EXPLORING WASTE LEAVES AS AN ALTERNATIVE MATERIAL FOR MAKING INDOOR SCULPTURE

BY

SSETTIMBA BENEDICT
19/U/GMAID/20694/WKD

DISSERTATION SUBMITTED TO THE DIRECTORATE OF RESEARCH AND GRADUATE TRAINING IN PARTIAL FULFILLMENT FOR THE REQUIREMENT OF THE AWARD OF MASTER'S DEGREE IN ART AND INDUSTRIAL DESIGN OF KYAMBOGO UNIVERSITY

JULY, 2023

DECLARATION

I Ssettimba Benedict of registration number 19/U/GMAID/20694/WKD**,** hereby declare that this Dissertation is my original work and has not been produced before for the award of a Master's degree in this University or any other Institution of higher learning.

Date: ……

Signature:……

APPROVAL

This is to certify that the Dissertation of Ssettimba Benedict titled "**Exploring waste leaves as an alternative material for making indoor sculpture**" which was carried out under my supervision is now ready for submission to the Directorate of research and graduate training with our approval as supervisors.

(Principal Supervisor)

Dr. Mutungi Emmanuel

Signature: …… Date: …….

(Second Supervisor)

Mr. Ssenyonga John Bosco

Signature: …… Date: …….

DEDICATION

I dedicate this book to my beloved wife Mrs. Jane Ssettimba and to my children Baylor Ssettimba, Bayron Ssettimba, Benjamine Ssettimba and Benita Ssettimba for their endless support they have accorded to me in this study.

ACKNOWLEDGEMENT

First and foremost, I would like to thank the Almighty God for His continuous protection and provision of life, May his Name be Glorified.

I would like to acknowledge the contribution of Dr. Mutungi Emmanuel my Principal supervisor for acquainting me with modern procedure of writing a proposal, investigating and collecting data and writing a dissertation. May the Almighty God reward you abundantly.

I also have no hesitation in thanking the following people for their support and encouragement; The Late Ssennyonga John Bosco (my second supervisor) May his Soul Rest in Internal Peace, Mr.Mujuzi Henry, Mr. Lubwama Godfrey, Mr. Kawuki Francis, Ms. Katesi Jackie, Mr. Okanya Paul, Mrs. Tuhaise Lillian Mr. Samula Paul, Mr. Kyeyune Charles and Ms. Namatovu Milly.

In the same way, I wish to express my sincere gratitude to my dear wife Mrs. Jane Ssettimba without whose financial and moral support this work would have been a failure.

I am indebted to all those and many others, some of whom I have chosen to keep in my heart rather than expose. To all of you, mentioned and un mentioned, I am really grateful.

TABLE OF CONTENTS

LIST OF PLATE

ABSTRACT

This study explored the use of waste leaves as a reliable alternative material for indoor sculpture. Indoor sculptures have been made from different conventional materials obtained from the environment such as; metal, wood, ivory, silver, gold, bronze, clay among others. Most of these materials apart from wood and clay are very costly and not easily accessible. Wood and clay have been few of the easily accessible materials used by sculptors however, human activities such as construction, deforestation, dumping of waste products, farming, human settlements, charcoal burning, brick making and many others, have tampered with the environment hence the access to these materials is equally difficult. The researcher therefore investigated the use of waste leaves as an alternative material for indoor sculpture. The objectives of the study were to investigate the type of materials used in producing indoor sculpture in Kyambogo University school of Art and industrial design, to explore how waste leaves can be used as an alternative material for producing indoor sculpture and to produce sculpture samples from waste leaves as a reliable and alternative material for sculpture. The study was qualitative and employed a case study research design to collect data among respondents at the school of Art and Industrial design in Kyambogo University.

The findings of this study affirm that waste leaves are a reliable alternative material for indoor sculpture, waste leaves can be used to produce indoor sculpture by using various sculpture techniques such as additive, subtractive or casting techniques and waste leaves can be used with an amateur for easy application of material and to give shape to the sculpture. This study recommends the use of waste leaves for production of sculpture to cut the cost of production using other materials and to save the environment. The study also recommends further research on the preservation of the finished sculptures for easy cleaning and restoration and using this material on outdoor sculpture.

The continuous negative impact of human activities on environment reduce the availability of materials for sculpture because the different materials for sculpture such as wood, clay, silver, Gold, bronze among others are obtained from the environment therefore there is no future for the future sculptor.

Well prepared waste leaves with a suitable adhesive, can produce a suitable, reliable and alternative material for indoor sculpture.

CHAPTER ONE: INTRODUCTION

1.0 Overview

This section covers the background of the study, the statement of the problem, purpose of the study, objectives of the study, research questions, scope of the study, significance of the study, definition of operational terms and concludes with the theoretical and conceptual framework.

1.1 Background of the study

Material refers to all commodities that are consumed in the process of manufacture Anbarasu, J.(2008). Materials are tangible inputs in the process of production. In terms of art and design, Digolo, O&Mazrui, O (2016), describes materials as the media inform of solid, liquid or powder substances that are used in the production of a given Art work. Materials that artists use in the production of art works are at the very core of art, they facilitate the process and their manipulation invokes all the images and content. Materials tell us so much even prior to the composition, form or texture. On the other hand, materials constitute an important part of the cost of production of a commodity. They account for nearly 60% of the cost of production of a large number of organisations (Anbarasu, J., 2008). Therefore, materials are very important components in the production of sculptures and any given art work.

According to Anbarasu, J. (2008), materials can be categorised into; direct materials which can be identified with the individual units, these materials form part of the finished product for example leather is used in the manufacture of shoes and yarn is required for production of cloth and indirect materials which do not form part

of the finished products, indirect materials cannot be accurately allocated to a particular unit of production for example; water is required for mixing cement and sand when producing sculpture from cement and lubricant oils required for the maintenance of machines.

Therefore, materials whether direct or indirect contribute a biggest percentage of the end product and without these materials, the process of production cannot take place and in most instances these materials become the product for example, a sculpture made from cement requires cement and sand as direct materials and water which is the indirect material used in the mixture, cement and sand become the sculpture itself. In the context of sculpture, materials refer to all items used to produce three dimensional art works such as wood, clay, metal, cement and many others.

Sculpture is a term used to describe three dimensional art works, it is an artistic form in which hard or plastic materials are worked into three dimensional art objects. According to Digolo, O. & Mazrui (2016) sculpture is the art of making three dimensional crafts by using one type or an assortment of materials. It is of great importance to note that sculpture is one of the most effective and eye catching art works in the world, sculpture keeps our cultures going and reinforces these values without saying a word but by using the language of form, space, time and also influences architects and architecture. Sculpture is a lifeless being with powerful voices which emphasise the role of sculpture in our homes; the expression and posture of a sculpture carry a self-explanatory and satisfactory meaning because it occupies real space.

