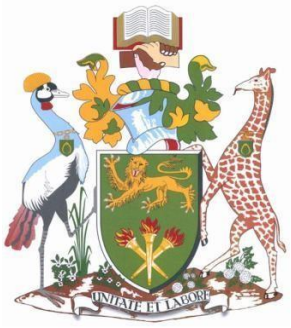

UNIVERSITY OF NAIROBI

College of Architecture and Engineering School of the
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BDS 413: PROJECT PAPER

(Interior Design Specialization)

By:

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BAMBOO, SWAHILI KIKOY AND ECO DESIGN IN REMODELING SPACES FOR RETREAT CENTERS:

CASE STUDY OF RESIDENTS AND YOUTH AT ADONAI RETREAT CENTER KABIRIA, DAGORETTI SOUTH.

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

14/4/2020

DECLARATION

I, Anita Wambui Wairimu, declare that this research paper is my original work and has not been presented in the past for examination or award of any degree course in any other university.

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ABSTRACT

For centuries, the earth's restricted resources are prodigally exploited in their distribution and uses, inflicting irreversible changes on the atmosphere. The idea of sustainability involves the respect of the planet's resources by its inhabitants. Designing is about satisfying a requirement inside a collection of limits and sustainability being a requirement in itself demands serious thought throughout the design method and in producing. People must strive to engage in activities that minimally affect the state of the planet, striving to leave it the same way they found it in order to ensure resources are left for future generations. Therefore, each stage of the design process requires the consideration of a product's life cycle to really implement sustainable practices in the product's design. Products have to be sturdy, reusable, recyclable and biodegradable; minimal and economical use of energy and waste management have to be ascertained throughout material harvesting, transportation, packaging and disposal; energy ought to be sourced from renewable. A designer hence needs to acknowledge the fact that sustainability is a need whose consequent constraints are non-negotiable and vital for the healthy existence of every living thing.

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List of Abbreviations

ECM Eco-Design Checklist Method

INBAR The International Network for Bamboo and Rattan Kenya Forestry Research Institute

IISD The International Institute for Sustainable Development

JICA The Japan International Cooperation Agency

KEFRI The Kenya Forestry Research Institute

LCA Life Cycle Assessment

LED Light-emitting diode

MDF Medium-density fiberboard

MIPS Material Input Per Service

PET Polyethylene terephthalate

PVC Polyvinyl chloride

UNCED The United Nations Conference on Environment and Development

UNDP The United Nations Development Programmed

UN-HABITAT The United Nations Human Settlements Programme

WBCSD The World Business Council for Sustainable Development

CHAPTER ONE: INTRODUCTION

1.1 Introduction

The fundamental foundations of all human life on earth are ecology and the natural equilibrium. Green development includes designing and redesigning products and services in order to minimize and reverse their negative environmental impact. Good design is therefore design that seeks to address its impact on its surroundings while keeping users and their experience in mind.

Kenya has no culturally distinguishable style of design that can fully represent the diverse ethnic tastes and identities of the country's communities, especially in recreational space interior design. The Maasai ethnicity was commonly believed to be the Kenyan heritage, with the Ministry of Culture and Social Services (Mwakugu 2004).introduced colors, beadwork and designs incorporated in the Kenya National Dress in September 2004.

Kenyan styles are poorly adapted to interior design due to large Western style influences and patterns following the onset of globalization. Most spaces have similar appearances, with many designers opting for new, internationally desirable tastes, often featuring standardized and mass-produced elements and missing the user's cultural meaning.

The emergence of the African Renaissance has given rise to a resurgence of African creativity and design solutions. More African designers have gradually adopted and fused vernacular design styles with modern styles in the 21st century, resulting in contemporary interiors that still reflect African heritage. With the need to be aware of the impact of goods and spaces on the environment.

With the growing need to be mindful of the environmental impact of goods and spaces, waste management and full use of materials are being studied, with focus on recycling and reuse as a conservation process. This study aims to evaluate the ways and importance of applying eco-design to interior refurbishment while supporting Kenya's cultural preservation by using Swahili kikoi.

This chapter discusses the context of the study, the description of the issue, and also explains the study's objectives. Research issues will also be answered and the purpose and context of the research will be discussed towards the start.

1.2 background of study

Eco design has not been adequately applied in most interior spaces in Adonai Retreat Center Nairobi, with little to no regard for adornment using African-inspired designs. The establishment has not adequately used ecologically-friendly materials or applied any recyclable up cycled materials in its construction and design. Kenya's construction and design industry is increasingly promoting the use of bamboo as material for construction.

The flexibility and biodegradability makes it an environmentally friendly alternative to existing materials. Recycled glass and cycling of wood chips are suitable substitutes for countertops and flooring material for marble and granite. Besides being viable options, however, these are inadequately used. In addition, African designers need to embrace their culture and promote decorative African styles. Swahili design is predominantly found along the coast in Kenya and it is important to spread the style in modern contemporary design while at the same time raising awareness among Kenyans.

This paper aims to show how bamboo can be applied at the Study site to create beautiful interior spaces, furniture and landscaping for refurbishing purposes while promoting eco-design in the process and using aspects of Swahili kikoy for adornment to give the spaces a revamped, modern Contemporary look.

1.3 Problem statement

At Adonai Retreat Center, eco design has not been applied adequately, with little to no respect for decoration using African-inspired designs. The establishment has not used environmentally friendly materials adequately or used any recyclable materials in its construction and design. This paper aims to show how bamboo, recycled glass and wood chips can be used on the study

site to create beautiful interior spaces, furniture and landscaping at Adonai for refurbishing purposes while encouraging eco-design in the process and using elements of Swahili kikoi for decoration to give the spaces a refurbished, modern contemporary appearance.

1.4 Objectives of the study

1.4.1 Main Objective

This study aims to establish how bamboo recycled glass and up cycled wood can be applied together with Aspects of Swahili kikoy to refurbish the interior, exhibition and display, furniture and Landscape of Adonai in a sustainable way.

1.4.2 Specific objectives

1. To explore the uses of bamboo as a sustainable and eco-friendly alternative material for furniture, interior finishes, exhibition and display and landscaping design.

2. To establish the different processes of recycling glass and up cycling wood as materials for use in landscaping and interior design.

3. To determine the extent of the application of eco-design in existing spaces and facilities at adonai retreat center and whether they need to be improved.

4. To propose the types of Swahili fabrics that can be adopted in modern Contemporary interior design and how they can be improved to last longer.

1.5 Research questions

1. Is bamboo a sustainable and eco-friendly alternative material for furniture, interior? Finishes, exhibition and display and landscaping design?

2. To what extent have the spaces at Adonai Retreat Center applied eco-design and how can they be improved?

3. What are the processes of recycling and upcycing glass and how can the resultant products is used in furniture, exhibition and display , landscaping and interior design?

4. Which types of Swahili fabrics and patterns can be adopted in modern contemporary interior Design?

1.6 Significance of the study

The study site management may see an increase in the number of visiting customers and therefore an increase in revenue due to improved user perceptions and interactions resulting from the representation of the Kenyan identity from the Swahili community in the spaces, giving the visitors a sense of belonging. This work can also pave the way for further research on trends and style integration.

The main beneficiaries of this research will be the clients of the study site, i.e. Adonai retreat center staff and residents visiting the site for swimming purposes. By improving the quality of the room through the introduction of Swahili ornamentation and the use of environmentally friendly bamboo and recycled glass and wood products, these two groups will benefit from their services. Both groups will enjoy their experience when engaging with the facility and will also appreciate the importance of recycling and reuse, as well as preservation of the environment and green design.

1.7 Limitation of the study

The site being a retreat center requires significance presence online in terms of a website, map location and directions. This meant that there wasn't information like visitor experience and online reviews about experiences and services provided and access to the site, other than relying on information provided by locals or previous visitors.

Financial constraint, case study research design required the researcher to frequently visit the site to collect data. Lastly time is a limitation given a period of less than three months to have completed the research.

1.8 Scope of the study

The scope of study entails the extent to which the research study is carried out. In this research, the scope is divided into three areas, that is, the geographical, conceptual and contextual scopes.

1.8.1 Geographical

The study will take place at Adonai retreat center located in Kabiria, dagoretti south, in Nairobi City County.

1.8.2 Conceptual

The research is confined to the four thematic areas of interior design, that is, Interior Architecture, Landscaping Design, Furniture Design and Exhibition and Display Styles and Techniques to be applied within the study site.

Interior space to be refurbished will be the restaurant, Landscaping will mainly comprise the entrance, garden, parking lot and surrounding pool areas. reception office for exhibition and display,furniture will be selected from different areas of the site.

1.8.3 contextual

In addition, the researcher will establish the viability of bamboo as an eco-friendly construction material and a sustainable tropical landscaping plant as well as the manufacture, usage and potential availability of recycled glass and up cycled wood as a furnishing, finishing and landscaping material.

The theme of Swahili as a Kenyan style will be covered in terms of its historical background being at the coast and its relation to the site as a retreat center, its elements, the application of Swahili kikoy and patterns in furniture and windows, ornamental pieces and drapery as well as the extent to which it has been applied in existing interior spaces in Kenya.

1.9 Summary

The chapter began with a brief introduction and background of the study, which led to the problem statement. From the problem statement, objectives and research questions were derived to be used by the researcher as guidelines for addressing the research. Thereafter, the significance of the study was explained as well as the limitations experienced during the research period. Lastly, the scope of the research study was outlined

CHAPTER TWO: REVIEW OF LITERATURE

2.1 Overview

This section will address eco design, the main philosophy of the research, as a method of sustainability. Eco design also entails tools of assessing the life cycle of a product and so the Life Cycle Assessment as one of the tools will be explained. A quick review of sustainable methods of handling waste materials will be done and eco materials, namely bamboo and recycled glass and up cycled wood will be discussed accordingly as viable alternatives for usage in the four thematic areas of interior design.

Following that will be a design champion who upholds eco design and sustainability methods in his works. In addition, Swahili kikoy and patterns and the different ways they have been used will be explored, as well as identifying their meanings and cultural significance to the people at the Swahili coast and in Kenya as a whole. Lastly, a case studies which have incorporated Swahili kikoy and patterns will be analyzed that will further aid in determining the ways these patterns and kikoy fabric could be adopted at a new site.

2.2 Eco design

Complete beauty is another word for eco-design. Also known as green design, eco design focuses on sustainability of the environment. Goods, facilities and processes are planned or revamped to prevent or restore environmental damage and, to a greater extent, society and economy (UNEP s.d.).

