



UNIVERSITY OF NAIROBI

College of Architecture and Engineering School of Arts and Design

BDS 413: PROJECT PAPER

(Interior Design Specialization)

**FORM FOLLOWS FUNCTION IN INCORPORATION OF ECO-DESIGN IN
ESTABLISHING SUSTAINABLE INTERIORS AND EXTERIORS IN
CHURCH**

By:

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Project paper submitted in partial fulfillment of the requirement for the Bachelor of Art in Design Degree submitted to the school of the Arts and Design, University of Nairobi.

Submitted: 14th April 2020.

DECLARATION

I, Onjala Donna Aluoch, hereby declare that this is my original piece of work and it has not been presented for the award of Degree in any other university. Where ideas of other scholars have been used, I have clearly indicated in a standard way.

To the best of my knowledge I have not committed any plagiarism or deliberate omission in the acknowledgement of original works by others.

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DEDICATION

My first dedication is to the Lord Almighty for opening the doors for provision throughout the scope of this degree and this project. None of this would have been possible without him.

I also dedicate this work to my parents, Mr. and Mrs. Onjala, and siblings who have supported in every necessary way in bringing this task to completion. Be it financially, emotionally and psychologically. They have been a crucial pillar in supporting all my ambitions up to this point.

I wish to dedicate this paper to my fiancé, Benard, who patiently waited for me to complete this course despite the occasional breaks brought about by unavoidable circumstances and offered guidance and moral support whenever necessary. May God bless you.

Lastly, I would like to dedicate this paper to my church family including my fellow youths and especially my spiritual father, Bishop Martin Gikori, for such great insight concerning the church and Godly setting.

May God bless you all.

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ABSTRACT

Gospel News Community Church is located along Base Road, off Kamiti Road in Zimmerman area of Kasarani, Nairobi. It was initially an open playing field with dust and minimal growth of grass on the ground due to the frequent depletion of grass by players. In contemporary society, the need for environmental sustainability has become a mandatory tool for reducing and eventually eradicating degradation of natural resources while building and expanding the design world. The two major themes of eco-design and form-follows-function are aimed at creating balance and universal convenience.

Chapter one provides an in-depth introduction of the study by stating the site and explaining the origin of the study's inspiration. It also sets the foundation of the study through statement of objectives which shall guide the whole implementation of solutions on the site. Other factors studied in chapter one include further information of the site including the geographical, conceptual and contextual scope. Summarily, chapter one is the starting point towards understanding what the whole project will be directed towards.

Chapter two will consist of literature review which displays previous research studies carried out by other designers concerning the similar philosophy and context. Since the main themes being covered include eco-design and form-follows-function, we shall give detailed explanations for each in order to further understand what is being implemented and the expectations. To further conceptualize the project, we shall study a design exemplar and champion that has demonstrated expertise in the design philosophy of choice. Finally, we shall examine the design process which entails a step by step guide on how to implement the design philosophy onsite.

Chapter three is about research design and methodology. In summary, this chapter addresses the data collection and analysis techniques. This phase is mandatory for the purpose of gathering facts from the field which will be used as proof and manipulated to establish credible solutions. Chapter four involves site analysis and interpretation of findings. It is a continuation of chapter three and processes the data collected into meaningful information that can provide the way forward. At this phase, we shall use the information analyzed through quantitative and qualitative analysis to answer the research questions that were formulated from the objectives in chapter one. Finally,

chapter five provides summary, findings, conclusions and recommendations from the whole study that has been conducted on the site. This will mark the end of the study with the establishment of appropriate solutions.

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Operational definition of terms

Eco-design: is an approach and principle to designing product with special consideration for the environmental impacts of the product during its whole lifecycle.

Form-follows-function: is a philosophy associated with late 19th and early 20th century architecture and industrial design in general, and it means the shape of a building or object should primarily relate to its intended function or purpose.

Congregants: a member of a congregation, especially a church.

CHAPTER ONE

1.0 INTRODUCTION OF THE STUDY

Below is a brief introduction of the study.

1.1 Introduction

The mandate of this study will be to incorporate weaving patterns and eco-design in designing a church and its important spaces like the board room and head office. Relevant information pertaining the weaves and eco-design will be gathered from a range of reliable sources. The information gathered will be used to establish meaningful information that will act as the guiding principle towards completing this study. The necessary scientific research methods will be used to identify the major problems that will be solved by the principles and philosophies stated in the topic. In the end, appropriate recommendations will be made to act as solutions to the problems identified after careful analysis.

Eco-design currently stands as one of the most valued philosophies in the contemporary design world. Therefore, it will be used immensely throughout the design process of this study in the form of repurposing water hyacinth and reducing usage of wood from trees. The different weaves incorporated will draw inspirations from a range of African communities that greatly manipulate the weaving technique in their day-to-day life and culture.

There are seventeen sustainable development goals according to the United Nations. The main SDGs that will come in handy for fulfilment of this study consist of number 11, 13 and 14 which include sustainable cities and communities, climate action and life below water. Sustainable cities and communities will be achieved by use of environmentally friendly philosophies like eco-design. Climate action will be achieved in many ways through the adjustments that will be made to the landscape and interiors and also through the water hyacinth material that will be used as an alternative for the furniture as an advocacy for the environment. Water hyacinth will also fulfill this goal through the advocacy against large-scale consumption of wood or use of plastic. Life below water will be protected through the putting of water hyacinth to better use in order to solve the current problem of water drainage on Lake Victoria due to overgrown hyacinth.

By using Gospel News Community Church, Kasarani as a case study, the interior architecture, furniture and landscaping aspects of interior design will all be attended to and used establishing suitable design along the lines of African weaves and eco-design. Moreover, it will solve the rampant issues of frequent breakage of furniture and soil erosion and create an unconscious awareness among people concerning environmental sustainability through the frequent interaction with sustainable material and landscapes.

1.2 Background of the Study

Gospel News Community Church, Kasarani, as the name suggests, is a place of worship with a population of approximately 200 congregants. It is a temporary structure built entirely with iron sheets and a half wall all round made of stone. The furniture used in the church and even the children's church section consists of plastic chairs mainly found in the local market. The landscape is a big compound with the east wing fenced with barbed wire and the west wing fenced with a wall constructed halfway up and a grown bush for a section of it.

There has been frequent need to purchase new seats for both the main church and the children's church due to frequent breakage of the plastic seats. The breakage becomes prevalent especially during the sunny season as the seats are weakened by the heat radiated by the iron sheets. There is also an aspect of inconspicuous body size biasness illustrated by the plastic seats. Small-bodied congregants are comfortable using the seats while big-bodied people experience challenges at times especially when the seats become too weak to contain their body weight. For the children's church section, the small plastic seats come in one size hence inconveniencing a certain age group who are forced to fit into the seats they have outgrown.

Many attempts to grow grass have failed due to the frequent movement of people around the compound with no elaborate paths to avoid stepping on the grass. For this reason, grass has grown unevenly with only the less frequented sections sprouting well. Soil erosion and mud are also experienced immensely during the dry and rainy season respectively due to the absence of adequate cover. There is room for improvement of the fence to create a sense of uniformity and enhance environmental sustainability.

Other than the situations listed above, there are also minor corrections to be on the roofing of the main church. The roof leaks at some points despite the iron sheets covering it being new. Summarily, the points of focus identified include the interior,

furniture, landscaping and a bit of exhibition and display in selected parts, all of which will incorporate the design philosophies stated in the topic.

1.3 Statement of the Problem

Gospel News Community Church, Kasarani environment need replacement and refurnishing with more sustainable ones.

1.4 Objectives of the study

Below are the main and specific objectives of the study.

1.4.1 Main objective

To investigate how church interiors and exteriors can incorporate eco-design and form follows function in creating long-term sustainable spaces.

1.4.2 Specific objectives

1. To examine existing interior and exterior designs of church spaces used by the congregants in Zimmerman.
2. To determine a criterion for choosing materials for church space design with reference to how others have been done.
3. To develop creative ways of enhancing functionality of spaces with the use of eco-design as the underlying theme.
4. To determine the credibility of eco-design as a major inspiration in the design field.

1.5 Research Questions

1.5.1 Main research question

How can eco-design and form-follows-function using locally available materials be incorporated in the design of interior and exterior design long-term sustainable church spaces?

1.5.2 Specific research questions

1. What is the current state of the interiors and exteriors of most churches in Zimmerman area?
2. How widespread is the consideration of eco-design as a major theme in churches?

3. How can eco-design be creatively implemented in the church space in a way that brings harmony with both the form and function aspects?
4. What are the key considerations when deciding on an eco-friendly material to be used and how credible are they?

1.6 Significance of the Study

The study will play a major role towards generating permanent solutions towards handling the water hyacinth on Lake Victoria. It will portray the occurrence of hyacinth as a blessing in disguise rather than a natural disaster.

It will also provide safer alternatives to our environment by encouraging sustainable design and eradicating deforestation. Sustainable design is one of the trendiest themes in today's design world. Therefore, this study will contribute towards the achievement of this vital role.

