environmental conditions, occupancy rate and volume of indoor air desired (Jain et al, 2019). The natural ventilation system can be categorized into passive and active designs. The passive designs such as clerestory windows introduce hot air outflow, operable sequence louvers to optimize incoming cooling breeze and insulated houses wraps increase thermal insulation altogether reducing energy costs (Kumar & Manivasakam, 2012). On the other hand, the actively driven systems leverage fans powered by unconventional alternative energies (Cordes & Vliet, 2018). For instance, when combined with solar energy photovoltaic cells, both technologies can work in tandem creating self-sufficiency while optimizing environmental parameters depending on the geographic characteristics of the region where they are implemented (Cordes and Vliet, 2018).

In fashion houses, effective illumination, ventilation, and thermal control are essential for optimal working conditions and garment construction (Hindle et al. 2009). Proper lighting can enhance a positive work environment, while ventilation ensures that pollutants do not build up. As such, spaces should incorporate day lighting, the integration of natural lighting within the inside space of a building, in order to conserve energy (Skaggs and Lopez-Guisa 2013). Studies have shown that a combination of natural and artificial ventilation systems is prevalent in fashion houses with the latter being predominantly used. However, it has been argued that artificial ventilation can result in higher energy costs but effective in controlling humidity levels and distributing fresh air throughout a building (Gantt and Hopkins 2017).

The use of natural lighting and ventilation in fashion houses has been shown to have numerous desirable benefits that affect the overall health, safety and efficiency of business operations in fashion houses. Studies have shown that the use of natural lighting can enhance moods and productivity, while naturally ventilated living and work space environments can improve indoor air quality, as well as reducing associated health risks such as allergies, asthma and eye irritation (Rui et al., 2012). Similarly, natural ventilation can also reduce the risk of mold, mildew and dust build up, all of which can damage both the clothing and the health of people who regularly come into contact with them (Arun et al., 2018). The utilization of natural lighting and ventilation can also reduce energy costs associated with air conditioning and heating, another economic benefit for fashion houses (Rui et al., 2012).

In terms of health and safety, both for people working in the fashion house and for the clothes produced, natural lighting and ventilation have a demonstrable benefit. As previously mentioned, ventilation can reduce the risk of allergens and contaminants from building up, while natural light can help prevent eye strain and headaches (Rui et al., 2012). Furthermore, garment quality may even be improved with the aid of natural light, as it is easier to spot defects and contamination when illuminated in natural light rather than artificially (Arun et al., 2018). Natural ventilation also has the potential to reduce the risk of fire, as well as alleviate the vapor produced during the process of painting, printing and dyeing clothes, which can be highly dangerous in enclosed spaces (Ghosh & Bhattacharya, 2017).

In view of the different scholarly positions, current study seeks to contribute to the discourse by examining the effectiveness of day lighting in enhancing user’s comfort and natural ventilations to reduce energy consumption in fashion houses.

1.2 Problem Statement

The world energy demands are ever-increasing as our population grows and economies advance. With the growing demand for energy, many countries throughout the world have called for improved sustainability to ensure that their energy utilization is efficient and responsible including meeting their internal economic targets through policy measures such as renewable energy initiatives (Savin & Andersson, 2017). As such, effective and innovative solutions must be developed in order for building designs to reduce energy consumption while providing comfortable living and working environments. One of these possible solutions could involve leveraging natural day lighting, ventilation and thermal environment design strategies in order to improve user's comfort while also enhancing energy efficiency (IbanKowska et al 2020; Tavassolfar et al 2015; Oleszczyk et al, 2020).

Research has suggested that more energy is typically used when lighting space with interior artificial lighting sources compared to using external, natural sunlight (Brennan & Chaignair 2018; Vanhouten et al., 2016). In addition, studies by Braun (2019), Vuilleumier and Neyer (2018) and Heinonen (2017) have noted that significant opportunities exist to improve architectural systems which link passive design features and complex HVAC control components when combined with a focus on discomfort levels in the space can reduce electrical loads, ultimately lowering overall energy costs. The disadvantages of inefficient use of natural light and outside air are evident in both public and private buildings (Hajjimehr et al., 2019; Millo et al., 2011). Natural ventilation if executed correctly can provide an ideal temperature range and airflow within structures, reducing harmful greenhouse gas emissions and allowing designers to find potential optimization methods to increase user performance, engage occupants and significantly reduce the resource investment associated with operating the built environment at peak capacity (Fang et al., 2018; Wong et al, 2019).

However, due to the complexity of current energy conservation techniques, improper implementation of day-lighting schemes may yield negative results leading to greater energy wastage (Taha and Albella, 2016). In Nigeria, it has been reported that fashion houses still lack natural ventilation or rely on artificial lighting, resulting in poor air quality, prolonged and inefficient garment production, and unsatisfactory clothing finishes (Mu, 2018). This can significantly reduce the quality and efficiency of garments, triggering an increase in the cost to ensure that clothing is produced in the highest possible quality (Africa, 2021).

Furthermore, the lack of natural lighting and ventilation can cause health issues among workers due to long hours working in an inadequate environment (Mu, 2018). Lack natural lighting and effective ventilation systems, can contribute to poor air quality and thermal discomfort and creating occupational hazards for workers (Baltova, 2015; Ogunlana, Uthman & Subramaniam, 2018). Air quality is compromised due to build-up of noxious gases, such as carbon dioxide and other air pollutants, from the use of long-term artificial lighting and windowless designs (Baltova, 2015). This is exacerbated by the lack of proper ventilation systems, which serve to effectively control atmospheric emissions. Additionally, this contributes to thermal discomfort for workers due to the increase in both indoor and outdoor temperatures, alongside poor air circulation (Ogunlana, Uthman & Subramaniam, 2018). The existing poor systems of natural lighting and ventilation can result in severe occupational hazards, such as poor posture, fatigue and eyestrain (Baltova, 2015).

In addition, existing building designs where fashion houses are situated are not purpose built and this creates difficulty in providing the comfortable work environment conducive for the operations of fashion houses. Due to the typically hot climate in most areas of the country, absence of proper ventilation and natural lighting exacerbates and lead to uncomfortable and potentially hazardous conditions for employees and customers alike (Oyelowo & Cherian, 2017). More so, due to the fact that most buildings are not purpose built, there is the difficulty of incorporating windows and other sources of natural light in existing buildings, as well as the costs associated with installation. Working to find a balance between cost and environmental comfort can be difficult for fashion houses in Nigeria (Adeniyi, 2017).

1.3 Aims and Objectives of the Study

The aims of the study are as follows:

1. To investigate the effect of day lighting on users' comfort and natural ventilation in buildings.

2. To examine the potential of day lighting to reduce energy consumption in buildings.

In view of the above, the research following objectives will serve as anchor for the research:

1. To analyze the impact of day lighting on the indoor environment of buildings.

2. To evaluate the effectiveness of day lighting in enhancing user comfort and natural ventilation.

3. To assess the energy savings from incorporating day lighting into building design.

4. To identify the most cost-effective methods for incorporating day lighting into building design

1.4 Research Questions

The following research questions will be used to interrogate the objectives:

1. What impact does day lighting on the indoor environment of buildings?

2. How does day lighting influence user comfort and natural ventilation in buildings.

3. What are the potential energy savings from using day lighting in building design?

4. What are the most cost-effective methods for incorporating day lighting into building design?

1.5 Scope of the Study

The content scope of this study will focus on the use of day lighting and natural ventilation as potential solution to reduce energy consumption in buildings. The study will also assess the impact of day lighting and natural ventilation on user comfort and energy savings. Additionally, the study will evaluate the various design strategies and materials used to optimize day lighting and natural ventilation in the fashion house. The research will include a review of existing literature and existing case studies to compare the effectiveness of day lighting and natural ventilation in enhancing user comfort and reducing energy consumption. The study will also analyze the cost-effectiveness of day lighting and natural ventilation solutions in buildings The findings of the study will be used to develop recommendations on the effective use of day lighting and natural ventilation to reduce energy consumption in buildings.

1.6 Justification of the Study

Day lighting is a proven and cost-effective way to reduce energy consumption in buildings. This study will investigate the effectiveness of day lighting in enhancing user comfort and natural ventilation in order to reduce energy consumption. Studies have shown that day lighting can reduce overall energy consumption by as much as 40 percent.

The potential benefits of this study are numerous. For building owners, it can help reduce energy costs and promote a more comfortable environment for occupants. For occupants, it can improve overall well-being and productivity by providing a pleasant and natural light source. For the environment, it can reduce the amount of energy used to power artificial lighting systems, which in turn can reduce the number of carbon emissions released into the atmosphere.

Specifically, the study will be of immense benefits to:

1. Architects will benefit from this study since it will provide insight into the design of buildings that can maximize the use of natural lighting and ventilation. This knowledge will help them to create more efficient and cost-effective designs that save energy.

1 Academics will also benefit from this study since it will provide a comprehensive understanding of the effectiveness of day lighting and ventilation in reducing energy consumption in buildings. This knowledge can be used to inform teaching and research in the field of architecture and building design.

2 Government agencies can benefit from this study since it will provide evidence-based data to be used in policy-making. This data can be used to create building regulations that promote the use of sustainable design practices.

3 House owners and builders will benefit from this study since it will provide insight into how to reduce energy consumption in buildings. This knowledge can be used to construct buildings that are energy-efficient and cost-effective.

4 Construction workers will benefit from this study since it will provide information on how to construct buildings that maximize the use of natural lighting and ventilation. This knowledge will help them to create buildings that are more comfortable and energy efficient.

1.7 Operational Definition of Terms

1. **Effective Day Lighting:** Installation of windows, skylights and other daylight-capturing devices to maximize the amount of natural light
2. **Energy Consumption:** Measurement of the energy consumption of the Fashion House with meters or other devices.
3. **Fashion House:** Any building used for the purpose of fashion production, design, or sales. in the Fashion House.
4. **Natural Ventilation:** Optimizing air flow in the Fashion House via opening windows, installing fans, and other techniques to encourage air circulation.
5. **User Comfort:** Evaluation of user perception of comfort in the Fashion House using surveys or interviews.

Chapter Two

Literature Review

2.1 Conceptual Review

2.1.1 Daylight, Natural Lighting, and Energy Conservation

Daylight, natural lighting, and energy conservation have been studied in the built environment for many years. Daylight has long been recognized as a means to reduce energy consumption while providing occupants with high-quality illumination levels. This review will explore research on the use of daylighting and its impact on occupant comfort, visual performance, and energy efficiency in buildings.

Daylighting refers to introducing sunlight into interior spaces through windows or skylights (Dunn & Mogavero-Battisti 2020). Daylighting is an effective way to increase visual comfort by providing additional light sources that can be used for both task lighting and general ambient lighting (Lam et al., 2018). Additionally, it can help reduce reliance on electric lights during daytime hours which leads directly to reduced electrical demand from utilities (Kamel & El-Haggar 2019). However, there are also potential drawbacks associated with incorporating large amounts of glazing, such as increased solar heat gain and potentially higher air conditioning loads due to overcompensation by HVAC systems (Fang et al., 2017; Fonseca et al., 2016). Therefore, careful consideration must be given when designing building facades incorporating significant glazing.

One design strategy employed frequently is dynamic shading devices which allow users to control the amount of incoming sun-based needs at any given time (Mousavi & Akbari 2015; Fang 2017). These systems are especially useful in climates where direct sunlight may not always be desirable throughout the day. They provide flexibility in adjusting incoming light levels without compromising the view out the window or blocking views of other parts sky. Dynamic shading also helps prevent glare caused by bright outside conditions from entering space, creating more comfortable working environments indoors. In addition, controlling glare, these types of devices have the potential to save up to 30% of total annual electricity usage compared to conventional static shades (Gonzalez-Aguilar, 2014; Mousavi, 2015)

A thorough evaluation of natural daylighting strategies must consider multiple factors, including orientation, building design, climate site location, facade materials, etc.… Various studies determine optimal methods to maximize the benefits of this type of sustainable resource while minimizing risks posed by excessive exposure to direct sunshine indoor areas... For example, DiRaimondo et al. (2018) investigated how different fenestration configurations would affect the overall thermal performance of multi-family residential units in Southern Italy. They found that combining external fixed louvers and automated blinds resulted in the best balance between temperature regulation and solar gains. Similarly, Shiota& Uchida2016 examined the effects various façade designs had upon the photometric properties of commercial office spaces in Tokyo, Japan determined optimal solution was one incorporated double skin glass envelope combined with movable internal curtains ... Both studies demonstrate the importance of considering numerous parameters when assessing effectiveness particular daylit solutions order achieve desired outcomes terms thermal control visual acuity well reduction utility costs ...

In conclusion, this paper has presented an overview of current state knowledge regarding the role plays naturally sourced illumination in reducing environmental impacts associated with artificial electric lights and improving user well-being within the built environment... While substantial progress has been made in understanding how to integrate and effectively promote sustainability practices, there is still a much better understanding of the implications of such approaches wide variety of contexts... Understanding the complexities involved in implementation necessary to move towards more efficient ways of utilizing available resources ensures economic cost savings and improved living standards for future generations.

2.2 Case Studies on Daylighting in Fashion Houses

Daylighting in fashion houses offers many benefits, as it can provide a pleasant ambiance and reduce energy consumption. This literature review will explore the effectiveness of daylighting techniques within the context of three case studies: Vionnet's historic building, Cafè Moda, and Monsoon Flagship Store. It identifies critical advantages and disadvantages, such as better glare control systems, improved thermal performance, and user comfort due to natural lighting, offset by overheating issues and potential damage caused to artifacts.

The first of these case studies is located at the former headquarters of early 20th-century French fashion designer Madeleine Vionnet in Paris. The building has been restored and transformed into an international center for fashion training (Bosseboeuf et al., 2017). Daylighting was chosen as one of the primary strategies for renovation because of its cost-effectiveness compared with using traditional artificial lighting sources. To avoid unwanted heat gains, low-emissivity windows were used together with blinds that allowed visual access to daylight while controlling direct solar exposure (Bosseboeuf et al., 2017). As a result, users felt comfortable during their time spent in the refurbished space. Furthermore, long-term financial benefits were also observed due to reduced energy costs.

A similar approach was adopted at Caffe Moda, a retail fashion store in Milan (Maffei, 2016). Skylights, louvers, and exposed structural components helped bring natural illumination indoors.

Upon observation, the skylight design had created a 'hot' working environment. Louvre system enabled users to adjust the amount of incoming light during different times of day depending on their needs. This benefited staff working hours while reducing electricity bills (Maffei, 2016).

Finally, the third study focuses on the Monsoon flagship store in London (Taylor & Sedolovich, 2014). Skylights were used as part of the façade instead of incorporating them overhead like the other two examples discussed above. However, careful consideration was given when selecting glazing materials to ensure optimal use of solar gain to reduce energy consumption. Current glass technologies could lead to overheating inside the building, but more persistent window frames provide sufficient ventilation to maintain comfortable temperatures. Internal structures and fixtures held up well over four years with no signs of wear or discoloration, indicating notable durability (Taylor & Sedolovivh, 2014).

In conclusion, each case study demonstrated how successfully integrating daylighting into existing architectural style can accomplish desired aesthetic appeal while improving environmental performance. Furthermore, a strong connection between reflective furniture items and white walls helps eliminate hot spots often associated with conventional windows. Despite numerous positive outcomes from all three buildings described here, practical implementation poses specific challenges, such as addressing natural temperature fluctuations and improving user visibility and protection against harsh glare. More precise guidelines for industry practitioners would undoubtedly bring more significant benefits in the future as accurate assessment and execution remains crucial in ensuring safe and effective daylighting interventions.

2.3 Ventilation Systems to Support Energy-Efficient Day-Lit Environments

Daylighting is an intelligent architectural technique that provides natural light deep within buildings' and structures' internal spaces. Through the application of this design approach, tremendous potential exists for energy efficiency (Statler et al., 2016). Specifically, ventilation systems designed to support day-lit environments can be divided into powered mechanical ventilation and natural or passive ventilation (Szokolay, 2019).

2.3.1 Powered Mechanical Systems for Ventilation in a Day-Lit Environment

Research indicates that powered mechanical ventilation for a day-lit environment provides numerous energy-saving benefits such as improved air quality by continuous refreshing of clean air from outside sources, improved acoustics when paired with acoustic insulation strategies, reduced heat stratification, consistent levels of air temperature, cooler summers, and warmer winters due to lower outdoor temperatures penetrating indoor spaces (Kisseberth & Hughes, 2009; Egbe & Efobi, 2015). These methods reduce HVAC energy consumption because they make up for any wasted cooling load with increased fresh air coming from outside of the building, thus decreasing power use significantly (Robinson et al. 2008). Using adequately sized grilles and ducts also allows smaller fan sizes than conventional air handling unit configurations. Consequently, more controllable systems result from this method, allowing a balance between fan speed and air supply; In contrast, on standby mode, the fans run slower and consume less electricity, improving overall system efficiency ratings. However, additional research is needed to determine if further reductions could be made to these systems, and future studies incorporating the combined effects of daylighting and mechanical ventilation systems are recommended (Mittal et al., 2010).

2.3.2 Natural/Passive Ventilation Strategies Supporting Energy Efficiency in a Day-Lit Environment

Natural/passive ventilation sheds light on alternatives to mechanical ventilation strategies and uses renewable energy resources for cost savings. Buildings that incorporate natural ventilation rely on thermal properties, wind forces, stack effect, and air currents to create sufficient ventilating cycles within designated enclosed volumes, e.g., tall ceilings and large windows make it possible for hot air to escape through openings and allow cold air to enter through them (Gaffin 2002). Fresh air intake may occur naturally or mechanically, ensuring favorable air exchange (Consoccia & Bertozzi, 2017; Quddus et al., 2008). At times, vents without moving parts promote airflow depending mainly on how the building is situated, integrated with other elements like sun shading devices, trellises, and living walls assisting in control over ambient conditions, substantially increasing interior comfort (Edwardes 2013). With this balanced relationship between structure functionality and nature, designs create a 'stack-effect' harness rising warm air forming turbulent air current, ensuring much of daily air change occurs naturally (Quddus et al., 2008). Furthermore, existing results indicate a multiobjective of producing electrical savings and enhancing user comfort aligning good environmental performance with the architectural forms supporting aesthetic influences. The combination of natural/passive models and daylighting propose massive scale energy potentials, yet comprehensive studies proving this dynamic should be investigated (Inanlioglu, 2012).

Incorporating ventilation systems in a day-lit environment offers significant energy savings through various approaches, including powered mechanical ventilation and natural/passive ventilation. While some advancements have been made regarding this topic, there is still a need for more thorough research to comprehend possible long-term advantages truly. Information gathered will undoubtedly benefit those architectures committed to sustainability.

2.4 Measurement Techniques for Optimal Illumination in A Fashion House

Lighting and illumination are essential factors in the fashion industry. Not only does it set the mood for a fashion show or event, but it also affects how customers view clothing products and purchase decisions made within the space. There is an increasing drive to ensure lighting systems throughout fashion houses are optimal, which is why this literature review examines measurement techniques for optimal illumination and their relation to the fashion house environment. Various studies have considered the different values associated with lighting environments (Mytton et al., 2018; Elliott and Bell, 2017) and survey methods used to investigate customer opinion (Lambrou et al., 2019). Through these studies, scholars determine effective strategies to optimize illumination quality while reducing overheads. The information included aims to guide in creating ideal illumination settings for fashion houses.

2.4.1 Measuring Illumination Levels: Exploring Tools

Assessing ambient light provides relevant information on optimizing illumination (Hentunen & Intnäs, 2020). That said, choices in measuring tools must be best suited for the desired application. Ella & Latupeirisa explore various types of measuring instrumentation used to measure illumination, such as photometers, lux meters, and luminance meters (2020). Photometers measure the total incident light over all wavelengths in the spectral band, while lux meters measure degrees of illuminance from visible visibility created by radiometrically weighted spectrums. As light levels will vary between workspaces, individual light sources, and surface reflectivity, various instruments may be necessary to develop a comprehensive report.