The aim of eco design is to meet human needs and desires by designing sustainable solutions. (Maina 2008), a product is said to have a “total beauty” when it is best for the people, profits and the planet. Total beauty requires a product to: be more cyclic by using recycled materials or becoming more recyclable, or both; make use of natural materials, such as wood or leather, or become more decomposable; be more solar by using a renewable source of energy during its

manufacturing process; be safe by substituting toxic materials and components for safer ones; preserve habitats by its raw materials being sourced from low impact sources such as approved forests; be durable as it becomes more efficient in the usage of materials as it lasts longer; more efficient by providing greater utility for the user such as multifunction or rented products; be safer through the use of living organisms and bio mimicry techniques during its manufacture; and communicate information that leads to a better environmental performance by changing user behavior (Maina, Introduction To Ergonomics: Fitting Tools, Man and Work 2008)

The concept of eco design was developed at the Rio Summit by the World Business Council for Sustainable Development (WBCSD) in 1992 to address issues such as climate change, population and sustainable development, conservation of biodiversity and managing waste (UNCED 1992). Designers championing eco design are now embracing the design of life cycles rather than the use of the end product, as the impact of a product majorly lies in its life cycle.

Resources, energy consumption, product lifetime and material recyclability are all important factors to consider during the design process in order to create environmentally-sound products and minimize waste. The design process is often different in various contexts but the methodology to be followed for eco design is almost always the same.

Sustainable solutions, according to Charter and Tischner (2001), are goods, services, alternatives or process improvements that mitigate negative and optimize positive and sustainable impacts during and beyond the life cycle of existing products or solutions while fulfilling appropriate societal needs or desires. Eco development is therefore a subst branch.

In Spain, researcher Alberto Navajas documented in his journal on Sustainability (Alberto Navajas 2017) a research on eco-design methodology using LCA as standardized by ISO 14040,14044:2006 in assessing the extent of reduction of environmental impacts of a common industrial product, a cough syrup glass container, with respect to the Spanish Standardization and Certification eco-design regulations requirements of integrating environmental aspects into the product design and development process. The results obtained indicated a decrease of 35.1% in the impact of the product on the environment when the container was made out of PET plastic in substitute of glass. The study served as a successful example of implementing eco-design in industrial processes

Eco design methodology, according to Nowosieleski (Nowosieleski, Spilka and Kania 2007), has six main stages: planning: the product idea is conceived and the economic, technological and ecological priorities are determined; conception: aspects of eco design are integrated into the ideas while applying guidelines for specifications; detail design: tools of eco design are applied in depth and life cycle tools are used to evaluate adherence; research/ prototype: estimations are made in comparison to previously generated products, checking if the objectives are met by the product; introduce to market: information about the ecological perfection of the product is collected from the consumer, educating the consumer on the suitable advantages while presenting the product and product estimation: the success of the product's ecological perfection is estimated while measuring rivals' success.

In order to create a product or service that embodies eco design, the environmental impact it has during its life cycle has to be evaluated. There are a number of existing techniques developed for the evaluation of environmental requirements of a product or service.

Some examples include Checklist (CL), Ten Golden Rules (Luttropp and Lagerstedt 2006), Eco-Design Checklist Method (ECM), Material Input Per Service Unit (MIPS) and Life Cycle Assessment (LCA) (Bovea and Pérez-Belis 2011). Each tool has its own complexities and methods of application and criteria to follow. This paper looks at the LCA method in which all kinds of environmental aspects are assessed and it covers a wider range of aspects than the methods mentioned above (Nowosieleski, Spilka and Kania 2007).

2.2.1Sustainability

Sustainability aims towards a healthy environment and ecosystems, vital for the survival of all living organisms and human beings. This can be achieved through the appreciation of natural resources and reducing negative effects of human activities such as pollution, to ensure long-term environmental and ripple-effect social and economic stability (Emas 2015).

Sustainable development is development that meets present needs without jeopardizing future generations ' ability to meet their own needs (IISD s.d.). Managing the production and use of raw

materials and goods in multiple ways avoids wastage while remaining useful for their intended purposes in the long term as well as cost-effectively reducing.

Sustainable living in the design and construction fields takes the form of using biodegradable and durable materials with low-energy and green engineering. Because of their biodegradability and natural abundance, cork, bamboo, bio plastics, wood, hemp and even desert sand are becoming the new choice of materials in sustainable construction.

recycling

The term ' recycle' as defined by Merriam Webster Dictionary means' to acquire (raw material) by extracting it from a by-product or waste product.' Down cycling is a method of recycling, but it involves turning discarded valuable items into materials of low value. This occurs when scrap is either tainted with unnecessary elements or combined with lower grades of scrap.

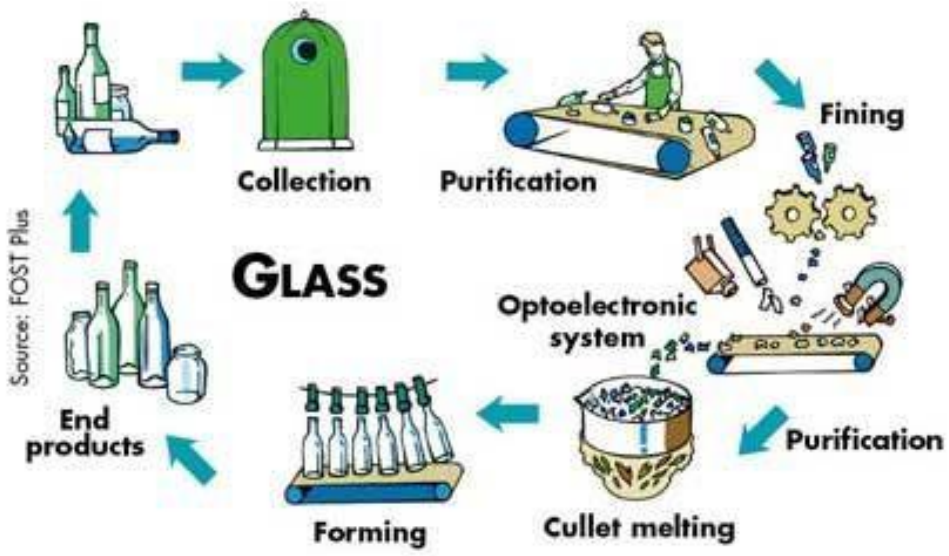

Figure 1: recycling stages and cycle

Source: (http://www.recycling-guide.org.uk/science.htm)

In many cases, down cycling is used to reuse inorganic solid waste such as plastics, glass and paper because it is much less durable because fibers degrade for polluted pulp, glass and plastic every time they are recycled. It ensures that only a small number of times they can be recycled before the fibers become too soft to be reused. In the short term, down cycling is beneficial because it preserves materials this avoids the pilling of products in landfills, reducing pollution of soil, land and water. When using down cycled materials, less new raw material is required, saving energy consumption as the production of materials involves high energy cost.

up cycling,

a combination of' upgrading' or adding value and' recycling' or recycle, is the method of transforming new and discarded products into something useful, improved and often beautiful while still planning to maintain their original purpose. This simply involves creating a fresh look by doing a paint job, adding new hardware and decorative features such as new upholstery on an old item.

Figure 2: various ways of up cycling

Source:https://www.goodhousekeeping.com/home/craft-ideas/how-to/g139/genius-upcycling-ideas/

Also referred to as ‘creative reuse’, reduces the consumption of new raw materials. The goal of up cycling is to turn low value materials into high value materials. It prevents wasting potentially useful materials by making use of existing ones and thus reducing the consumption of new raw materials during manufacturing or the creation of new products. Consequently, levels of energy usage, pollution and greenhouse gas emissions are reduced.

reuse

One of the most successful ways to reduce the amount of waste created by human activity is not to make it. It is expensive to acquire raw materials to create new goods and facilitates the depletion of capital. Reusing is therefore much more effective in saving money and natural resources and in protecting the environment. People can recycle goods through the purchase, repair and maintenance of used products

Figure 3: : reuse cycle diagram

Source: https://www.preloved.co.uk/blog

repurposing

Repurposing as opposed to up cycling, though similar, means taking products originally intended for one use and transforming them into something completely different, often with an alternate intent. Instead of individual items, repurposing projects also includes bits and parts.

Figure 4: repurposed old drawers to a sofa

Source: https://www.preloved.co.uk/blog

Repurposing is intended to work against consumer culture by inspiring people to think of new and innovative ways of using products instead of all too often buying new items. It also benefits the environment by facilitating recycling over discarding, if necessary, thereby reducing the amount of waste that is often generated.

During the First and Second World War, the pattern of repurposing was found in Western countries where households had very little material resources and were forced to constantly recycle and repurpose products until they were no longer useful. In fact, for most people in developing countries, repurposing is a way of life because raw materials are often costly and scarce.

2.2.2Bamboo

Sub-Saharan Africa is home to several species of bamboo but their uses have been limited to constructing traditional houses, making handcrafts, fuel and irrigation (Kassa 2009). There are more than 1,250 species of bamboo in the world, Kenya being the main producer in Africa, among China, India, Thailand, the Philippines, Indonesia and Costa Rica globally (Larionescu 2016).

Large-scale cultivation of bamboo for commercial use in some parts of the world has seen a significant growth due to increasing demand for bamboo, especially in veneer processing industries. However, bamboo still remains a largely unexploited resource in Africa (UN-HABITAT 2012).

The International Network for Bamboo and Rattan (INBAR) in collaboration with the Ministry of the Environment and the Kenya Forestry Research Institute (KEFRI) are working towards the development of bamboo housing in Kenya with the aim of contributing towards low-income, affordable, green housing and ultimately, the Vision 2030.

The main advantage of using bamboo is its impact on the environment, making it an ideal material for structures and decoration inside and outside. Bamboo is one of the native forests in Kenya, most of which are located on the bamboo belt in the mountain forests, making it an integral part of the country's water towers.

It is a rapidly growing and maturing crop which can be harvested up to 40 times once it crosses its threshold of two years of maturity. Besides preventing soil erosion due to its large roots network, it reduces air pollution by releasing twice as much oxygen as ordinary trees. It is a viable substitute for wood, as it produces more timber per plant and its tensile strength.

Bamboo is widely available in a variety of species, offering a range of diameters, heights and different color variations. Black bamboo, scientific name Phyllostachys nigra, is a species of bamboo that is believed to have attained its dark coloration following a genetic mutation that allowed it to absorb more light, giving it an advantage in evolution in forest systems over other plant species.

Figure 6: black bamboo

Figure 5:black bamboo

Source:www.bamboogarden.com/Phyllostachys%20nigra.htm, www.pinterest.com

Black bamboo, similar to yellow and brown bamboo, thrives in tropical climates, with numerous groves being found in China. Its dark tones vary from dark coffee to jet black depending on the place of origin and climate, the color tones changing and gradually turning to black three years after planting.