Sculpture maybe either in the round or in relief form. A sculpture in the round form is a separate detached object in its own right, leading to same kind of independent existence in space as a human body. A relief sculpture does not have this kind of independence. It projects from and is attached to or is an integral part of something else that serves either as a background against which it is set or a matrix form which it emerges. (Encyclopaedia Britannica, 2010).

Traditionally throughout the world, sculptors have been making sculptures from different conventional materials such as metal, wood, stone, gold, silver, ivory, bronze, cement, clay among others. Some of these materials involve a lot of processes, preparation, preservation and special techniques to use them, Straiger, M. (2015), posits that, sculptures are painted, oiled, glazed or waxed to preserve them. These treatments, and processes on materials therefore end up becoming threats to the environment from which these materials are obtained, it is worrying that various human activities have continued to affect the environment. For example, in Plate 1.1 we see natural environment full of life and in Plate 1.2 we see the effects of human activity. There is a likelihood of scarcity of materials for sculpture in the near future for, if human activity continues as shown in Plate 1.2. More so, sculpture from clay requires firing which is mainly done with wood from trees, excavation of clay silver and gold also destroys the environment, farming human settlement, charcoal burning, construction and many others continue to indicate environmental degradation.

Plate 1.1: Showing a natural environment from where material for sculpture is obtained
Source: internet.

Plate 1.2: Showing destroyed environment due to human activities
Source: internet.

In Africa, sculpture was made using permanent materials for instance metal, or cement, although works made from durable materials were more likely to survive over time. Sculpture made of wood and other environmental sensitive materials were less likely to survive in outdoor space. Although wood is the best known medium of

African sculpture, many others are employed: copper alloys, iron, and pottery, on fired clay and infrequently, stone (Encyclopaedia Britannica, 2010). African sculpture takes many forms and can offer us vast insight into African culture and the intricacies and dynamics of the tribal communities from where it came.

African sculpture is most often figurative representing the human and fashioned primarily from wood but it can be stylised and abstracted and curved from stone (Bronwen, E(2010). The nature of materials used to produce sculpture will determine where the sculpture should be installed. Some sculpture made from durable materials such as cement, bronze or stone can be installed out-doors but those made from environmental sensitive materials are installed indoor. Indoor sculptures are those that are installed under a permanent shelter for instance in hotels, galleries, churches, lounges among others.

In Uganda, most indoor sculptures are installed in churches, galleries, lounges and in public places. In Africa and the entire world and like any language and social organisation, art has been essential to mankind as a means of communication of one's experience. As a means of getting the most basic needs that support life, Art has accompanied mankind since prehistoric times Namdala , M.& Yiga, A.P, (2017). Traditions, ideas, beliefs, customs, norms, values, attitudes and feelings and various forms of cultures can be expressed in art through engraving, sculpting or painting. In many societies, Art has been a response to some natural or physiological demands as well. The materials used for most Ugandan sculptures are those that are easily manipulated such as clay, wood and cement. The other alternative materials for sculpture such as Gold, silver, bronze, fibre-glass, ivory among others are not readily

available or their expensive and most of them are imported. Most of the commonly used materials such as wood and clay are not environmental friendly.

In the school of Art and industrial design, Kyambogo University Kampala Uganda, Art Students produce indoor sculpture. The main materials used are wood, cement and clay. The material from which indoor sculpture is made in the school of Art and Industrial Design, are those that are easily manipulated such as wood and clay but not environmental friendly. For example, it means cutting down a tree every time a sculpture is produced or for the clay sculptures that need to be fired, firewood is required. More so, clay excavation affects agricultural practices as excavated areas are not suitable for agriculture and cause soil erosion. In addition, once a tree is cut, it takes close to 30 years to grow another, therefore planning alternative materials that preserve the environment is very important.

1.2 Statement of the problem

Sculptors world over make indoor sculptures using a variety of materials more especially conventional ones such as cement, stone sand, plastics, soap, wood, plaster of Paris, bronze, silver, gold among others. In Kyambogo University, School of Art and Industrial design, indoor sculptures are also produced largely using conventional materials acquired from environment. However, the cost of materials, their availability, and environmental concerns, have affected the use of these conventional materials in production of indoor sculptures. It is not known how many artists have started producing indoor sculpture using none conventional materials such as waste leave or others. But also, there are no sufficient studies to explain if artists or clients prefer artworks produced using conventional materials or if a new material can be accepted. It is not even clear or documented if indoor sculptures from alternative materials can be accepted amongst the collectors, artists and the general public. Therefore, the study explored the use of dry leaves as an alternative material for producing indoor sculptures to increase production, cut the cost of production and to preserve the environment.

1.3 Purpose of the study

The purpose of the study was to explore the use of waste leaves as a reliable alternative material for indoor sculpture.

1.4 Objectives of the study

1. To investigate the type of materials used to make indoor sculptures
2. To explore how waste leaves can be used as an alternative material for producing indoor sculpture.
3. To produce sculpture samples from waste leaves as a reliable alternative material for indoor sculpture.

1.5 Research questions

i. What is the nature and type of materials used to produce indoor sculpture?
ii. How can waste leaves be used as a reliable alternative material for indoor sculpture?
iii. How can sculpture samples be produced from waste leaves as a reliable alternative material for indoor sculpture?

1.6 Significance of the study

This study provided information to the researchers and academicians about alternative materials that can be used to produce indoor sculpture.

The study was also to help the community to restore the environment that has greatly been destroyed due to human activities. The restoration of the destroyed environment increases the availability of materials for indoor sculpture because The

For instance, if an alternative material for sculpture is invented, there will be no cutting of trees to produce sculpture as one of the human activities, there will be no clay, Gold and silver excavation which causes soil erosion, there will be no cutting of trees to fire clay sculptures.

The study also provided desirable information to policy makers and government authorities about how various waste products such as waste leaves, plastic bottles, polythene papers, metallic objects, waste glasses and many others can be turned into useful products to benefit the community and increase on government revenue as well as restoring the environment. Since this study is centred on using of waste leaves, it will provide information that will help the country to recycle waste products that have destroyed the environment for example blocking the drainage channels, some waste products have been deposited into lakes and rivers and have reduced the reproduction of fish and some plastic materials that have been buried into the soil have reduced agricultural activities. So this study will be an eye opener to authorities to transform waste products into reliable materials for various products.

1.7 Scope of the study

The scope covered the Geographical and content scope

1.7.1 Geographical scope

Geographically, the focus of the study was put on the School of Art and Industrial Design of Kyambogo University. The researcher concentrated on art students mainly those who majored in sculpture because they are the ones who produce sculpture so they were expected to give reliable information.