The study, through the sustainable aspect, will cut on the expenditure diverted by the church for the purpose of frequent furniture replacement. It will also enhance universality by making the available seats comfortable for all age groups.

1.7 Limitations of the study

The main limitation is time. For instance, planting of trees and grass in the landscape would require more time for growth in order to manipulate into the desired form. Furthermore, the process of preparing enough hyacinth to make all the furniture would take a significant amount of time out of the available time.

The distance between the location of the hyacinth and the case study site is long. For this reason, more costs would be incurred in form of transportation.

1.8 The scope of the Study

1.8.1 Geographical area

The site of this case study is Gospel News Community Church located in Zimmerman, Nairobi, Kenya. It is surrounded by residential flats to the East, commercial office stalls to the North, and an open field to the South and West.



Figure 1: Location of Gospel News Community Church on map (Google, 2020)

1.8.2 Conceptual

This study will emphasize on maintaining the touch of African feel to design in whichever concept. It will also illustrate the possibility of optimism in dealing with environmental problem by using design as a problem solver. Lastly, it will also tactfully instill a subconscious awareness of sustainability by creating an environment that visually speaks for itself.

1.8.3 Contextual

All the literature sourced for this study will fall in the context of ‘form follows function’ and eco-design.

1.9 Summary

Chapter one included detailed information of the site for the purpose of familiarization with the site and the basis of the study. A background of the study was first conducted to provide basic information concerning the site and the existing conditions of the ground. This was helpful in establishing the underlying perspective that would enable us to understand the need for the design rectification and implementation. The problem of the site was then stated. The next crucial phase involved noting down the objectives of the study that comprised of one main objective and four specific objectives. The objectives stated were used to develop research questions in the same proportion.

The next subtopic was about significance of the study where the benefits of the study were highlighted and the beneficiaries were also identified. The few unavoidable limitations that act as setbacks to conducting of the study were listed generally for the purpose of awareness and risk assessment. Finally, we examined the geographical,

conceptual and contextual scope of the study in order to understand the various aspects of the site and guide further research in other features like climate and social setting.

CHAPTER TWO

2.0 LITERATURE REVIEW

This chapter addresses all existing background knowledge and existing information about eco-design and form-follows-function philosophy.

2.1 Introduction

In this chapter, we shall examine works and studies done by other exemplars in the similar field to figure out their approaches and thoughts on the philosophies. We shall also examine the processes followed and useful ideologies developed to come up with credible solutions to similar problems identified in the church site. Although some exemplars may seem to incline more towards other design specializations, their works and ideologies are used to show how applicable the philosophies are in interior design and its four branches including furniture, exhibition and display, interior architecture and landscaping (Abercrombie 2018).

2.2 Review of Theoretical Literature

This section examines what has been written by other authors pertaining the design theory, philosophy and technique discussed below.

2.2.1 Eco-design

Eco-design is referred to as ecological design in full. This a design principle that emphasizes on the use of ecologically friendly matter in the design process. Any design form that seeks to minimize the direct negative impacts on the environment by use of self-integrating living processes, qualifies to be called an eco-design. Water hyacinth has been a troubling issue within the ecosystem and especially harmful to the existing water bodies within the ecosystem (Dalhammar 2016). The high rate of multiplication and the poorly defined measures put in place to control it have accelerated the negative impacts it has had on aquatic life and the water bodies at large. Despite being a naturally occurring physical feature, certain factors have contributed to the uncontrollable occurrence of this sea weed that is now threatening to extinguish some of the most vital water bodies on the planet. One major feature that could be to blame for this situation

is climatic change and human activities that result in unwanted spread of the hyacinth seeds in undesirable areas.

There are various modes of ensuring environmental sustainability including reduce, reuse, recycle, repair and rethink. By using water hyacinth as the main material, eco-design will be achieved at its fullest by embracing reduce, reuse and recycle techniques. Reduce will be applied through the reduction of wood used hence minimizing cases of deforestation which are as rampant as the Lake Victoria hyacinth calamity. Most of the interior design activities that would previously have required the use of wood will have a significant portion replaced with processed water hyacinth and applied using the weaving technique.

The reuse concept will also be implemented through the diversion of water hyacinth from processing of fertilizers to interior design (Hayles 2015). Currently, the major commercial use of hyacinth involves manufacturing of fertilizers for farm use. However, it has not been efficient enough as a remedy for eradicating the water hyacinth calamity since fertilizers are only on demand on seasonal basis during the planting season for farmers. For this reason, introducing water hyacinth for use in the interior design field will not only provide a solution to the hyacinth calamity on Lake Victoria but also act as a good replacement to the plastics and other non-biodegradable matter used in the interior design field. Finally, the recycle concept will be achieved because woven hyacinth can easily be recycled when it gets worn out through a series of restoration processes that will leave it looking as good as new (Dihua,2007)..

There are seven aspects of eco-design including:

1. Low impact materials: An environmentally modified material must work towards reducing the negative impacts of the creation of the design on the society. For example, the use of water hyacinth rather than wood for furniture-making reduces the general problem of deforestation hence increasing the retention of trees. The result is a balanced ecosystem. Moreover, the use of water hyacinth for design eliminates the general problem of strain on water bodies and aquatic life due to oxygen degradation and dropping water levels.
2. Reducing material use: Environmentally modified products offer relief on the amount of material used. This is almost like a minimalist approach. However, reducing material use can also be interpreted in terms of increased use of renewable

resources rather than non-renewable. For instance, in the design of furniture, the introduction of hyacinth should result in the reduction of plastic used in the design of the furniture of choice.

3. Optimizing production techniques: By doing this, the outcome considered as waste should be reduced or at least have alternative uses to ensure the maximum use of the available resources. An advancement in technology also works well towards implementing this strategy since the number of processes involved in the production process reduces hence cutting on the amount of energy needed.
4. Optimizing distribution systems: Getting the best cheapest and least energy-consuming transport system is necessary at this point depending on a number of other factors including quantity of products to be transported. For instance, it would be more economical to get one huge vehicle to transport many products rather than many small ones for every product. Furthermore, situating the manufacturing zone as close as possible to the source would significantly reduce on energy and costs.
5. Reducing impacts of use: In this aspect, it is important to ensure that the use of the finished product does not lead to intoxication of the ecosystem. For instance, the use of hyacinth furniture is healthy to the environment since any disposal of worn-out furniture supplies nutrients to the soil. Plastic ware on the other hand, slowly emits harmful gases to the atmosphere after consistent heating by the sun (Rossi, et al, 2016).
6. Increasing lifetime or durability: This involves making the environmentally modified product more long-lasting. For example, one of the most effective ways to increase the durability of hyacinth products would be to add a coating layer of wood varnish to prevent direct contact with water. Since the volatility of the hyacinth is in its dryness, preventing any direct contact with water would make the resultant product last longer.
7. Optimizing redeemability: When the life of the environmentally modified product is over, it should still be possible to manipulate it by upgrading it, designing for a second life with a different function or reusing its components. This is summarized as recycling, reusing and up cycling irrespectively (Ritter, 2006).

2.2.2 Form Follows Function

This is a design philosophy that places emphasis on the use of a structure over its outlook. It reasons that paying attention to the functionality features of a structure will determine the form it takes in the end and not the other way round. For example, in this case, the seats in church will be designed to be able to accommodate small luggage like handbags. Therefore, attention will be given to the seats' ability to fulfil its sitting and storage function simultaneously before any alterations can be made to the form (Thayer, 1989).

Some of the main reasons why form should follow function rather than vice versa for this site is that interior design will change overtime, there is more value in functional spaces and it is less costly. The nature of activities requires all equipment to always maintain their functionality. Form can be altered any time especially during special events like weddings using objects like flowers and linen to create a theme. In today's interior design world, churches need functional spaces due to the rise number of believers. As a church grows, there is more need to be able to comfortably accommodate new masses hence the need for function over form. Lastly, form follows function reduces the cost that would be incurred in altering spaces to sustain the function for which the space is designed.

2.2.3 African Weaving Patterns

The manipulation of water hyacinth through weaving will bring a touch of African feel and outlook to every product and space in which it is implemented. Inspiration will be drawn from random Kenyan and African communities.

2.3 Design Champion: Achenyo Idachaba

Achenyo Idachaba is a Nigerian-based designer and entrepreneur. She first identified the issue of water hyacinth that was threatening to displace the waterside communities due to the oppression of resources relying on the adjacent lakes and rivers. Her inspiration was further triggered by the sight of a group of fishing boats trapped in the hyacinth mesh formed around them. The abundant amounts of free raw material lying before her sparked the idea of an unending business and design idea. After harvesting the hyacinth, Achenyo allows it to dry before further processing it into fiber-like form for use in weaving of her signature bags and tab holders.

In the case of interior design, the same idea is very much applicable but the end products are different. The harvesting part all the way to the weaving part remains constant but the end product is furniture made of the same water hyacinth material. Achenyo's idea has changed the whole view and mentality that people have towards water hyacinth as being a waste and nuisance. Instead, it has gained purpose and is used for commercial design. Therefore, it is possible to repurpose the water hyacinth that seems to be causing trouble in water bodies. One main trait of water hyacinth is that it multiplies rapidly due to quick wind pollination. For this reason, creating a positive purpose for it could be the long-awaited solution for combating the problem of overgrown hyacinth in water bodies.