Compared to the conventional and popular bamboo that has brown to yellow tones and which is fast growing and structurally stronger, black bamboo grows and spreads slowly, and is growing in popularity as a decorative material rather than for construction. As a result, black bamboo is very rare to find and thus highly valued.

In an attempt to popularize black bamboo and make it more affordable, techniques and colors such as oil application and burning have been developed to darken yellow bamboo species that produce similar colors and textures to black bamboo. It also occurs in a number of species, each with features that are well suited for specific architectural and design functions.

Bamboo is a flexible material that can be used as follows in many ways: Bamboo culms or poles are commonly used in the construction of walls, roofs, floors, ceilings, purlins, rafters, scaffolding, windows and doors. It is also possible to use the poles for cladding, improving

Figure 7 Bamboo Wall Cladding

Source: www.ecobambooafrica.com/news/tag/Architects

thermal safety and texture aesthetics. Processed bamboo, also known as engineered bamboo, is manufactured in the form of particle and fiber boards, sheets, laminates and parquet tiles that can be used for floors, tables, and wall and ceiling panels.

Bamboo furniture production has also been widely used in the manufacture of furniture, particularly in the manufacture of chairs, tables and beds.

Figure 8: Bed and seats made from bamboo.

Source: https://www.dezeen.com/2012/11/30

Household items / accessories Rugs, curtains, blinds, blankets, pergolas, sun screens and exterior shade systems can be woven into leaves and younger bamboo culms. Among other items, bamboo stems were also used for fencing, decorative jewelry, and lampshades.

2.2.3 Up cycling of wood

Up cycling is the reverse of down cycling, the other side of the cycle of recycling. Down cycling requires the transformation of lesser quality materials and services into new materials. Most recycling includes removing or extracting usable materials from an item and making a different product or material.[1] In an article in Salvo NEWS by Thornton, the word down cycling was first used in print.

Up cycling has shown significant growth across the United States. For example, the number of products on Etsy or Pinterest tagged with the word "up cycled" increased from about 7,900 in January 2010 to nearly 30,000 a year later—an increase of 275%. As of April 2013, that number stood at 263,685, an additional increase of 879%.

Material down cycling occurs when it is not economic to restore materials to their original quality, for example, when wrought aluminum alloys are melted to produce lower-grade casting alloys. Material up cycling, in the thermodynamic sense, is only possible if even more energy is added to upgrade the material quality.

Figure 9: up cycled material called “Foresso”, by Taylor cono and upcycled wood

Source; https://www.dezeen.com/2020/01/26/foresso-timber-terrazzo-design/

2.2.4 Recycling glass

Waste poses a major environmental problem in major cities in Kenya. Nairobi alone generates approximately 2,400 tons of municipal solid waste daily, mainly from the Dandora Dumpsite (UNDP 2016). Inorganic waste makes up 8.4% of the total waste, with glass taking up 3% of the recyclable inorganic waste and only 5% of the glass recovered in the dumpsites being recycled (JICA 2010).

Waste glass, comprising of bottles, containers, cutlets and glassware, often contains different color pigments mixed together and is commingled and consequently contaminated with materials like ceramics, metals, plastics and biodegradable waste material

A number of companies have begun experimenting with waste glass, in the process transforming them into products ranging from paving stones, floor tiles, wall panels, planters, outdoor park benches, table-top counters and partition walls to glass furniture, household items, architectural elements, sculptures, accessories, jewellery and décor pieces. Examples of such companies venturing into waste glass recycling are Kitengela Hot Glass Limited in Nairobi, Kenya.

Figure 10: recycled glass art and work

Source: www.kitengela.com/how-we-make-it/glassblowers

kitengela hot glass limited

Located in Kitengela on the border of Nairobi National Park, Kitengela Hot Glass was started and is owned and managed by Anselm Croze. He was trained in the art of glass making in Holland in 1991 with glass masters and returned to Kenya where he set up shop and built Kitengela Hot Glass, concentrating on glass blowing. He employs 35 people and is helped by his mother Nina Croze in running the business.

The workshop is a haven of exhibited handmade glassware, home ware, glass sculptures, furniture, jewellery and mosaics, all products of recycled glass and metal scraps transformed into

beautiful works of art by skilled artisans. According to Anselm, he was inspired by the pragmatic Kenyan jua kali artisans who use rejected items to create useful day-to-day objects, the main reason why they recycle waste glass. Kitengela Hot Glass makes a range of products: mouth blown glass, dalle de verre, lighting fixtures, beads, fencing. Murals, architectural design elements, furniture and exhibition pieces (Croze 2018), which are explained further below.

a)Dalle de verre

This is an alternative method of creating stained glass and mosaics. Stained glass is a method used for windows and other structures that let light to pass through. Dalle de verre is a French-inspired technique of casting glass in cement. Blocks of glass are carved with a tungsten-tipped hammer onto a steel mould used for achieving difficult shapes such as curves. The glass pieces are then arranged and cast into a cement and iron or stainless-steel framework to create panels.

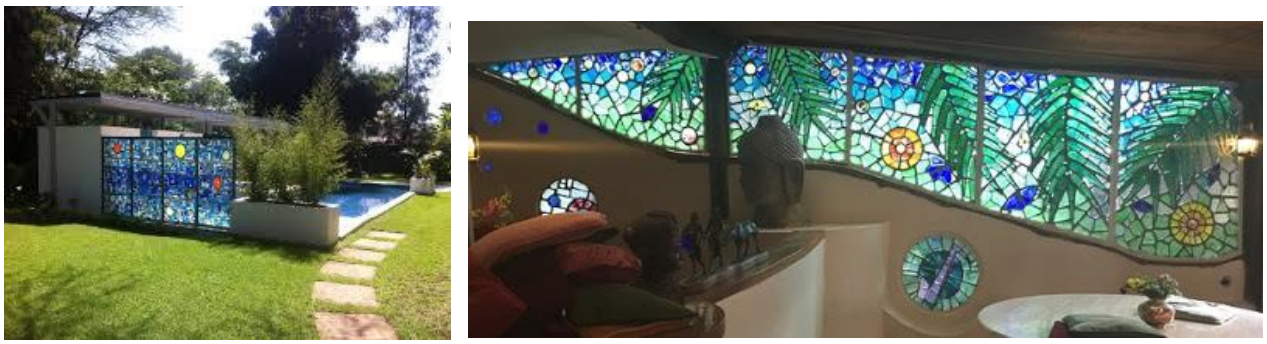

Figure 11: stained glass and mosaics.

Source: www.kitengela.com/what-we-make/dalle-de-verre

b)Lighting fixtures

Kitengela Glass lighting fixtures range from skylights, chandeliers, standing lamps and floor lighting.

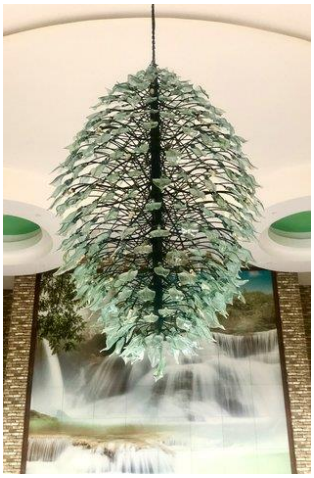

Figure 12: Dutch adjustable lamp.

Source: www.kitengela.com/what-we-make/lighting

c) Furniture

Furniture making incorporates the technique of dalle de verre, sculptural accents and materials like granite and metal bits. The furniture range includes dining sets, bar stools counters and shelves, wine racks, coffee tables and planters etc.

Figure 13: table

Figure 14: Bench and

Source:www.kitengela.com/what-we-make/furnishingsfurniture

2.3 Eco design in interior architecture and exemplars

Building design significantly influences environmental impacts in the short-term and long-term. Eco design can be adopted in interior design practices through selecting furniture and building materials manufactured from renewable resources which can hence be reused and recycled and remain durable. The choice of materials for interior finishes plays a great role in reducing harmful effects to the surroundings.

Essentially, careful selection of building materials for green design starts from analyzing the use of the building, its expected life duration, the loads to which the building will be subjected and the thermal comfort requirements to be met (Aktas n.d.). Efficient use of resources and ecological principles can be incorporated in creating healthy built environments and bettering the quality of life within interior spaces. Interior finishing such as green walls containing live vegetation, materials derived from waste such as particle boards and materials made from natural renewable sources such as straw blocks can make a great contribution to the interiors, their occupants and most importantly, sustainability.

Using local vernacular design elements in building design also improves material use and enhances comfort while respecting cultural heritage (Shu-Yang, Freedman and Cote 2004).

Systems should also be put in place to reduce, reuse, and recycle waste materials on-site. In addition, landscaping can be made natural through using native vegetation and applying

Design practices appropriate to local climatic conditions while keeping in mind the need for aesthetics. Such are sustainable principles practiced by Frank Lloyd Wright, a pioneer of the green design philosophy

2.4 Frank lloyd wright

Frank Lloyd Wright (June 8, 1867 – April 9, 1959) was an American architect, interior designer, writer, and educator, whose creative period spanned more than 70 years, designing more than 1,000 structures, of which 532 were completed. Wright believed in designing structures that were in harmony with humanity and its environment, a philosophy he called organic architecture. This philosophy was best exemplified by Fallingwater (1935), which has been called "the best all-time work of American architecture." As a founder of organic architecture, Wright played a key role in the architectural movements of the twentieth century, influencing three generations of architects worldwide through his works.

Figure 15: Wright's historic Fallingwater house

Source: Wright House

He and his team conceived of living “machines” that would replicate some of what nature accomplishes in natural wetlands. American Architect Frank Lloyd Wright, who began to work at the beginning of the twentieth century contributed to Eco-design through his ideas on Organic Architecture.

2.5 Swahili kikoy and pattern

The Swahili culture is a product of local influences from indigenous tribes and trading parties from the Arabic Peninsula, Persia, the Portuguese, Chinese and Indians who sailed to East Africa using dhows and with the aid of monsoon winds, and the eventual intermarriage among them. This interaction also led to the birth of a rich culture and with it came a unique type of architecture and décor found along the Swahili coast- the coastline stretching from Mogadishu in Somalia in the North to Cape Delgado in Mozambique in the South, inclusive of islands and archipelagos off the coastline (Purdy n.d.).

Before the onset of British colonialization and adaptation of Westernized cultures, the Swahili people had had their fair share of interaction with foreigners from the East and had thus adopted their cultural beliefs and traditions, religion and languages. Swahili patterns are thus a result of an intermarriage of different styles coalesced by the many people who travelled to and interacted with each other along the Swahili coast for a very long time.