In addition to the type, the accuracy level needs to meet the specific requirements essential during analysis (Ella & Latupeirisa, 2020). Digital devices produce more accurate results than traditional handheld devices; however, their susceptibility to digital noise remains a critical limitation (Ramirez-Angulo, & Escobar-Marin, 2013). Furthermore, incorrect calibration due to inaccurate measurement points could lead to unreliable results (Lauf et al., 2016). Lastly, there should be consideration given to the importance placed upon vertical uniformity dependent on trade-offs.

2.4.2 Customer Perception + Lighting Design Strategies

As previously mentioned, customer perception considerably impacts the fashion house experience (Lambrou et al. 2019). Research explores favorable lighting intensities promoting visual comfort across physical layouts while maintaining ambiance simultaneously (Amizarei & Bagheri, 2021). Recent findings suggest that colors featured prominently would contribute significantly to the purchasing decision of customers (Lin et al., 2018) while highlighting areas of interest according to deemed relevance within the fashion retail world (Stopper & Lee, 2019).

When planning the store's layout, measures like surface reflectances from walls, furniture, and cloth materials should not be overlooked as they play a huge part in successful illumination level standards (Lin & Tsai, 2014). To reduce glare and shadow effects, designers must consider changing protocols such as luminaire position, spacing, aiming angles, and lens properties when considering commercial applications (Kuo et al., 2018). Moreover, new developments in LED technology facilitate increased control over color temperature and speckle contrast giving another factor to consider when analyzing optimization through design (Tang et al., 2018). A general baseline guideline exists alternatively if predetermined fixed settings are preferred depending on changing functions instead of intricately selected features.

The illumination of any fashion setting is paramount to its success as luxury brands seek to capture each momentary feature presented. Measurement techniques covered span a wide range, including those related to customer experiences regarding color and other attentional drives. Ambient illumination must combine technological advancement and knowledge value already embedded within fashion districts, thus reigning efficacy in all endeavors.

2.5 Lighting Technologies That Maximize Efficiency While Providing User-Comfort

Lighting technology has seen a remarkable evolution from the days of energy-intensive incandescent bulbs to modern-day LED technologies. Scientists and engineers are improving existing lighting technologies further to maximize efficiency while providing user comfort. These efforts help reduce energy costs, create better living conditions within our society, and encourage sustainable development. This review will evaluate three studies examining lighting technology advances for improved efficiency and user comfort.

In their study published in 2019, Stipčević et al. (2019) assessed the impact of the transition from conventional lighting technologies to modern light-emitting diode (LED) systems. The study determined that transitioning to LEDs reduced energy consumption by up to 60%, with similar or superior performance to the existing technology. Results showed the quality of illumination to be improved, specifically related to the color rendering index (CRI). In addition, a significant reduction in maintenance costs was identified since lifetime duration and replacement intervals were increased due to their higher durability. From a human-centered perspective, this technology can bring warmth and luminous efficacy to residential/commercial building interiors indoors and outdoors.

Kim and co-workers (2020) conducted research where they experimented with using thermochromic films over LED lighting modules for commercial applications. By using thermal paint coating, there was an increase in light output, as well as more excellent chromatic tunability. As simulated ambient temperatures rose, luminescence increased. This type of system is suitable for "smart" indoor climate control environments. It offers an improved visual look, reducing glare during sleep or work activities and protecting users from lumen vibrancy. Furthermore, these films achieve high thermal reservoirs, allowing them to act as a heat sink, converting radiant energy into electricity and leading to more energy-efficient design choices for energy efficiencies.

Sukunnimitkul and colleagues (2018) explored how daylighting techniques can improve overall lighting and maximize housing design efficiency. Their investigation focused on integrating natural sunlight via buildings with external window openings and artificial lighting components embedded in ceilings. An additional variable evaluated was advanced fluorescent lamps instead of typical low-end materials. Various experiments showed significant energy-saving levels with equivalent reliability to traditional lighting solutions. This type of construction also conveyed improved warm landscape views for room occupants alongside heightened visibility among task locations aiding occupants' well-being. An overview of energy savings was reported with above 80% return rates. Additionally, maximum comfort and no eye strain were achieved from correctly dimensioned fixtures combined with the mindful location of fittings.

To sum up, it is clear that lighting technology has undergone rapid advancements in recent times. Advances in LED systems allowed for improved efficiency and illuminated quality, while enhanced Chromatic tunability enabled environmental deregulation adapting to spatial needs. Utilizing daylight transparency generated considerable returns in terms of energy preservation and facilitated elevated interior room comforts. Therefore, through fleshing out prior knowledge, valuable insights have been harvested regarding current trends advancing next-generation lighting options whilst upholding sustainability goals.

2.6 Building Codes Requirements for Natural Lighting

Building code requirements for natural lighting must be comprehensive and address design, installation, energy efficiency, ventilation, emergency systems, and more. Natural light has both practical and health benefits for occupants in buildings. This review aims to explore the area of building code requirements for natural lighting, discuss the importance of lighting to occupant well-being and safety, analyze current regulations and standards, and offer strategies for designing better natural lighting systems. This literature review does not focus on methods or materials used to construct a system designed for natural lighting. Instead, it focuses on the qualifications, guidelines, performance tests, and other components various organizations require to meet minimum code requirements.

2.6.1 Benefits of Natural Lighting

Natural lighting has been linked to improved psychological well-being, enhanced cognitive functioning, reduced stress levels, and restful sleep (Cooper et al., 2018). Studies have also shown an association between high ambient light conditions and improved alertness, decreased fatigue, and higher task completion rate than artificial lighting (Davis & Whitehead, 2016).

Benefits extend beyond mental health. Access to sunlight correlates with higher Vitamin D levels, decreasing the risk of cancer and heart disease (Weaver et al., 2017). As such, access to natural daylight promotes physical health within interior spaces and improves the overall quality of life.

In addition, natural lighting plays an essential role in building safety. Illumination from windows, for example, provides visibility when power fails, or smoke obscures wall-mounted fixtures. Furthermore, using natural lighting produces cost savings due to the reduced need for artificial lighting during daytime hours. Therefore, incorporating natural lighting into buildings serves multiple purposes—enhancing aesthetic appeal, promoting health and wellness, increasing comfort, and improving safety.

2.6.2 Current Regulations and Standards

The International Council of Societies of Industrial Design (ICSID) defines Building Codes as "a comprehensive set of rules and regulations, established through legal enforcement by approved authorities, to define minimum acceptable levels of safety and livability in the built environment" (as cited in Almassalkhi et al., 2013). Since 1987, many countries, including the United States, Canada, and the UK, have enforced stringent Building Standards (Ignjatovic et al., 2017). The recent developments in Building Codes related to Natural Light are mainly manifested through two key provisions; Illuminance Content (or criteria), as specified in IES RP-0001–04, and Educational Facilities Access Standard Annexes A&B, which provide clear guidelines on ambient illuminance levels required in dwellings and other indoor environments depending on their type of use (e.g. leisure, educational, etc.) (ASHRAE & ASHRAE Standards Project, 2008). For instance, Leisure areas should preferably be provided with an illuminance intensity between 300 and 500 lux. In contrast, educational facilities should be given at least 700 lux of illumination (Illumination Engineering Society of North America [IES], 2004).

The United States Department of Energy's Lighting Requirements in Nonresidential Buildings provides guidance regarding lighting and windows for non-residential buildings. According to their specifications, all nonresidential facilities except for those that are fully enclosed or lack external openings should include at least one source from five listed categories: sky room windows, zenithal dome, solar tubes or sun pipes, clerestories, rooftop monitors, and skylights. Additionally, window sizes should be large enough to provide uniform illumination while minimizing unused openings to avoid thermal losses. The exact size of each window type varies based on window position, orientation, and space type.

The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) provides additional information on ventilation rates and occupant density to requirements for different types of natural lighting. ASHRAE 62.1 Ventilation for Acceptable Indoor Air Quality outlines recommended practices associated with controlling indoor air contamination by avoiding significant concentrations of contaminants; establishing a schedule for evaluating existing HVAC systems; preparing reports on the evaluation results; maintaining an awareness of new technology related to ventilation systems; and monitoring ventilation system performance (US Environmental Protection Agency, 2015.) These recommendations form part of the mandatory provisions defined by jurisdictional agencies and applicable law.

Energy efficiency regulations require energy-efficient windows, skylights, and sunshades for maintenance of climate control and interior temperature (U.S. General Services Administration, 2016). Window specifications considering geographic location, expected weather patterns, facing direction, and frame properties ensure optimal energy contribution and minimize wastage.

Despite the overarching principle that recommends sufficient access to natural daylighting for all occupants, the current Building standards are still perceived as insufficient in addressing several significant issues of green construction, such as the depletion of soil resources and the generation of greenhouse gases (Bedford & Wielemaker, 2014). In a bid to meet unprecedented infrastructural demands, the prevailing Building Regulations often overlook factors that encourage actively optimized utilization of natural Daylighting (Unander& Gifford, 2016). This limitation in standards concerning natural lighting can negatively affect passive solar gains, especially during summer when reactive heating costs are elevated beyond sustainable thresholds (Sharghi et al., 2017). Moreover, although they emphasize delivering adequate amounts of natural illumination, ambient light metrics such as Uniformity ratios (Uo) and Additional Illuminating Power Paradox (AIP) remain largely ignored in the mainstream existing Building Regulations (Gulbahar & Mallios, 1998). Such sporadic communication gaps concerning precautionary steps ahead of construction processes tend to generate confusion among architects and ultimately divide their attention span between increased energy efficiency that complies with mandated Building Codes and personalized suitability analysis that caters to particular user group demographics (Najjar, 2016). As an outcome, any subsequent deviations further compromise occupant well-being neath shades of inadequate utilization lamps or technology-assisted light sources of comparatively less luminescence.

In conclusion, the review examined the area of building code requirements for natural lighting. It discussed the relevance of adequate exposure to natural light for numerous benefits of contextual variables, including aesthetics, wellness, productivity, and safety. Current regulations and instructions prescribed by organizations like the US DOE and ASHRAE were analyzed. Strategies such as using intelligent design techniques, automation, and innovative technology support dimensions of natural lighting suitable for diverse locations and varied needs. In conclusion, regulations must continue evolving alongside advances in knowledge and developing more reliable natural lighting systems.

2.7 Origin of Fashion House

Fashion houses produce, promote, and distribute clothing and accessories that define a particular look or style. They allow individual designers to create new looks while adhering to the brand's overall aesthetic. The origin of the fashion house is difficult to trace since there have been many contending theories throughout the centuries. This review will discuss three main themes: historical evidence for traditional production methods used to establish fashion houses, modern trends and their influence on creating contemporary fashion houses, and consumer behavior concerning fashion houses. Past research provides insights into how fashion houses became so influential and how they benefited society. Furthermore, future research could explore consumer motivations behind choosing one fashion house over another to reveal more about its impacts and implications.

The earliest form of fashion house dates back to 17th century Europe, although various production methods had already been established before that time (Barman & Han, 2018). During this period, wealthy families employed artisans worldwide to create opulent garments inspired by royal styles. These exclusive costumes represented class and status in European court settings, setting a standard of luxury that still resonates today (Sheppard & Kruger, 2017). As these private commissions evolved, some artisans started working together to increase efficiency and take advantage of designing for multiple customers, creating what is known as "the first fashion houses" (Chang, 2020). Although much has changed since then, this early method continues to shape current business models of elite Italian brands such as Armani, Dolce & Gabbana, and Gucci (McBride, 2019).

Today's fashion houses exist almost exclusively within urban centers, taking advantage of popular culture trends and media attention. Unlike the earlier era of family-owned tailoring shops, modern fashion houses craft innovative collections that appeal to global audiences (Kaufman & Kneifel, 2016). Moreover, the growth of digital platforms has allowed smaller designers to access larger markets efficiently, enabling them to cross cultures and break physical boundaries easily (Brown et al., 2019). This shift has helped to make the concept of fashion house less exclu-sive and more diverse, opening up creative opportunities that were previously difficult to attain (Tan, 2018).

At the consumer level, brand loyalty is essential when selecting items from fashion houses. Motivations are varied and can include factors such as product quality, price, convenience, and personal image (Jones, 2015). Studies note that those who choose higher-priced designer labels often do it to affirm their social identity, being willing to pay top dollar for something that represents success and status (Muller et al., 2014). Price remains a relevant factor influencing purchasing decisions, particularly when considering affordable, fast fashion companies (Davidson et al., 2011). Even if consumers aspire to own expensive items, economic realities ultimately decide which products fit their needs financially and aesthetically.

This review analyzed fashion houses' origins and modern evolution, highlighting how historic traditions evolved to accommodate changing tastes and cultural expectations. Research suggests that certain aspects, such as exclusivity, innovation, and consumer loyalty, remain central to successful fashion lines. Future studies should explore why people invest in high-end brands and what drives their preference for lower-cost options. Additionally, examining emerging technologies and alternative retail strategies could provide further insight into the impact of fashion houses in our lives now more than ever.

2.7.1 Categories of Fashion House

Fashion houses are businesses that produce and design fashionable clothing to sell in the retail market. These fashion houses are categorized into three different groups; couture, ready-to-wear, and fast fashion. Each category offers a wide range of products with unique characteristics, benefits, and advantages over its competitors. However, each fashion house has a distinctive approach when marketing their products. In this section, the study will discuss the differing features of each category of the fashion house and offer a detailed insight into the positives and negatives associated with each one.

Couture is a type of luxury fashion that focuses heavily on artful designs and intricate detailing to create an exclusive product. This level of attention to detail often comes at a high cost, as Couture pieces can be costly due to the time consumption and effort involved in creating them (Chung et al., 2018). Higher production costs tend to drive industries from mass production to limited output, thus meaning prices for buyers remain steep as there will be buyouts or other protective measures taken by designers and brands to minimize counterfeit goods (Siwek & Ivarsson, 2017). The upside, however, is that customers willing to pay up receive a garment and experience that stands out as unique amongst others. Furthermore, buying a unique couture piece makes the customer feel valued and wanted – they get the sense that the designer takes a personal interest in producing something exclusively tailored to them, making them feel special (Wenner, 2020).

Ready-to-wear fashion is clothes that can be bought off the rack without any alteration or adjustments required. Ready-to-wear is often more affordable than couture and widely available. Brands will engage in seasonal launches of product lines two to four times a year, targeting all demographics. Also, using store boutiques to show case plenty of choices is another way for people to find what they're looking for (Smith, 2019). Popular stores like H&M use promotions and collaborations with famous faces such as celebrities and Instagram influencers, which helps draw attention to their collection and boost sales figures. The brand seeks out a broader audience by investing in a quality line and eye-catching advertising campaigns (Kim et al. 2021). This can bring significant growth for the company by facilitating extensive revenue generation and recognition within the industry (Rosser & Simmons, 2016). Additionally, engaging social media platforms incentives new followers while providing feedback from potential customers about the products on sale (Ahn & Ritter 2015).

Fast fashion is defined as low-cost garments inspired by popular culture reminiscent of catwalks and celebrity looks. Fast fashion targets younger consumers who want trendier apparel at very cheap and affordable prices. They often follow quick turnarounds implementing trends quickly but tend to sacrifice the quality and longevity of the goods they sell (Kamaruddin et al., 2017). Online retailers like Missguided and Boohoo have become international sensations drawing in customers by offering the latest trends without breaching budgets. Thereby adopting a continually changing array of mini-collections focused on specific events and reaching target audiences through digital campaigns. Fast fashion profits come mainly from quantity instead of upper-tier pricing (Eisner, 2019).

Consequently, taking advantage of labor overseas leads to inexpensive manufacturing rates, permitting companies to keep costs down without sacrificing too much on quality—at least superficially (Robben, 2019). On the downside, poor working conditions and long hours may arise since most clothing is made outside the Western economy (Papo et al., 2013). Moreover, ethical considerations such as animal rights violations, abusive labor strategy, and unethical environmental practices, among other factors, must be considered while participating in this particular fashion style.

Each type of fashion house carries with it its own set of pros and cons. Couture provides exquisitely designed items at higher prices that only a select few can afford. Ready-to-wear offers an accessible range of prices suiting a variety of financial stipulations yet compromising slightly on craftsmanship quality. And while Fast fashion offers meager prices with frequent, trendy releases, the exploitation of Labour and the environment cannot be ignored. Therefore, whatever options are chosen requires thorough research and weighing the affordability and ethics surrounding the selections. It is wise to consider individuals' budgets and lifestyles before deciding whether the merchandise from the store matches both requirements and sentiments of customer satisfaction.

2.7.2 Production System in A Fashion House

Production systems are the procedures, methods, and tools used to produce a good or service efficiently and cost-effectively. They play a critical role in the success of businesses operating within the fashion industry, enabling them to provide their customers with high-quality products that meet customer expectations within the timeframe and cost-effectively. This review will critically discuss the production system in a fashion house, reviewing relevant literature to analyze consumer demands, efficiencies required when managing the supply chain, and the logistics associated with building stock inventories. It will also discuss how technology can improve productivity and consider the costs of maintaining production systems.

Consumer demand is one of the main factors driving the production process in the fashion industry. The trend for “fast” fashion has been increasing; this term describes how current trends turn over at breakneck speed (Harwell, 2015). Consumers expect more variety and higher levels of customization, often making orders outside traditional selling periods like seasonal sales and usually placing orders via internet websites where delivery is expected immediately. Fashion houses must be highly reactive within their production processes to meet these ever-changing demands (Gangadharan et al., 2016).

Effective management of the entire supply chain is essential to support real-time response and remain more successful than competitors (Li et al., 2017). Supply chain management entails control from raw material acquisition to product delivery to consumers. The challenges facing producers include shortages in materials due to varying lead times, unscheduled fluctuations in demand, competition between retailers and designers, under-utilized fabric capacities, over-dependent sources of goods, and inability to attain information about inventory status and other related inputs (Vinayak & Loebbecke, 2009). To combat some of these problems, managers should look to implementing automated warehouse operations coupled with electronic data interchange (EDI), which enables integrated communication across the supply chain, ensuring accurate and speedy delivery (Li et al., 2017).

Once the desired product design/style has been developed, approved by the end customer, and ordered by them, it needs to be produced efficiently and logical stocking maintained. Most fashion brands usually have a small stock window before new items arrive in store. Therefore, controlling and handling returns or discrepancies becomes particularly challenging because of short replenishment time frames (Jacobsson et al., 2008). Obsolescence risk may occur if forecasting models do not guarantee accurate volume estimates, and therefore, forecasts must be constantly revised based on external market conditions and other digital practices (Tatemura et al., 2019). Similarly, improvements can be made in optimizing shipping routes, automating customs clearance protocols for international shipments, and freeing up space within warehouses where possible.

Finally, technology plays a massive part in keeping production systems running smoothly within fashion houses. Checklists minimize production errors, computer-aided design (CAD) helps streamline development processes, and enterprise resource planning (ERP) assists with tracking incoming goods at all stages to ensure yield rates are optimal wherever applicable (Kumar et al., 2009). Automation in product assembly lines keeps timelines shorter and reduces the number of employees involved; robots are often used to reduce defects and improve quality standards for limited edition runs (Salama et al., 2010). Furthermore, eCommerce initiatives have improved the speed with which customers can order garments, and locating larger companies online allows smaller firms to reach out to markets they didn't previously have access to (Raupp et al., 2017).

Despite technological advancements, producing goods does come with its set of costs. According to Vetoquinol SAQ Business Review Fees (2018), these can range from manufacturing equipment, storing resources, labor, transportation, inventory carrying costs, and maintaining distribution channels. These indirect costs add significant overhead expenses to daily operations, reducing profitability margins significantly. Moreover, sourcing fabrics from suppliers in various locations can take longer than expected, resulting in potential disruption of projects down the line (Gannayaka et al., 2020). Thus, spreading overheads into several segments and using lower-cost alternatives depending on technical specifications and timeline restrictions is advisable.

To conclude, the production system remains pivotal for fashion houses in today's fast-paced lifestyle. By understanding customers' demands and investing in technologies, production teams can positively influence throughput and overall growth. However, directors should keep aware of hidden costs that often creep up while managing operations and take proactive steps in controlling rising expenditures as much as they can, adjusting plans accordingly whenever necessary.

2.7.3 Natural Lighting Requirements in Fashion House

Regarding fashion houses, lighting is critical for some of the more unique looks and styles that clothing offers. As such, there are specific requirements for lighting when it comes to these productions. In this section, efforts will be channeled toward discussing the various lighting requirements in fashion house productions and how natural light sources can meet these needs.