In this case scenario, water hyacinth that is processed can be used to make many alternative products. When the created product gets rugged, it is simply reprocessed and used to make a different product to serve a different purpose. The meaning attached to the existence and multiplication of water hyacinth on water bodies can change drastically depending on the functionality allocated to it. Rather than making it a continuous source of trouble for communities, it can be termed as a blessing in disguise simply because of the key flexible functionalities it carries.

She rarely gave any titles to her work. They were simply products of creativity in manipulating water hyacinth to create beautiful designs. Her organization is called MitiMeth and deals in production of hyacinth products.



Figure 2: Achenyo Idachaba's company collection (Google, 2020)

The hyacinth she harvests is majorly used in product design. However, this is clear proof that it is possible to manipulate water hyacinth into usable products. There is no scope as to the nature of products she produces. She can make baskets, ladies' accessories and even bags. Whatever she thinks of, she goes for. Her innovativeness her won her major special awards including the Cartier Initiative Award for women in Sub-Saharan Africa in 2014.

2.4 Design Exemplar: Louis Sullivan

The central tenet of Louis Sullivan, "form follows the design," has been a guide of the modern design and architect in the United States. The significant influence by Sullivan in the perfection of skyscraper design and ornament development is felt in contemporary architecture. Sullivan developed a lot of interest in drawing since his childhood. At age sixteen, Sullivan was privileged to enroll at the Massachusetts Institute of Technology in the school of architecture (Jansson et al, 2019). The enrollment was the start of his journey in the field of architecture. During his tender age, he managed to gather experience through the registration at ECOLE des Beaux-Arts found in Paris. During his maturity period, Sullivan went to Chicago as a freelance designer and draftsman. It was during this period when he met Danker Adler with whom he did a lot of architectural work.

Under Adler's partnership, Sullivan works enabled the ornament designs merged with office buildings. The models are considered as the first tall building in Chicago. The Wainwrights' building is one of the arts that cemented his position as the leading architect in the United States, whereby he gained the brand of Father of Skyscrapers. Adler and Sullivan made the art Transportation Building during the 1893 exposition in St Louis. The building, designed by Sullivan, won three medals as he secured the position of an excellent ornamental.

Sullivan and Adler started a firm that dealt mainly with the design of buildings. The firm grew as the most reputable architecture firm in Chicago. In this sense, the construction of many residents was done following Sullivan's designs. In particular, the designing of office buildings played a significant role in creating the proper name of Sullivan. The critical design criteria in his works focused on ornate exterior designs accompanied by wide windows. Another distinguishing feature of Sullivan's work is the massive semicircular arcs on the windows and entrances. Other forms of art by

Sullivan include a memoir called "The Autography of an idea," which presents an illustration of his ideas on the architectural ornament. Therefore, his works remain as an influential tool to modern architecture through the presentation of his views on architecture.

Before the beginning of the nineteenth century, construction was done on the concept of load-bearing walls. However, the development of versatile steel was a game-changer in the field of architecture. Therefore, the mass production of steel was the driving force behind the skyscraper construction during the 1880s. Sullivan's era embraced this model of development, where the use of iron was the primary reinforcement material in support of the weight of structures. For the ornaments, Sullivan used terra cotta, such as vines and ivy. The use of terra cotta was rampant because of its malleability (Brooker 2017).

Sullivan made various achievements in the partnership with Adler. For instance, Chicago's Auditorium, constructed in 1889, was marked as the first achievement. The building was the best auditorium design of the time, which creates excellent insight into modern architects. Another outstanding performance was the Wainwright building constructed in St Louis in 1891. The models serve as the key contributors to the growth of Sullivan's reputation in the field of architecture.

2.5 Design Process

The major tool of the design process is water hyacinth. It is scientifically known as *Eichhornia Crassipes* and is a tropical floating plant that is majorly found on Lake Victoria within Kenya. It has proved to be a nuisance due to the difficulty in controlling it due to its fast rate multiplication compared to its extinction rate hence proving difficult to control. With no fruitful measures taken, it has covered a vast majority of the lake that is known as Africa's largest lake. This plant majorly survives in large volumes of water. Lake Victoria is just but the perfect spot for it considering it is a huge water body and contains fresh water, this provides the perfect conditions for the growth and multiplication of water hyacinth. However, there is need to control the numbers of the weed due to the threat it is posing on the lake including dropping volumes of water and the reducing oxygen levels available for aquatic life. While the hyacinth is a threat on its source, it is a new breakthrough in the design world. It remains the most reliable material in the country at the moment due to the supporting factors like availability,

costs and sustainability. However, it is yet to be efficiently manipulated (Woodcraft, et al.2012).

The use of water hyacinth in the fields of furniture making, exhibition and display and interior architecture has been widely embraced. The flexibility of water hyacinth makes it easy and fun to manipulate in creative ways since it easily follows the form of whatever object it is added to. This makes it a suitable material for use with reference to the form-follows-function philosophy.



Figure 3: Hyacinth seat (Google, 2020)

There are five main stages involved in the processing of water hyacinth. It is first harvested from the lake either manually or mechanically. However, the mechanical method is always faster and more reliable for the large scale production. It is then dried either mechanically or through the sun. It is more advisable to device mechanical methods in order to save on time since the sun is quite seasonal and may take days or weeks to dry each harvested bath. The second stage involves braiding together the stems of three plants, each being 80cm long. This means there are hardly any joins along the woven furniture which makes the outcome neat. However, other methods like hatching and crosshatching can also be incorporated to make the outlook different (Zhou, 2018).

Stage three involves dyeing the woven hyacinth in the desired colour in order to give it a deep shade of permanent colour. In so doing, the designer gets to decide on the colour scheme at this point. Stage four involves drying the dyed hyacinth either through exposure to the sun or mechanically. Finally, the dried braids are woven onto the wooden frame to fill up the form of the furniture. However, the wood used to make the frames is extracted from sustainable sources and are constantly replaced through the cut-one-tree-plant-two policy.

The main mode of light cleaning involves regular vacuuming or simply brushing over. However, the later can lead to faster wearing out due to the frequent friction over the weaving. Therefore, it is advisable to use a soft brush with smooth edges. For intense cleaning, remove any additional upholstery, remove any surface spillage with a sponge or paper towel, do any necessary washing of the stained area with mild soap, warm water and a soft cloth, use a nylon brush to remove any dried food flakes, do testing on an inconspicuous part of the furniture with a paint thinner before applying it to the hyacinth object for removal of tougher stains and finally place the furniture in a well-ventilated area to dry completely. Do not leave any sign of dampness.

2.6 Analytical Review

In addition to the manipulation of hyacinth in form of weaving with reference to the form of the frame prepared, it can also be manipulated through coating it around plastic furniture in order to avoid wastage of existing resources. By making an object thicker in diameter, it becomes more rigid hence reducing the chances of breaking. In addition to this, coating hyacinth over the existing plastic furniture would significantly reduce costs and form a protective layer that acts as an insulator to the pieces of plastic designs. As part of environmental sustainability, it would be reasonable to deal with both the existing environmental hazards tactfully in ways that neutralize their harm to the environment.

2.7 Summary

The general aim of this chapter was to provide the foundation for the implementation of the design process through provision of background information. We examined the exemplar and champion of design within the related field in order to borrow ideas that we could use as inspirations for the development of our own project. The design process summarily explains the main stages involved in the implementation of the designs on the site by providing an overview of what to expect from start to finish. In this section, more information was also provided concerning the main materials used for the designs with special highlights on how to care for and maintain them. Also included in this chapter was a detailed description of the concept and philosophy used in application of the designs. For this project, eco-design and form-follows-function philosophy forms the basis of the project.

CHAPTER THREE

3.0 RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter, referred to as research design and methodology, highlights the whole process of data collection and analysis. It provides basic information that governs the criterion used to gather data that is relevant to the fulfilment of the objectives. In it, we will look at research methodology which involves the qualitative and quantitative aspects of research. Under the quantitative analysis, we shall give focus to descriptive research while we shall focus on ethnography and focus groups. Under the population subheading, we shall identify the target population and their nature then further narrow down to the sample population which will form the basis for data collection for the study (Demirbas 2012).

Purposive sampling shall be used to select the sample population in order to gather accurate and relevant data to the study. The next step will be to expound on various data collection tools that will be applicable for gathering data from the site. They will include interviews, observation, audio recording, open-ended survey questions and photographs. We shall also examine relevant data analysis methods including content analysis, narrative analysis, visual analysis and thematic analysis. Finally, various suggested data presentation methods shall be discussed in order to determine how best to output the collected data into meaningful information. Some methods may include word clouds, quotation banks, tabulation, bar graphs and charts.

3.2 Research Methods and Design

Research is the synthesized way to search and gain new knowledge on information on a given topic in order to acquire intent and encompasses defining and redefining problems, formulating hypothesis or suggested solutions which involves collecting, organizing and evaluating data, making deductions and arriving at conclusions, testing the conclusions or findings to determine or identify whether they fit or work for the formulating hypothesis.