During the 19th century, Indian influence resulted in wood carving emerging as a symbolic form of expression within Swahili art, particularly used in the decoration of doors and other domestic items (Athman 1996). This was brought about by booming mercantile trade (Meier 2009) and the construction of the East African Railway that saw the influx of immigrating Indians contracted to build the railway line in the early 20th century.

Distinguishable from each other through the style of carving and forms used, the patterns were named after the regions from which they originated from and developed their functions and, for the more recent ones, the master carvers who created the patterns. Examples of these patterns and styles are the star, square and diamond patterns of the Bajuni style, leafy (vijani), floral (maua) and rosette (mawaridi) patterns of the Mapi, Siu, Zanzibar, Gujerati, Lamu and Ali

Swabu styles, the wave (nyoka) patterns of the Siu style and the rope, vine, chain, and bead patterns of the Omani style (Athman 1996), often accompanied by brass studs for embellishment. These patterns are often abstract forms carved in relief, incised, pierced or engraved. They also form an important component of body art mostly preferred by women, with more complex designs used during major ceremonies such as weddings.

The kikoy (or kikoi) is a rectangular wrap; the length is 160 cm and the width is 100 cm. nowadays it has become a fashion article all over the world. Traditionally, this fabric made on a simple loom, is evenly in the middle and striped along the edges. In recent years the kikoys are also woven with stripes across the entire width of the fabric.

The word derives from the Swahili kikoy and means: wrap, something to wrap around you. This shows the multiple use of the kikoy.The kikoy has a long tradition along the coast of Kenya and Tanzania. Businessman from Arabia came sailing over the Indian Ocean and disembarked in several cities along the East African Coast. This is how the kikoy was introduced in Kenya and Tanzania.

Figure 16: a picture of the kikoy in different colors

Source: https://www.kasukukikoy.com/

Athman (Athman 1996) observed that Swahili motifs and patterns have meanings: geometric designs in form of triangles and squares symbolized the owner's expertise in accountancy and monetary problems; chains, lines or ropes (cheni) carved on a door and frame represented security, protection and power in the society; fish scales, fish patterns or any other sea creatures, a fisherman or wealth in form of fishing vessels and maritime trade; palmettes (nyanda) on the door frame, unity and harmony within the household; the lotus flower or any floral patterns, peace and tranquility; rosettes or any rose imitations (waridi), happiness, as in all other floral patterns; varieties of fruit, heavenly life; beads, a dealer in precious stones and jewellery, and Koranic calligraphy and arabesque patterns, divine blessing, atmosphere and protection.

2.6 Swahili Style and the Present

Swahili style of décor using Swahili patterns has been embraced outside of the coast as a result of visitors from inland, triggering the exchange of skills and ideas. In addition, the importance of embracing this style of décor could not be stressed further with regards to its significance as an embodiment of the African, and more so, the Kenyan identity, despite not being fully regarded as genuinely 'African', the latter often characterized by forms and shapes truly symbolic in their representations of proverbs, myths and legends (Athman 1996).

Stakeholders in the tourism, real estate and corporate sectors have shown significant interest in the incorporation of Swahili patterns in their architecture, furniture and branding. Current trends in design emphasize on the modern while still highlighting the importance of products' and spaces' embodiment of a sense of identity and appreciation of local culture, a philosophy that has been picked up on by local designers working on high end residential and hotel projects. Tudor apartments located in Mombasa, Kenya are a perfect example of the fusion of the Swahili style, environmental friendly design and modernism in its architecture.

Figure 18: Swahili Architecture and Interior Design at Palm House, Lamu

Figure 17: Swahili Architecture and Interior Design at Palm House, Lamu

A major setback however is the dwindling number of artisans skilled in Swahili art and carving styles needed for mass production of the carved doors, furniture and friezes, niches and corresponding Swahili architectural elements. This has resulted in the acquisition of what is considered 'Swahili' to become a very costly venture, leaving it at the disposal of the wealthy. Furthermore, more designers are simply duplicating patterns and there is very little effort exerted in creativity. Even the young Swahili generation to whom the tradition is to be passed on is disinterested in creating their own patterns. Swahili patterns are, if not conserved and are continuously disused in this way, losing their original traditional meaning.

2.7Design process

Creating a successful and useful product with the aim of solving a problem requires a designer to develop ideas and transform them into working solutions. A designer's work is concerned primarily with solving problems by developing and explaining ideas (Aspelund 2010). The development of an idea into the final product follows a process which involves a series of stages widely known and used by all designers for a well-informed and elaborate working procedure. The stages may be followed in a step-by-step manner but they need not be linear as the process is evolutionary and the stages may require continuous revisiting to maintain and expand creativity.

Karl Aspelund (Aspelund 2010) examines in detail seven main stages of the design process as follows: inspiration, identification, conceptualization, exploration or refinement, definition or

modeling, communication and production. The inspiration stage is marked by an initial idea from which creativity is driven. Also called the discover stage, finding inspiration requires keeping a wide and open-minded perspective to allow for a broad range of ideas which can be sourced from anywhere and anyone.

A client may provide useful insight concerning his or her style, values, context and requirements from which the designer can draw inspiration from. Activities like brainstorming and lateral thinking, current global trends and events, existing competitor products and services provide a base from which a designer can begin to draw inspiration from.

These inform the designer about the project requirements, needs and styles they would prefer to include into their project. In this case, the researcher chooses to draw inspiration from the African continent and specifically Swahili culture and the patterns included in their architecture, furniture, accessories and religious contexts. Eco design, a current global environmental trend, dictates the framework which the researcher uses to inform environmental-friendly design.

Identification involves the designer examining the project or product and defining the problem. The context of the project is explored, ideas collected in the inspiration stage are analyzed, reviewed, selected and refined and the findings defined as problems whose ideas are pitched. Often, ideas generated here are actualized into a brief which is shared and discussed with the client. A research design methodology is chosen from which tools of qualitative and quantitative data are utilized to collect data from appropriate sources concerning the project.

This stage often ends with an approval to begin design work and design development. For this project, the researcher takes the case study research design approach from which data is collected regarding the case study site and the target population sample questioned about the conditions of the existing spaces at the site and their opinions regarding eco design and Swahili patterns. Conceptualization as the third stage concerns the full exploration of concepts and the understanding of their impacts before implementation on working products and spaces.

The designer creates impressions that may not be workable or solve any problems. Through the use of mood boards, inspiration boards or collages, the designer introduces his or her concepts to the target audience in a way that is easy to comprehend while simultaneously clarifying them in

his or her mind. This stage encourages concept development whereby there is continuation or a change of concept.

The researcher sketches ideas and concepts drawn from aforementioned inspirations and design philosophies that are to be infused in the design of the furniture, interior spaces, and landscape and display products at the case study site.

The exploration or refinement stage follows and encompasses detailed exploration of the concepts with the aim of developing working solutions. Impractical elements are reevaluated and the concepts outlined in the conceptualization stage are fully defined.

The designer begins developing preliminary orthographic drawings, scheme plans and design layouts to be reviewed by the client and be revised thereafter. Here, the designer may revisit the inspiration stage to come up with possible creative solutions.

The designer may begin to draw up a budget to outline a list of materials to be purchased and any other financial requirements needed for the project for presentation approval by the client. The designer fully commits to his or her design concepts at the definition and modeling stage. Schematic or formal drawings are prepared to help illustrate ideas and space

Requirements of the project. Working drawings of the structure, lighting and layout of the spaces and products are done in detail as well as prototyping and testing in the form of scale models. Cost estimates and product specifications are also done at this stage.

The communication stage takes place at virtually all the stages of the design process. This ensures constant feedback between the designer and the client and any other concerned parties that could influence changes in the design of the product or space.

The client is able to visualize and understand the final product or space from the beginning. This is usually done through PowerPoint presentations, a portfolio of working drawings and images of computer-aided models from which references can be made.

The final stage, production or implementation, concerns final revisions and approvals of the designs. Final prototypes are made and feedback provided. This stage may take place over a long period of time, with constant communication between the relevant parties regarding technical decisions, budgeting and project management. Production and project supervision begins with

the client and designer constantly working to refine original designs and make changes based on the client's needs and budget constraints.

2.8 Summary

The previous sections of the chapter looked at eco design and its subsequent assessment methods. Sustainable methods as key factors to consider when designing spaces that are meant to be environmentally conscious. They provide the necessary guidelines and methods to follow as well as exemplars who have applied them effectively in order to achieve the much desired ecological ideal.

The practices of recycling, reusing, repurposing and up cycling waste have been explained and their significance in reducing waste and maintaining a healthy environment has been highlighted. Consequently, recycled glass up cycled wood and bamboo has been discussed as viable alternatives to existing unsustainable materials. Swahili patterns and kikoy, with their rich history and background, have been identified and their meanings and applications discussed, concluding that they are a great way to incorporate a local cultural significance to spaces while still upholding the modern. Finally, the design process was outlined, whereby the seven stages were explained and how they were implemented in the research project.

CHAPTER THREE:

RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter aims to explain the meaning and type research design study to be applied as well as the sample population and sampling method. It also looks at how the data collected will be analyzed and presented.

3.2 Research design

A research design according to Robert K. Yin (Yin n.d.) is the logical sequence that connects the empirical data to a study's initial research questions and its conclusions. It is the action plan that the researcher uses to undertake the research study, from data collection and analysis to data presentation and finally, drawing conclusions from the information initially collected.

This paper aimed to assess the quality of the interior, exterior and landscape spaces and the efficiency of exhibition and display techniques in providing quality aesthetics and communicating information to the target users in terms of the use of ecological materials and the application of African design styles. Case study research provides a more qualitative approach in explaining the processes and outcome of a phenomenon, which can be limiting when using quantitative methods of research (Zainal 2007) and enables the scrutiny of data within the context of its use (Yin n.d.), as in the natural environment in which an individual is in or an event is taking place. It is an in-depth study of an event, individual or institution (Mugenda and Mugenda 2003), focused on in its singularity to inform similar situations or practices due to its unique characteristics and uniqueness. It is also regarded as the preferred strategy when the researcher has little to no control over events and the focus is on a contemporary phenomenon within real-life contexts (Yin n.d.).

As a result of the nature of the study being carried out, case study research was the most appropriate research study design that was used. It was the most appropriate for this research

study as it allowed for the researcher to focus on the visitors and management of the study site, Adonai retreat center, in a natural setting. Using this type of research design enabled the researcher to understand the users and their interaction with the space in great depth permitting for an overall synthesis of the factors involved that helped in determining the best way to transform the environment

3.3 Target population

A population refers to an entire group of individuals, events or objects having a common observable characteristic. The target population in this research comprises residents and youth.