For any fashion show within a fashion house production, sufficient illumination must be met. This involves general and specific lighting requirements that must be addressed for each location (Trudell 2012). Firstly, designers need quality brightness in particular areas throughout the space - this has been referred to as the luminous surface of objects on stage, which can be critically crucial for detail perception (Khalturina et al. 2017). This includes focusing on intricate details on fabric textures, small accessories or embellishments, colors, etc. The objective would be to bring out further vibrancy from those colors and textiles, which adds extra attractiveness to the look – "fashion brands rely heavily on their image and use visuals to create desire" (Depreux et al. 2017). Adequate brightness levels also facilitate greater audience engagement with illusions, concepts, and messages through emotions produced by attaining clear visibility (Weintraub 2018). With reference to brighter sections or patterns used during performances, increased visible clarity in darker settings due to higher power directed towards an area helps deliver the intended message. To sum up, for fashion house presentations, diversity of lighting strength and control is vital; one purpose should be to employ spotlights and calibrated intensities onto performers (Field & Fehn 2013). Another factor worth mentioning is vibrant coloring, which requires mixers to balance colors for accuracy and blend between colors which helps create a refined end product (Ferguson et al. 2018).

To achieve all these performance criteria mandatorily set by the fashion industry, contemporary energy-efficient solutions require consideration though creative cost-efficient alternatives have existed over centuries. Natural daylight pouring in through windows could satisfy the most basic expectations in theatrical lighting, although not deemed appropriate for runways until recently (Wakefield et al. 2018). Through a design synthesis merging technical aspects of immersive environments into daily interiors, natural light could offer enough lumens while keeping wear and tear costs down – providing unencumbered sunlight suited for makeshift facades (Lee et al. 2017). Sfulgosi (2019) illustrates that skyward materials like skylights allow lux to penetrate dramatically deep within structures due to reflective surfaces, creating bright interior surroundings. Utilizing open venues or outdoor locations could cut operational costs drastically (Crabtree et al. 2020); instead, massive indoor pavilions make way for curtains and glass ceiling features needed to refract outdoors while maintaining constant temperatures with air conditioning systems (Maiocco 2019).

A sizeable role contextual architecture plays in passageways and corridors; Ambient light combined with accentuated lamps around edges paired with smaller chandeliers provides just enough external glimmering shine to welcome guests (Watt 2012). Prioritizing pedestrian movement paths can guide audiences, especially illuminating stairs catering to patrons transitioning seat levels while paying attention to individual safety measures (Bignon et al. 2016). Considering this, Miller & Nissenbaum (2015) note adjustments made possible by controlling primary constituent factors ranging from the scale of the environment to the source of light, including the positioning of fixtures. Moreover, the placement of LED lights serves double duty for functionality and strengthens brand identity in unfamiliar spaces (Al Sayegh et al. 2014). Expanding on that, Simonsen (2018) outlines simple proven advantages of turning to essential natural elements remaining coincidental to budget frames plus heightened experience levels. On top of that, exterior decor techniques using dimmers mounted overhead yield illuminated surfaces along decorations erected, bringing profound alterations from shadows cast (Seyfried 2017).

Further advancements, such as interactive technology, revolutionized the approach to incoming spectacles introducing touch capabilities taken advantage of manually or remotely via iPads (Reyes et al. 2017). Manufacturers display their new products articulately by appointing proficient crew members who operate vivid new devices, signifying sentiment amongst the target audience (Coquoz et al. 2018). Even recessed lighting proved more efficient for gala refreshment than other available display options (Richardson 2014).

Considering all of these considerations, natural light is a viable option for satisfying the complete range of lighting requirements present for fashion house productions. From freeing up resources devoted towards purchasing items like fans, projectors, lighting bars, and panels or eradicating costs related to electric supply charges, even if temporarily (Baines et al. 2018), Reaping benefits of daytime heating-free covered rooftops arguably trump every other discourse enabling practitioners to save on time budgets as well (Lipschutz 2015). Working hand in hand with current designs ultimately bridges the gap between production powerhouse and authenticity, reinforcing the costume's storyline while embracing methodologies implemented elsewhere so far unheard of (Gillespie 2017). Applying portable applications establishing a distinct aerial presence leverages connectivity with limitless themes and awash high beams bouncing off walls developing dualistic feelings never seen before (Hirschfeld et al. 2019). Thus, shifting paradigms may trigger transformative culture in businesses across the board, eventually planting sustainable seeds helping encase echelons' newfound daring (Myburgh & Cant 2019).

In conclusion, when it comes to producing fashion-house productions, it is paramount to examine all your lighting requirements before execution to ensure the best outcome. Various conditions should be acknowledged to guarantee perfect captures that remain memorable for extended periods. Several efficiencies emerge by considering the pros and cons of ongoing methods involving modernized platforms, bolstering means to regular delivery. Energizing sustainable industrial practices stays the chief concern backed up by natural light sourcing, serving as formidable catalysts to preserve delicate equilibrium, reinforcing intimacy. Despite perceived inconveniences, exposure impacts social and economic elements impacting communities driven predominantly by inherited aesthetic values. Foreseeing adoptions proven transformations dependant on choice visions encouraging exclusive codes to legitimize operations certifying authorities modern day. As a result, natural light proved an outstanding solution for many aspects needing consideration when lighting is utilized within fashion-house productions (Lavin et al. 2018).

2.7.4 Importance of Natural Lighting in a Fashion House

Fashion houses must consider natural lighting requirements to ensure production is of the highest quality while being creative and engaging for their employees. Natural light's role in a fashion house can be significant, impacting how garments are designed, produced, and presented. This review critically analyses the relevance of natural lighting in fashion operations, with particular attention paid to influences on design processes, color representation, energy efficiency initiatives, employee wellbeing, and potential weaknesses.

2.7.4.1 Design Processes

When designing and creating garments, subtle variations of color due to available lighting can profoundly affect the outcome (García-Flórez & Magrini-Baradel, 2019). Natural daylight is more appropriate than artificial lighting, as it allows designers to accurately depict different shades and highlight certain fabric features or texture features (Andrusyszyn et al., 2019). Additionally, exposure to daylight encourages creativity by requiring designers to think 'outside the box' when developing ideas, pushing them to come up with fresh concepts they may not have thought of before (Diaz, Stouffer & Ahrendsen, 2008). Ultimately, allowing plenty of natural lighting within the workspace increases accuracy during the design process, potentially adding value in terms of revenue from sales and the brand's reputation.

2.7.4.2 Color Representation

As previously mentioned, natural daylight is essential for assessing the accurate tone of materials used in garment construction. This is especially important in the fashion industry, where differences between hues can make or break designs (Soudavar, 1999). However, many other benefits are associated with exposing products to natural light in retail settings. For example, it has been said to improve customer satisfaction, entice customers into stores, and facilitate decision-making (Haščík, Chudý & Šimková, 2007; Tung-ying, Hsiao-peng & Ma, 2011). Therefore, paying attention to natural lighting requirements can positively influence maximizing business profit and success.

2.7.4.3 Energy Efficiency Initiatives

Environmental conservation and technological advances are two components that now play an integral part in fashion (Klein, 2017). Many fashion businesses have recognized the importance of sustainability in energy consumption (Hsu, Chen & Lo, 2011). Natural lighting within workplaces could significantly reduce dependence on electrical appliances and machines, thus limiting their carbon footprint (Syal, 2018). In addition, allowing sunlight to pass through buildings via windows provides cost-effective temperature control, reducing the need and expenses for air conditioning in the summer months (Sequino, Overend & Ballatore, 2013). Therefore, effective use of natural light can be seen as a symbol of going green in fashion, which will help protect the environment for future generations without sacrificing productivity.

2.7.4.4 Employee Wellbeing

In fashion, long working hours and deadlines are typical characteristics of any job. As Huang et al. (2005) pointed out, daylighting can provide physiological, psychological, and visual benefits to those who work in such environments. Exposure to natural light improves the overall comfort levels experienced in the area, leading to better concentration rates and improved employee attention strategies (Nishii & Wright, 2009). Further, when adequately integrated within building structures, daylight can enhance staff engagement and social interaction at the workplace

(Löhner, 2002). Optimizing natural lighting conditions within fashion houses is paramount in encouraging positive employee attitudes and ultimate performance improvement.

2.7.4.5 Potential Weaknesses

Although natural lighting options offer many advantages that artificial solutions cannot match, they also present some noteworthy drawbacks. First, natural daytime illumination can rapidly fluctuate based on the changing weather and season patterns (Zhang et al., 2020). This can create unexpected problems concerning completing tasks and ensuring desired results are achieved, particularly if these changes are not monitored closely or accounted for appropriately (Padron-Rivera, Núñez–deBie & Monclús-Cobo, 2000). Furthermore, glare from direct sunlight onto monitors or workspaces can be highly distracting and irritating, obstructing employees from efficiently carrying out their duties (Isaković & Stanković, 2010). Such climatic scenarios illustrate the significance of implementing sufficient window treatments in any daylighting project to reduce unnecessary discomfort caused by external elements and aid workflow.

To conclude, today's fashion industries place increasing demands on the way they operate and employ sustainable measures to promote growth. Integrated usage of natural light must comply with awareness of specific interior design principles, technical intricacies, health considerations, and productivity performance. By evaluating all these aspects related to daylighting requirements, fashion houses can meet professional standards while simultaneously saving costs and providing consumers optimal comfort and sound quality design output.

2.7.5 Challenges With Proper Integration of Daylight into The Design of Fashion Houses

Daylight is a valuable source of natural lighting used in the design of fashion houses throughout history, with numerous known benefits. Fashion houses differ from most buildings due to their larger public spaces and extensive daylight requirements for localized tasks such as fashion shows or photoshoots (Ackermann and Stebilescu, 2016). However, both challenges in control and integration prevent the proper implementation of daylight into the overall design of these facilities. This critical literature review focuses on the existing knowledge about the associated obstacles when aiming to integrate daylight efficiently into modern fashion house designs.

Utilizing daylight contributes significantly to space aesthetics and indoor comfort; however, its nature can cause problems when unrestrained by architectural forms, requiring appropriate strategies for successful integration into building plans (Yu et al., 2015). Utilizing sunlight has many direct effects: it stimulates circadian regulation and encourages thermal warming while reducing energy consumption (Taha and Hume, 2019). Furthermore, natural light helps reduce eye strain and improves mood within the environment (Wolf and Nevêkine, 2018). These beneficial results encourage architects to capitalize on those features and use daylighting techniques well.

Control of daylighting is essential in its successful usage within interior architecture. Uncontrolled sun penetration can lead to overheating or glare risks, negatively affecting occupants' comfort. Glare can be caused by bright monochromatic lights, which interfere with visual performance (Proff et al., 2019). Discomfort glare is challenging to analyze because it strongly depends on individual experiences, thus introducing complexity in the evaluation process where subjective factors considered cannot be fully quantified (Perez and Farias, 2017).

Additionally, researchers have pinpointed the presence of steep facets in glass coverage, meaning the filtration of direct sunlight should maximize visual comfort (Hartig et al., 2017).

Variations in exterior geometry provide creative movement but create an irregular distribution of incoming solar radiation. Room dimensions and orientation must hold reflective symmetry so as not to introduce shadowing issues in certain parts of the room layout. In contrast, shallow angles don't allow adequate sunlight streaming (Lin 2020). Large glazed surface areas also generate higher heat levels within the internal walls, leading to temperature increases during peak sunny hours, causing discomfort among users (Karimi and Enayati, 2016). Consequently, this failure needs careful consideration, requiring accurate prediction based on environmental data estimations (Soheili et al., 2020).

Although an optimized indoor climate can assist visual acuity and improve occupant health, the external environment also holds significant importance in considering suitable window size distinction. A fusion between analysis methods and physical simulations presents a key dataset from nearby meteorological elements enabling engineers to make decisions near analytical precision (Arndt et al., 2014). Meteorological changes impact generated data from simulations since they are sensitive variables that modify project input data. Data fluctuations make extraction to meet actuality a daunting task, given that simulations may need to take decades to mature if a limitation of computational power is imposed (Vasarhelyi et al., 2018).

This contrast between desired outcomes, including reactions to sky conditions applied to modeling programs, restrains fashion house designers from adopting established solutions where feasible flexibility is limited, mainly depending on climatic conditions (Jódar, 2018). Nevertheless, some strategies attempt to overcome these difficulties by combining filter materials, geometrical measures, and lateral guidance devices at different heights across vertical axes, making the usage of fabric screens dimmable according to the interested lighting level (Xiujun et al., 2016). Despite technical efficiency, controlling access to daylight does not guarantee improved activities for end users (Rollandin et al., 2009), creating further complexities when attempting to identify the best modes of operation. Lighting gurus often fail to recognize tenant engagement and perceived perception dynamics embedded internally (Sheibani et al., 2019), leading to adverse effects with necessary repairs under extreme circumstances.

Overall, this brief assessment of shared agreements regarding each stage of design processes currently encases poor handling within daylight incorporation. Existing findings primarily consider conditioning parameters with minimum evaluations about tenants' feel as ultimate consumers suffering delay with incorporating attention concepts. Although critical stages range from user prerequisites before passive sun systems are installed until illumination values are apt for desired inducement feeling inhabitants, gaps still exist in customer-oriented research directions. Therefore, future efforts should center around pervasive monitoring attributes, extending attentive reflexive usages suited for audiences transforming conventional models going forward.

Chapter Three

Methodology

3.1 Preamble

This study adopted the case study research approach towards achieving the aim of the study. Five existing facilities were understudied; two international fashion houses and three local fashion houses were studied. The case study conducted employed search of technical reports for the international case studies and observations for the local case studies. The result was presented descriptively using pictures.

3.2 Why Case Study Approach?

Case study methodology play important roles in architectural research. One key aspect of case study methodology is the fact that is the combination of different methods which aims at illuminating a case from various viewpoints (Harrison et al, 2017)

This case study approached is distinguished by the deliberate selection of the case study to research and which is often carried out using a variety of data gathering techniques. In the interest of theory or of other cases, generalizations are produced from a specific case. A proper case study design technique aims to deliver answers to the already provided research questions. (Hancock et al, 2021). The case study research techniques have been critically used to evaluate the values, restrictions, ethical, and practical difficulties that could occur in the research and findings of architecture.

An early generation of case study was developed in the anthropology, but this was criticized during the logical positivist era, which saw the separation of social science technique into quantitative and qualitative research.

The study of the existing fashion houses will be given an insight into what is existing and analyzing them in terms of merits and demerits vice versa what has been studied from literature will present a good basis to come up with a functional design proposal of a fashion house located in Ibadan North local Government Area, Nigeria. It is important to note that each fashion house has different niches that they are known for and which vary for each of them.

The case studies are;

i. China Fashion Show Centre, China
ii. Chefeng Group Fashion Hub, China
iii. Datina Designs, Eleyele, Ibadan, Nigeria.
iv. One-Stop-Celebration Fashion House, Lagos, Nigeria.
v. House of Adeola, Lagos, Nigeria.

3.3 Case Study Analysis

3.3.1 Case study 1: China Fashion Show Centre, China

Niches: Fashion Shows

Location: Chouduan Rd, Keqiao District, Shaoxing, China

Client: Office of CTC Development

Principal architect: WAU Design

Area: 5260 m²

Year: 2018

Building Scale: 4 (Floor)

Max Height: 15.8 m

Materials: Glass, Steel, Concrete

3.3.1.1 Description of the Building

The location is situated in Chouduan Road, Keqiao District, Shaoxing, China Central Business District Open Space. The location that was once used for traditional textile and dyeing industry has now been replaced by Creative Fashion Industry. Based on this traditional industrial reformation, the original commission is to design a space for a fashion show, wedding, and exhibition which fits with the new industry in Keqiao. As a place for holding events, the architectural space is manipulated by specific time schedule and too enclosed as a public area. In terms of the using frequency, the project would bring more maintaining cost and creating very negative space in daily time. Therefore, the project proposed an extra public ring around the fashion show area, which brings more daily events to the site. The extra space includes a permanent exhibition room, educating and fashion design workshop. By inserting new functions, the public area creates a connection between the fashion market, public citizens and landscape and creating a more dynamic urban space in Keqiao.

The inner events space is lower than the public square which gives more interior ceiling height and allows an open and infinite sense of space. The Serving space such as utility room is located under the raised platform. It also provides an independent entrance for logistics. The typical arrangement of public and private space allows the building to adapt different use at a certain time.

The main fashion show area is constructed with a radiated truss structure and load-bearing wall. The outer ring is supported by tiled columns and hangs over, which creates a sense of “floating” with a better connection to the surrounding landscape. All the utility equipment is hidden inside the circular wall and interprets the architecture pureness.

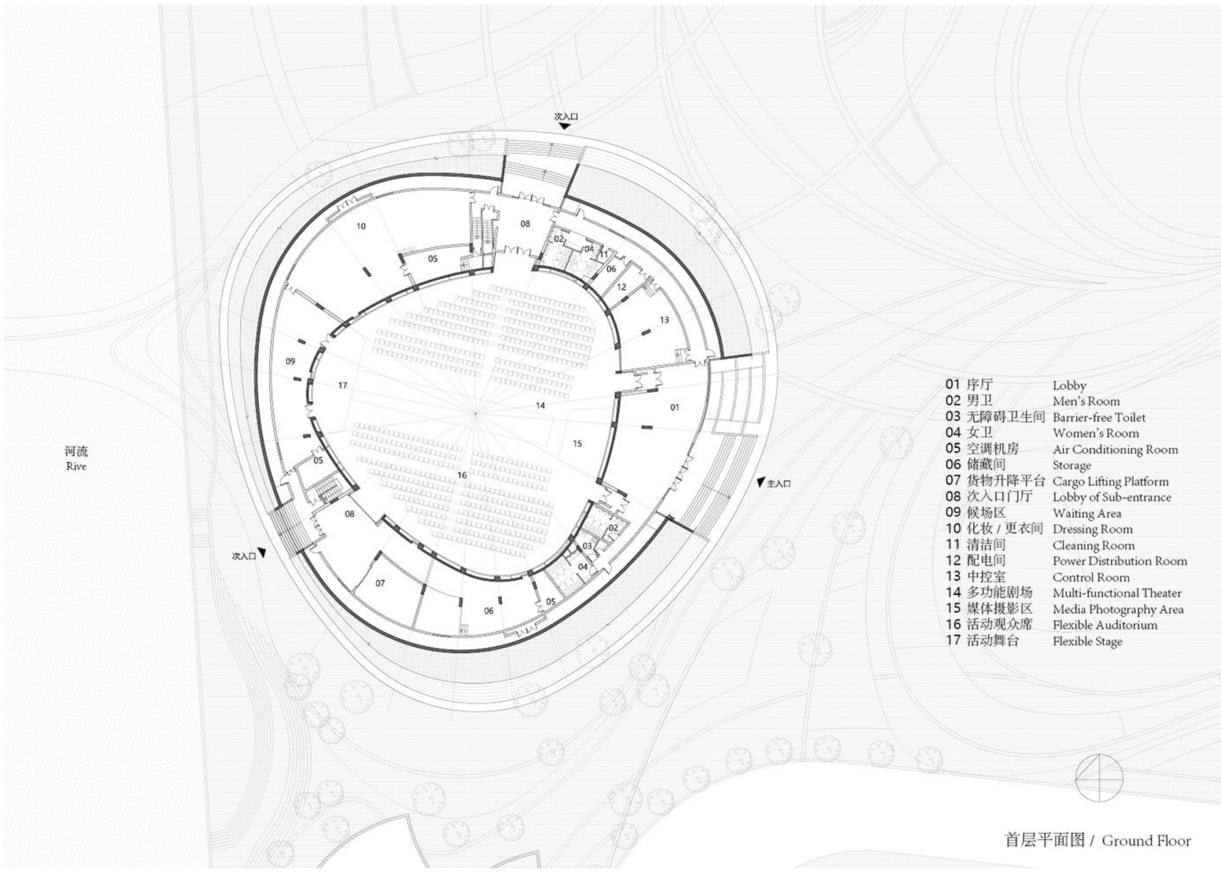

Figure 3.1: Figure Showing the Ground Floor Plan
Source: (Google Search, 2023)