1.7.2 Content scope

The study limited itself to analysing waste leaves as an alternative material for indoor sculpture. The researcher experimented on waste leaves from five different types of trees which shed leaves seasonally namely; Ficus Benjamina, teak tree, Measopsis Emirii (musizi), Milicia Excelsa (Muvule) and Terminalia Sppicie (Step Tree). The researcher used these trees because waste leaves from them have little water in them and the leaves from these trees are shed seasonally unlike other trees which do not shed leaves at all. Therefore, there is hope to get waste leaves all the time throughout the Year.

1.8. Limitations of the study

1. The researcher faced a problem of weather changes, during the rainy season, it was hard for the leaves to dry and the finished work used to take long to dry and used to develop fungi.
2. It was tiresome and time consuming to crash leaves with a motor and pestle and using a domestic blender, however, it was very expensive to use a commercial grinding machine from Owino Market.

3. Some students did not want to disclose the required information to the researcher

1.9 Definition of operational terms

Conventional materials: conventional materials refer to the commonly used materials that have been in place. That is to say; the ordinary materials for instance, gold, wood, marble, silver, bronze, metal among others.

Waste leaves: These are leaves that have fallen off the tree that is to say; the leaves that are no longer useful to the tree.

Sculpture: This is a three dimensional art work made of waste leaves.

GDP: Gross domestic product

3D. Three dimensional

Step tree: Is a big tree with branches and leaves spread like an umbrella commonly found in African and some Asian countries. Its botanical name is Terminalia sppicie.

Indoor sculpture: These are sculptures that are installed under permanent shelter for example; in lounges, hotels, offices, galleries or churches.

Galleries: A gallery is an institution, building or room for the exhibition and conservation of works of Art

Language of Form space and time: This is the message conveyed by the three dimensional appearance of scripture. That is, the three dimensional appearance of sculpture gives or creates realistic situations and feelings.

CHAPTER TWO: LITERATURE REVIEW

2.0 Overview

In this chapter the researcher studies the theory of production with waste and recycling and how it is related to this study and reviews literature related to the study. The reviewed literature follows the study objectives to investigate the type of materials used to make indoor sculptures, to investigate the use of waste leaves as an alternative material for producing indoor sculpture and producing indoor sculptures from waste leaves.

2.1 Theoretical and conceptual Frame work

This study was based on the theory of production with waste and recycling Conrad, K. (1997). This theory was formulated by Conrad Klaus in 1997. According to Conrad, government should stimulate firms to enhance recycling of resources by a fee on waste. The theory also provides that, product responsibility means that a product will accompany its producer from cradle to grave, prevention; recycling and disposal of waste are part of a theory of firm which we develop under solid residual management. A comparative statistics analysis shows the impact of a fee on waste reduction, on the structure of the production process, on recycling, on input demand, material saving effort, number of firms and on the amount of waste disposal. In this theory, Conrad, K. (1997) further observes that given increasing rates of gross domestic product (GDP) and the population in most countries in the world, the management of solid waste becomes more and more an urgent problem. Recycling of depletable natural resources is one way to mitigate this problem. According to this theory, recycling means the re-processing and re-utilizing of solid (or liquid) waste as

a resource at the wrong place in production line and in the wrong consistency, basing on Conrads theory, the researcher observes that, apart from waste leaves to provide manure to the trees, these dry leaves can be used to save the trees that would be cut to make sculpture and to fire finished clay sculptures.

Aggregated overall firms (and consumers), the economic system leaves behind a huge amount of refuse which in turn has a negative impact on the economic system, if this process of environmental deterioration in quality and quantities, the conditions for future economic activities (regional and worldwide) will be seriously endangered. In this theory, Conrad, K. (1997), assumes that, Government aims at stimulating the firms to enhance recycling of resources. This activity should yield a double dividend in terms of preservation of depletable resources as well as in preventing the degradation of the quality of the environment. This theory therefore supports production by recycling to reduce on waste disposal that degrades environment, to increase production and for material saving.

In conclusion the theory highlights the following; the producer has to prove that the required treatment technologies and pollution prevention measures have been installed and do function. This means that, producers and manufacturers should not only aim at producing commodities but also ensure prevention measures of the effects of the bie-products produced during the production process. It should be multiple usage, technically, long lasting and easy to dispose. An instrument to stimulate recycling activities should be a fee on waste (solid or fluid waste) such a fee is an indirect way to increase the price of materials and hence will induce the firm to substitute material saving technical progress, and to encourage recycling process. The

tax system can also be used to promote recycling by taxing virgin materials and by subsidizing recycling activities.

Although the theory of production with waste and recycling is challenged by Seadon, J.K (2010), who contends that during the last few decades, resource/ waste management has been developing operationally and technologically in response to resolve contemporary environmental, technical and economic challenges. However, current global waste management practices focus on reducing the impacts rather than preventing them and suggest so called “end of pipe” solutions to waste problems rather than long-term sustainable measures. In this contention, Seadon, J.K. (2010) highlights a challenge with the theory of production with waste and recycling by showing the need to prevent the impact of waste, if waste materials are recycled and new products are made, then the need for preventing the impact of waste will be neglected.

According to Kumar (2017), the major problems affecting solid management are on scientific treatment, improper collection of waste and ethical problems. This leads to hazards like environmental degradation, soil pollution, and air pollution. Kumar (2017) shows the different challenges created by waste recycling which can lead to various problems for example, the recycling process of polythene and plastic material produce emissions which cause air pollution hence environmental degradation.

However, the theory of production with waste and recycling was used by Yhdego, M. (2021). Observes that, the waste pickers who are the main actors in the

waste management in most developing countries are not recognised by Municipal authorities. Yhdego, M. (2021) also add that, Regulations that are incentive driven, with technological innovations which is the missing link in the country's development system. They also suggest that there are opportunities for the country's transformation which can inspire and stimulate youth to engage in, for example waste recycling, industries in utilization of agricultural waste and urban centres, in recycling centres by integrating waste pickers/ scavengers in upstream and downstream of waste management.

Relevancy of the theory to my study

Although this theory is challenged and criticised by many scholars, it was related to my study because it suggests goals, aims and strategies for implementing using of waste products. The theory also helps in spelling out the importance of recycling for production. For instance, if the waste leaves are used to produce indoor sculpture, there will be no excavation of clay, gold and silver and there will be no cutting of trees for sculpture and for firing finished clay sculpture for preservation. There will also be a reliable and environmentally friendly material for sculpture.