3.4 sample and sampling method

Sampling is the process of selecting a number of individuals for a study in such a way that the individuals selected represent the large group from which they were selected (Mugenda and Mugenda 2003). Therefore, the sample population was, ideally, the visitors, management and staff members of Adonai retreat Centre present on site at the time the research was conducted.

The sampling method used was simple random sampling since a sample of any size in the selected population had an equal chance of being selected (Mugenda and Mugenda 2003). Purposive sampling was most suitable for the management and staff because they yielded the most required amount information regarding the establishment and management of the research study site.

Table 1: Adonai retreat Centre Management and Staff

No.	Description	N=	Male	female
1	Owners	3	√	√
2	Manager	1	√	-

3	Assistant manager	1	-	√
4.	Caretaker	2	√	√
5.	Life guards	5	√	√
6.	Cooks	3	√	√
7.	Guards	2	√	√
8.	Gardener	1	√	-

Source: Author, 2020

Table 2: Daily Average Number of Visitors

	Residents	clinicians	Teenagers and youth
Holidays	36	7	40
Normal days	15	16	20

Source: Author, 2020

3.5 Data collection instruments

Data collection instruments are tools used by the researcher to collect necessary information when carrying out a research. The instruments used in this research are namely participant observation, photography, interviews and questionnaires.

3.5.1 Observation

Participant observation requires the researcher becoming a participant in a situation (Mugenda and Mugenda 2003). This required the researcher constantly immersing herself in the activities taking place at Adonai retreat Centre in order to take part in the activities and experience first-hand the spaces within. It allowed the researcher to see the emotions and problems being faced by the visitors and understand their preferences and tastes that could have otherwise been missed, as the view from the inside is fairly different than the view from the outside. However, observing people without their consent raised the question of ethics and the researcher's experience or participation could have affected the situation and the subjects, as documented in the book Research Methods: Quantitative and Qualitative Approaches (Mugenda and Mugenda 2003). Participant observation required taking notes of what was observed or a checklist to tick off a predetermined list of behaviors or states. These two could have however interfered with the researcher's participation and the subject's behavior due to their knowledge that they were being observed

3.5.2 Photography

Photography is a method of documenting site data and activities using a camera or any other device containing a camera. Photography in research is most commonly used for illustration and documentation (Holm 2014). Photographs offer concrete proof of existing physical features and the nature of the spaces on the site and offer exact records of the reality. They are a cheap and convenient way of documenting data first hand and can be used off-site for future reference. Photographs of the existing landscape, furniture, the interior spaces, the swimming pool area and the playground were taken by the researcher using an Android smartphone camera.

3.5.3 Interviews

Interviews created a flexible and friendly environment when interacting with the interviewees. In-depth information on the viewpoints and experiences of participants on a particular topic are revealed and documented through the use of interviews (Turner 2010). Nearly clear, accurate information was acquired because interviews provided a channel through which the interviewer asked nearly any question relevant to the study and yielded immediate, high response rates.

Out of the three qualitative interview design methods, that are informal conversational interviews, general interview guides and standardized open-ended interviews, the most appropriate interview method was the standardized open-ended interviews which allowed for the wording of identical questions that still prompted for open-ended responses.

This yielded more information and also allowed the interviewer to use probing questions to prompt answers to sensitive personal information. In addition, there was reduced researcher bias especially when many participants were involved. However, comparisons were more difficult to make because of the diverse nature of information often acquired from different people (Leedy and Ormrod 2005). Therefore, the researcher adopted the open-ended approach and conducted the interview to the staff at Adonai retreat Centre.

3.5.4 Questionnaires

A questionnaire is a type of research instrument containing a number of questions and items that prompt responses, formulated by a researcher in order to gather information from respondents. Questionnaires come in different forms, the main ones being structured or close-ended questionnaires and unstructured or open-ended questionnaires.

Structured questionnaires have questions formulated in such a way that they entail all the possible alternatives from which an answer that is best suited can be selected. Unstructured questionnaires contain questions that give the respondent complete freedom to answer in their own words. Questionnaires are often used for quantitative analysis.

3.6 Data analysis tools

Qualitative data analysis as outlined in the book Practical Research: Planning and Design (Leedy and Ormrod 2005), entailed the following steps: organizing the details, where the data was collected and read thoroughly for the researcher to become familiar with the content. Data from checklists and interview field notes were edited and voluminous continuous prose data were broken down into simple sentences and words; categorizing data and pattern identification, where the researcher was able to identify categories, themes and patterns that were similar and dissimilar from each other.

The data was then classified according to the theme or category it belonged to, and synthesis and generalization, whereby after pattern identification, the researcher analyzed the data to determine

its usefulness, consistency and credibility in relation to answering the research questions while simultaneously generalizing it for the audience. The relationships between the categories were explained and hypotheses and recommendations provided. The data was arranged in schemes such as tables and hierarchical diagrams.

In general, a logical analysis of the questionnaire and interview feedback was done at this stage. Similarly, photographs were transcribed here. The researcher then tried to come up with possible reasons for the respective findings and feedback and tried to point out the problems and provide recommendations. Data collection and analysis of the qualitative nature was done simultaneously to avoid confusion and enable the researcher to familiarize with the data in the early stages of the research design.

3.7 presentation methods

Qualitative data grouped according to similar categories and themes are presented using, pie charts and tables, showing numbers and percentages that allowed for comparison. Photographs are described, stating the content and problems as viewed on site. Data from interviews is presented in narrative prose form and tables respectively after being analyzed.

able 3: Data Analysis Tools and Presentation Methods

No.	Description	Data Analysis	Presentation Process
1.	Participant Observation	Transcription Grouping, Categorizing and Comparison	Photos Narration
2.	Photographs	Transcription	Narration
3.	Interviews	Grouping, Categorizing and Comparison	Narration, Pie charts, Table
4.	Questionnaires	Descriptive Statistics Grouping, Categorizing and Comparison	Graphs, Pie charts of Percentages Tables of Mean, Mode, Median

Source: Author, 2020

3.8: logical frame work

Table 4:logical frame work

Logical frame work

OBJECTIVE: . To explore the uses of bamboo as a sustainable and eco-friendly alternative material.				
DATA NEEDS	DATA SOURCES	DATA COLLECTION TOOLS	ANALYISIS METHODS	EXPECTED OUTPUT
Is bamboo a sustainable and eco-friendly alternative material for furniture, interior? Finishes, exhibition and display and landscaping design?	Available Literature on bamboo as a sustainable materials	Library ,desktop research	Narrative	Information on if the material is available and sustainable
OBJECTIVE: To establish the different processes of recycling glass and up cycling wood as materials				
DATA NEEDS	DATA SOURCES	DATA COLLECTION TOOLS	ANALYISIS METHODS	EXPECTED OUTPUT
To what extent have the spaces at Adonai Retreat Center applied eco-design and how can they be improved?	companies already dealing with recycling of materials egg glass and wood	Photography and observation, desktop research	Narrative	To find how it has been applied and how it can be improved
OBJECTIVE; to determine the extent of the application of eco-design in existing spaces and facilities at Adonai retreat center				
DATA NEEDS	DATA SOURCES	DATA COLLECTION TOOLS	ANALYISIS METHODS	EXPECTED OUTPUT
what extent has the spaces pplied eco-design and how can they be improved?	Case study , desktop research	Photography ,observation and reading	Narration , Comparison	If the material are easily available and how they can be used
OBJECTIVE : To propose the types of Swahili fabrics that can be adopted in modern Contemporary interior design				
DATA NEEDS	DATA SOURCES	DATA COLLECTION TOOLS	ANALYISIS METHODS	EXPECTED OUTPUT
Which types of Swahili fabrics can be adopted in contemporary Design?	Examples who have used the fabrics and patterns before	Observation and photography	Narration and transcription , Grouping, Categorizing	How the materials have been applied in other places as a guide

source: Author,2020.

3.9 Summary

The research methodology section utilized the case study research design with a bit of a mixed-methods approach. Data was collected using interviews, photographs, reviewing existing documents of the study site and the researcher applying participant observation. Analysis of the data took a qualitative approach of organizing, pattern identification and categorization and data generalization. Analysis photographs and recorded audio interviews were transcribed respectively. The main methods of data presentation were through tables and pie charts, with information from interviews and photographs being described to the audience verbally and in written form.

CHAPTER FOUR: SITE ANALYSIS AND PRESENTATION OF FINDINGS

4.1Introduction

The main objective of the research study is to establish how bamboo, up cycled wood and recycled glass can be applied together with aspects of Swahili kikoy to sustainably refurbish the existing spaces at the site. Therefore, all the data collected regarding Adonai retreat Centre will be examined to determine whether eco design has been adequately applied at the site and whether Swahili kikoy would be an ideal décor style. Information concerning the historical background, geographical location, climatic conditions, vegetative cover and amenities around the site will be highlighted. Existing conditions of the spaces at the site will also be discussed in detail using the four main areas of interior design as guidelines, namely Interior Architecture, Landscaping Design, Furniture Design and Exhibition and Display. This will be done through the use of photographs taken of the site and short narratives. Data obtained through interviews administered by the researcher will be analyzed and common relationships evaluated to find out the general view and preferences of the users.

4.2 Qualitative analysis

This section focuses on information regarding the site profile such as the history, location and social and geographical factors affecting the site. In addition, a detailed description of the interior and exterior spaces, furniture, exhibition and the landscape at the site in that order will be provided.

4.2.1 Historical background

Adonai retreat Centre is a recreational establishment in the outskirts of Nairobi City County by three partners who own the land on which it stands on. Beginning with only seven employees, the establishment has rapidly grown into a recreational hot spot with a swimming pool, two changing room, Accommodation, a garden, children's playground and a restaurant with eighteen

employees and, a conference hall. It prides itself in providing services such as swimming, hosting garden wedding photography and birthday party's services, youth group events plus accommodation rooms for groups or individuals.

4.2.2 Geographical location

Adonai retreat center is located in kabiria Waithaka, Dagoretti, Nairobi, Kenya. It is found along Kabiria road.

4.2.3 Access and utilities

The site can be easily accessed using matatu or tuk tuk from kabiria center which is about five or less minute drive. Situated within a high middle-class residential area, amenities such as piped water, the Nairobi sewer line and power lines are readily available. In addition, the large residential areas equate to a large market for the establishment, mainly being youth and residents.

4.2.4 Climate, vegetation and soil

Waithaka, dagoretti experiences a warm Subtropical Steppe climate with a Tropical Highland microclimate due to close proximity to ngong Forest . The average annual temperature ranges between 18°C and 26°C. Average annual rainfall is 619mm and average annual humidity ranges from 54% in the dry season to 300% in the wet season (Physiographic and Natural Conditions n.d.).