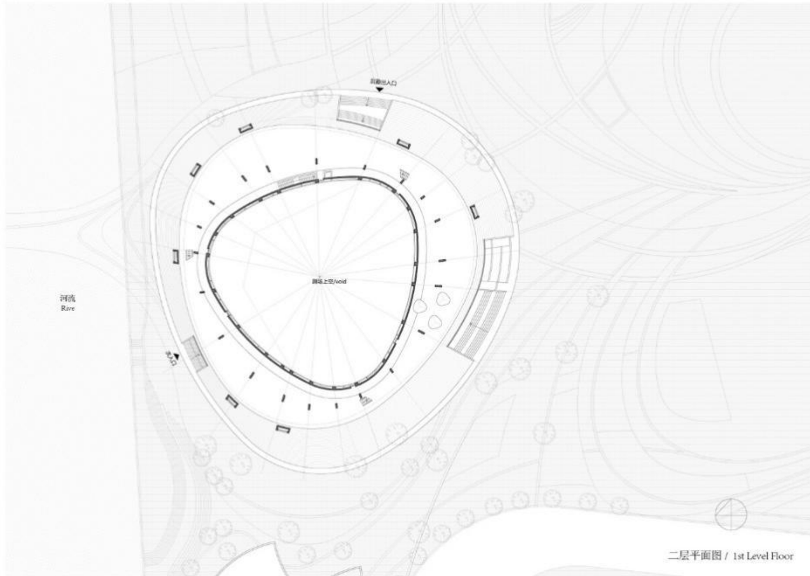

Figure 3.2: Figure Showing the First Floor Plan
Source: (Google Search, 2023)

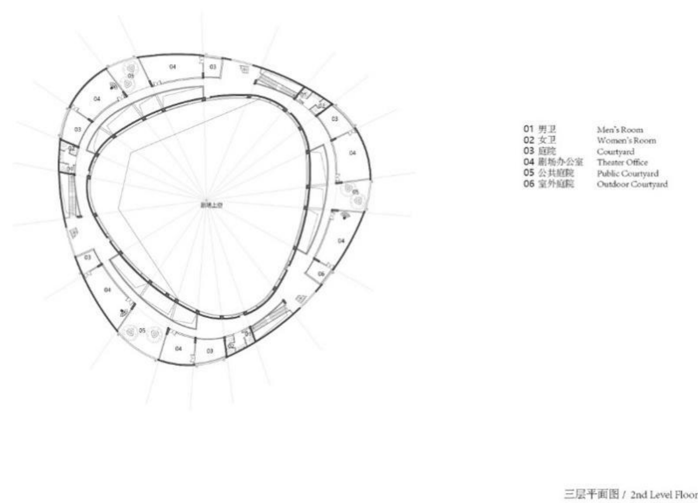

Figure 3.3: Figure Showing the Second-Floor Plan
Source: (Google Search, 2023)


Figure 3.4 & 3.5: Figure Showing the Aerial View and Terrace View
Source: (Google Search, 2023)

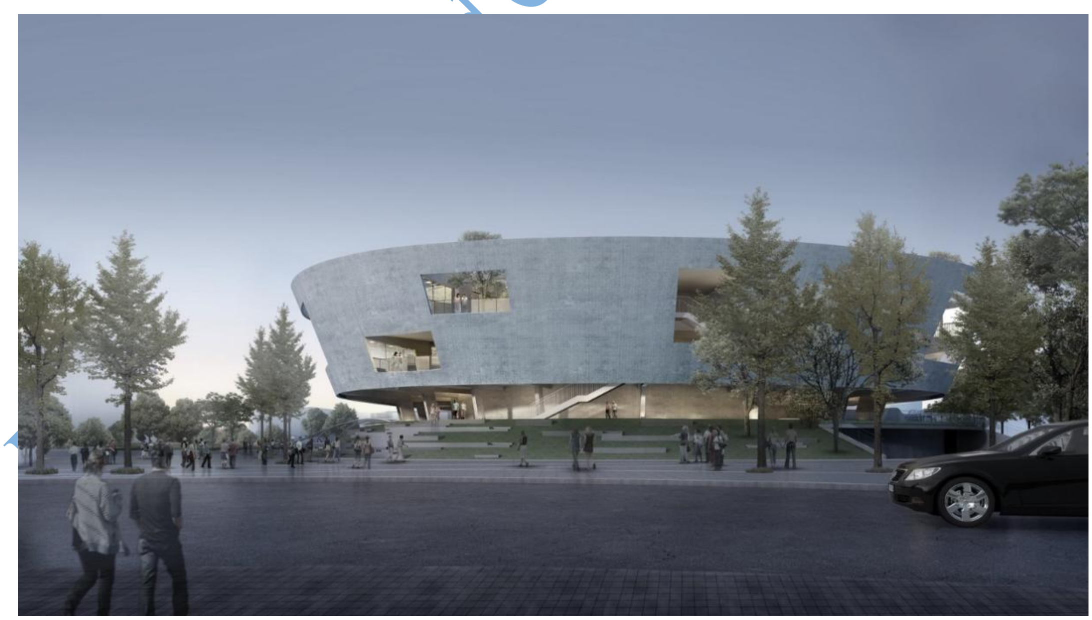

Figure 3.6: Figure Showing The 3-Dimensional View
Source: (Google Search, 2023)

Figure 3.7: Figure Showing The 3-Dimensional View
Source: (Google Search, 2023)

3.3.1.2 Appraisal

A. Merits

• the design form is unique.

• there is provision for sufficient number of entry/exits for quick discharge of occupants at the exhibition area.

• design of the inside and outside space being compose as a whole is an architectural masterpiece.

• the inner event space being lower than the public square gives more interior ceiling height and allow for an open and infinite sense of space.

• the distinctive arrangement of private and public space allows flexibility of use at a certain time.

B. Demerits

• The central ring space as main area for fashion show lacks ventilation and natural lighting

• There is heavy dependence on artificial lighting at the exhibition area.

- There is possible high running cost of the event centre.

3.3.2 Case study 2: Chefeng Group Fashion Hub, China

Niches: Consultancy, Production and Retailing

Location: Shanghai, South China.

Client: Chenfeng Group's

Renovated by: Joseph Dejardin

Area: 6000 m²

Renovated Year: 2018

Materials: Glass, Steel, Concrete

3.3.2.1 Description of the Building

Chefeng Group Fashion Hub is Located at the border of Kunshan City and Shanghai, Chenfeng Group's 90,000sqm factory campus was set up in 2003. With over 15,000 employees, Chenfeng Group is a certified enterprise of the International Fair Labor Association and a member of the International Sustainable Apparel Coalition. The company is a production partner to international brands including Patagonia, Uniqlo, Stella McCartney, and Chinese fashion designers such as Feng Chen Wang, Xu Zhi and Chen Peng. The group is also a partner in the ready-to-wear brand Comme Moi, founded by former supermodel Lü Yan. Taking advantage of the group's garment manufacturing expertise, the redevelopment masterplan aims to establish long term collaborations with the country's top fashion design institutions and internationally renowned young Chinese fashion designers, many of whom already maintain studios on site.

Joseph Dejardin completes the renovation of a 12000sqm former factory building at Chenfeng Group's Kunshan campus near Shanghai, South China. The design transforms garment production workshops & administrative offices into contemporary fashion studios and flexible office space. As one of China's largest textile & garment manufacturing companies, the conversion project is part of the studios's ambitious redevelopment masterplan to transform the factory site into a creative hub for nurturing fashion design in China.

The former factory building sits at the centre of the campus, which is progressively being transformed from a conventional production facility into a modern fashion hub with integrated production capabilities. A phased renovation strategy was devised with the Client to minimise disruption, as continuation of production is key to the Client's vision for the site. This facilitated the continuous operation of factory floors, pattern cutting rooms, and studio spaces in the lower floors of the building throughout the renovation process.

The former factory building was renovated from a conventional production facility into a modern fashion hub to accommodate grand entrance lobby, pattern cutting rooms, and studio spaces in the lower floors of the building. The meeting and multi-functional spaces, design studios & executive offices.

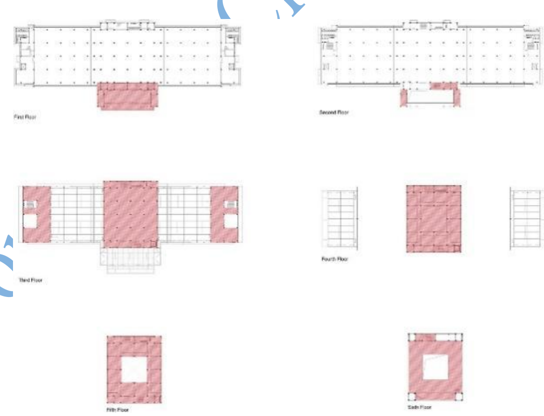

Figure 3.8: Figure Showing the Existing Floor Plans
Source: (Google Search, 2023)

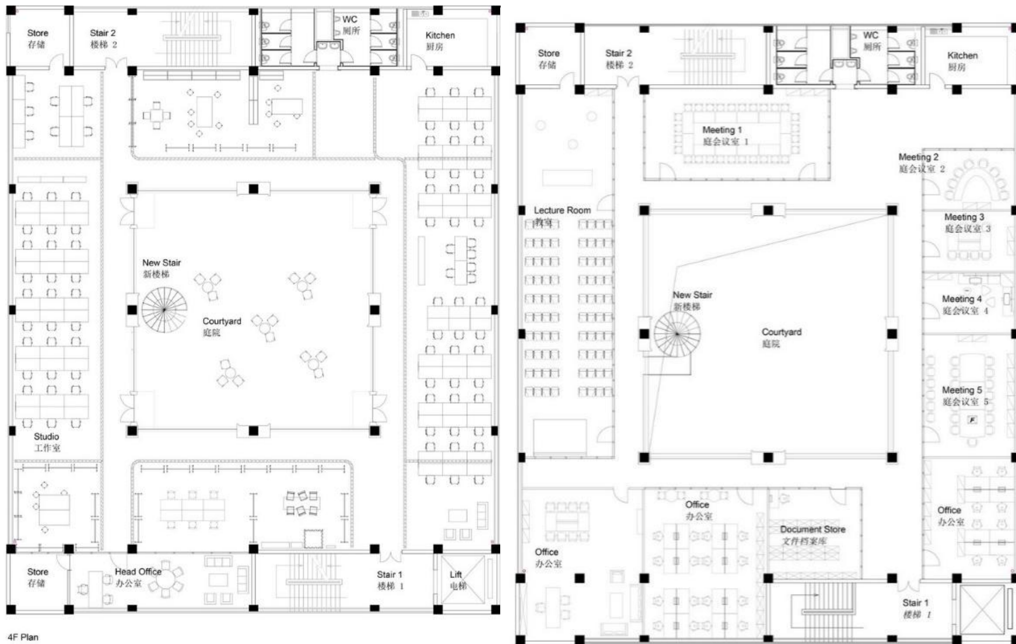

Figure 3.9 & 3.10: Figure Showing the Renovated Ground Floor & Upper Floor Plans Source: (Google Search, 2023)

Figure 3.11: Figure Showing the Approach View
Source: (Google Search, 2023)

Figure 3.12: Figure Showing the Showroom
Source: (Google Search, 2023)

Figure 3.13: Figure Showing the Courtyard Area
Source: (Google Search, 2023)

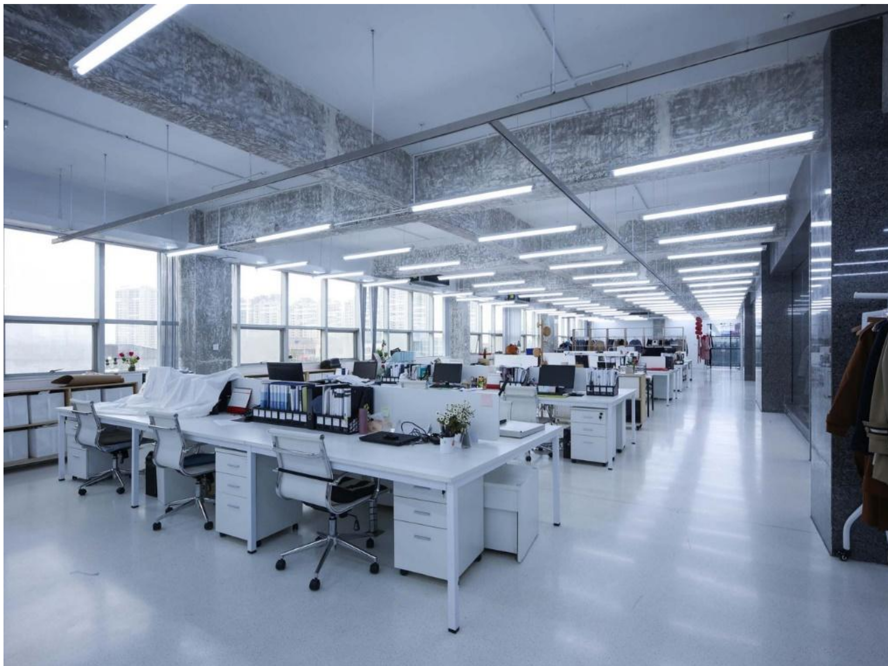

Figure 3.14: Figure Showing the Design Office
Source: (Google Search, 2023)

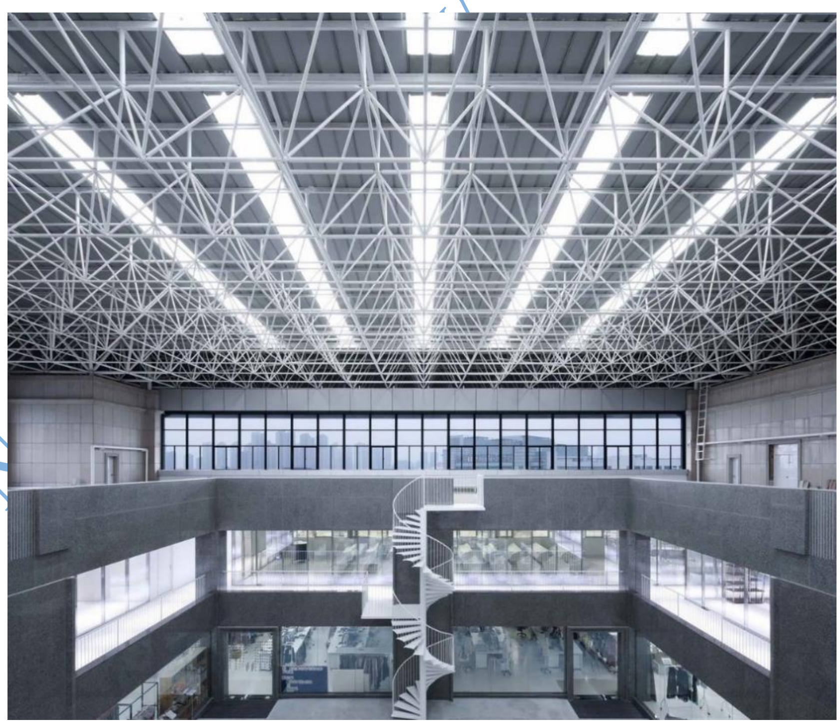

Figure 3.15: Figure Showing the Lobby and Courtyard
Source: (Google Search, 2023)

Figure 3.16: Figure Showing the Conference Room
Source: (Google Search, 2023)

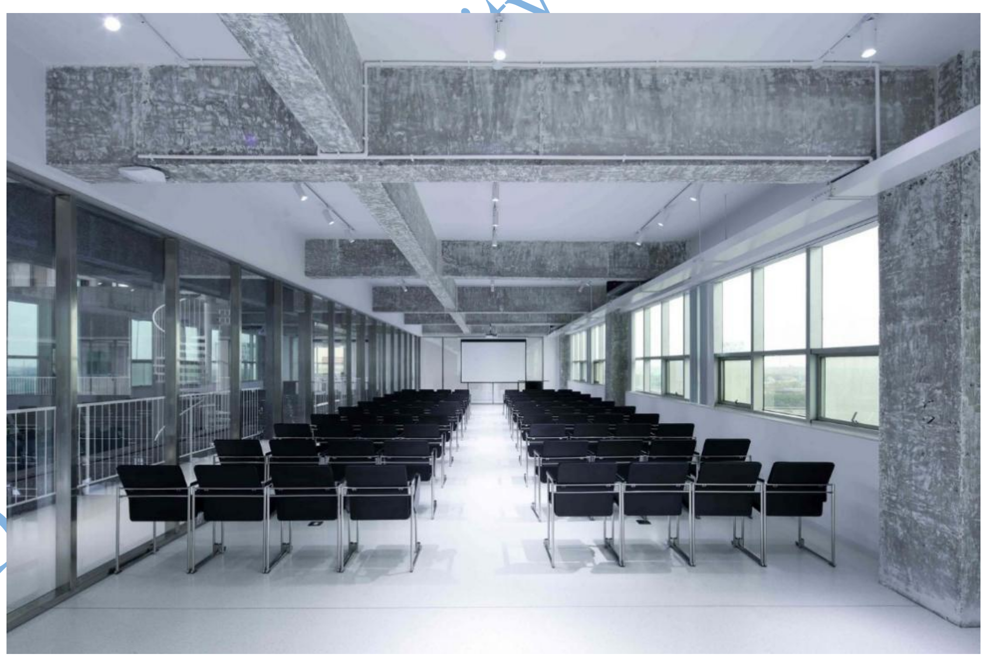

Figure 3.17: Figure Showing the Multipurpose Hall
Source: (Google Search, 2023)

3.3.2.2 Appraisal

A. Merits

• The renovated spaces are designed to maximize flexibility, meeting the varied demands of fashion studios for design, cutting, storage and fitting, as well as the potential demands of any future occupants through minimizing the use of fixed subdivision and increasing the ability to circulate between spaces while focusing on the use of high-quality finishes.

• The renovation process was carried out such as that the key original features were still maintained.

• The design form allows proper ventilation and natural lighting.

• The circulation is highly functional with the use of wide corridors for easy movement.

B. Demerits

• there may be possibility of solar radiation because of the heavy use of glass.

3.3.3 Case Study 3: Datina Designs, Eleyele, Ibadan, Nigeria.

Niches: Consultancy, Production (Ready-to-wear, Bridal wears, Mass production) Retailing, Fashion school, Fashion show.

Location: Eleyele, Ibadan.

Founder: Mrs. Atinuke Smith

Founded in: 1995

3.3.3.1 Description of the Building

Datina Design is one of the top most, well known fashion brand in ibadan. They are known for their competence in training students and for their huge impact of outstanding ready-to-wear pieces in almost every store in ibadan. It is safe to say that their fashion store meets the everyday needs of a woman. The facility is a rented office space that has all their facilities accommodated. This include the reception, customers waiting area, CEO’s office, fitting room training room, sewing hall, pattern drafting, cutting and ironing section, store and rest room.

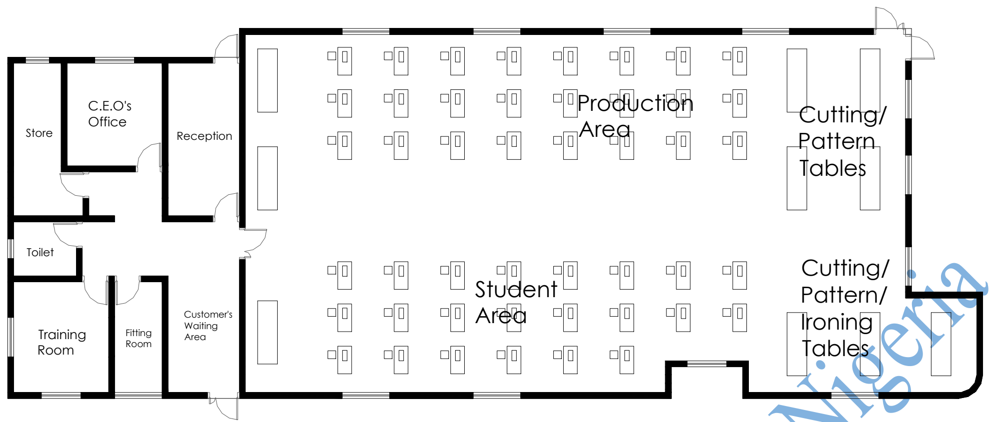

Figure 3.18: Figure showing the floor plan of Datina Fashion House
Source: (Google Search, 2023)

Figure 3.19: Figure Showing the Sewing Hub of Datina Fashion House
Source: (Researcher's Field Work)

Figure 3.20: Figure Showing the Relationship Between Students and Production Area
Source: (Researcher's Field Work)

Figure 3.21: Figure Showing the Cutting Table Area
Source: (Researcher's Field Work)

Figure 3.22: Figure Showing the Cutting Fitting Room
Source: (Researcher's Field Work)

Figure 3.23: Figure Showing the Display Area
Source: (Researcher's Field Work)

Figure 3.24: Figure Showing the Display Area
Source: (Researcher's Field Work)

Figure 3.25: Figure Showing the Student Training Room
Source: (Researcher's Field Work)

Figure 3.26: Figure Showing the Cutting and Ironing Area
Source: (Researcher's Field Work)

3.3.3.2 Appraisal

A. Merits

• there is adequate natural lighting and cross-ventilation in the sewing hub and training room.