2.2 Materials used to make indoor sculpture.

The problems of unmanaged waste to environment calls for solutions from all quarters. Therefore, individuals, families, communities, industries and government; each has its role and responsibilities in management of waste in our environment. As a way of preserving the environment in city and urban centres, these waste materials can be turned into useful materials to produce Art forms of aesthetic value. Olotah, A.

(2019) provides that, the waste materials are transformed into sculptural works in line with the ideas, concepts and techniques required. Olotah, A. (2020). Adds that in this way, the researchers attempt to reduce, reclaim, reuse and reform waste materials into sculptural mixed media of the modern time. In the same way, waste leaves can be turned into useful materials to produce sculptures that suit modern times.

Given the fact that Art comprises of an assortment of styles, techniques and media. In the search for creative fulfilment, the artist has consistently explored the environment as a useful source of ideas and materials. The waste leaves like many other waste products should be explored and experimented to contribute to the various media used in sculpture formation. Odoh, G.C, Odoh, N.S., & Anikpe, E.A. (2014), affirm that, given the growing global concerns on environmental degradation and climate change, the transformation of waste and found objects into works of art imbued with new meaning, function and value, is an important avenue to creating a sustainable environment. Therefore, there is need to use waste leaves as an alternative material for producing indoor sculpture.

The conventional materials used to make indoor sculptures are becoming scarce every other day, some materials are becoming expensive and others are not readily available for instance, sculpture made from gold, silver and bronze are expensive, there is need to use waste material such as waste leaves and other discarded objects to produce useful art forms for economic and socio-cultural well-being. Kayoed, F. (2006), argue that, without prudent waste discard practices and creative conversion of dormant materials into substances of benefit to end-users, the entire society would be susceptible to environmental epidemics emanating from waste

and junk pollution. In my own view waste materials such as waste leaves can be wisely utilised to produce useful objects

Faltermeier, R.B. (2014), posit that artefacts have various fundamental differences, which have to be taken into account when collecting and preserving them. Such fundamentals that needed to be considered are material inputs of an art work consumed in the process of production which should be given a special treatment. In my own view, therefore, there is need to study and prepare well the materials for indoor sculpture in order to have them stand the environmental conditions and according to the purpose of the sculpture and where it is intended to be installed.

The materials used for indoor sculpture should be those that can withstand all environmental conditions. For example, pieces of art stored in museum depots and display rooms are subjected to fungal colonization that leads to bio-deterioration processes (Milica, Jelena, Ivana, Natasa, 2013), Milica et al, 2013), therefore there is need to have sculptures that can last for a long time. It is important to carefully select appropriate material for indoor sculpture, and the best ones should be those that can withstand the environmental conditions of a time. Francis (2018) contents that, public concern over the deleterious effects of Atmospheric deposition has grown rapidly due to its adverse effects to human, animal and materials. In my own view, selection of materials should also depend on where the sculpture is to be installed to suit the environment and to prevent destruction of the quality of the sculpture. Therefore, materials selected to produce indoor sculpture should be those that can withstand the atmospheric deposition that destroys the quality of the sculpture.

The materials from which indoor sculpture is made should be well understood by the sculptor, this should be in terms of preparation, treatment, properties and characteristics, techniques or methods to apply when using them. Jack (1988), contends that, acknowledge of materials is the foundation upon which real achievement is based. In my own view, understanding the materials for sculpture helps sculptors to produce quality work and improves maintenance and restoration of these sculptures. In addition, Andrews, O. (1988), provides that, every material has an active presence and every material is susceptible to change. The task of a sculptor is to understand the natural properties of a chosen material and its characteristics. According to Andrews, there is a great need for a sculptor to know the nature of material to use for sculpting because the nature of material affect the complex act of making a sculpture. In reference to this contention, there is need for the sculptor to master the components and nature of the material for sculpture because these directly affect the process of production of a sculpture.

Materials selected for sculpture should be those that are easily manipulated to bring out essential features and functions of the sculpture. According to Ashby, M., & Johnson, K. (2003), material and process give the product its tangible form, its flesh and bones so to speak; they create the product physiology. Therefore, the nature of material selected for a sculpture can change the function and the appearance of the sculpture for instance, some materials are not easily manipulated, hence they can change the sculptors intended subject matter of the sculpture. Therefore, great care must be taken when selecting the type of materials to use. For example, some

materials are plastic while others are none plastic. It is very easy to bring out the intended subject matter with plastic materials than with the none plastic materials.

2.3 The use of dry leaves as an alternative material for indoor sculpture.

The use of waste leaves like any other waste material can be executed through different techniques of sculpture formation. The recycling of waste products not only provides alternative material for sculpture but also helps to conserve the environment. Sai, A.O., Qvansah, S.A., & Acquaye, R. (2022), provide that, the need for effective means of recycling without adverse repercussion to environment was found critical. Sai, A.O., Qvansah, S.A., & Acquaye, R. (2022), add that, kilograms of the fabric waste collected were converted into interior decoration pieces such as a pair of foot rest, a set of arm rest, a set of chair backs, table mats, a door mat and a set of curtains and window blinds. In the same way, waste leaves can be turned into useful indoor sculptures to serve as domestic decorative interior products. The waste leaves are collected, washed, dried and ground to form powder which is mixed with adhesive to form a plastic consistency that is used to make different sculptural forms. The art of forming waste leaves like in any other form of waste reduces its impact on the environment.

Hawari, F., Sachari., &Nugraha, A. (2017) affirm that, in the field of design, activities to develop form, application materials, production process and product function lead to eco-design, which is an opportunity to use urban waste for supporting daily human activities and aesthetic values, reducing dependency on nature and also conserving resources. Therefore, waste leaves can be used as material for indoor sculpture to reduce over dependence on nature and to conserve the environment.

Recycling of waste products is very important in the production process. This is because more production equals to more waste, more waste creates environmental concerns of toxic threat. An immediate solution to this problem should include utilization of waste materials for new products. Bolden IV, J.J, (2013) asserts that, the importance of recycling is huge because it saves natural resources saves energy, reduces solid waste, reduces air and water pollution and reduces greenhouse gases. In the same line, waste leaves are used as material for indoor sculpture to reduce the burden on natural resources such as trees for wood sculpture and for firing finished clay sculptures and to prevent soil erosion which is likely to take place in clay excavation areas as well as reducing the scarcity of materials for indoor sculpture.

The use of waste leaves as an alternative material for sculpture is not only making use of waste materials but also for protecting the environment. A distinctive, yet functional interior space can be created through the process of converting waste materials or useful products into new goods which also contribute to a higher environmental value (Nawwarshukriah, Nuurfarhanahm Shahriman, 2013). Therefore, the invention of an alternative material for sculpture is aimed at preserving the environment by using the waste leaves and leave the trees to serve their purpose.