Vegetation around the site is mainly man-made, with large sections of natural vegetation having been cleared to pave way for residential buildings, dairy farms and coffee plantations. Evergreen flowering shrubs such as bougainvillea, trees like bamboo, the jacaranda tree, silky oak (mukima), croton tree (mukinduri) and eucalyptus tree, short grasses and kei apple (kayaba) hedges are the most common within the locality. The soil present at the area is of the red volcanic type (Physiographic and Natural Conditions n.d.). It is well drained and very fertile, ideal for agricultural and gardening purposes.

Figure 20: View outside Adoinai Retreat Centre entrance
Source: Author, 2020

Figure 19: View outside Adoinai Retreat Centre entrance
Source: Author, 2020

4.2.5 Sensory elements

The site is located in a quiet serene environment, approximately one kilometer away from the nearest shopping center and matatu terminus. Immediate neighbors are low-density gated households that emit little noise, therefore causing minimal to no disturbance. As a result, the surrounding views are pleasant and serene..

Figure 21: View outside Adoinai Retreat Centre entrance

Source: Author, 2020

4.2.6 Interior architecture

The main interior spaces at the site are housed in different buildings. The main areas contains : the reception office, the accommodation area double and single rooms the women's and men's changing rooms containing a common changing area, the restaurant , kitchen, office reception and, the conference hall.

The building has been constructed out of masonry stone, concrete and aluminum and zinc profiled sheets for the roof. The restaurant and reception office have ceramic tile floor finish and the walls have been painted orange and black using water-based paint. There is also a tent assembled on a raised platform situated on the pool area is the space currently being used as the restaurant. Two parallel beams run across the ceiling. The large open spaces provide sufficient natural daylight during the day while artificial lighting is provided through fitted LED fluorescent tubes.

Figure 22: View inside Adoinai Retreat Centre restaurant

Source: Author , 2020

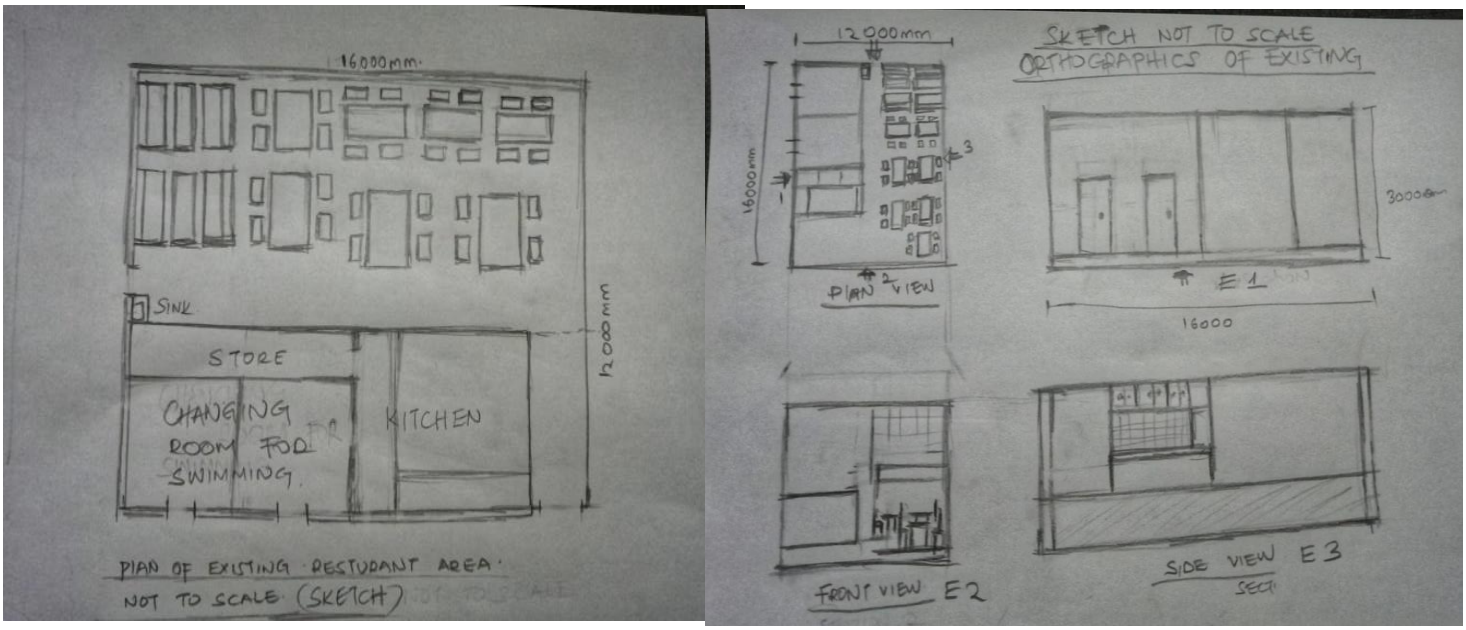

Figure 23: illustration of plan and orthographic drawings not to scale (sketches)

Source: Author, 2020.

4.2.7 Furniture

Furniture found at the makeshift tented restaurant and pool area mainly comprises of red coca cola plastic chairs and tables by the pool and black metallic wooden tables and metallic chairs ,there is also rexin booth coach at the restaurant. Despite the chairs and tables being waterproof by the pool , the plastic chairs are particularly ergonomic for children below 10 years old and the metallic tables are prone to rusting once the black paint peels off as a result of the wet and damp environment. The reception office contains one sofa, two office desks two office chair and a wooden storage cabinet the garden comprise of metallic benches which have rusted due to poor maintained.

Figure 24: View inside Adoinai Retreat Centre restaurant of the furniture

Source: Author, 2020

Figure 25: View inside Adoinai Retreat Centre restaurant of the furniture

Source: Author, 2020

4.2.8 Landscaping

Landscaping has mainly been done outdoors in three main areas: the entrance and parking lot area, the garden and adjoining path walks and the pool area. The parking lot and entrance area have been graveled and surrounded by trees and a variety of flowering shrubs that have been planted. Paths leading to the reception, swimming pool area, playground and garden have been put up using The garden mainly consisting of Kikuyu grass, trees and shrubs is well maintained. A low iron picket fence has been used to surround the playground and a perimeter wall to separate it from the pool area.

Figure 26: parking and swimming pool

Source: Author , 2020

Figure 27: pavilion and garden

Source: Author , 2020.

4.2.9 Exhibition and display.

The reception area looks kinder serious and doesn't look welcoming. It is very isolated given that the site is a retreat center. There are no paintings or display of anything in the office to show what really the place is about. The room is too harsh for a retreat center. There is only one sofa allocated for visitors.

Figure 28: reception/ office space

Source: Author , 2020

4.3 Analysis of response

The researcher's main area of study as previously stated is the incorporation of eco design through the use of bamboo and recycled glass coupled with Swahili kikoy in remodeling spaces. The researcher opted to use questionnaires and interviews as methods for collecting data from the visitors and staff at the study site, Adonai Retreat Centre.

Questionnaires were administered to the staff and visiting swimmers while the assistant manager, who represented the management, was interviewed. The questions in both the interview guide and the questionnaire touched on the awareness of the respondents on eco design and whether it has been applied at the site, their preferences regarding a variety of bamboo and recycled glass products and Swahili kikoy in décor and whether their application in the spaces at the site would impact positively or negatively in terms of upholding eco design and cultural significance respectively.

Table 5: Respondents' profiles at Adonai retreat Centre

	Age groups (yrs.)			Visitors	Stuff	Total
	18-26	27-35	36-50			
Male	5	3	1	6	3	9
female	4	4	3	7	4	11
Total	9	7	4	13	7	20

Source :Author,2020

Out of the 25 questionnaires that were administered, 20 were returned, indicating a good response rate. The data obtained was collated and analyzed to find common preferences and themes. Tables, bar graphs and pie charts were used to present the data and enable for easy interpretation.

Majority of the visitors were aged between 18 and 26 years, followed by those aged between 27 and 35 years, signifying that Adonai retreat Centre is frequented by the young adults, who are more likely to be well versed in themes concerning environmental conservation and décor styles.

Regarding the site being eco-friendly, majority of the respondents thought that it was ecofriendly particularly in the aspect of the eco garden being present, using biodegradable materials and using durable materials.

Bamboo was widely known by all the respondents, most especially as a fencing material. Many of the respondents were surprised that bamboo could be used in interior décor and as a structural material.

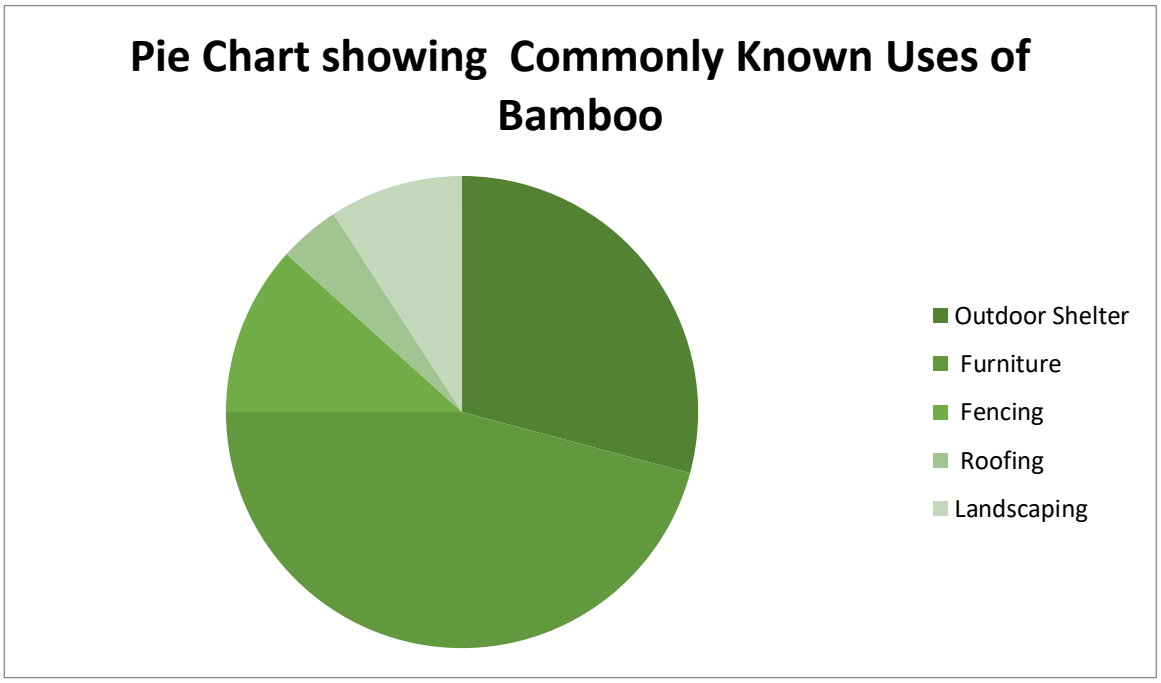

Figure 29: pie chart showing commonly known uses of bamboo.