• the open-plan layout allows for proper coordination of activities in the sewing hub.

• related activities based on work flow patterns are zoned together.

• there is functional space relationship.

B. Demerits

• not purpose-built building therefore the building performance is not efficient.

• student area in the sewing hub is poorly lit.

• circulation space being used as display area is inadequate.

• inadequate fitting room.

• poor circulation around the sewing machines in the student area of sewing hub.

3.3.4 Case Study 4: One-Stop-Celebration Fashion House, Lagos, Nigeria.

Niches: Consultancy, Production (Ready-to-wear, Bridal wears, Mass production)
Retailing, Fashion school, Fashion show.

Location: Ikeja, Lagos.

Founder: Mrs. Olusola Babatunde

Founded: 2009

3.3.4.1 Description of the Building

OSC Fashion is a certified fashion company whose services include consultancy, garment Production and Pan African Fashion Training. They consult and mass produce garment for Companies such Unilever, British Council, Sterling Bank etc.

Their core area of production includes; cooperate wears, school uniforms, casual wears, suits, Security wears, sport wears, academy gowns, medical robes, prison wears, T-Shirt, polo etc.

The facility is a converted residential apartment which houses the training and production unit.

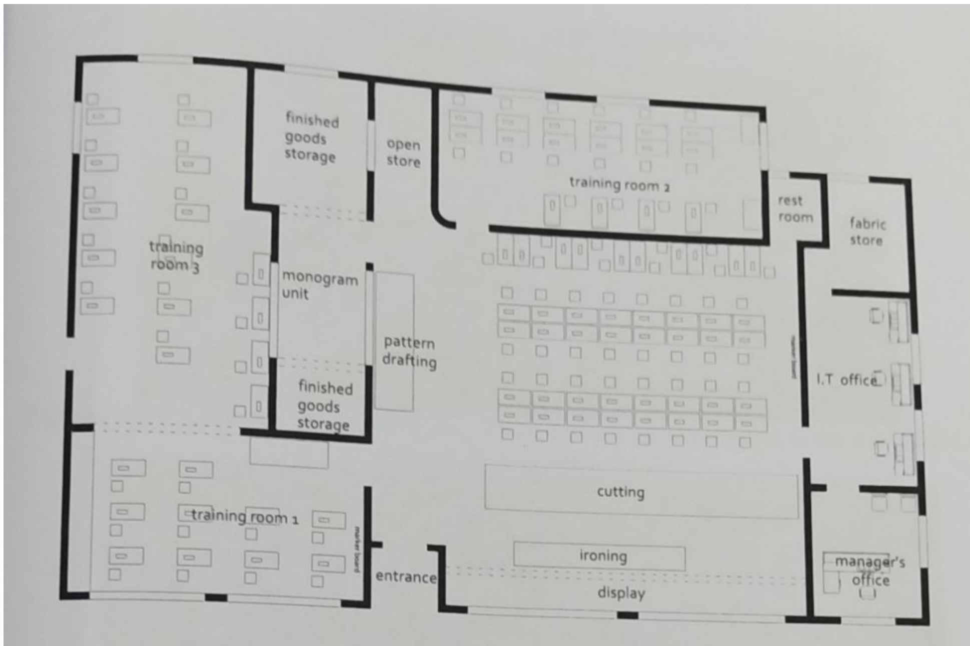

Figure 3.27: Figure Showing the Floor Plan of One-Stop-Celebration Fashion House
Source: (Researcher's Field Work)

Figure 3.28: Figure Showing the Sewing Hub Area
Source: (Researcher's Field Work)

Figure 3.29: Figure Showing the Sewing Hub and Drafting Area
Source: (Researcher's Field Work)

3.3.4.2 Appraisal

A. Merits

• there is adequate natural lighting and cross-ventilation in the sewing hub and training room.

• the open-plan layout allows for proper coordination of activities in the sewing hub.

• related activities based on work flow patterns are zoned together.

• there is functional space relationship.

B. Demerits

• student area in the sewing hub is poorly lit.

• circulation space being used as display area is inadequate.

• inadequate fitting room.

• poor circulation around the sewing machines in the student area of sewing hub.

3.3.5 Case Study 5: House of Adeola, Lagos, Nigeria.

Niches: Consultancy, Production (Bespoke & Bridal wears) Retailing and Fashion show.

Location: Victoria Island, Lagos.

Founder: Ms. Deola Ade-Ojo

Architects: Consultants Collaborative Partnership, Lagos.

Building Completed in: 2008

Area of the Building: 359.858 m²

3.3.5.1 Description of the Building

House of Deola was established in 1988 when Deola joined her Mother's business with a view to developing the label to more contemporary designs for the high-brow society. The brand makes Used of hand woven and incorporate almost lost traditional techniques with the modern. It specializes bespoke and bridal wears globally recognized for its unrivalled clothing quality and Continuous innovation. Deola Sagoe is made of two brands. The mother brand "Deola" specializes in haute couture, bespoke garment and bridal wear while the second "Clan" designs and retail premium ready-to-wear clothing. The building houses the brands offices, atelier and show rooms, pattern drafting, tailoring, embroidery and embellishments.

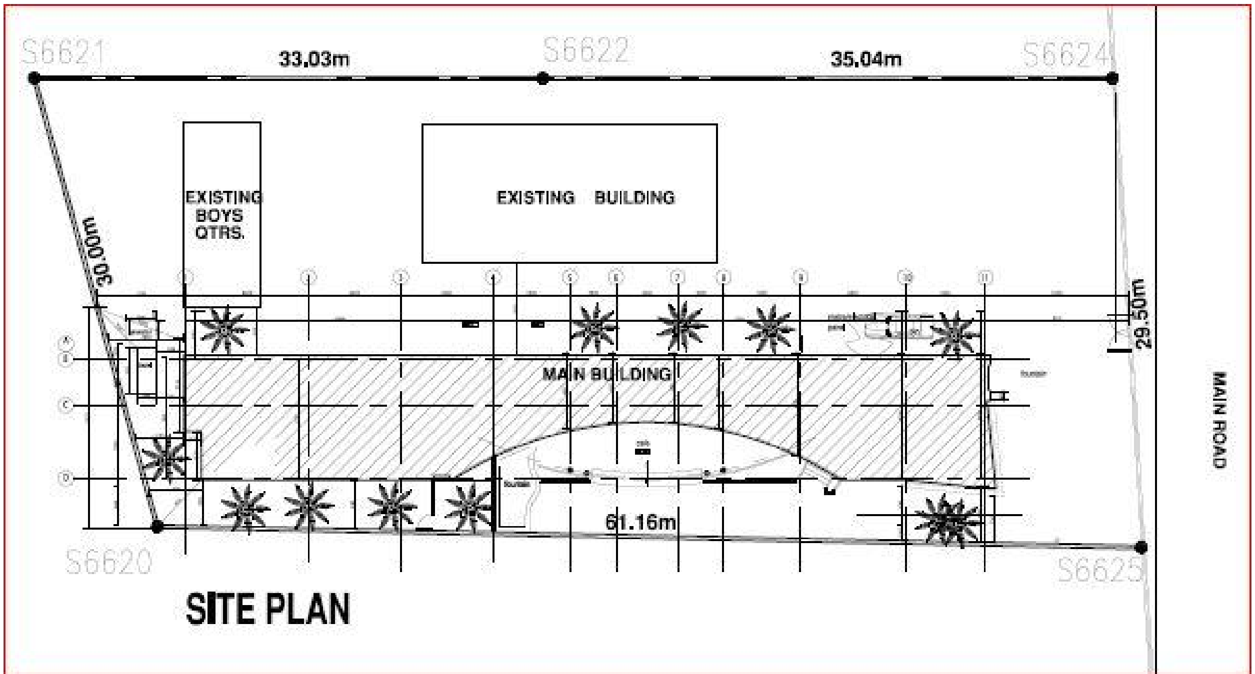

Figure 3.30: Figure showing the ground floor plan House of Adeola
Source: CCP's Database

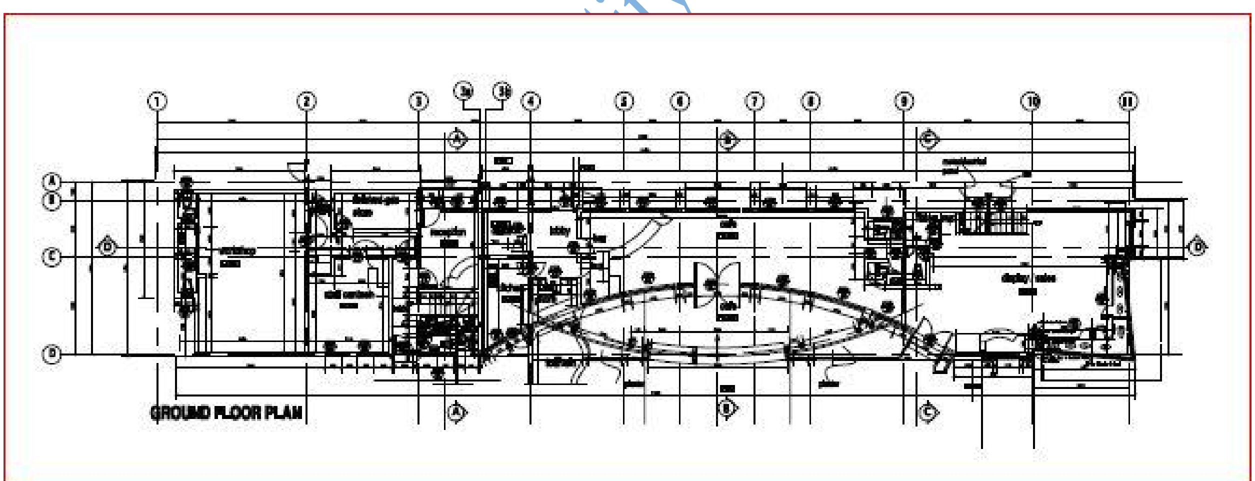

Figure 3.31: Figure Showing the Ground Floor Plan House of Adeola
Source: CCP's Database

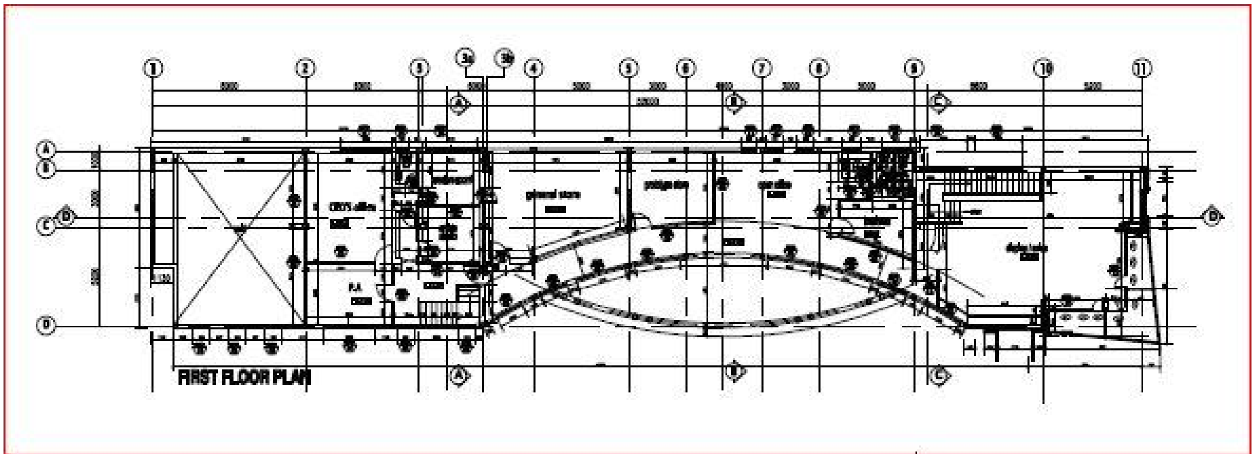

Figure 3.32: Figure Showing the First-Floor Plan House of Adeola
Source: CCP's Database