The use of waste leaves can be a means of environmental conservation because when some leaves that fall off from trees are left in an area, can be carried away by running rain water and deposited in rivers and lakes. They block the drainage system and become dangerous to environment. Ritah (2020), asserts, waste solid material is an environmental hazard. It contributes to environmental degradation. It should be noted therefore, that most waste material if not put to use or if not recycled can be

dangerous to our environment. In addition, The transformation of waste and found objects into works of art imbued with new meaning, function and value, is an important avenue to creating a sustainable environment (George, Nneka & Ekene, 2014) therefore, the use of waste leaves will be an appropriate remedy for environmental degradation for example; it will prevent the cutting of trees to make wooden sculpture, and as fuel for firing clay sculpture but to make sculpture from waste leaves that are no longer useful to the trees.

Environmental degradation is a subject that is currently receiving attention all over the world, therefore, improper use of waste leaves may give rise to environmental problems. Mayyadah, F.H. (2012), provides that, the amount of waste leaving the property can be reduced however, through responsible procurement choices as well as by implementing comprehensive recycling programs. Mayyadah (2012) emphasises the need for recycling of waste products to prevent environmental degradation. In my own view, the use of waste leaves will also help to restore the environment that has very much been destroyed to get materials for sculpture for instance, cutting of trees to make sculpture, cutting of trees to fire clay sculpture, excavating clay, silver and Gold, to mention but only but a few.

The environment used to be the most reliable source for sculpture materials for example trees for wood sculpture, clay for clay sculpture among others but due to various human activities, such as construction, agriculture, charcoal burning and human settlement, the environment has been destroyed. Recycling of waste products such as plastics, paper, waste leaves, and metals will help to serve as alternatives, conserve resources and will restore the environment. Hawari. F. (2017), asserts that in

the field of design, activities to develop form, application of materials, production process and product function lead to eco-design, which is an opportunity to use urban waste for supporting daily human activities and aesthetic values, reducing dependence on nature and also conserving resources. Therefore, if waste leaves are recycled into materials for sculpture, this will reduce on over dependence on nature and will preserve environment.

The extraction of materials for indoor sculpture and any other form of sculpture from our environment is one of the human activities that have fostered environmental degradation for example; cutting of trees, excavation of clay, Gold and Silver to mention but only a few. As humans continue to carry out different activities, different forms of waste are produced. There is need to re-use this waste to reduce on straining the environment. Pizarro, I.O. (2014), highlights that; waste is one of the biggest challenges faced by our society. If not handled correctly, waste pollutes our environment. In this contention, Ondoriez stresses the need for recycling of waste products for waste material can become a biggest problem to society if not put to proper use. In the same way, waste leaves should be recycled into material for sculpture to prevent straining of the environment.

2.4 Experimentation of dry leaves as alternative material for indoor sculpture.

The waste leaves if processed and experimented well, can provide a sustainable and dependable alternative material for indoor sculpture. Andrea, Lawrence and Robinson, (2002), in scavenging and reusing a variety of unusual materials, it is a model of sustainable architecture. Andrea et al, (2002) stressed the importance of reusing waste and unusual materials for sustainability. In my own view, the

conventional materials for indoor sculpture need to be replaced with modern materials invented from waste leaves (products). This will help to sustain the production of indoor sculpture because there is assurance of materials.

In the course of studio experimentation, various methods and techniques should be used to produce an extraordinary product. Glenn, A. & Julia, B. W (2016), argue that, today, artists are able to create using multiple methods of production. In my own view, there is need for an artist to experiment the material with multiple methods and techniques to come up with substantial out comes and to seek additional ways of simplifying the process of production.

Hawley, N.J. (2018), affirms that, in order for a material to be used, there is need for its experimentation. This explanation is reinforced by the studio practice, which reflects on the physical qualities and processes of the media. Therefore, studio experimentation and tests with the material is important before the material is used. This is so, because by experimentation the artist is able to identify a suitable or appropriate method to use.

There is need for experimentation of materials to facilitate direct physical contact with materials. Experimentation allows students to understand the technical mechanical and physical properties of materials while easily comprehending their aesthetic and sensory attributes and behaviour (Camilo, 2014). Therefore, as artists experiment about these materials, they discover various physical properties about these materials. Experimentation also fosters creativity of an artist. In the same way,

the researcher wishes to experiment with the waste leaves to discover the possibility of using them as an alternative material for indoor sculpture.

Studio experimentation provides an opportunity to artists to innovate new ideas as Camilo (2014) observes that, “inaccessibility to material in terms of touch, feel, breaking, form of experimentation fosters a designers’ ability to innovate. Camilo’s contention highlights the importance of physical experimentation with the materials and has it that, as the artist feels and touches the materials, discovers more with them and it supports innovation, creativity and new ideas of production.

CHAPTER THREE: METHODOLOGY

3.0 Overview

In this chapter, the researcher explains the overall systematic aspects of the study, such as, research design, study area, study population, sample population, methods of data collection as well as data analysis.

3.1Research design

The researcher in this study used a case study research design to explain the information that respondents provided on the three objectives of the study. Yin, R.K. (1994), describes case study as an empirical inquiry that investigates a contemporary phenomenon with in its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used. Shona (2019), provides that, a case study is a detailed study of a specific subject, such as a person group, place, event, organization or phenomenon. On the other hand Roberta Heale, R.N.E.C., James, S., & Garceau, M.L. (2016), defines case study as an intensive study about a person, a group of people or a unit, which is aimed to generalize over several units. Roberta Heale, R.N.E.C.et al, (2016), adds that, case study is an intensive systematic investigation of a single individual, group, community or some other units in which the researcher examines in-depth data relating to several variables. Therefore, the researcher used the case study research design because he intended to explore a single entity to acquire in-depth information from respondents and they were the Art students who were involved in the production of sculpture at the school of Art and Industrial design of Kyambogo University. In other words, the researcher used a sample fifteen Art students who majored in sculpture to represent

other Art students. The case study research design was used by Sigmund Freud, Anna O and Little Hans. In 1909, Freud, S. (1909) conducted detailed investigations into the private lives of his patients in an attempt to understand and help them in their illnesses. The case study method was also used by Frederick Le play in 1829 as a handmaiden to statistics in his studies of family budget.

3.2 Study area.

The study was carried out with in Kyambogo University School of Art and Industrial Design. This study area was ideal because it is one of the institutions in Uganda where sculpture is taught and made.

3.3 Study population.

Majid, U. (2018), defines study population as the study's target population that it intends to study or treat. The researcher targeted art students mainly those who majored in sculpture at the school of Art and Industrial Design at Kyambogo University as his study population. The researcher selected Art students majoring in sculpture because he expected them to give precise information about the materials they use and how they use them while sculpting. During experimentation of the material the researcher carried at the experimentation himself basing on the information he acquired from the respondents.