Qualitative research will be majorly used to capture the attitudes, behaviours, feelings and opinions of the sample population so as to better understand their needs and

accurately apply them to the new proposed designs and philosophies. This emphasizes on the importance of understanding the culture and traditions of the congregants of Gospel News Community Church in order to remain relevant even with the incorporation of better design spaces. Quantitative research will also come in handy in creating pictorial presentations of the findings. This will be mandatory due to the necessity of numerical data to generate the diagrammatic representations. (Dekoninck, 2016)

3.3 Population

A population is the general term for the inhabitants of a site. It does not have any stratification for particular type of characteristic but is rather universal and inclusive of every living individual in the space. There are two types of population examined in this paper.

3.3.1 Target Population

A target population is a set or group within a population that meets the criteria that a researcher wants and that is relevant to the study. From a design perspective, it is the section of a population whose needs the designer is interested in meeting at the end of the design process. The target population in Gospel News Community Church is the adult category consisting of age 18+.

3.3.2 Sample Population

A sample population is the portion selected from the target population to represent the whole. This is major picked out in order to shorten the time span and scope of gathering information to make data collection less tedious. The sample population is selected using suitable sampling methods depending on the nature of the target population. For instance, stratified sampling would be applicable for a massive target population. The criterion of sex and gender will be used to pick out samples for the study. However, the church ministers are considered mandatory samples to the study.

3.4 Sampling Method

A sampling method is the criterion that is used to select the subjects that will assist in collecting data for the study. Purposive sampling will be the most convenient for the study. It is also known as judgmental, selective or subjective sampling. The maximum variation technique will be used because of the need to examine diverse range of criteria

that are relevant to the study. For instance, in Gospel News Community Church, there are many other criteria like body size, stature and behavioral characteristics to look at besides the sex. For the sake of meeting the short time frame, there is need to use purposive sampling rather than stratified sampling that needs more time and resources.

3.5 Data Collection Procedures/ Tools

Data collection procedures and tools are discussed below.

3.5.1 Data Collection Procedures

Various data collection procedures are discussed below.

3.5.1.1 Descriptive Research

This procedure involves describing the characteristics of the target population and the site of the case study. Incorporating this research technique will help in remaining in psych with the congregants by ensuring a similar understanding of vocabulary and protocol within the church. It is also useful in understanding the preferences and tastes of the majority sample of the population in order to adhere to their needs and wants throughout the design process.

3.5.1.2 Observational Research

This is a more reliable procedure of data collection because it is collected firsthand from the population through observation. There is little to no probability of biasness because all the feedback gathered is as it is on the ground. Information gathered is reliable because it collected based on visible facts rather than individual opinions and biases. However, there is need to put measures in place to ensure originality is maintained during the observation process in order to avoid pretentious behaviour. One way to minimize this would be to mingle normally with the target group in order to gather genuine behaviours and maintain originality. Making the population aware of your presence could affect the credibility of data collected since it is in human nature to want to cover up weakness.

3.5.2 Data Collection Tools

Data will be collected by use of two of three major categories of tools including primary, secondary and tertiary sources. Primary sources are firsthand and require the researcher to directly interact with the site and population to acquire data. Primary sources include

audio-recording, interviews, measurements, observation and photographs. Secondary sources are secondhand sources directly linked to the site and include magazines and pamphlets. Tertiary sources rarely have direct contact with site and the researcher relies on hearsays of sites and blogs. However, primary and secondary sources will be used.

An announcement was made on the day of the sampling procedure in order to avoid giving time to the respondents to formulate biased opinions and answers to the questions they would be asked. Despite this, verbal skillfulness was necessary in breaking the ice and easing the atmosphere for the respondents.

3.5.2.1 Audio-recording

For this source, a tape recorder was legally used to record the proceedings of a committee meeting where the design problems affecting the smooth operation of the church were discussed at length. The tape recorder was also used to capture the answers of the responses of the interview.

3.5.2.2 Interviews

This involved asking the interviewees preset questions. However, each of them will answer the same questions that cut across all the different criteria by which were selected. Anonymity is optional but preferably absent in order to carefully analyze the answers of the respondents based on the category they fall under and their ability to connect and empathize with the group in question.

3.5.2.3 Measurements

Getting the measurements of the existing amenities is relevant to the study in order to further understand the underlying cause of some of the problems including ergonomics and functionality aspects. This is mandatory in the implementation of form-follows-function philosophy.

3.5.2.4 Observation

This is necessary and relies on good memory to familiarize the researcher with the site. Observation expands the understanding of the researcher by paying attention to both the visual and verbal aspects of the congregants. Through this, the researcher is able to gather constructive feedback from a larger scope of the population than just the sample population hence confirming feedback through creation of a reference point.

3.5.2.5 Photographs

Photographs complement the observation technique by acting as a reference point where human memory fails. This also reduces the probability of error.

3.5.2.6 Magazines

The church edits semi-annual magazines as a way of updating the congregants on the progress of the ministry. This is a useful avenue to gather information from especially about the church activities, layouts and projects.

3.6 Data Analysis Methods

Data analysis is the process of gathering, filtering and processing data into meaningful information that draws out the facts of necessity. The methods used are discussed below.

3.6.1 Narrative Analysis

This is a cluster of analytic methods for interpreting texts or visual data that have a storied form. Data collected through the magazines and interviews can be processed through narrative analysis which will pick out relevant information from texts and findings of interviews.

3.6.2 Visual Analysis

Interviews, photographs and observation call for visual analysis. For interviews, visual analysis is used to gauge responses through the ability of the interviewer to gather non-verbal cues like facial expressions of interviewees. For photographs and observation, good visual skill is needed to identify relevant information by paying attention to detail and quantifying where necessary.

3.6.3 Thematic Analysis

This analysis methods relies on the ability to group patterned datasets into relevant themes for the study. Interviews and audio-recording are beneficial to conducting thematic analysis through identifying similarity patterns in the opinions and responses of the sample population.

3.6.4 Needs Assessment

As the name suggests, needs assessment involves identifying the needs of the population on the site by analyzing the feedback collected from them. By conducting interviews, observation and recording audios, it is easy to identify the needs of the target group onsite.

3.6.5 Content Analysis

This is an analysis method used for studying documents and communication artifacts, which might be texts of various formats, pictures, audio or video. Therefore, photographs and audios are relevant to content analysis.

3.7 Data Presentation Methods

Data presentation methods are the formats through which data collected from the site is represented in audio-visual or written form. The methods used are discussed below.

3.7.1 Tabulation

This involves representing findings on a table. It could be either qualitative or quantitative data. Qualitative data is tabulated for the purpose of easier interpretation and reduction of words. It is a summary of narrative analysis. Quantitative data is tabulated for the sake of manipulation into bars, graphs and pie charts.

3.7.2 Bar graphs

Bar graphs are a result of manipulation of both qualitative and quantitative data. A bar graph is mostly applicable in carrying out comparisons of frequencies and thematic patterns.

3.7.3 Charts and diagrams

Similarly, charts and diagrams carry out the same function of comparison of frequencies and thematic patterns through manipulation of both qualitative and quantitative data.

3.7.4 Pie diagrams

Pie diagrams are a circular presentation of data proportions. They represent qualitative data in a quantified manner.

3.8 Summary

Table 1: Chapter 3 conceptual framework (Author,2020)

Objective 1: To investigate the activities conducted to ensure proper accommodation during weekly fellowships and Sunday Services.				
<i>Data Needs</i>	<i>Data Source</i>	<i>Data Collection Tool</i>	<i>Analysis Method</i>	<i>Expected Output</i>
Determine what protocol is used in distributing and managing resources during church activities like fellowship.	Men and women from different departments including hospitality, elders and ministers.	Observation Interviews Audio recording	Thematic analysis Visual analysis Narrative analysis	Better organization of resources to comfortably accommodate the congregants all week.
Objective 2: To gain insight into the knowledgeability of congregants regarding sustainability.				
<i>Data Needs</i>	<i>Data Source</i>	<i>Data Collection Tool</i>	<i>Analysis Method</i>	<i>Expected Output</i>
Currently available media of sensitization concerning eco-design.	Congregation	Interviews Audio recording	Narrative analysis Thematic analysis	Sensitivity of the congregants to eco-friendliness and the need for environmental conservation.
Objective 3: To improve the existing amenities by incorporating eco-design and form follows function philosophy.				
<i>Data Needs</i>	<i>Data Source</i>	<i>Data Collection Tool</i>	<i>Analysis Method</i>	<i>Expected Output</i>
Access to sustainable materials for the fulfillment of eco-design and form-follows-function.	Environmentalists Craftsmen	Measurements Photographs Observation	Visual analysis Content analysis	Availability of more eco-friendly materials and a reduction of non-biodegradable matter.
Objective 4: To introduce eco-design through hyacinth and environmental conservation in improving GNCC, Kasarani.				
<i>Data Needs</i>	<i>Data Source</i>	<i>Data Collection Tool</i>	<i>Analysis Method</i>	<i>Expected Output</i>
Implementation of alternative hyacinth material in interior design	Environmentalists Interior designers Carpenters	Interviews Observation	Visual analysis Needs assessment	A change of protocol in church due to development of more sustainable spaces. More space and order in church

CHAPTER FOUR

4.0 SITE ANALYSIS AND INTERPRETATION OF FINDINGS

4.1 Introduction

This chapter will give a detailed account of the church ranging from the geographical, contextual and conceptual aspects. We will further do an in-depth analysis of all its operations, schedules, population, constitution, qualitative and quantitative aspects. From this we will have sufficient information on how to apply the design concepts that will provide solutions to the problem stated earlier in the paper. We will analyze both internal and external environmental factors that directly influence the credibility of the applicable designs. We shall also use the research design and methodology discussed in chapter three to actualize the findings and represent the analyzed information in the recommended methods including tabulation, bar graphs, charts, diagrams and pie charts.