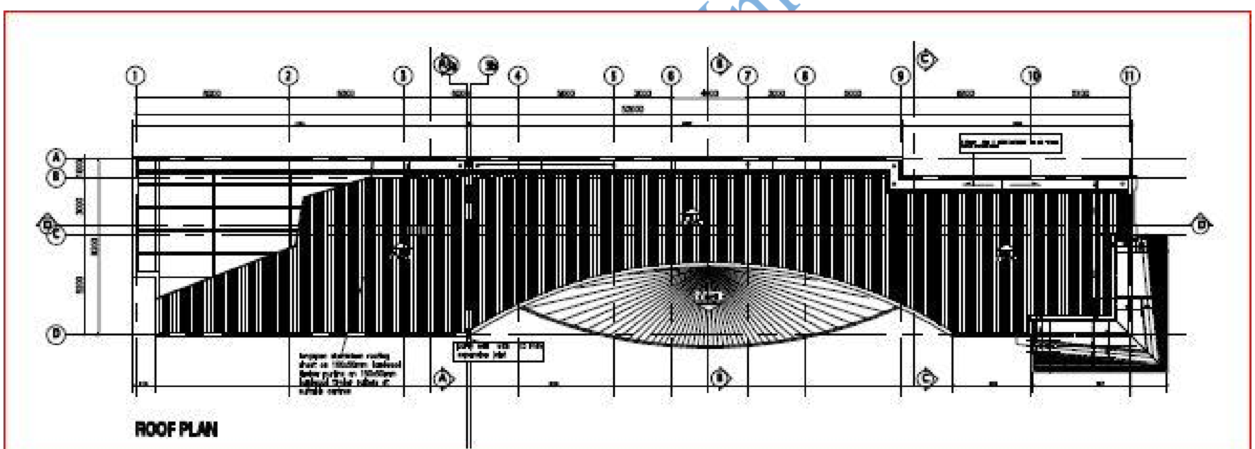

Figure 3.33: Figure Showing the Roof Plan House of Adeola
Source: CCP's Database

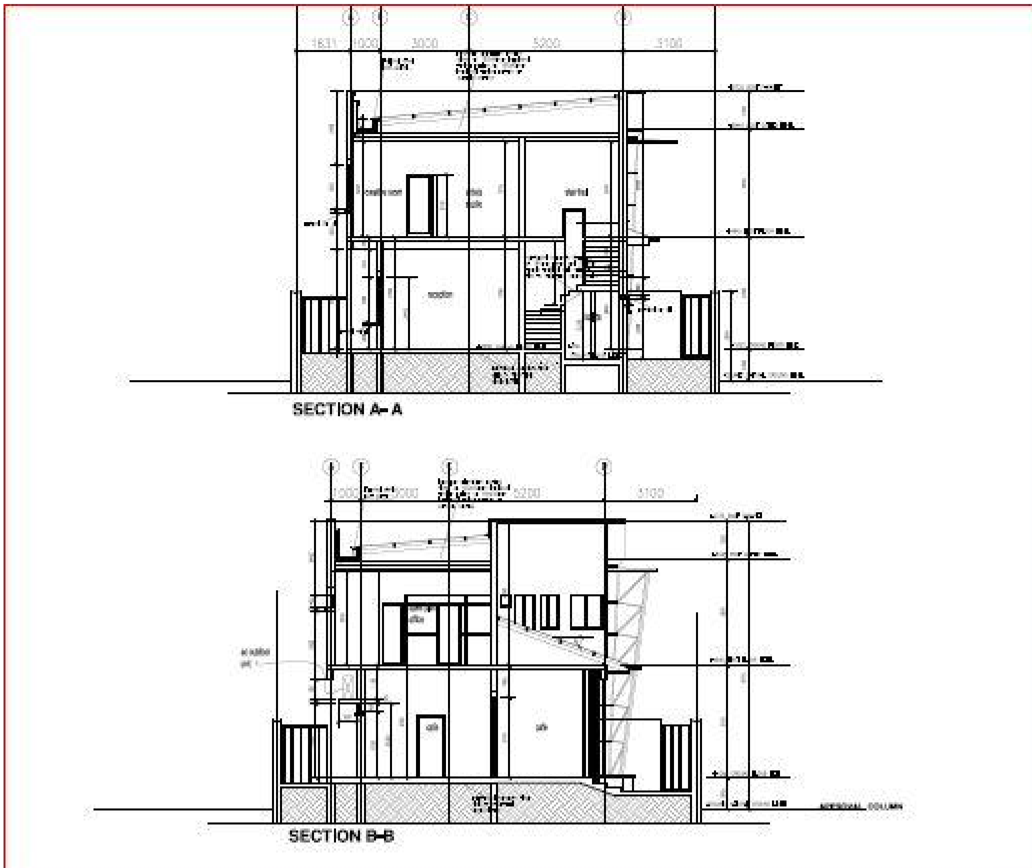

Figure 3.34: Figure Showing the Section
Source: CCP's Database

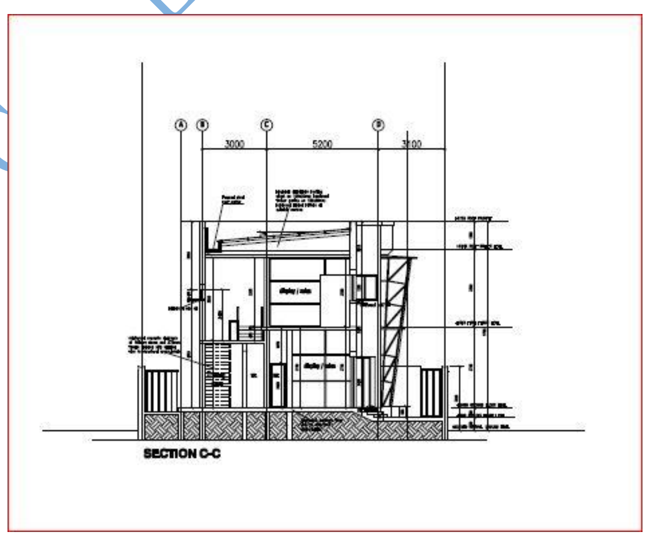

Figure 3.35: Figure Showing the Section
Source: CCP's Database

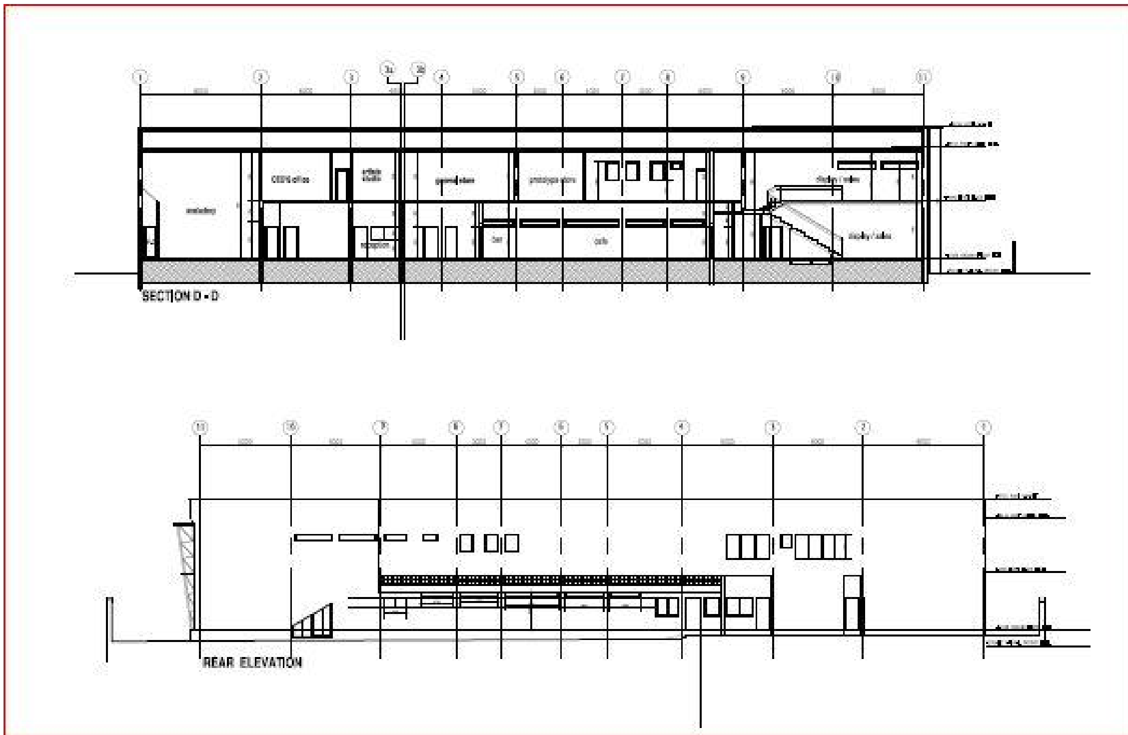

Figure 3.36: Figure Showing the Section
Source: CCP's Database

Figure 3.37: Figure Showing the Approach View
Source: CCP's Database

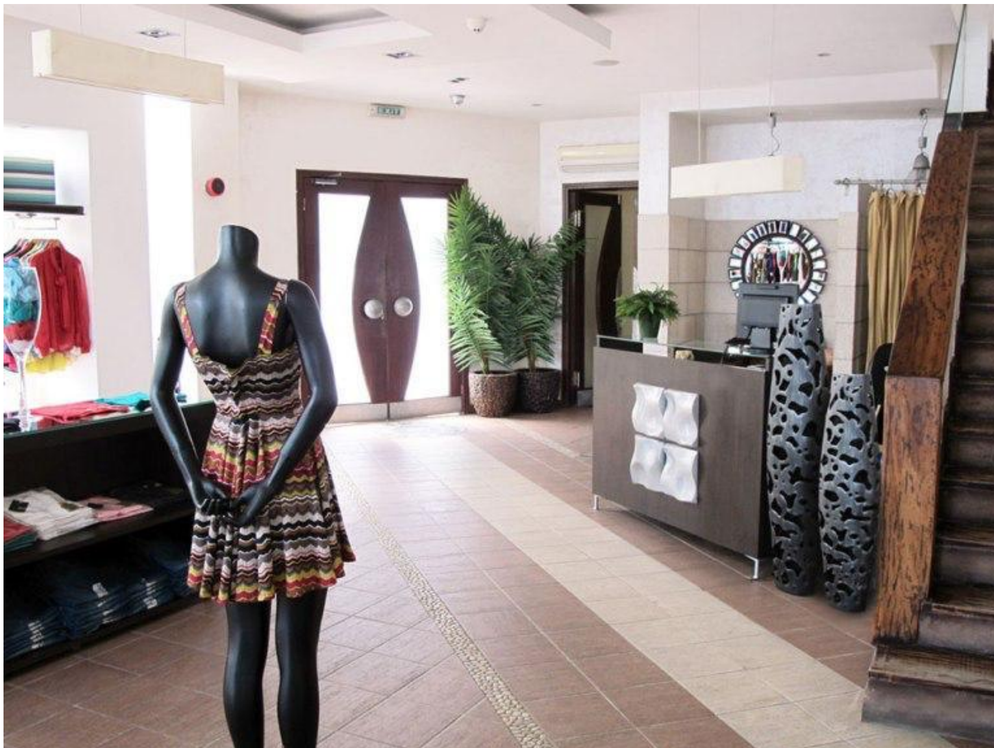

Figure 3.38: Figure Showing the Display Area
Source: CCP's Database

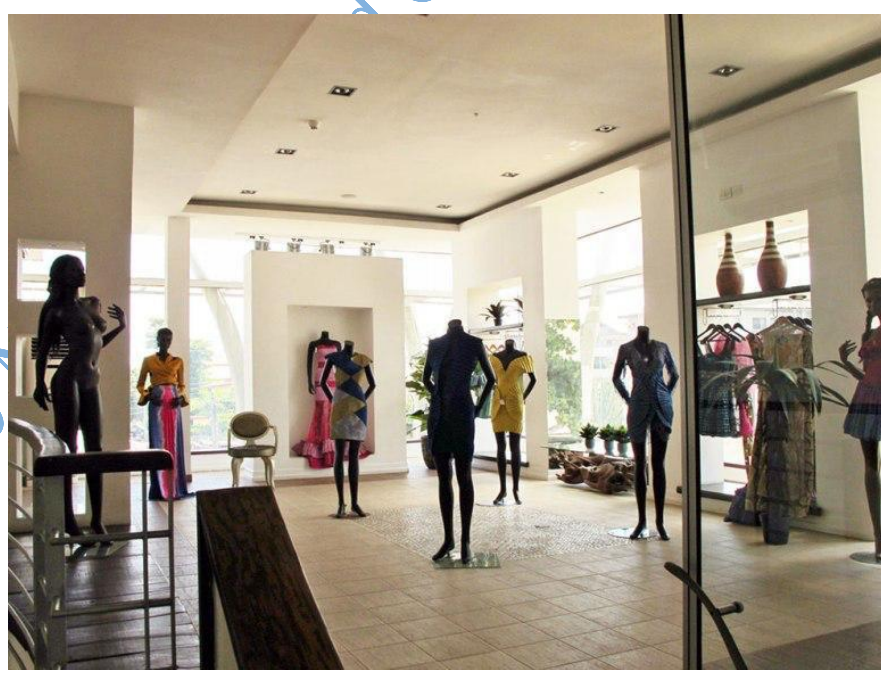

Figure 3.39: Figure Showing the Display Area
Source: CCP's Database

Figure 3.40: Figure Showing the Display Area
Source: CCP's Database

3.3.5.2 Appraisal

A Merits

- aesthetically appealing structure with its uniqueness as a fashion house.
- natural lighting was maximized and less use of artificial lighting.
- good circulation and flow of activities.
- Efficient ventilation and natural lighting

B Demerits

• poor zoning of reception

• circulation space being used as display area is inadequate

• limited landed area the student area of sewing hub.

3.4 Case Study Synthesis

From literature review, it has been established that fashion house design is a dynamic and not limited or restricted to a particular set of activities. Having studied all five case studies, it is safe to say that each fashion house is unique in its own way. Each has a niche that it has carved for itself bearing in mind that fashion house has different niches and each designer decides on the niches like production, academy, consultancy, retailing and fashion exhibition.

The study focuses on five major areas of a fashion house namely; consultancy, production, academy, retailing and fashion exhibition.

3.4.1 Analysis of Key Features of a Fashion House observed in case studies

- Lighting

In any fashion house, lighting design is very important. Poor lighting especially in the production areas can lead to eye-strain, fatigue and accident, while too much lighting causes health and safety issues that are related to glare such as headache and stress. Each scenario leads to poor quality and low productivity. Also, implementing proper lighting increase sales in fashion retail outlets. In all the case studies, the functionality of their lighting systems varies. Some made use of artificial lighting heavily as it is in the case of China Fashion Centre and One-Stop-Occasion Fashion House. Chenfeng Group on the other hand made use of natural lighting effect.

- Ventilation

Chenfeng Group Fashion House has adequate ventilation system and not solely depends on artificial means of ventilation.

- Circulation

The two international case studies have good circulation systems either vertical or horizontal through the use of manual or mechanical means. Circulation in OSC Fashion House and Datina can be said to be inadequate.

- Ergonomics

In terms of how the design and arrangement of different spaces fit the users of the spaces, such as production areas, training rooms, Store and equipment rooms, offices etc. The local case studies are not ergonomically adequate.

3.4.2 Lesson Learnt From The Case Studies

Having studied relevant literatures with regards to what is required for a functional fashion house design with more emphasis on lighting, the followings are the lesson learnt which will be incorporated in the proposed design.

- The use of more natural lighting and less of artificial lighting system.

- The use of right strategies to achieve good circulation system.

- maximizing space by making use of the atrium as proposed design for exhibition purpose.

- ensuring a connection with nature from the interior space.

Chapter Four

Site Analysis and Design Synthesis

4.1 Study Area

4.1.1 Site Location

The proposed development is located along U.I and Agbowo Road, Ibadan North, Nigeria.

4.1.1.1 General Overview of Ibadan

Ibadan is located in Oyo State, Nigeria and consists largely of Yoruba speaking people. It is referred to as the largest indigenous city in Nigeria with total area of 3,080sq. kilometers after Bauchi.

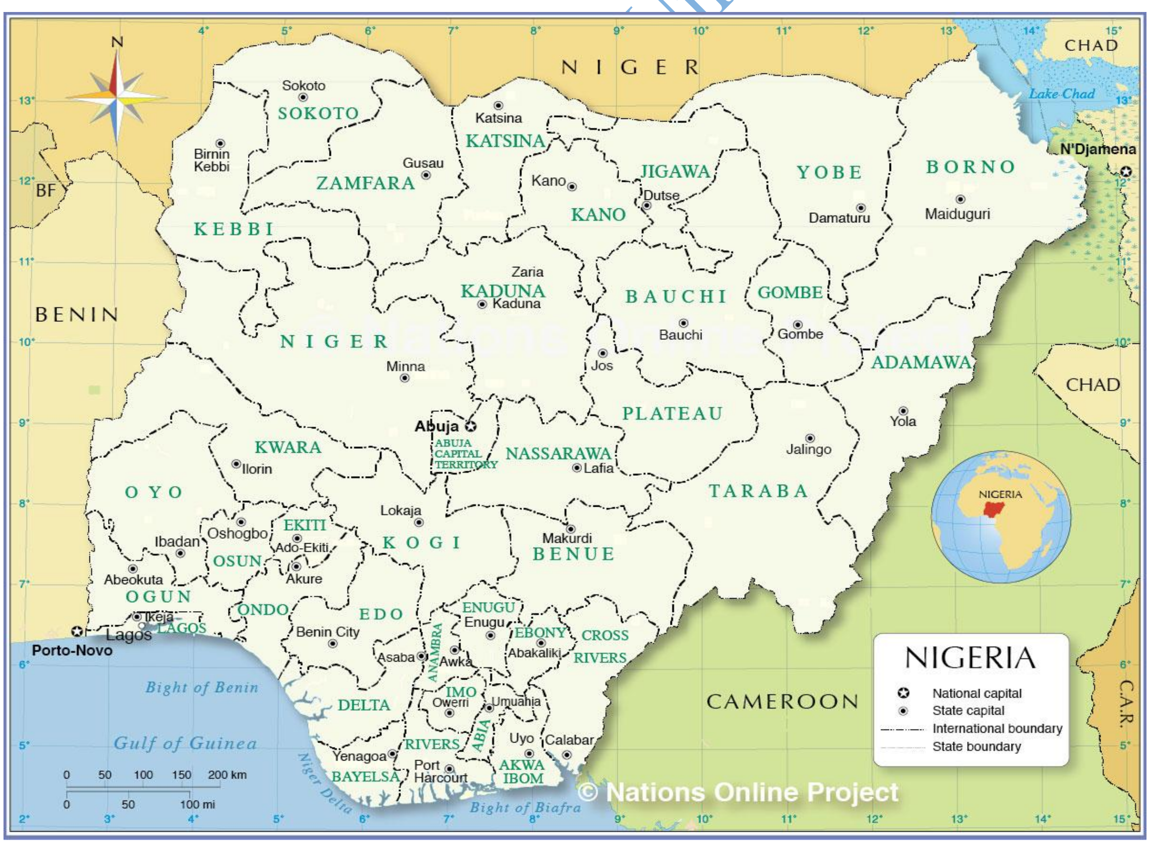

Figure 4.1: Figure Showing Administrative Map of Nigeria.
Source: (Google Search, 2023)

4.1.1.2 Geography

Ibadan is located in south-western Nigeria in the southeastern part of Oyo State at about 119 kilometers northeast of Lagos and 120 kilometers east of the Nigerian international border with the Republic of Benin. It lies completely within the tropical forest zone but close to the boundary between the forest and the derived savanna. The city ranges in elevation from 150m in the valley area, to 275m above sea level on the major north–south ridge which crosses the central part of the city. The city of Ibadan is naturally drained by four rivers with many tributaries: Ona River in the North and West; Ogbere River towards the East; Ogunpa River flowing through the city and Kudeti River in the Central part of the metropolis. Ogunpa River, a third-order stream with a channel length of 12.76 km and a catchment area of 54.92 km2. Lake Eleyele is located at the northwestern part of the city, while the Osun River and the Asejire Lake bounds the city to the east.

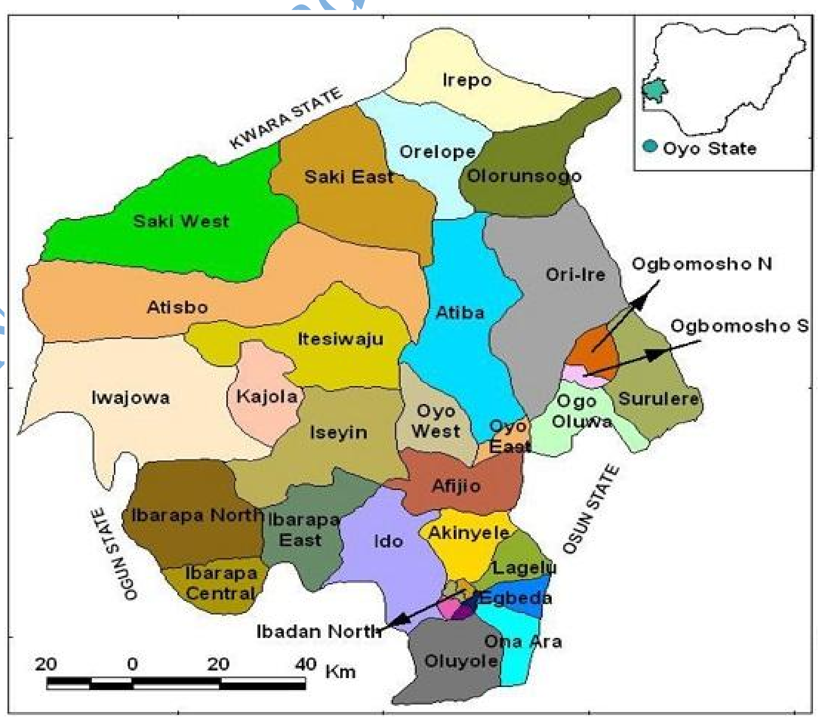

Figure 4.2: Picture Showing Map of Oyo State Indicating the Different Local Government Areas.
Source: (Google Search, 2023)

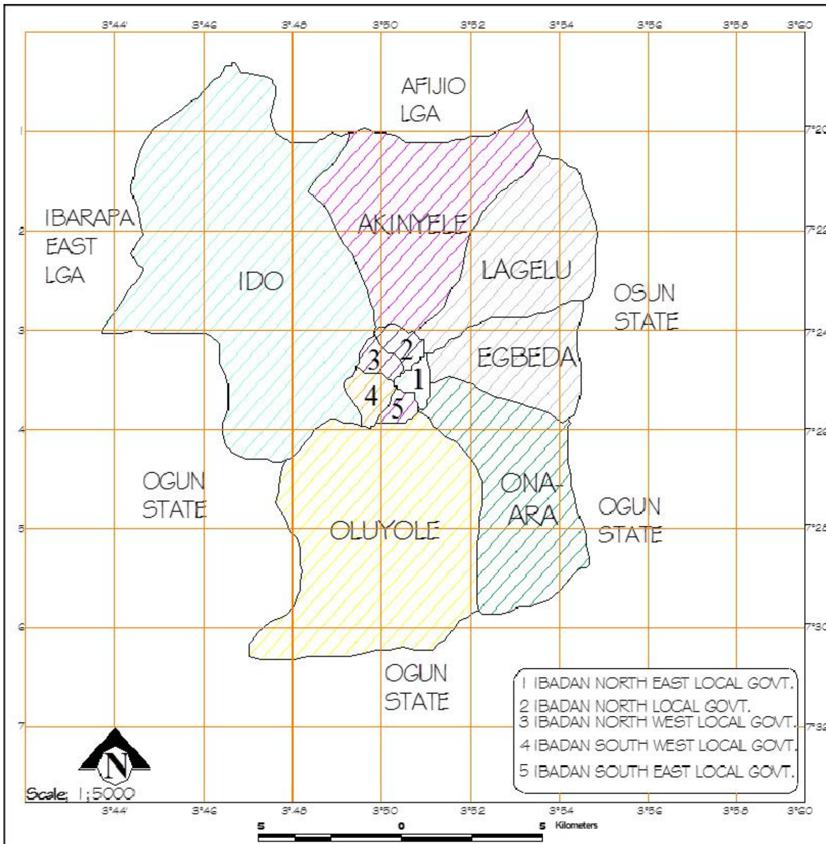

Figure 4.3: picture showing Map of the Eleven Local Government Areas of Ibadan.
Source: (Ministry of Lands and Housing, 2023)

4.1.1.3 Climate

Ibadan has a tropical wet and dry climate (Köppen climate classification), with a lengthy wet season and relatively constant temperatures throughout the year. Ibadan's wet season runs from March through October, though August sees somewhat of a lull in precipitation. This lull divides the wet season into two different wet seasons. November to February forms the city's dry season, during which Ibadan experiences the typical West African harmattan. The mean total rainfall for Ibadan is approximately 1,230 millimeters or 48 inches, falling over about 123 days. There are two peaks for rainfall, June and September. The mean daily temperature is 26.46 °C or 79.63 °F, the mean minimum 21.42 °C or 70.56 °F, and the relative humidity 74.55%.

Table 4.1: Climate Data for Ibadan

Climate data for Ibadan [hide]													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	37.2 (99.0)	38.9 (102.0)	38.3 (100.9)	37.2 (99.0)	35.0 (95.0)	33.3 (91.9)	31.7 (89.1)	31.7 (89.1)	35.6 (96.1)	33.3 (91.9)	33.9 (93.0)	35.6 (96.1)	38.9 (102.0)
Average high °C (°F)	32.3 (90.1)	34.0 (93.2)	33.5 (92.3)	32.3 (90.1)	31.2 (88.2)	29.6 (85.3)	27.8 (82.0)	27.2 (81.0)	28.5 (83.3)	29.7 (85.5)	31.3 (88.3)	31.9 (89.4)	30.8 (87.4)
Daily mean °C (°F)	25.7 (78.3)	26.9 (80.4)	26.9 (80.4)	26.3 (79.3)	25.6 (78.1)	25.1 (77.2)	23.6 (74.5)	23.1 (73.6)	23.9 (75.0)	24.3 (75.7)	25.6 (78.1)	25.5 (77.9)	25.2 (77.4)
Average low °C (°F)	20.9 (69.6)	21.9 (71.4)	22.5 (72.5)	22.0 (71.6)	21.7 (71.1)	21.6 (70.9)	21.2 (70.2)	20.7 (69.3)	21.8 (71.2)	21.7 (71.1)	21.6 (70.9)	20.7 (69.3)	21.5 (70.7)
Record low °C (°F)	10.0 (50.0)	11.1 (52.0)	15.0 (59.0)	18.3 (64.9)	17.8 (64.0)	17.8 (64.0)	16.1 (61.0)	15.6 (60.1)	17.2 (63.0)	17.8 (64.0)	15.6 (60.1)	11.1 (52.0)	10.0 (50.0)
Average rainfall mm (inches)	10 (0.4)	25 (1.0)	91 (3.6)	135 (5.3)	152 (6.0)	188 (7.4)	155 (6.1)	86 (3.4)	175 (6.9)	160 (6.3)	46 (1.8)	10 (0.4)	1,233 (48.5)
Average rainy days (≥ 0.3 mm)	1	3	7	9	14	17	15	13	18	18	7	1	123
Average relative humidity (%)	76	73	77	82	85	87	89	88	88	87	83	79	83
Mean monthly sunshine hours	198.4	197.8	186.0	180.0	195.3	147.0	86.8	65.1	93.0	164.3	207.0	220.1	1,940.8
Mean daily sunshine hours	6.4	7.0	6.0	6.0	6.3	4.9	2.8	2.1	3.1	5.3	6.9	7.1	5.3

Source: (Deutscher Wetterdienst, 2023)

- Demographics

Before 1970, Ibadan was the largest city in Sub-Saharan Africa by surface area (Lyold, P.C et al. 1962). In 1952, it was estimated that the total area of the city was approximately 103.8 km² (On Education' - Page 69, Anna Hinderer) but only 36.2 km² was built up. This meant that the remaining 67 km² were devoted to non-urban uses, such as farmlands, river floodplains, forest reserves and water bodies. These "non-urban land uses" disappeared in the 1960s: an aerial photograph in 1973 revealed that the urban landscape had completely spread over about 100 km². The land area increased from 136 km² in 1981 to 210–240 km² in 1988-89 (Areola, 1994: 101). By 2000, it is estimated that Ibadan covered 400 km² (Iroham et al. 2020). In the 1980s, the

Ibadan-Lagos expressway generated the greatest urban sprawl (east and north of the city), followed by the Eleiyele expressway (west of the city). Since then, Ibadan city has spread further into the neighbouring local government areas of Akinyele and Egbeda in particular.