3.4 Size and Sampling procedure.

Majid, U. (2018), describes sampling as the process of selecting a statistically representative sample of individuals from the population of interest. In this study, various sample categories were used including, five (5) first-year Art Students, five (5) Second-years Art Students and Five (5) third-year Art Students. The population selected made a total of fifteen (15) respondents who willingly took part in the study

and gave desirable information. The essence of selecting five students per year was that the researcher wanted to carry out an in-depth investigation with all years represented, this would help him get the correct information on the type and nature of materials used to produce indoor sculpture in Kyambogo University School of Art and Industrial Design because it is these students who produce sculpture therefore they are well conversant with the materials, they use.

3.5 Data collection methods/instruments

The researcher used observation, group discussion, interviews, studio experimentation, questionnaires, and document analysis. The researcher used research tools such as interview guides and in these, open ended questions were used to respondents, and checklists among others to get information from respondents.

3.5.1 Observation

Observation refers to the systematic description of the events, behaviour and artifacts of a social setting (Marshall & Rossman 1989 p. 79) as quoted by Barbara (2012). Observation is largely used as a method of collecting data about people, processes and cultures. Observation is an excellent tool for collecting data in a variety of situations and it requires a good memory and extensive note taking (Barbara, W.W. (2021).

In order to achieve objective (1) which is, to investigate the type of materials used to make indoor sculpture in the research area, the researcher used the observation method to collect data by directly observing the materials used on these sculptures. The researcher also attended sessions of sculpture making to obtain desirable

information by observing the type of materials Art students were using to make indoor sculpture and the suitable techniques for these materials.

3.5.2 Interviews

The researcher also used interviews and interview guides to individual participants in different sessions to obtain desirable information. An interview is an important data gathering technique involving verbal communication between the researcher and the subject. An interview is a meeting between a researcher and a respondent that take place in a professional setting. It is designed to obtain information from a person or group of people through oral responses from an oral inquiry (Totempool 2015),with the interview, the researcher interacted with five male students, five female Art students and by using the interview guide, the researcher saved time because he was guided on what to ask and how to ask the questions.

3.5.3 Focus group discussion

In order to achieve objective (II) which is to investigate the possibility of using waste leaves as an alternative material for making indoor sculpture, the researcher used a focus group discussion. A focus group discussion is frequently used as a qualitative approach to gain an in-depth understanding of social issues. The method aims at obtaining data from a purposely selected group of individuals rather than from a statistically representative sample of a broader population (Davide 2018). The researcher approached Art students who majored in sculpture as his focus group, and had a discussion session on the possibility of using waste leaves to replace the conventional materials for indoor sculpture, the respondents opened up freely with the

researcher and aired out their experience with the conventional material the respondents also showed the need for an alternative material.

3.5.4 Questionnaires

A questionnaire is a set of standardized questions often called items which follow a fixed scheme in order to collect individual data about one or more specific topics. (Paul 2008)

Questionnaires were used to collect information from Art Students at the School of Arts and Industrial Design at Kyambogo University. The questionnaires contained question items to be responded to.

3.5.5 Document analysis/ library and archival search

The researcher also used the document analysis method to collect data. That is to say, collecting data from different written down information such as articles, books, journals, and internet publications on the type of materials used for sculpture, the use of alternative materials to cut the cost of production of sculpture, and the use of waste materials to protect the environment.

3.5.6 Studio experimentation.

The researcher used studio experimentation, for objective (111) which is, to produce sculpture samples from waste leaves as an alternative material for sculpture. The researcher experimented on the material by producing samples to find out which technique or method works better with this material and the researcher experimented. The samples made from waste leaves will later be shown to the participants as a way of advertising indoor sculptures made from alternative waste materials.

3.5.7 Photography

The researcher used photography as a method to collect data and to bring out the facts in this study. According to Datta, R., Joshi, D., Li, J., & Wang. J.Z. (2006). Photography refers to the art or practice of taking and processing photography. Photography is an important method of data collection for visual artists aimed at bringing out reality in images. The researcher used a camera as a tool for photography as a data collection method.

3.6 Validity and reliability

Validity and reliability are important aspects in assessing the applicability of research finding in solving the identified problem. According to Charles and Robert (1985), Reliability is a concept that guides researchers on how to select and on how to develop instruments for judging the credibility of research findings on the other hand, Hame, T. (2016) explains that an instrument is valid when it measures what it intends to measure.

In order to ensure validity and reliability, the researcher used appropriate methods and tools of data collection that were required to bring out the intentions of the study. To determine reliability, the researcher selected, reliable source of data, he selected suitable participants and they were the art students who majored in sculpture and these availed the researcher with reliable information in respect to the objectives.

3.7 Ethical consideration

The researcher introduced himself to the respondents and before administering interviews and presenting his questionnaires to the respondents, he made it clear that they had to first sign a consent form to grant him permission to carry out investigation among them. The researcher took photographs of the study with the consent of the participants. The responses of the respondents were considered without alteration only relevant questions were administered and responses from the subjects and their identity were concealed.

3.8 Data analysis.

According to Ameer, A. (2021). Data analysis refers to the systematic process of both collecting and evaluating measurable and verifiable data. Data analysis helps in the interpretation of Data collected from the study. In this study the researcher collected data by using interviews, observation, questionnaires, photography, library and archival search and studio experimentation. The data collected by using the above- mentioned data collection methods was studied and put into comparison. The studio experimentation was done by testing the material extracted from waste leaves with different adhesives and the material was tested with different techniques of sculpture formation. This helped the researcher to draw a desirable conclusion on the reliability of the material.

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF STUDIO FINDINGS

4.0 Over view

In finding the possibility of using waste leaves as an alternative material for producing indoor sculpture, the researcher presented the findings using objectives which were; To investigate the type of materials used to make indoor sculptures in Kyambogo University School of Art and Industrial design, to explore how waste leaves can be used as an alternative material for producing indoor sculpture and to produce sculpture samples from waste leaves as a reliable alternative material for indoor sculpture.

4.1 Materials used in making indoor sculptures.

In order to achieve objective (1), which was, materials used in making indoor sculpture, the researcher used the observation and interview methods to collect desirable information from respondents who were the Art students at the School of Art and Industrial Design at Kyambogo University. The researcher also used Pseudo names instead of respondent's real names to respect their privacy. The respondents were fifteen (15) in number and their real names were replaced with John, Paul, Julie, Abigael and Aisha among first years, the second-years included James, Peter, Aidah, Mary, Jane and Hilda and the third years included Jacob, Lucy, Angel, Peace and Harunah.