Figure 4: Photo of Gospel News Christian Church (Source, Author, 2020)

4.2 Qualitative Analysis

In this section, we shall carry out a wholesome analysis of the pictorial and narrative aspects of the site including the geography and programme of the church.

4.2.1 Location Context

The site for the project is located in Zimmerman area of Kasarani Constituency of Nairobi County. The service road along which it is situated is known as Base Road which connects Kamiti Road to the Thikaroad Superhighway. It lies just adjacent to the Nairobi-Kiambu county border. It is bordered by corporate stalls to the North, an open plot of land to the South, a feeder road and flat to the East and another feeder road and open field to the West. It is nearer to the Thikaroad Superhighway than it is to Kamiti Road and accessible through a five-minute drive or a ten-minute walk from the former.



Figure 5: Map of Gospel News Community Church scope (Source, Google, 2020)

4.2.2 Climate

The climate around Gospel News Community Church, Zimmerman is warm and temperate. There is significant amount of rainfall in Zimmerman all through the year including the driest month. The temperature here averages 19.0 °C. In a year, the average rainfall is 869 mm. The driest month is July, lower than 20 mm of rain while the wettest month is April with approximately 190 mm. The graph below shows weather by Month of Zimmerman area where Gospel News Community Church is situated.

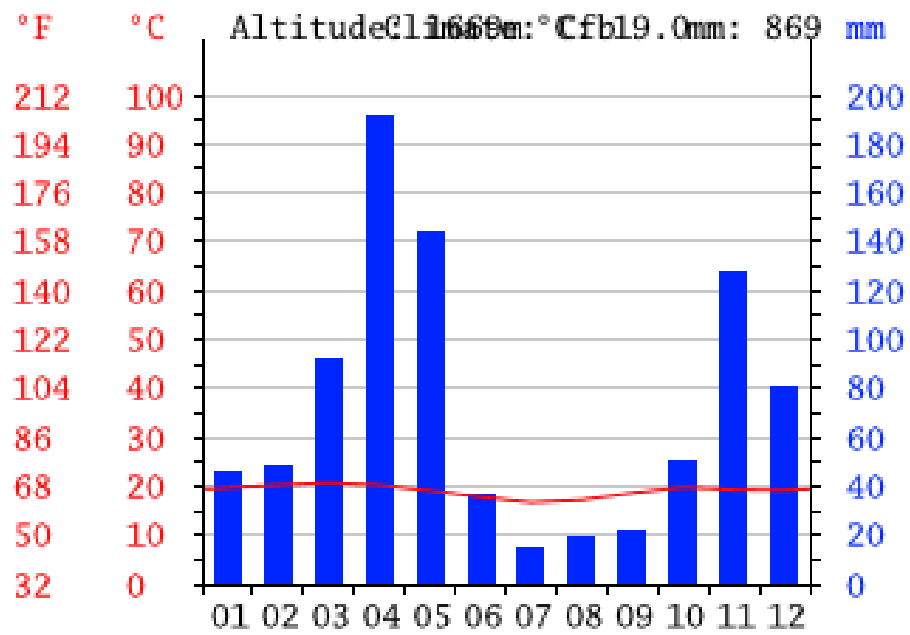


Figure 6: Climatic graph (Source, Google, 2020)

4.2.2.1 Temperature

March is the warmest month of the year with an average temperature of 21.0°C while July is the coolest month of the year with an average temperature of 17.0 °C.

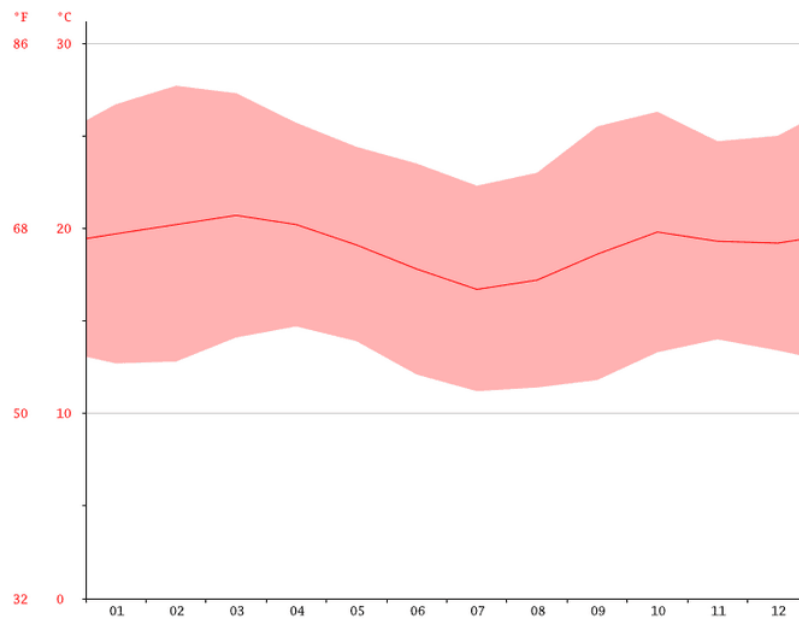


Figure 7: Temperature Graph (Source, Google, 2020)

4.2.2.2 Weather Averages

NAIROBI WEATHER BY MONTH // WEATHER AVERAGES

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature (°C)	19.7	20.2	20.7	20.2	19.1	17.8	16.7	17.2	18.6	19.8	19.3	19.2
Min. Temperature (°C)	12.7	12.8	14.1	14.7	13.9	12.1	11.2	11.4	11.8	13.3	14	13.4
Max. Temperature (°C)	26.7	27.7	27.3	25.7	24.4	23.5	22.3	23	25.5	26.3	24.7	25
Avg. Temperature (°F)	67.5	68.4	69.3	68.4	66.4	64.0	62.1	63.0	65.5	67.6	66.7	66.6
Min. Temperature (°F)	54.9	55.0	57.4	58.5	57.0	53.8	52.2	52.5	53.2	55.9	57.2	56.1
Max. Temperature (°F)	80.1	81.9	81.1	78.3	75.9	74.3	72.1	73.4	77.9	79.3	76.5	77.0
Precipitation / Rainfall (mm)	46	48	92	191	144	36	14	19	21	50	128	80

Figure 8: Zimmerman, Nairobi weather by month (Source, Google, 2020)

There is a difference of 177 mm of precipitation between the driest and wettest months. The variation in temperatures throughout the year is 4.0 °C.

4.2.3 Rainfall

The area enjoys a moderate climate. Under the Köppen climate classification, the area experiences subtropical highland climate. Every month receives varying amount of rainfall. For instance, April receives rainfall on up to 15 days in a month while July receives minimal periods of rain of up to 3 days in a month.

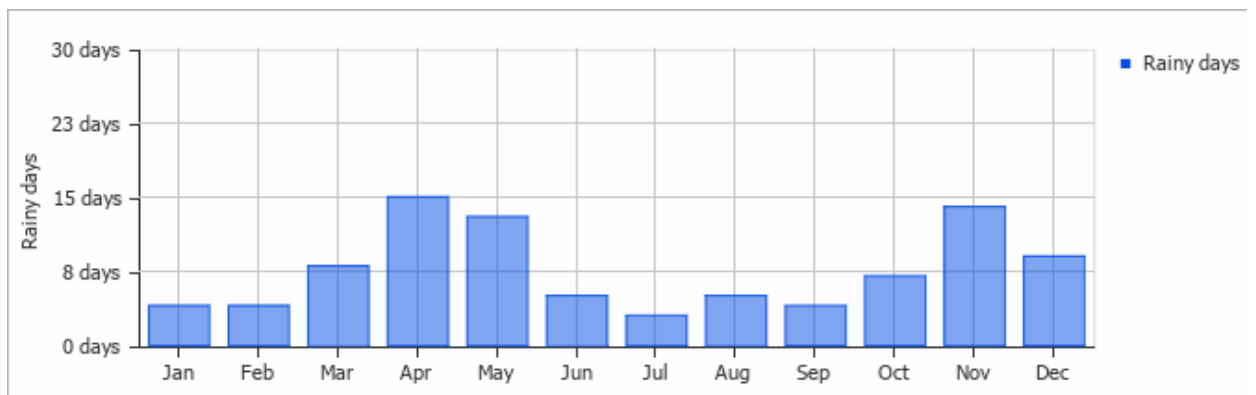


Figure 9: Rainfall Graph (Source, Google, 2020)

4.2.4 Humidity

The annual relative humidity of Zimmerman area ranges between 60% and 75%. May reflects the highest percentage of relative humidity while February reflects the lowest.