- Economy

Ibadan is the capital city of Oyo State, the fourth largest state economy in Nigeria (oladejo 2021) and the second largest non-oil state economy in Nigeria after Lagos state. With its strategic location on the railway line connecting Lagos to Kano (*BBC News*. 13 February 2013) the city is a major center for trade in cassava, cocoa, cotton, timber, rubber, and palm oil. The city and its environs is home to several industries such as Agro allied, Textile, Food processing, Health Care and Cosmetic, Tobacco processing and Cigarette manufacturing, Leatherworks and furniture making Etc.

The main economic activities engaged in by the Ibadan populace include Agriculture, Trade, Public service employment, Factory work, Service sector/Tertiary production, Etc. The headquarters of the International Institute of Tropical Agriculture (IITA) have extensive grounds for crop and agricultural research into key tropical crops such as bananas, plantains, maize, cassava, soybean, cowpea and yam (Cgiar. Retrieved 18 February 2014) According to a report, Ibadan is the 3rd cheapest Nigerian city to live in (Ibadan Gists Retrieved 17 November 2014)

- Site Location and Description

The proposed site is located along U.I and Agbowo Road, Ibadan North, Nigeria. It is between the Hon. Akinremi multi-purpose hall and Irepodun LCDA. It is also adjacent to Agbowo shopping mall under renovation. This is highly developed commercial area in Ibadan North

Local Government Area. It has relatively flat terrain with moderate greenery and few shady trees and shrubs. The site is open without fence overlooking the road with an existing drainage system.

- Site Inventory and Analysis

To get the best of any design, it is important to study the physical characteristics of the site where the building is proposed to be located. The information will serve as basis and a guild for the Architect to make an informed decision on the overall approach to the design. Some of such characteristics include humidity, temperature, the prevailing wind, sun movement which make up the micro-climate and other physical features such as vegetation, presence of water bodies, topography, adjourning structures, etc. analyzed below are the peculiar features of the site.

SITE LOCATION

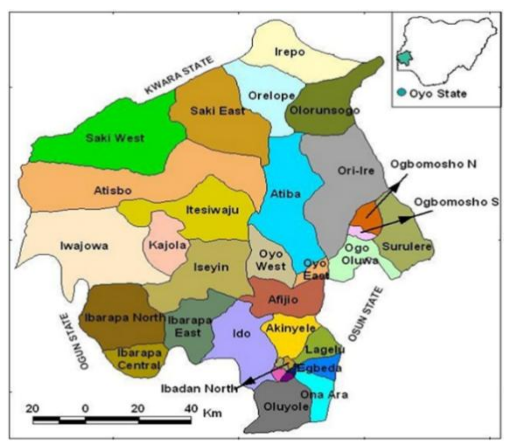

Figure 4.3: Picture Showing the Site Location in Relation to Oyo State, Nigeria and Africa.
Source: (Google Earth, 2023)

- Access Road

The site is accessible through the major Mokola/Samonda Road, Ojoo/Agbowo Road as well as Major Bodija road. The site location allowed good entrance and exit gate though is high traffic road which is part of consideration siting this project at this location.

- Noise Level

The major source of noise is from the major roads thus why the public space is located at the front. The effect of this noise is reduced through the tall trees planted as buffer. The quite zones of this design proposal like the administration, training, production and exhibition sections are located far away from the noise region.

- Rainfall

The proposed site experiences both wet and dry climate with longer raining season. To take care the effect of rainfall on this design, proper drainage system to take care of large water volume is proposed. In addition, vegetation covering the soft part of the site will prevent erosion and its effect. Roof coverings are designed to quickly throw off the water and not retain water. Building materials used are the ones with low water retention. Areas prone to driving rain are shielded with good eaves and reinforced concrete canopy.

- Solar Radiation

The tropical sun is overhead for most of the day and a lot of solar radiation is received during the day. The site is shielded to some extent by existing primary school buildings and event hall. To also combat the effect of solar radiation, shady trees, shrubs and grasses are proposed to be planted to convert the hot breeze to cool breeze. Adequate opening sizes that are appropriate positioned will enhance adequate air movement in the interior spaces to keep the inhabitants of the spaces thermally comfortable. Building will also be oriented such that shorter area of the building is affected by solar radiation.

- Topography

The site slope gently towards the back of the site with difference of about 1.8m high. Drainage channel will be designed such as to take advantage of the gentle slope and drain in the same direction.

- Vegetation

At the time of carrying out this study, the site has mild vegetations and shrubs which will be cleared off. There are no land forms of any sort observed on site.

- Soil Condition

The soil condition can be said to be relatively good and firm with good bearing capacity. This will make it suitable for the proposal which is a two storey building. Isolated pad foundation is suitable foundation type for this proposal.

- Prevailing Wind

There is cold dusty harmattan wind from the North-East which brings about discomfort. On the other hand, the South-West trade wind brings cold humid wind. To maximize this prevailing wind to the advantage of the building, adequate ventilation through the use of appropriate sizes of opening is essence. Also, the orientation of the building such that the harsh effect of weather on the structure is maximized while taking the advantage of the south west trade wind.

4.1.2 Site Selection Criteria

These are set of parameters which should guild the selection of a site for any development. These parameters ensure that the choice of the site is appropriate for the proposed project. These includes access roads, location, size, proximity to activities zone, environmental impact of the development, social impact on the neighboring community, land use ordinance and so on.

Site Inventory

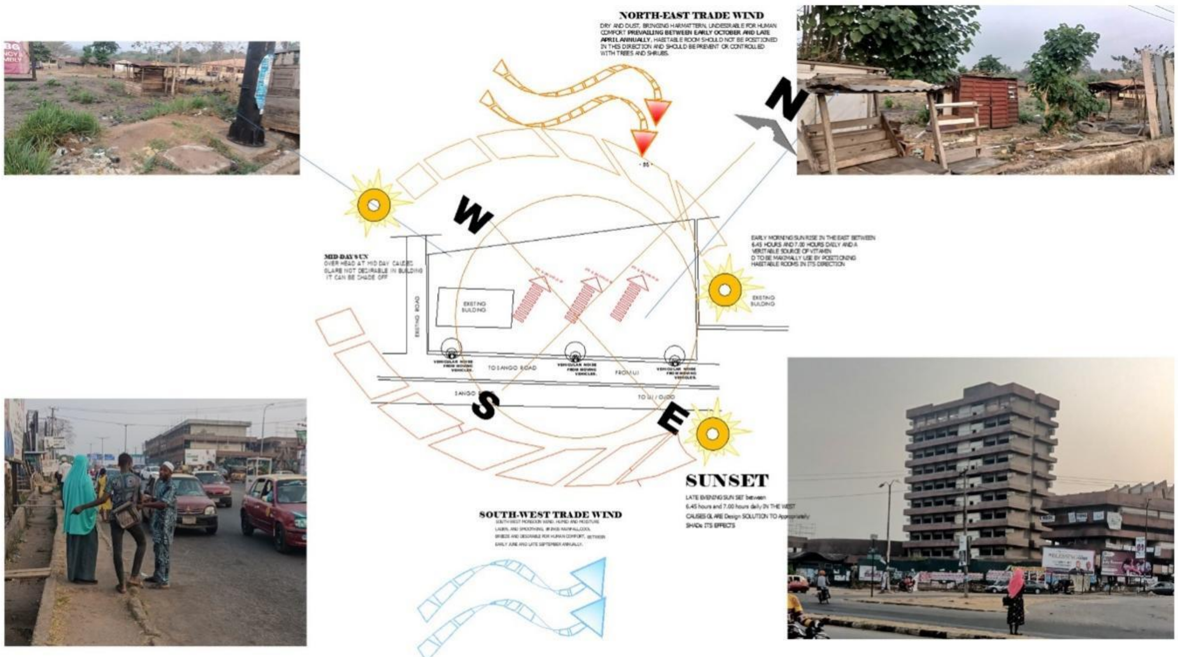

Figure 4.4: Picture Showing the Site, Physical Structures and The Climatic Elements.
Source: (Researcher's Field Work)

Site Sections and Analysis

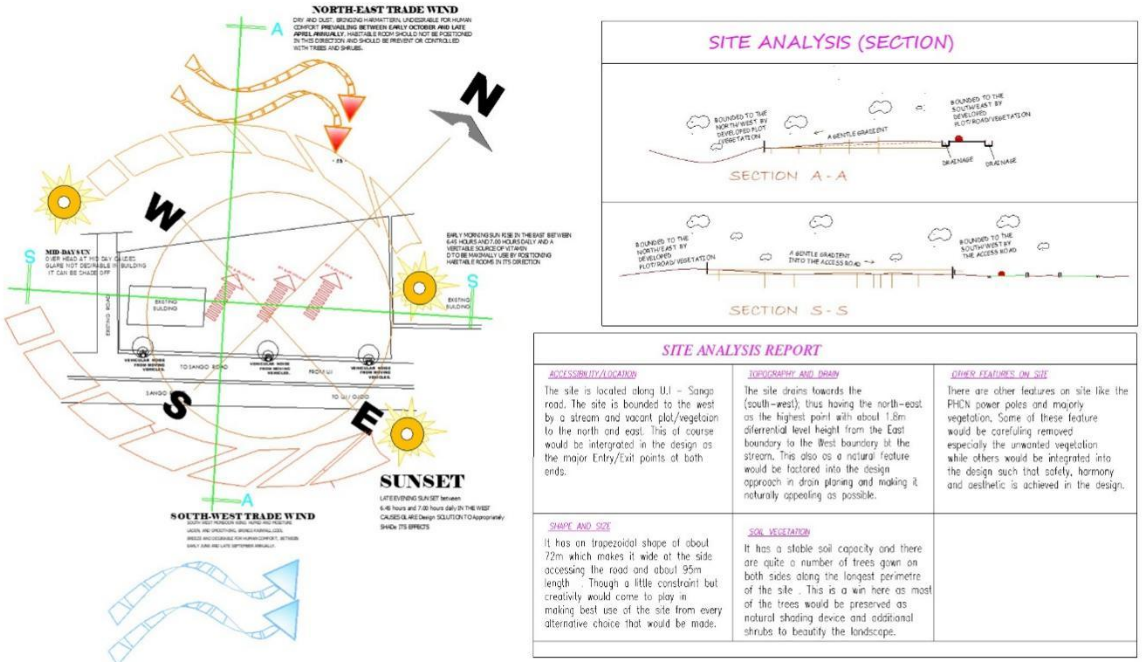

Figure 4.5: Picture Showing the Analysis of the Site.
Source: (Researcher's Field Work)

- Access

Access to site is a major consideration for any development. It makes it possible for people to find their way to the facility. It also makes delivery of raw materials to the site easily. The site of the proposed Fashion House is carefully chosen because of the purpose majorly to serve the community and Nigeria as a whole. The site is easily accessible from virtually all parts of the ibadan city via any form of transportation means.

- Size and Shape

Having duly considered the require area required for this proposal, a site adequate in size and enough to accommodate every activity. Also, a shape that is favorable to the proposed design is vital. The size and shape of the site should be such that it makes planning and zoning uncomplicated. The proposed site is 14,099m^2 and almost a square in shape.

- Proximity to Activity Zone

The proposal such as Fashion House is better located in the activity zone of the city. This is because of the activities involved such as retaining which make shopping of fashion retails item easy; training which will bring in potential students who are scattered all over the city and fashion shows which brings different people from all walks of life regardless weather they are fashion savvy individuals or not. This fashion house is located right besides prestigious University of Ibadan where potential fashion students and fashion retailers are located. It is also located not far from Oyo State Secretariat which has quite numbers of potential customers. Lastly, the offices around has the fashion house targets audience who might shop at the retail stores. These are few among many others.

- Availability of Basic Amenities.

The importance and impact of basic amenities and services like water supply, electricity supply, sewage system, good roads, functioning transportation system, security system etc on a fashion house cannot be over emphasized. These are needed for the effective running of the facility.

- Land Use Ordinance

There can be no development without following policies guiding development in a particular area. These laid down guide lines are to be followed before any development can take place. The proposed site is in a developed institution and commercial area. The design follows the required setbacks as well as other planning requirements.

4.2 Project Analysis and Design Synthesis

4.2.1 Brief Development

The brief has been developed based on the Client's requirement which are as a result of the brand's niches. These includes provision of mass production of garment, production of bespoke outfits as well as ready-to-wear outfits. This requirement gives birth to the production unit that encompasses each of the activity earlier stated and more. Secondly, training of students is another major activity that they carry out and give birth to academy section of the Fashion House. Thirdly, the Client runs fashion show from time to time which usually hold in rented multipurpose halls most of which are not suitable for the purpose they are intended to serve in terms of lighting system, runway settings, changing room and so on. Based on this, the exhibition unit was developed to cater for this need. Lastly, the brand offers clothing consultancy services for many cooperate and Government's establishments, hence the inclusion of the department that sees to this. Because of the numbers of production staff that the brand has and a need to sometime stay on the facility for days when they have bulk orders, the need for accommodation is imminent, and so this was included in the brief. It is proposed that the accommodation will also serve out-of-town students who may be willing to join the fashion academy as well as out-of-town guest attending fashion shows who are proposed to be lodged in the accommodation provided.

4.2.2 Brief Analysis

The design proposal makes provision for five (5) major niches namely; garment production, fashion training, fashion retaining, exhibition and consultancy with accommodation as a supporting facility.

The garment production section makes provision for different department including, illustration, pattern, cutting, sewing and finishing department. This garment production section caters for bespoke outfits, ready-to-wear outfits and mass-produced outfits. Other spaces that complement this department includes fabric store, trimmings and accessories store, tools and equipment store, area for coupling of new equipment/maintenance

The training section of the fashion house has provision for the administrative unit that takes care of training-related businesses. There are offices for instructors as well as classrooms which are for the basic level, intermediary level and advance level in fashion training. There are workshops where practical projects are carried out and they share storage facilities with the production unit.

The fashion retailing section consists mainly the retail outlets where ready-to-wear designs from the production section are showcased on mannequins and on cloth display rack. This outlet enables shoppers to buy from the displayed designs. There are also lettable outlets for the sales of complementary fashion items like shoes, bags, wristwatches, cosmetics, hair outlet. These will be let out to different individuals who are willing to sell their fashion items in the facility. This is an income generation means for the fashion brand.

Exhibition section is to host fashion shows which may be organized by the brand itself or any other interested fashion brand. It is worthy of note that there is no standard fashion exhibition venue in Ibadan as people make use of multipurpose halls which were not designed with fashion exhibition in mind. This will be another major means of income generation for the brand because fashion shows are usually organized in Ibadan from time to time and this exhibition venue will be most preferable as the design resonates well with what a fashion exhibition Centre should be.

Consultancy/ Admin section of the fashion house oversees the overall activities of the facility. This unit controls many other activities including administrative processes in the fashion house, accounting activities such as payment and cash management, employee's salaries, customers bookings, maintaining records of suppliers payments and following up with buyers payments; human resource processes including employees/students orientation and welfare, factory and social compliance; merchandising/marketing department that work as a mediator between factory and buyers coordinating buyers' orders, sending samples, following up with production and also handling all shipments

The supporting facilities provided include hostel accommodation for students in training and also production unit workers. Guest house was also provided for out of town visitors that attend fashion shows which at times extend beyond one day. With this is a cafeteria as well as tuck shop that serve this community of people. Others include the generator house and gate house.

4.2.3 Design Consideration

The design proposal is unique because some factors that shape the holistic approach to the design were carefully considered and are described below;

4.2.3.1 Lighting

The illumination condition of a space plays both positive and negative role in the health of the occupants of the space. This has to do with quality and quantity of lighting available in the space.

Specifically, in the production area of a fashion house where adequate illumination condition is imminent, the total luminous environment usually varies with the type of source of lighting and also where such sources are located.

In this design proposal, high consideration is given to lighting because is a major determinant of how successful a fashion house is in terms of the quality of merchandises produced. Some of the key areas in this design proposal where adequate lighting is highly required are the production area, the training area and retail outlets. The importance of lighting can not be over emphasized at the production area and training section while the necessity for ambient and decorative are at the retail outlets cannot be downplayed. These are complimented by natural lighting through the openings. In addition, natural lighting was heavily exploited at the lettable outlets as well as the administrative section by the combination of natural and artificial lighting system. Same hold for accommodation provided.

4.2.3.2 Ventilation

The need for constant air movement within a space to expel stale air and to replace it with fresh air in order to achieve conducive interior spaces cannot be over emphasized. With good ventilation, the temperature of internal spaces is well maintained for the occupants to be thermally comfortable. This proposal adopted both the natural and mechanical means of ventilation but which much depends on natural ventilation through the use of adequate opening types, sizes and taking the advantage of the climatic condition of the site by proper orientation of the building.

4.2.3.3 Ergonomics

Ergonomics has to do with people's efficiency in their working environment. It takes into account the capabilities and the limitation of the workers while seeking to ensure that equipment, tasks and the environment suits the workers. Safety, ease of use, comfort, productivity/performance and aesthetics are aspect that ergonomics look into. The role of ergonomics in garment production factory is crucial because of the major health risk associated with the production area that is not ergonomically functional. Such risks do not really arise from hazards that are potentially fatal but subtle risks whose effect accumulate over time. For instance, the risk of those who work on the sewing machine has been linked to conditions such as poor workstation design. Factors like repetition, postures and vibrations are associated with higher injury rates. The proposal incorporates some ergonomics strategies particularly in the production area.

4.2.3.4 Fire Safety

Safety concern in a fashion house are more prominent in the production area because it is prone to dangers and hazard by the virtue of the functions the space performs and also the equipment used. Fire safety in this area is given consideration bearing to the facts that hazard due to electrical short circuits, loose connections and other electrical hazards are possible. Fire resistance materials will also be recommended. Provisions will be made for quick discharge of occupants to a muster point in case of fire through the escape staircase in each of the section of the production area and training area. Short travel distances to outside safe areas will also be incorporated for easy escape.

4.2.3.5 Accessibly

Accessibility is an important consideration in any design. It ensures that people with any form of disability are well catered for. This is not only limited to wheelchair users but also those who may be visually impaired. This goes beyond provisions for ramps, wide corridors and elevators which are usually considerations for those confined to wheel chairs but also incorporating tactile elements for those with visual impairment. This design will give due consideration to this accessibility.