Through interaction with the students of Art and Design and observation of materials used to make indoor sculptures, the study found out that most first-year students were using clay as material for sculpture and through observation the

researcher was able to note that, most first years use the old techniques of making sculpture that is additive and subtractive technique as shown in Plate 4.3 and 4.4 below;

Plate 4.3: Showing some of the student's work

Materials: Clay

Source: Photography taken by the researcher


Plate 4.4: Shows A Female and Male art students respectively making sculpture by subtraction

Material: Clay

Technique: Subtractive technique

Source: Primary Source

When the researcher interviewed John a first-year respondent, he was able to share that he prefers to use clay because it is a plastic material and it is easy to manipulate, in the same way Julie a first-year also preferred clay and claimed that it was readily available in the research area, most first years disclosed that they obtain these materials by buying. However, the researcher was able to observe that as first years were concentrating on clay and preferring it for various reasons, some second-years were experimenting on other materials such as wood, cement, found objects and paper in addition to clay. The researcher's interaction with second-years through interview reveal that the second-years were using other materials in addition to clay because they were conversant with various techniques of sculpture production. James and Peter in second year preferred using wood and through interview they disclosed that it is cheap, however they agree that acquiring wood could in the near future destroy the environment. While first-year respondents were mostly using clay and

second-years using clay and other materials like wood and found objects, the third-year respondents were using unconventional materials such as found objects, paper, plastic bottles, metallic objects and cement among others.

During observation, the third-year respondents were very much in recycling and most of them used found recycled objects as shown in Plate 4.5, 4.6, 4.7, 4.8, 4.9, 4.10, 4.11 and 4.12 below;

Plate 4.5 Sculpture from plastic bottles
Source: Photo Taken by the researcher

Plate 4.6 Sculpture from waste papers
Source: Photo Taken by the researcher

Plate 4.7 Sculpture from found plastic Objects
Source: Photo Taken by the researcher

Plate 4.8 Sculpture from waste papers
Source: Photo Taken by the researcher

Plate 4.9 Showing third-year students making sculpture from wood

Source: Photo graph taken by the researcher

Plate 4.10 Showing third-year students making sculpture from wood

Source: Photo graph taken by the researcher

Plate 4.11 Showing third-year students making sculpture from mashed paper
Source: Photo graph taken by the researcher

Plate 4.12: Showing third-year students making sculpture using cement

Source: Photo taken by the researcher

Through interview with the third-year respondents, the researcher found out that third-year respondents preferred using unconventional materials to make indoor sculpture. Angel in third-year was able to share that conventional materials and found objects such as plastic bottles are available in the environment and are cheaply obtained, Harunah disclosed that he prefers using recycled objects, because they do not require firing like clay sculpture which requires the cutting of trees for firewood, Jacob a third-year respondent shared that conventional materials such as clay wood and cement are expensive and involve long processes of preparation. However, the researcher was able to observe that the third-year respondents use conventional and none conventional materials to make indoor sculpture for example some use plastic, found objects, others use metallic objects while others still use clay, wood and cement as shown in Plate 4.13 and 4.14 below;

Plate 4.13: Showing sculpture made from wood

Source: Photo by the researcher

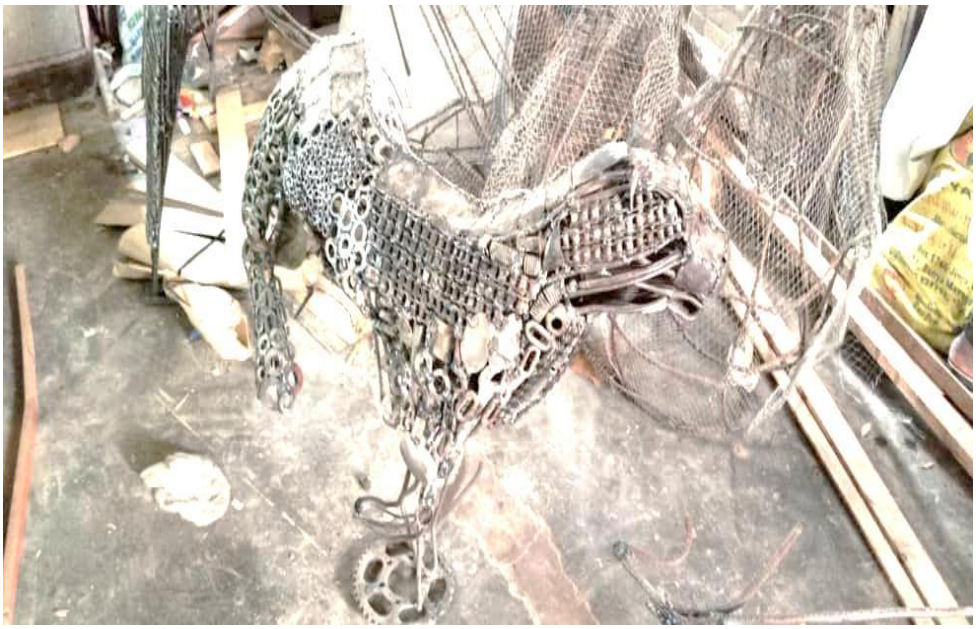

Plate 4.14: Showing sculpture made from found metallic objects

Source: Photo by the researcher

4.1.1 Findings obtained from observation, interview and photography

During the observation and interview data collection methods, the researcher was able to observe and document the materials respondents were using, availability of these materials and the techniques of application of these materials in the sessions of sculpture formation. Therefore, the researcher was able to give the following in the conclusion on materials used for indoor sculpture at Kyambogo University School of Art and Industrial Design.

1. Majority of the First-year Art students use clay as material for sculpture
2. Majority of the students can use the two major techniques of making sculpture. That is, sculpture by addition and sculpture by subtraction. And some of them actually can integrate the two techniques of making sculpture in producing one sculptural piece.

3. Art students at the School of Art and Industrial Design at Kyambogo University do not produce sculpture by casting.
4. Some students can produce sculpture by using alternative materials. Such as plastic bottles, polythene paper, paper, waste metal and saw dust among others.
5. Sculpture can be produced using recycled materials and found objects.
6. The extraction and acquisition of some of the conventional material has a negative impact on environment.
7. Most of the Art students acquire these materials by buying them.
8. Some conventional materials are not readily available and therefore, there is need to change the type of materials used.
9. Waste leaves can be used to produce indoor sculpture.

4.2 Using waste leaves as an alternative material for producing indoor sculpture

In order to get in-depth information on using waste leaves as an alternative material for producing indoor sculpture, the researcher used different methods of data collection on the respondents such as focus group discussion, questionnaires and document analysis.