Source: author (2020)

Concerning Swahili kikoy, 81% of the respondents considered them as part of the Kenyan heritage and if used in the spaces at the study site, they would significantly improve their aesthetic appeal.

4.4 Interview analysis

The researcher opted to use interviews for the management because they were likely to provide more information regarding the site. The senior-most person at the site during the research study was the assistant manager Mr Kevin oringo. His response regarding eco design , bamboo ,Swahili kikoy and recycled glass in terms of the increasing importance in their applications in construction and design of spaces. However, he showed a lot of concern with regards to bamboo and its longevity and the resultant costs incurred in maintaining bamboo and such like wood products used in relatively wet areas. Recycled glass products also posed another challenge. He was wary of using glass ornamental pieces around the establishment because they posed a danger to the young kids going for swimming once the pieces broke or were mishandled. He noted that the use of Swahili kikoy in the interiors at Adonai retreat Centre would "make a big, positive difference. Many people will come and the number of customer would increase in numbers.

In addition, the assistant manager remarked that the Swahili kikoy would look good on the pool area and restaurant , furniture and accessories like picture frames to be displayed in the restaurant. Concerning the increase in visitor numbers and better service provision if Swahili kikoy, bamboo and recycled glass would be incorporated,. He however noted that people are changing and are becoming more aware of the environment and what could be termed as 'African'. Therefore, the site would serve as a good example of eco-friendly design and African themed décor.

4.5 Summary

This chapter first described the existing conditions of the study site in detail, particularly the landscape, interiors, exhibition areas and furniture. Afterwards, data collected by the researcher through interviews was analyzed. The results were examined to find out the views and preferences of the respondents regarding eco design, bamboo and recycled glass products and incorporation of Swahili kikoy in the spaces at the study site. The results were also reviewed to determine whether they answered the research questions mentioned in the first chapter. Finally, important concerns that were raised by the assistant management during the interview concern the themes and materials being researched and had not been highlighted before such as costs and maintenance were mentioned.

CHAPTER FIVE: SUMMARY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The chapter will aim to discuss and make a summary of the findings presented in the previous chapter. Thereafter, based on the research questions and analysis of the information collected earlier, the researcher will seek to make conclusions and suggest appropriate recommendations pertaining to the eco design philosophy, sustainable materials and Swahili kikoy discussed in the literature review section. The recommendations will touch on the interiors of the restaurant, reception office, the landscaping immediately next to the restaurant pool area and of the garden area as well as the furniture and exhibition and display techniques suited for Adonai retreat Centre.

5.2 Summary of findings

The case study site, Adonai retreat Centre is a fairly popular recreational establishment for Kabiria area residents. From the researcher's participant observation and qualitative analysis of the site's existing spaces and surrounding conditions, it can be concluded that little regard has been put into the aesthetic improvement of the interior spaces and much focus has been put towards the garden and pool areas.

There is no evidence of the incorporation of any African décor styles and user-friendly furniture provisions for the different room functions.

The landscaping is top-notch but more could be done in terms of systematic alignment of vegetation types, well-defined flower beds, storm drain provisions, outdoor seating and lighting and a well-defined entrance and driveway inclusive of a gate.

Exhibition and display was mainly confined to the reception exhibitions with no art exhibitions displayed both indoors and outdoors. Furniture for visitors was a misplaced single sofa that ergonomically doesn't suit the area.

Findings from the interview show that bamboo and recycled glass are viable eco-friendly materials. The use of bamboo for interiors would be a great way to create awareness on the diverse uses of the material which is conventionally used for outdoor structures and furniture.

Similarly, bamboo would work seamlessly as a landscaping plant, creating a lot more variety and volume once it reaches maturity. Recycled glass would work well outdoors and indoors , especially for outdoor lamps and furniture.. Pertaining an African-inspired design style, the researcher chose to explore Swahili kikoy particularly for furniture and hangings

5.3Recommendations

The following solutions were therefore recommended by the researcher for implementation with regards to rectification of some of the issues revealed, majorly pertaining to eco design and environmentally-friendly materials and Swahili kikoy décor.

Figure 30: color palette

Source: https://www.pinterest.com/pin/80501912062387372/

5.3.1 Interior architecture

Interior architecture encompasses wall, floor and ceiling treatments as well as doors and windows and any other opening confined within an indoor space. Eco design can be adopted in the interiors of the study site through selecting building materials manufactured from renewable resources which can hence be reused and recycled and remain durable. Bamboo cladding, partitioning and ceiling paneling as well as bamboo interior accessories. Recycled glass of different color range will also be incorporated in the architectural design of light wells and

different ways in the interior from furniture to kitchen counters and also parts of the floor plans. Swahili kikoy will be included in the interior though in furniture and curtain.

The color scheme will gravitate towards bamboo and color palette consisting of a mix of creams and beiges that will be contrasted with darker browns , richer blues ,white ,yellows, pink purple , the aim being to create an African ambience, more specifically of the Swahili kikoy multi cultured fabric to go with the culture. The choice of color is also influenced by the intention to contrast the bright colors of yellows and blues present at the site due to the vegetation at the garden and the water at the swimming pools around the restaurant building.

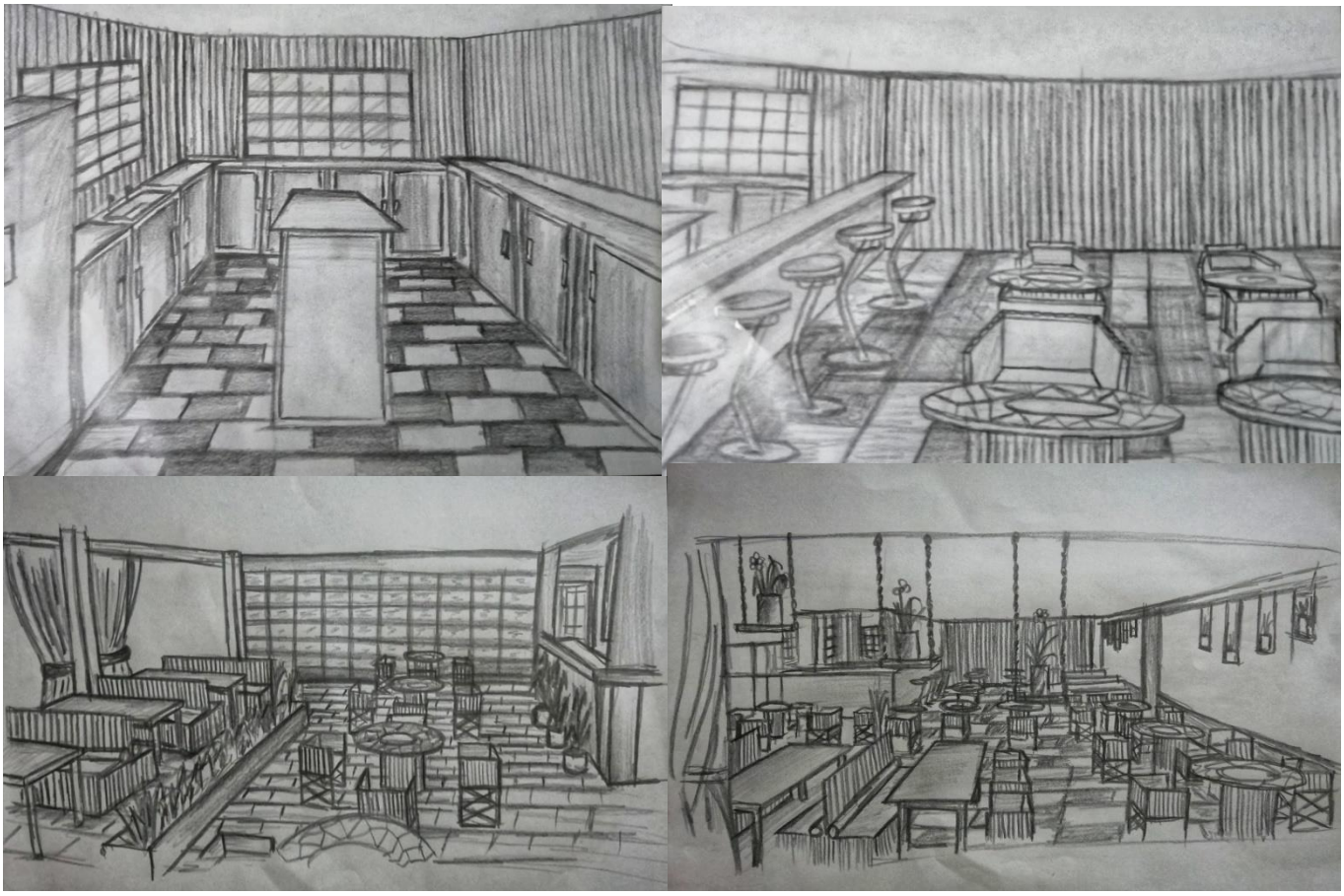

Figure 31: Composite image showing concepts of proposed interiors of the restaurant.