4.2.3.6 Circulation

Human and vehicular circulation in a facility of this magnitude is of great importance. With an exhibition area that accommodate up to 500 audience with parking area of over 100 spaces with a circulation adequately planned. To achieve functional circulation within the facility bearing in mind the volume of people shopping or attending a fashion show. For vertical circulation, wide staircases of 1.5m tread width are to be positioned in each of the wings. Also, staircases and lift are proposed to be located withing the production area, training workshops as well as storage facility areas for ease of movement across the floors within the units. For circulation within the site, pedestrian circulation path will be clearly delineated and separated from the vehicular path through the use of both soft and hard landscape elements.

4.2.3.7 Acoustics

The role of acoustics is vital in any interior space. More specifically, the exhibition area and training classrooms of the Fashion House must be given attention. In addition, the production area and training workshops that generate much sounds from equipment used are also to be given due consideration. Every situation related to can be described in terms of the source of sound, the path for transmission of sound, and a receiver of the sound. To achieve good acoustics in this proposals, sound absorbing materials for floor, wall and ceiling will be specified. Also, noise operation in the production area will be isolated such that it has minimal impact on the employees. Also, equipment that will be installed will be ones manufactured with low noise generation.

4.2.3.8 Aesthetics

The aesthetics of a building determine the visual appeal which is as a result of the combined effects of the shape of the building, the size, colour, emphasis, balance, texture, rhythms, proportion, movement, symmetry, alignment, space etc. the proposal will present the most beautiful Fashion House Concept in Nigeria as it will be aesthetically pleasing.

4.2.4 Concept Development

The proposed design takes its conceptual root from the circle of fashion trends which is fashion bond. Fashion and trend are closely related. Trend can be referred to what is popular at a particular point in time. Fashion has to do with latest and popular style of clothing, hair, decoration or even behavior. One thing that is constant with fashion trend is change. It occurs in circles. That is why a style that was trending 20 years ago can come back again.

Fashion trends occur in five stages. They are introduction, rise, acceptance, decline and obsolescent stages. Introduction stage is when a new style is just being introduced. At the rise stage, fashion influencers wear the trendy outfits. The trend becomes accepted and adopted by many at the acceptance stage and this is when the outfit is often mass-produced. The decline stage is when the trend has been adopted into the mainstream fully and has lost its sense of newness. The final stage is obsolescence stage, when the once trendy clothes are no longer worthy to be fashion-forward.

Figure 4.6: Picture Showing Wheel Representing Circle of Fashion in Relation with Trends.
Source: (Researcher's Field Work)

Concept Development

Concept: Revolving Fashion Trends

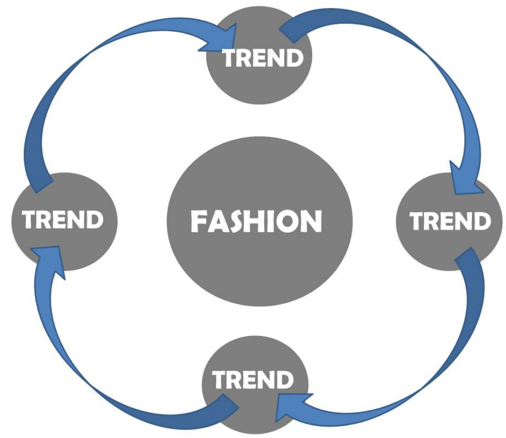

Figure 4.7: Picture Showing the Relationship Between Fashion and Trends.
Source: (Researcher's Field Work)

BRIEF ANALYSIS

Figure 4.8: Picture Relating the Concept of Revolving Fashion Trend to The Design.
Source: (Researcher's Field Work)

The building form for this propose fashion house was developed with the circle of fashion trend in mind. It features four main wings with each standing for different activities in the fashion house. The essence of a fashion house is to produce clothing which has to be showcased to the public before they can become aware of the collections which is what consequently generates money for the brand. If the collections are not showcase to the world, no one will see it.

4.2.5 Functional Relationship

This has to do with different spaces within the facility and how they are functionally related. This fashion house has been divided into two major zones namely; the public and semi-public zones. The criterion for this zoning is the function that they perform. Activities such as shopping at the lettable fashion outlets and at the clothing retail outlets as well as attending fashion shows are categorized as public. In the same vein, administrative activities like making enquiries, bookings, consultation etc. are zoned as public. These public zones are located at the front/easy access region of the building while semi-public zone activities like garment production, model lodge and students training are located at the back region of the building. This shows that the activities at the public zone are related while the while the activities at the semi-public zone are also related.

4.2.6 Space Allocation / Schedule of Accommodation

The fashion house has five major sections with supporting facilities. Each section has different functional spaces and they are highlighted below;

4.2.6.1 Administrative Section

1. General reception / waiting area / display area
2. Visitors waiting area
3. Booking office
4. General office
5. Conference room

6. Fashion house manager's office
7. CEO's office
8. Conveniences

4.2.6.2 Retailing Section

1. Ready-to-wear retail outlets 1 to 4
2. Complimentary fashion items retail outlets 1 to 10
3. Fitting rooms
4. Display cubicle
5. Conveniences

4.2.6.3 Exhibition Section

1. Fashion runway
2. Audience seating
3. Models' lounge
4. Make-up room
5. Cloak room
6. Conveniences

4.2.6.4 Production

1. Reception / waiting area
2. Fitting / measurement room
3. Finished goods room
4. Office
5. Finishing and quality control area

6. Fashion illustrators’ office
7. Supervisors’ office
8. Monogram unit
9. Packaging and shipping unit
10. Sewing hub 1 and 2
11. Fabric store 1 and 2
12. Trimmings and accessories store
13. Tools and equipment store 1 and 2
14. Equipment coupling area
15. Store manager’s office
16. Conveniences

4.2.6.5 Academy

1. Reception / waiting area
2. Instructors’ office 1 to 3
3. Beginners classroom
4. Intermediary classroom
5. Advance classroom
6. Sewing workshop 1 and 2
7. Students and workers lounge
8. Seminar hall
9. Conveniences

The major supporting facility is the accommodation for students and workers as well as guest visitors. The same building also has cafeteria that serves the whole community, a tuck shop, a laundry services and utility area / general lounge for the use of those in the accommodation unit.

4.2.6.6 Accommodation / Cafeteria

1. Hostels
2. Guest rooms
3. Cafeteria
4. Laundry
5. Kitchen
6. Tuck shop
7. Conveniences

4.2.7 Space Programming

Table 4.2: Schedule of Accommodation of Administrative Unit.

Space	Area (sqr.mtrs)	Numbers. Available	Average No of Occupants	Total Area (sqr.mtrs)
General Reception /				
Waiting Area /				
Display Area	149.42	1	10	149.42
Visitor's Waiting Area	41.40	1	10	41.40

Conference Room	60.24	1	45	60.24
Booking	21.59	1	3	21.59
General Office	27.01	1	3	27.01
Fashion House				
Manager's Office	25.65	1	1	25.65
C.E. O's Office	44.96	1	1	44.96
General				
Conveniences	33.22	1	6	33.22
Private				
Conveniences	9.94	1	2	9.94
Total Square Area	**413.44**			**413.44**

Source: (Researcher's Field Work)

Table 4.3: Schedule of Accommodation of Training Unit.

Space	Area (sqr.mtrs)	Numbers. Available	Average No of Occupants	Total Area (sqr.mtrs)
Visitor's Waiting Area	41.40	1	10	41.40
Instructor's Office	21.60	3	1	64.80
Beginner's Classroom	68.69	1	24	68.69
Intermediary's Classroom	53.99	1	20	53.99
Advance Classroom	44.99	1	16	44.99
Student Workshop	208.72	2	50	417.44
Student /				
Workers Lounge	16.20	2	5	32.40
Monogramming				
Workshop	37.81	2	3	75.62
General Conveniences	33.22	1	6	33.22
Private Conveniences	9.94	1	2	9.94
Total Square Area	**536.56**			**842.49**

Source: (Researcher's Field Work)

Table 4.4: Schedule of Accommodation of Exhibition Unit.

Space	Area (sqr.mtrs)	Numbers. Available	Average No of Occupants	Total Area (sqr.mtrs)
Fashion Runway	196.69	1	5	196.69
Audience Sitting Area	175.75	1	250	175.75
Back Stage	107.29	1	25	107.29
Model's Lounge	177.23	1	30	177.23
Female Make-Up Room	55.08	1	10	55.08
Male Make-Up Room	18.33	1	4	18.33
Cloak Room	28.50	2	4	57.00
Model's Lounge Store	8.77	1	-	8.77
Female Make-Up Conveniences	11.42	1	2	11.42
Male Make-Up Conveniences	6.24	1	2	6.24
Total Square Area	**785.30**			**813.80**

Source: (Researcher's Field Work)

Table 4.5: Schedule of Accommodation of Production Unit.

Space	Area (sqr.mtrs)	Numbers. Available	Average No of Occupants	Total Area (sqr.mtrs)

Visitor’s Waiting Area	45.19	1	10	45.19
Fitting’s /				
Measurement Room	21.60	1	3	21.60
Finished Goods	21.60	1	-	21.60
Supervisor’s Office	21.60	1	1	21.60
Monogram Unit	27.00	1	5	27.00
Logistic Unit	27.05	1	6	27.05
Packaging /				
Quality Control	100.00	1	25	100.00
Sewing Hub 1 &2	208.54	2	48	208.54
Computer Drafting Unit	37.81	1	6	37.81
Workers Lounge 1	16.20	1	4	16.20
Workers Lounge 2	23.34	1	5	23.34
Fashion Illustrator’s				
Office 1	21.60	1	1	21.60
Fashion Illustrator’s				
Office 2	27.74	1	1	27.74
Fabric Store	23.29	1	1	23.29

Maintenance Office	77.49	1	5	77.49
Trimming /				
Accessories Store	79.03	1	-	79.03
Fabric Store 1	77.49	1	-	77.49
Fabric Store 2	79.03	1	-	79.03
Tool / Equipment Store	51.52	1	-	51.52
Equipment				
Coupling Area	45.12	1	2	45.12
Store Manager’s Office	26.30	1	1	26.30
General Conveniences	33.22	1	6	33.22
Private Conveniences	9.94	1	2	9.94
Total Square Area	**1,101.7**			**1,310.24**

Source: (Researcher’s Field Work)

Table 4.6: Schedule of Accommodation of Retaining Unit.

Space	Area (sqr.mtrs)	Numbers. Available	Average No of Occupants	Total Area (sqr.mtrs)
Lettable Retail				
Outlet Type 1	28.85	2	-	57.7
Lettable Retail				

Outlet Type 2	41.46	6	-	248.76
Lettable Retail				
Outlet Type 3	71.09	2	-	142.18
Ready-To-Wear				
Retail Outlet	101.31	4	-	405.25
Display / Showroom	81.46	2	-	36.92
Total Square Area	**324.17**			**890.81**

Source: (Researcher's Field Work)

Table 4.7: Schedule of Accommodation of Accommodation Unit.

Space	Area (sqr.mtrs)	Numbers. Available	Average No of Occupants	Total Area (sqr.mtrs)
Hostel Room	15.96	28	2	446.88
Hostel Conveniences	3.80	28	1	106.4
Lounge 1	23.58	4	1	94.32
Guest Room 1	17.00	6	1	102.00
Guest Room				
Conveniences	4.43	6	1	26.58

Source: (Researcher's Field Work)

Lounge 2	26.28	2	2	52.56
Guest Room 2	17.01	2	1	34.02
Reception / Waiting Area	47.92	1	15	47.92
Cafeteria	108.00	1	56	108.00
Kitchen	63.00	1	5	63.00
Store	10.62	2	-	21.24
Cloak Room	8.85	2	3	17.7
Cloak Room				
Conveniences	3.60	2	2	7.2
Delivery Bay	30.25	1	1	30.25
Kitchen Laundry	25.64	1	2	25.64
Hostel Laundry	27.55	2	2	55.10
Mini-Mart	19.43	1	1	19.43
Total	**452.92**			**1,258.24**

Source: (Researcher's Field Work)

4.2.8 Construction Methods and Materials

Given the nature of this brand, budgetary considerations on the project necessitated the use of design solution that is cost effective and so the project will keep within the price points set by the Client and still be able to achieve the desired functionality and effect. The design uses variety of passive climate control techniques and lessen the need for resource-intensive mechanical environmental control measures. The construction materials used are a combination of block, concrete, steel and glass keeping in mind the climatic needs of this region and yet retain the design intent. Energy efficiency is a prime concern with cost effective passive design strategies.

Other factors that are considered include;

- Site condition especially soil type and bearing capacity.
- The functional requirement
- The structural system
- Availability of construction materials and labour in the locality
- Cost of construction, materials and the cost of maintenance

4.2.8.1 Basic Building Materials

The following are the basic materials specified for this project;

- 225mm sandcrete block walls for exterior walls
- 150mm sandcrete block walls for interior walls
- Glass in aluminum frame
- Reinforce concrete for floor
- Steel for roof frame
- Longspan aluminium sheet for roof covering
- Gypsum board for ceiling
- Timber and steel for furniture work
- MDF panel boards
- Perforated steel sheets as façade materials

- Fine texture paint, glaze ceramic wall tile and 3D panels internal walls finishes and textured paint for external walls.

4.2.9 Services

Electrical, lighting, mechanical (HVAC), acoustics, refuse, sanitary and plumbing building services brings building and structure to life. The mechanical and electrical systems necessary for the safe, comfortable and environmentally friendly operation will be designed, installed, operated, and monitored by the building services engineering team with the Architect as the prime consultant.

4.2.9.1 Electrical

The national grid will provide power to the building. The supply arriving must be tunneled underground. The metering tariff shall be adopted. The electrical switch room shall be located in a dedicated area with internal access. The room location shall be such that it does not present difficulties for services distribution from the adjoining plant spaces or rooms and provides for economic distribution of services.

The primary switchboard will have a metal clad-cubicle design in accordance with established norms and laws. At least 25% of switch gear assembly shall be spare. On the incoming mains, electronic surge protection will be protected. As much as it is practical system between the main switchboard and distribution board is made hidden, but still accessible without causing any structural damage to the building. Electrical distribution cables will be carried via galvanized trays, trunking or conduit as necessary. The distribution board will be contained within built-in fire-stopped construction with the proper door closure, without them projecting into circulation spaces.

4.2.9.2 Lighting

There shall be provision of correct colour and intensity of lighting for proper illumination in the spaces. It is required to give lighting that is the proper colour and intensity of illumination. The lighting fixtures must be of high-quality reliable durability and ease of maintenance. Artificial lighting will be provided for supplemental functions. In classrooms, circulation areas, and general-purpose places, linear high frequency fluorescent type with opal diffusers shall be used utilized. For reasons of energy efficiency, maintenance and safety, up-lighting and suspended lights are not recommended. Compact fluorescent lighting shall be employed in retail locations as well as the main entry reception area for ornamental purposes. In order to treat the bathroom area as a single space when determining the number of light fixtures, toilet cubicle barriers will be terminated below ceiling level. Shower areas will have adequate lighting placed outside of the cubicle wet areas. i.e in the general circulation spaces. Fitting shall not be placed in a way that makes changing tubes hazardous to health and safety. The most cost effective and energy efficient option shall be taken into consideration when chosen tubes. The placement of light fixtures must not create glare or shadows. Each space's lighting system must only be used within that space. The arrangement of light switches in teaching spaces will be such as to maximize natural sunshine and allow for independent management of individual rows illuminating regions that benefit from daylight.

Automatic lighting controls in classrooms shall be based on manual on / off switching, absence detection, and day light sensing. This means that light must manually turn on and will automatically dim or turn off based on the signal from automatic control. The lighting should be allocated to account for the diverse effects of the different types of daylight in corridors where some part may benefit from external glazing and others may not. To maximize the use of natural daylight, highly reflective natural glass tubes shall be incorporated into the design of corridors. Standard plastic light switches which are used for surface installation. They are also designed to fit flush with the back box.

Depending on the building's design, the lighting conduits should typically be run on surface or concealed-mounted galvanized steel conduit. The push-type time delayed release light switches for stores and other locations shall be placed on the interior wall of the room on the side opposite the door hinges. When renovating lighting system, the layout shall maximize the reuse of existing conduits and other components.

High level, wall mounted buckhead fittings type shall be used for external lighting and where this cannot be achieved, light mounted on hinge high columns shall be considered in areas such as driveways, pedestrian ways, car parks and entrance / exit locations. It is essential that the lighting does not create a floodlight facility for after-hours playing, gathering etc. or a glare on any building façade where access is available.

4.2.9.3 Mechanical (HVAC)

The installation of mechanical services shall include services for heating, ventilation, water, soils and waste, and fire protection. The micro climate of the site, the building shape and space orientation, the building's thermal performance characteristics, occupants' patterns and pollutant emission regulations will be considered in the design of the mechanical services.

- The HVAC loads in different parts of the building at different times and in various location will vary. The system will only run as needed to coincide with core business hours if time controls are properly set up. The energy consumption of an HVAC system is influenced by five key factors; The layout, design and operation of the building have effect on how the external environment impacts internal temperature and humidity;

- The air quality and indoor temperature that is required more extreme temperatures, greater precision and more refined air quality consume more energy;

- The heat that is internally generated as a result of people, equipment and lighting have an impact on how the building retains warmth;

- The HVAC system's design and efficiency ensure that heat, cool, and moisture are control exactly where they are needed in the structure;

- The HVAC system's running hours and controllability only allow for operation at necessary times.

4.2.9.4 Acoustics

Spaces that produces noise and those that are sensitive to noise shall be situated, built and constructed in a way that minimizes noise interference between them. Between classrooms and other noise-producing areas, the educational zones shall achieve a minimum noise reduction of

40 dB. The elimination of transmission of noise between spaces is a matter of primary importance. Spaces such as production rooms which are bound to produce a lot of noise will safe the floor beneath and their ceiling for the floor beneath it as well as that above. The space will be used to pass services through the building. This would be done to minimize as much as possible the amount of noise transferred to adjoining rooms and floor levels.

4.2.9.5 Refuse

Refuse generated from this facility will be handled in this project through the use of incinerator which will be located at the far back of the site given a consideration for easy access.

4.2.9.6 Sanitary

All other structures intended for human habitation or usage on property next to sewage system or equipped with private waste disposal system shall have efficient sanitary facilities. Provision is made for separate facilities for each sex. Each floor has four to six wings of male and female conveniences to take care of the crowd likely envisaged especially during fashion shows. All water closets and urinals will be provided with flushing system.

4.2.9.7 Plumbing

The general system of installing plumbing works are as follows;

(a) All pipes and fittings shall adhere to the waterworks ordinance's and waterworks regulations criteria.

(b) A license plumber shall perform plumbing work under the direction of a mechanical and electrical engineer.

Chapter Five

Conclusion

5.1 Project Appraisal

The concept of fashion house has not been given much attention probably because fashion is viewed as more of art but with literature studied and also case studies carried out in some existing fashion houses in South-West, Nigeria. It is imperative to give due awareness to this especially with majority of fashion brands increasing in number and of which majority are not meeting up with some health needs of workers in terms of ergonomics and lighting.

This thesis can be appraised as being diligently carried out in relation to the fact that it covers most aspects of the type of building.

5.2 Conclusion

Fashion has come to stay and it is part of our lives whether we like it or not. Fashion houses are evolving on a regular basis and a functional design will enhance productivity of such organizations. Though a design that gives consideration to effective lighting and with less attention to artificial lighting means, not only will there be a reduction of the building energy consumption, visual comfort of workers will be enhanced and consequently productivity will be increased.

5.3 Recommendation

One of the challenges encountered in carrying out this research was insufficient literature that addresses issues that pertain to fashion houses. Although, there were quite a number of literatures on textile industries but quite a few numbers of research on fashion houses.

It is therefore recommended that many aspects of this arm of fashion industry should also be looked into to increase the data base for fashion design materials. This thesis looks at lighting as an important consideration in a fashion house; others can come up with other aspect such as acoustics, ventilation and ergonomics.

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Potter's House Consult Limited, Ibadan, Oyo State.	• Project Architect • Site supervision • Interpretation of Drawings on site • Subcontractors' selection and payment • Procurements of Building Materials • Site meetings coordination and report writings	2012-Till date

E. Publications

Lighting Considerations for Fashion House

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Signature   Date

The University Compliance Form

This is to certify that the thesis by Oluwole Victor AJAYI, with the matric number LG/PG/002866 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

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