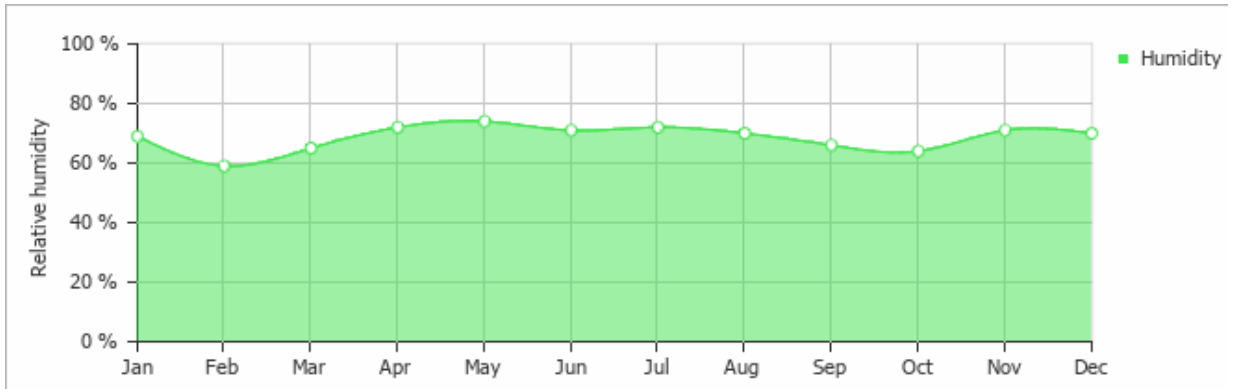


Figure 10:Relative humidity of Zimmerman (Source, Google, 2020)

4.2.5 Wind Speed

The wind speed is high from November to March then goes relatively low in April before an abrupt steady drop between May and August. It gradually starts to rise in September and October before reaching the peak in November. The cycle repeats itself.

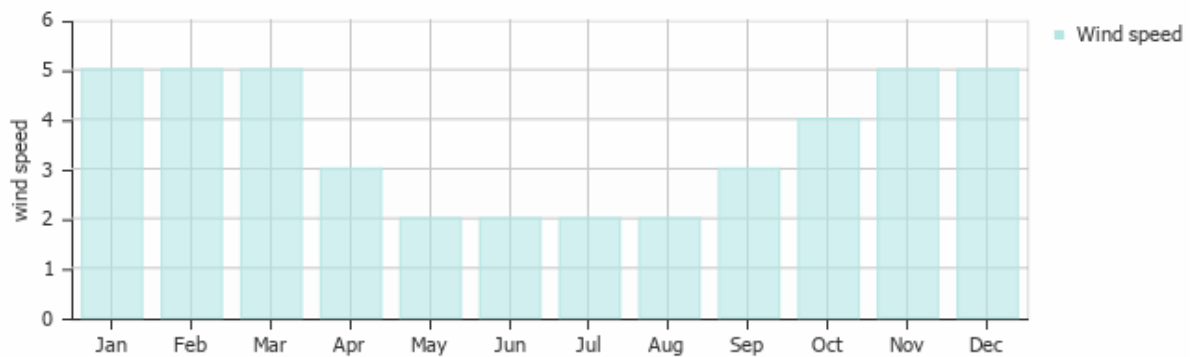


Figure 11: Graph of Wind Speed in Zimmerman (Source, Google, 2020)

4.2.6 Altitude

Zimmerman area and Nairobi county in general lies 1795m above sea level. It lies 1.2921° South of the Equator and 36.8219° East of the GMT line.

4.2.7 Soil

Dark red friable clay soil is the most dominant within Gospel News Community Church. It is a common phenomenon within Zimmerman area. The common nature with this soil is that it floods quickly at the slightest rain and is very slippery. However, it drains equally fast and form dust within 24 hours of the end of rain. It generally supports healthy growth of grass as its deeper layers have good water retention capability.

4.2.8 Security

The crime rate in the area surrounding the church is high due to the sparse population of that side of Zimmerman area. However, the site is always under 24-hour surveillance by hired security guards. A watch light has been installed against the church building to keep the compound illuminated at all times when it is dark. However, it is not enough as it only sheds light on one phase of the rectangular compound.

4.2.9 Vegetation

The compound mainly consists of grass. Kikuyu grass is the main type of grass and grows green and healthy especially when there is minimal movement by people within the compound. However, the rainy season also accelerates its growth. A few tall trees surround the church and store buildings and shield the latter from strong sun rays.



Figure 12: Kikuyu Grass and hedges onsite (Source, Google, 2020)

4.2.10 Sun and Shadow Patterns

The timing of sunrise and sunset varies little throughout the year, due to Nairobi's close proximity to the equator. Seasonal changes in the sun alter shadow length and direction. January experiences long periods of sunshine of up to 290 hours monthly while the period between July and August experiences as low as 125 hours monthly.

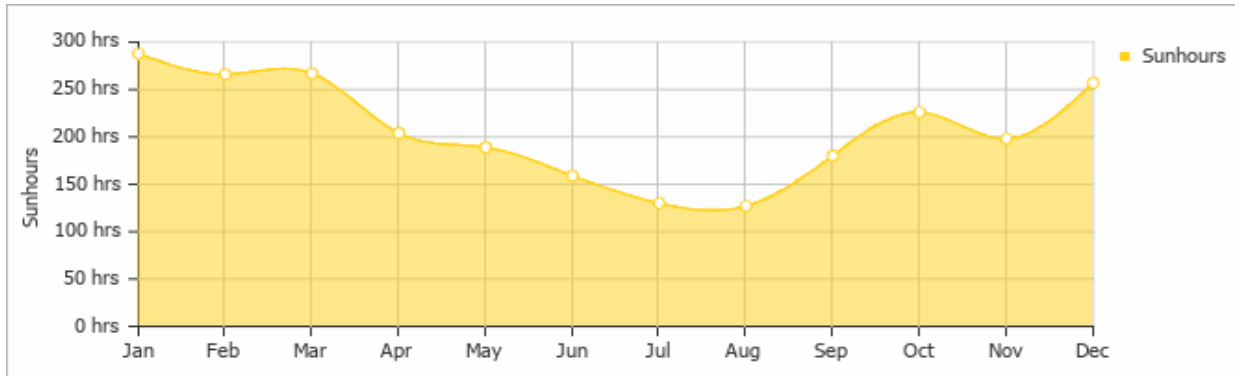


Figure 13: Sunhours in Zimmerman (Source, Google, 2020)

4.2.11 Drainage

The drainage is poor due to the absence of elaborate water channels. Considering the fact that the land is flat, there is no flow of water and therefore it settles on the ground and causes flooding and soil erosion. This leaves the area marshy and difficult to navigate through.

4.3 Quantitative Analysis

The main determining factor for the initial step of selection was gender. Assuming that the ratio of men to women is 1:1 in a church of 200 people, we sample out 10 from each gender. Of the 10 from each side, 5 were youth below 35 years old and the other five were of elderly age. The sample had individuals of different variations including different statures, body sizes, roles in church and personalities. From this, was possible to get wide perspectives of the needs of the congregants. The first evaluation made was to rate their comfortability with the overall environment in terms of percentage. The results were as follows.

Table 2: Respondents' comfortability (Source, Author, 2020)

	Male		Female	
	Youth	Elderly	Youth	Elderly
Furniture	70	55	60	50
Interior	20	60	30	50
Display	40	20	30	45
Landscape	20	50	30	20

The next point of examination was on their preferences on the material used. The options were plastic, metal and wooded hyacinth. The results were as follows.

Table 3: Respondents' preference (Source, Author, 2020)

	Metal	Plastic	Wooded Hyacinth
Youth	20	20	60
Elderly	25	40	35

4.4 Presentation of Findings

The above activities were analyzed and the presented inform of bar graph and two pie charts. The first inquiry on comfortability is represented below.

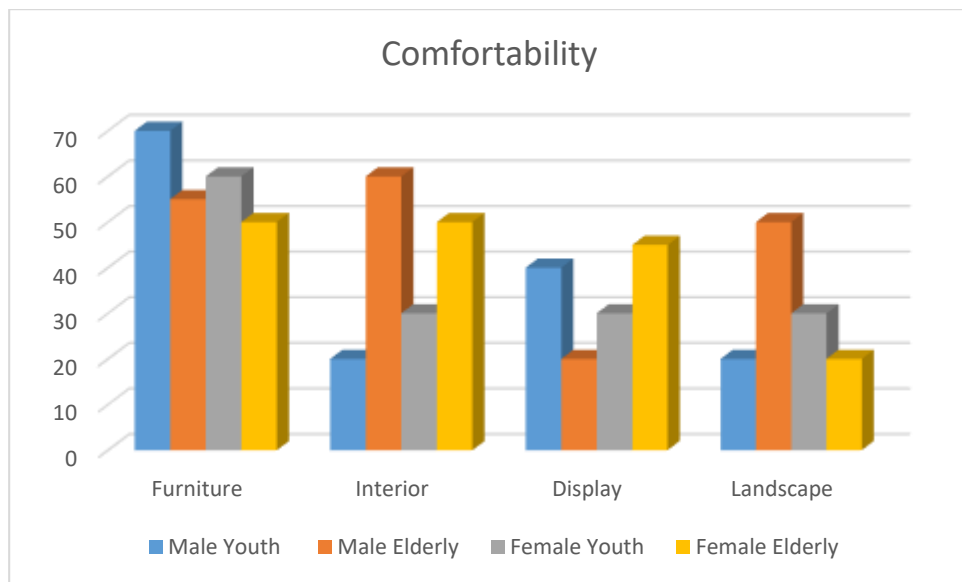


Figure 14: Comfortability Graph (Source, Author, 2020)

The next research on the preference of material is represented below.