Source: Author, 2020

Figure 32:inspiration board interior architecture

Source: Author,2020

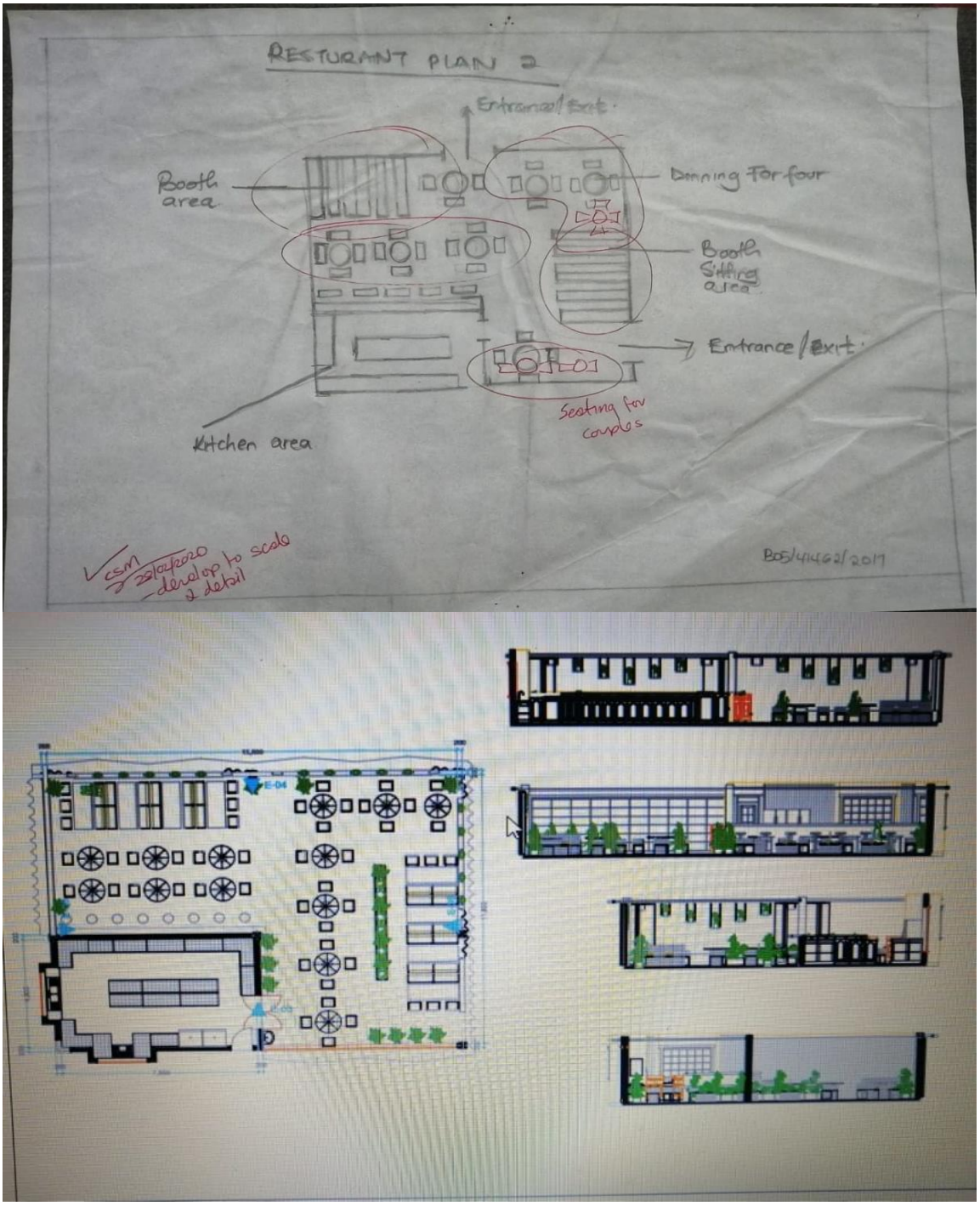

Figure 33: proposed sketch plan and digital sketch orthographic projections.

Source: Author, 2020.

5.3.2 Furniture

The establishment has not adequately used eco-friendly materials in its furniture design or acquired furniture made from renewable or recyclable materials. Eco-friendly materials like recycled glass, bamboo, metal, recycled fiber boards, reclaimed wood and pallets will be employed in redesigning the furniture. The materials' thermal properties and surface treatments will be put into consideration to ensure comfort and longevity during extreme temperatures. Furniture will be function-specific, distinguishing between office furniture, foyer furniture and restaurant furniture, as each has different spatial requirements and size for its user.

Figure 34: inspiration board furniture

Source: Author 2020

Figure 35: Composite image showing sketches of proposed furniture pieces

Source : Author,2020.

5.3.3 Landscaping

Efficient use of resources and ecological principles can be integrated in creating healthy landscaped environments and bettering the quality of lifestyles around them. Eco design can be adopted within the landscaping of the study site through selecting outside furnishings and landscaping materials manufactured from renewable resources which can subsequently be reused, recycled and remain durable.

Landscaping will be made natural by growing plants tailored to the climatic conditions across the site which includes the purple head fountain grass, the Palmyra palm tree, bamboo which already exists on the site and applying layout practices suitable to neighborhood climatic conditions while maintaining in mind the want for aesthetics.

Stepping stones will be added in the garden to define the direction of movement for the visitors without harming the grass. The stones will be set at grade or sunken below ground to allow for easy mowing. The choice of paving material will range between white concrete pavers and flags and interlocking block pavers for vehicular access areas and brick pavers and brick walkways for pedestrian access areas.

Figure 37: Conceptual diagram of proposed landscape design of Adonai Retreat Centre.

(curvilinear and angular design concepts of landscaping site plan).

Source: Author, 2020

5.3.4 Exhibition and display

Exhibition and display items will play the function of display and storage pieces. The pieces will draw inspiration from bamboo which will be as decorative elements. The pieces will correspond to the spaces into which they will be placed and their respective users, that is, the reception office and the restaurant.

Materials to be utilized will be durable and environmentally-friendly and will include bamboo, reclaimed wood, scrap metal, wrought iron, cardboard, mixed paper and pallets.

Figure 38:inspiration board exhibition and display

Source: Author,2020.

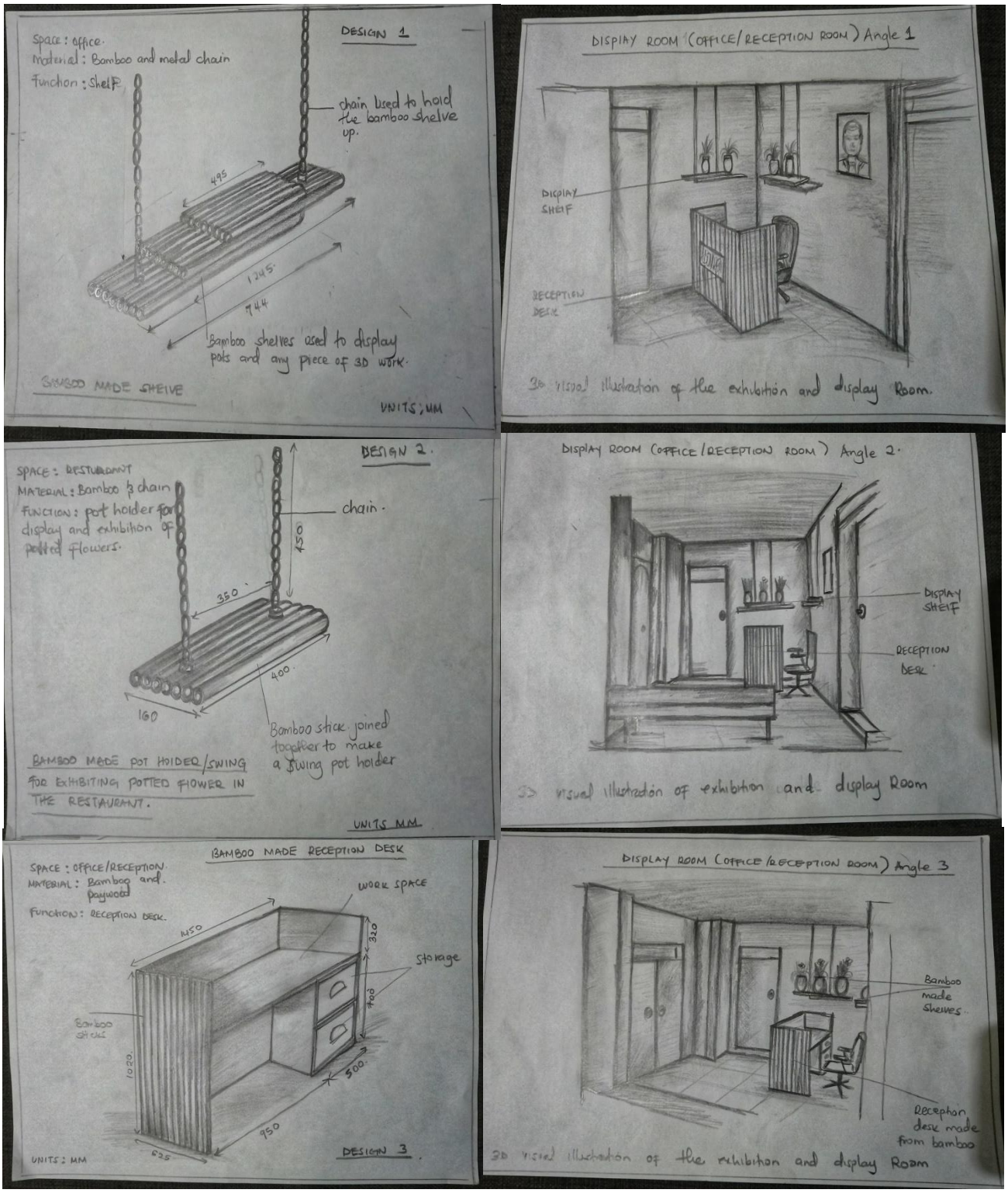

Figure 39: Concept sketches of proposed exhibition and display products and space .

Source: Author, 2020

5.4 Summary

This chapter looked at the summary of the researcher's findings from which the researcher gave various recommendations and proposed design ideas that could be used to create environmentally-friendly spaces at the study site while still incorporating aspects of Swahili design. The researcher concluded that by applying the recommended solutions, the site would be transformed into an eco-environment at per with global trends while keeping the African and specifically the Kenyan cultural spirit alive.

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APPENDICES

Appendix 1: Interview Guide

Interview Guide for Adonai Retreat Center

UNIVERSITY OF NAIROBI

Collage Of Architecture and Engineering

School of Arts and Design

BDSS 413: PROJECT PAPER

Year 2020

1. Kindly introduce yourself?

2. Have you ever heard of eco design ?

3. Do you consider adonai retreat center as an ecofriendly establishment regarding design and materials ?

4. Whats your take on inspired Swahili décor ?

5. Would applying eco design and Swahili décor improve in the the number of visitors and raise of servive provision?

Appendix 2: Questionnaire for visitors and staff, Adonai Retreat Centre

Questionnaire

UNIVERSITY OF NAIROBI

Collage Of Architecture and Engineering

School of Arts and Design

BDSS 413: PROJECT PAPER

Year 2020

Opening statement
Hi My name is anita wambui wairimu, I'm a fourth year student at UON carrying out research for my final project.

Background
As apart of coursework project, am conducting a research on bamboo, recycled glass and Swahili kikoy.the main focus being eco design.
Am there for requesting for your assist in this search project by completing the questionnaire below.

Section A
1. Gender : female _____ or male_____

2. Age _____

3. Visitor or stuff_____

4. How often do you visit _____

SECTION B

1. In your opinion is Adonai Retreat Center an eco-friendly center?_____
2. Do you think bamboo is eco-friendly ?_____
3. Which uses of bamboo do you know about?_____
4. Which method of recycling glass do you know ?_____
5. Do you consider kikoy as Kenyan culture heritage ?_____