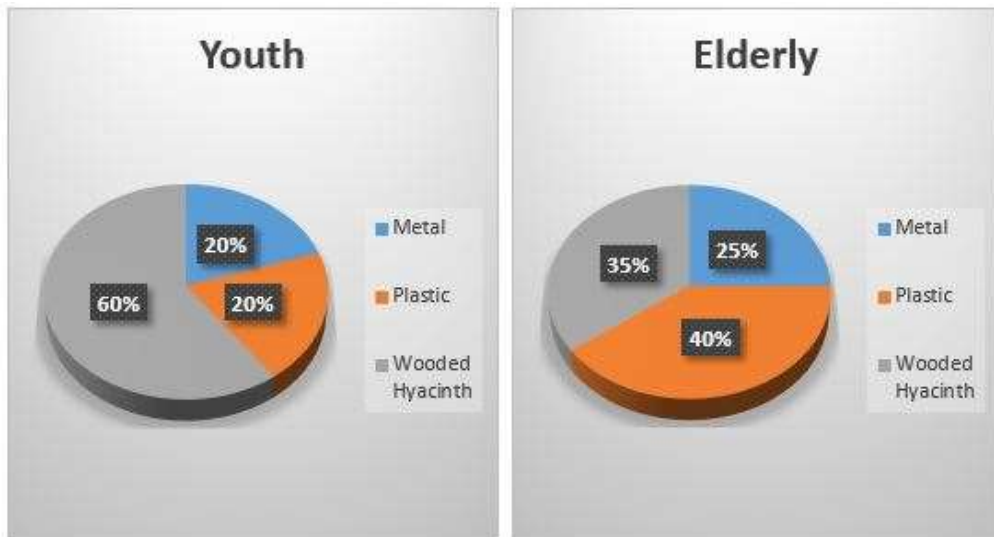


Figure 15: Preference Graph (Source, Author, 2020)

4.4.1 Interview Discussions

The interview which also involved the ministers was compiled into a brief narrative. According to all the respondents, the church needed an upscaling. Everyone agreed that there is room for improvement of the outlook and functionality of the church spaces. A good number of the interviewees admitted that they didn't take into account the aspect environmental sustainability whenever they picture bringing transformation to the church. Most of the elderly men and women opened up concerning their fear of sitting on weak chairs and many even had past experiences of falling during services as the chairs unexpectedly snapped. They admitted it was a very embarrassing ordeal. After briefly explaining to them the details of the proposed design, they were quite ecstatic and immediately gained confidence in the durability and reliability of the new design.

The female gender especially expressed great interest in the idea of having a slot under their seats to store their handbags. It was an even bigger relief to nursing mothers who expressed discomfort at having to place the nursing bag on the floor to comfortably carry their babies. Majority of the interviews acknowledged the need to properly create demarcations for the space in the compound which is quite bare. The Sunday school section would also use a bit of creative woven hyacinth to make the classroom more appealing. Summarily, all the interviewees identified the need to improve the form and functionality of the church spaces with the application of eco-design.

4.5 Conclusion

This chapter included a detailed discussion of various features existing on the site. Contrary to the shallow listing of the geographical scope earlier in the paper, we went further to study more about the geographical aspects of the features within the site. Climatic conditions and patterns were shown for certain aspects like humidity and rainfall as a way for developing an understanding for what the proposed designs need to incorporate. Data collected was also presented in tabular forms which were then manipulated using Microsoft Excel to generate a bar graph and two pie charts. Presentation of findings resulted in answering the research questions.

CHAPER FIVE

5.0 SUMMARY FINDINGS CONCLUSIONS AND RECOMMENDATIONS.

5.1 Introduction

In this chapter, we will start by doing a summary of the data analysis and findings. All the stages of analyzing data and interpretation of findings shall be carried out in this chapter. Through creating a summary of findings, we will be able to filter out the information that is vital to the establishment of functional solutions. The next step will be to use the findings to make recommendations for applicable solutions in each specialization including interior architecture, exhibition and display, furniture design and landscaping. All the recommendations will be made as a result of the facts established by the researcher for research methodology. Each of the four specializations will give focus to selected areas of the church site for implementation. Interior architecture will be applied to the main church and one office. Exhibition and display will be applied to two Sunday school classrooms. Furniture design will be applied to the main church. Landscaping will be applied to the whole church compound. Finally, suggestions for further study will be provided at the end of the chapter as a way of creating opportunity for further improvement of the project (Gunnarsson, 2017).

5.2 Summary of Data Analysis and Findings

Gospel News Community Church, located in Zimmerman, Nairobi county, was the site for the study. The was data collected through primary sources including interviews, observations, audio recording, magazines and photographs. The main methods found suitable for analysis included content analysis, visual analysis, narrative analysis, thematic analysis and needs assessment. Based on the qualitative analysis that was carried out on the site, the main conclusion is that there is insufficient knowledge on the possibility of applying eco-design in designing of spaces. Most churches opt for readily available local furniture and materials and rarely venture into the possibility of having custom-made designs. Custom-made design tends to be costlier than popular design since the necessary skilled labour to execute it is quite rare to get. It was also made clear that there is need for exposure of the church and other public domains to the concept of eco-design and form-follows-function philosophy in order to strike a balance between sustainability, aesthetics and functionality (Brooker & Stone 2019).

5.3 Recommendations

In this sections, we will propose applicable design for each of the four specializations with reference to the spaces being worked on for each. In so doing, the issues identified within the site will have been solved with appropriate solutions.

5.3.1 Interior Architecture

There should be a consistency in the theme created within the interior space of the main church. Rather than having the altar having a contrasting theme from the rest of the church, there should be a thematic relationship flowing through the whole church. Water hyacinth and plywood would perfectly balance out the theme quickly and easily. With respect to the colour scheme of the church, the preferred colour scheme is navy blue, grey, white and gold. However, natural colours of wood would also complement the church's theme colours and break monotony brilliantly (Demirbas, 2000).



Figure 16: Main church layout (Source: Author, 2020)

5.3.1.1 Walls

The walls are half stone and half steel beams and iron sheets. The stone blocks section of the wall should be painted with grey oil-based paint with a matte finish in order to absorb light rather than reflect. Dura coat vinyl matte fragrant paint, which is eco-friendly, would be the perfect recommendation in the shade of grey.

The steel beams and iron sheets that form the upper half of the walls should be insulated with plywood to reduce radiation of heat which causes heat exhaustion during church programs (Marinic 2018).

The altar wall should have a monochromatic shade of the overall colour of the church in a darker or lighter shade. This will apply the principle of contrast in drawing the viewers' attention to the intended point of focus which should be the altar at all times. The church should be painted in dark grey while the altar background wall should have a lighter shade of grey.



Figure 17: Church interior with outstanding background (Source, Google, 2020)

5.3.1.2 Doors

Instead of a solid metal structure, the door should have additional glass strips at the sides to increase the amount of light entering the building even when the door is shut. However, it is necessary to maintain the metal material due to safety concerns within the scope of the study.



Figure 18: Church door with glass frames for illumination (Source, Google, 2020)

5.3.1.3 Floors

The flooring would be best done with tile in a solid colour in order to reduce the visual business of the room design. Alternatively, wooden flooring using sustainable material like bamboo can also be applied in order to blend with the bare wood theme in other parts of the church. However, white tiles would best blend in with the theme of church and symbolically display the church.

Concrete flooring can be used in order to avoid incurring costs of new tiles. Not only is it easier to clean but also to repair. The maintenance cost is cheap and concrete can easily be manipulated into producing desired effects and colors.

5.3.1.4 Windows

Architecturally speaking, it is impossible to increase the vertical height of the windows due to the amount of roof weight being carried by half wall, steel beam and iron sheets. Therefore, creative ways need to be found to give the illusion of space and larger size of windows. One way of doing that is by altering the form to fit into the function. We can change the window type from grilled to plain in order to allow more unobstructed light to enter using the one-way mirror glass. Form-follows-function philosophy will come in handy in rectifying this problem.



Figure 19: Church with small windows and few windows (Source, Google, 2020)

5.3.1.5 Roofing and Lighting

Energy-saving techniques should be embraced by all means by installing a skylight on parts of the ceiling alternating with the iron sheets so as to allow as much natural light as possible to enter during the day and eradicate the need for electricity for lighting.

The plywood roofing should be embraced for the purpose of insulation of the roof from radiation of heat that causes immense heat in the interior space. It also completes the form-follows-function philosophy by improving the outlook of the ceiling rather than leaving it in a constructivist state.



Figure 20:Roof lighting of church (Source, Pinterest, 2020)

The artificial lighting used can either be inbuilt with the plywood ceiling with an increase of intervals between them or alternatively suspending lamps significantly lower from the ceiling with increased intervals to serve the purpose without overcrowding the air. In the first, space is spared over quantity while in the latter, the opposite is true.

Lighting at the altar should be relatively more concentrated than the lighting in the rest of the church as a way of making the altar the focal point of the church.

5.3.2 Furniture Design

Plastic chairs, glass pulpits, one seater tables, an old weakened projector stand and space consuming coffee tables are the main constituents of Gospel News Community Church at the moment. Plastic chairs can be replaced with well-designed functional seats made of sustainable matter such as hyacinth woven onto a wooden frame. This will

automatically eradicate the problems of unsustainable design and improve both the form and functionality while working within the confines of eco-design. The seats also maximize on their function by having the additional slot for storage (Gunnarsson & Petersen).



Figure 21: Furniture sketches

Glass pulpits are two, one for the bishop and the other for the interpreter of the sermon. There is need design a pulpit that serves both comfortably as a way of reducing crowding and to reduce on the amount of wood it would take to make to functional pulpits. Water hyacinth and wood are the main materials used in order to bring harmony of the theme in church. The capacity for ushers' desk needs to be increased in order to accommodate the required number of ushers and provide adequate storage space for all of the ushers' tools of ministration including church envelopes and pamphlets.

The projector stand is wooden and weak. It is actually covered with a black cloth during services and placed along the steps to the altar in order to compensate for it deficiency in form and function respectively. A long independent stool tilted at an angle is a useful tool. The concept should include water hyacinth to enhance the concept of sustainability rather than using more wood. To replace the bulky coffee tables, small sized ones made of water hyacinth woven on wooden frames are recommended so as to provide a sense of space and more privacy for the ministers and elders at the front row. All the furniture

discussed above are given a clean finish using varnish in order to give the extra touch of perfection.

5.3.3 Landscape

The landscape is the first impression of a place before anyone gets to interact with the interior. Therefore, it is equally important to work on it so as to compliment the interiors. Some simple ways of tending to the exterior landscape include paying attention to the fencing, plants, pathways and services.



Figure 22: Existing landscape (Source: Author 2020)



Figure 23: Proposed landscape (Source, Author, 2020)

The overall recommendations for the landscape include:

- Demarcation of footpaths to all parts of the compound in order to reduce damage of grass by frequent movement of people on grass.

- Creation of a playground like a tarmacked basketball court at the parking lot to serve dual purpose.
- Building a gabion wall along the east and west elevation fences of the church to trap any soil that may be blown by wind. This is beautiful and stops soil erosion at the same time (Mišćević et al, 2018).
- Lighting through small footpath lamps should be installed along the footpaths to improve the navigability of the compound even in the evening.
- More trees and grass should be grown to avoid soil erosion and make the landscape easier to interact with through defined spaces.

5.3.3.1 Fencing

The best type of fencing for Gospel News Community Church landscape is the gabion fencing that entails stacking up rocks in a block shape defined by a mesh or wires. This not only carries out the function of reducing the rampant soil erosion and breaking strong winds. It is an uncommon design in the area and mimics nature in a way hence increasing the awareness of people to nature and the need for maintenance of its beauty.

Golden duranta plant can also tactfully incorporated in the fencing by forming a double layer of fence; the outer being the gabion wall and the inner being the golden duranta hedge (Mišćević et al, 2018).



Figure 24: Gabion wall and hedge fence (Source, Pinterest, 2020)

5.3.3.2 Plants

The Felicia Heterophylla should be planted along the pavements. From it, blue daisy flowers sprout. The blue church theme would be well complemented by blue daisies

hence creating harmony in both the interior and exterior aspects of the site. Grand fir and spruce trees can also be added in some parts of the compound like around the children's playground in order to provide adequate shade (Selman 2008)..



Figure 25: Felicia heterophylla blue daisy (Source, Pinterest, 2020)

5.3.3.3 Definite Paths

There are pavements around every building structure in the compound. Therefore, it would be good to make pavements that connect all the pavements of the different buildings in order to guide navigation which mostly occurs from one room to another.

5.3.3.4 Lighting

There are frequent night vigils at Gospel News Community Church. Therefore, there is urgent need for proper lighting to provide security for the congregants even as they maneuver from the main church to the ablutions every now and then amidst night fellowship.

5.3.4 Exhibition and Display

This particular area of Gospel News Community Church carries great opportunity for expansion. The classrooms are well built with very minimal detailing but tend to be a bit too plain for Sunday school-going children. Some of the main areas that need a touch of design include the shelves, noticeboards and tables which are the basic constituents of these spaces. This is the only one of the four specializations that will portray a contrasting colour scheme from the rest of the church spaces due to the nature of the age group for which it is designed.

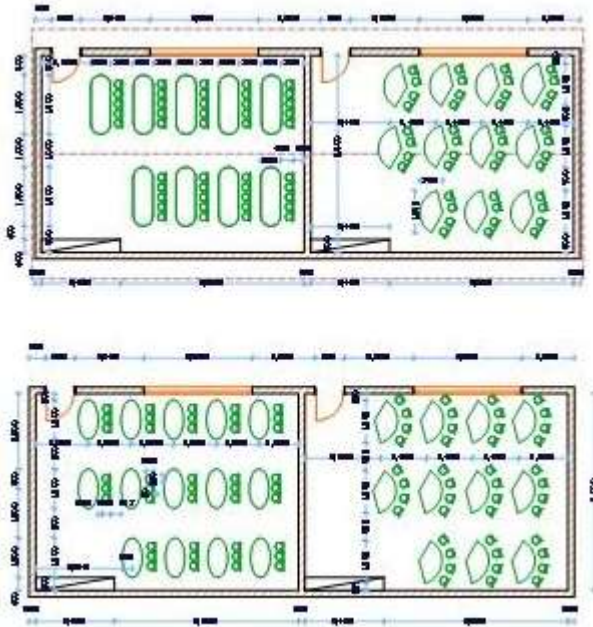


Figure 26: Sketch plan layouts (Source: Author, 2020)

The colors tend to be bright and outstanding as is normally appealing to children. There is only one shelf at the front of the class and only the teacher has direct access to it at any time. Mini-shelves should be created using woven hyacinth along the walls with hooks for hanging bags so as to allow the children to interact with the exhibition and display aspects too as they learn to use it. This will also keep their attention and curiosity off the teacher's shelf. The tables also needed to be added in order to comfortably accommodate the children and form an organized layout for the room. The noticeboards have educative content but need to be decorated with more colorful and vibrant artwork from the children as it sets the mood for them. It could include Bible activities completed by them.

The whole point of exhibition and display in the Sunday school classrooms is to make the learning experience more comfortable for the children by making them more aware of their surrounding in a way that is appealing to their age and interest.

5.4 Conclusion

The recommendations made for every specialization above are all aimed towards fulfilling either or both the design concept and philosophy. By implementing the said recommendations in Gospel News Community Church, it becomes an improved space

with serene environment and adequate resources to seek connection with God. The theme of our site is ‘the home of all divine blessings’. Nature has a way of expressing divinity with such gentleness. Therefore, embracing eco-design in such an extravagant manner improves the atmosphere of divinity and only emphasizes the tagline of the ministry further. All the available recommendations were made with utmost sensitivity to both the internal and external environment and are in no way a nuisance to the surrounding neighborhood of Gospel News Community Church. Careful consideration was made in bringing out the best of all aspects including sustainability, functionality and aesthetics.

5.5 Suggestion for further study

All the research and analysis conducted in this paper is open to reference and expansion by other researchers. There is no claim of having completely exhausted every available information concerning similar projects. Therefore, this project is open to critiquing and further study.

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APPENDIX 1: Landscaping Inspiration



Figure 27: Landscaping pavement inspirations (Source, Pinterest, 2020)



Figure 28: Landscaping gabion walls (Source, Pinterest, 2020)



Figure 29: Landscaping plants (Source, Pinterest, 2020)

APPENDIX 2: Interior Architecture Inspirations



Figure 30: Interior architecture inspirations (Source, Pinterest, 2020)

APPENDIX 3: Furniture Design Inspirations



Figure 31: Furniture design inspirations (Source, Pinterest, 2020)

APPENDIX 4: Exhibition and Display



Figure 32: Exhibition and display inspirations (Source, Pinterest, 2020)

APPENDIX 5: God`s Touch Ministries



Figure 33: Location of Gospel News Community Church (Source, Author, 2020)



Figure 34: Church interior (Source, Author, 2020)



Figure 35: Sunday school classrooms (Source, Author, 2020)



Figure 36: Church landscape (Source, Author, 2020)