In the focus group discussion, the researcher met and discussed with the focus groups of respondents at different sessions. That is, five (5) first years, five (5) second year students and five (5) third-year Art students who majored in sculpture. in all the three sessions, the researcher interacted with the art students to get empirical evidence as to whether the waste leaves can be used to substitute the conventional materials such as clay, wood, metal, stone among others to reduce the cost of production of sculpture and to save the environment. The researcher resorted to meeting the

respondents in their respective years of study because he wanted to obtain concrete evidence from the three focus groups according to their experience in sculpture formation.

Among the first years, respondents John, Jane, Paul, Julie and Aisha agreed that it is possible, waste leaves can be used to substitute the conventional materials but they were a little naïve about how they can be used. Among the second-years, the majority of the five respondents. That is; James, Peter, Aidah, Mary and Hilda agreed on the possibility of using waste leaves as alternative materials and gave reasons that they are readily available everywhere in the research area, they are cheaply obtained and they are environmentally friendly.

In the researcher's discussion meeting with the third-year Art Students, the respondents namely; Jacob, Abigael, Angel, Peace and Harunah freely opened up and supported the idea of using waste leaves as an alternative material for indoor sculpture and suggested that, ground waste leaves with a suitable adhesive can be used as a plastic material with all the three major techniques of sculpture formation that is; sculpture by subtraction, sculpture by addition and sculpture by casting. Abigael suggested that, possible measures should be used to make waste leaves an alternative material for even outdoor sculpture because it is readily available. Angel, Peace and Harunah supported the use of waste leaves and gave reasons that it is cheap. It is environmentally friendly and reliable. Jacob suggested that, possible measures should be taken to provide preservatives to apply the material on outdoor sculpture and he gave reasons that it is a reliable material and it is cheap.

The researcher also obtained information about the use of waste leaves as an alternative material by using questionnaires. A questionnaire was prepared and was given to Art students who majored in sculpture at the school of Art and Industrial Design. This was aimed at collecting data from individual participants; the respondents gave their own view about the possibility of using waste leaves as an alternative material for indoor sculpture. In this exercise, five (5) Art students were selected in first year, five (5) Art students were selected in second year and the researcher was also able to give out five(5) questionnaires to five(5) third-year Art students. The researcher was able to get desirable information from respondents and the respondents were able to suggest possible ways of using this material from waste leaves on indoor sculptures.

The researcher was also able to use document analysis to get desirable information about the possibility of using waste leaves as an alternative material for indoor sculpture. The researcher was also able to gather information on other alternative materials obtained from recycled objects, such as waste glass, waste fabrics, waste plastic materials, urban dumped waste products and waste products from factories and industries. This information from articles, books, journals and internet publications on the type of materials used in sculpture and various artists who used recycled materials to produce sculpture, gave the researcher inspiration and insight into finding more evidence on waste leaves as an alternative material.

4.2.1 Findings obtained from focus group discussion, questionnaire and document analysis

According to the data collected by the researcher using focus group discussion, questionnaires and document analysis, the researcher was able to make the following analysis;

1. There is a possibility of using waste leaves as a reliable alternative material for making indoor sculpture
2. The waste leaves are readily available everywhere and they are cheaply obtained from the environment.
3. The use of waste leaves to produce sculpture does not by any means destroy the environment.
4. Waste leaves if prepared well with a suitable adhesive can be used as a plastic material to produce indoor sculpture by using any of the three major techniques of sculpting. That is, sculpture by subtraction, sculpture by addition and sculpture by casting.

4.3 Sculpture samples produced from waste leaves as an alternative material for indoor sculpture.

When the researcher was done with observing, interviewing and discussing with the respondents on objectives 1 and 2, and after getting the ideas of the respondents on the materials they use to produce indoor sculpture and the possibility of using alternative materials (waste leaves), basing on their views, he decided to develop an alternative material for indoor sculpture. To achieve this, the researcher made projects.

Project I

Developing an alternative material from waste leaves.

In this project, the researcher made different tastes with waste leaves from different trees which shed leaves and with different adhesives to find out which type of adhesive work well with waste leaves.

4.3.1 Collection of material

The researcher collected waste leaves from five different types of trees which shed leaves seasonally namely; Ficus Benjamina, teak tree, Measopsis Emirii (Musizi), Milicia Excelsa (Muvule) and Terminalia Sppicie (step tree). The researcher used waste leaves from these trees because they don't have much water in them and these trees shed leaves seasonally, so there was assurance that sculptors could get waste leaves all the time throughout the year. In Plate 4.8 and 4.9 below the researcher shows the different types of trees whose leaves were experimented for the production of indoor sculpture.

Different types of trees and collection of leaves

Plate 4.15: Showing Ficas Benjamina Tree

Source: Photograph taken by the researcher

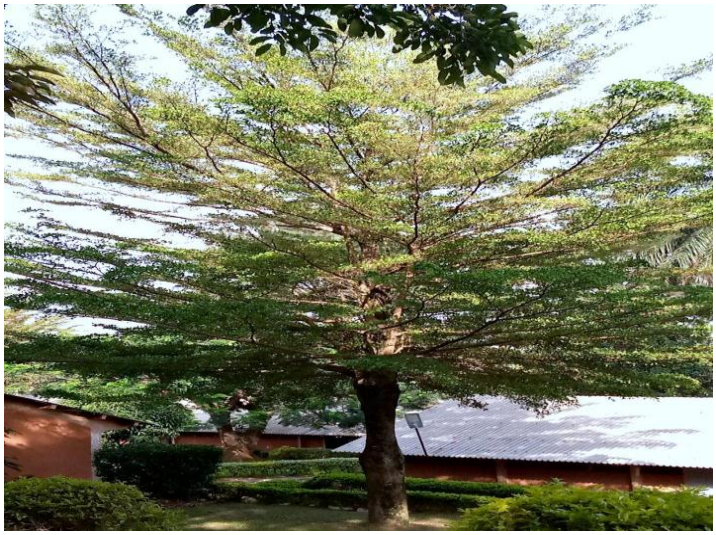

Plate 4.16: Terminalia Spicie (Step Tree)

Source: Photograph taken by the researcher

Plate 4.17: Showing Milicia excelsa tree produces hard, leaves

Source: Photograph taken by the researcher

Plate 4.18: Showing Measopsis emirii tree (Musizzi) tree

Source: Photograph taken by the researcher

Plate 4.19: Showing Milicia excelsa (Muvule) tree

Source: Photograph taken by the researcher

4.3.2 Preparation of material

The researcher washed the collected leaves and spread them on the table under a shade and allowed them to dry. The leaves were dried under the shade in a room to avoid exposing them to the wind which could blow them away. The dried leaves were later ground into powder form. In Plate 4.20, the researcher collects, the waste leaves. Plate 4.21, the researchers washes the leaves and spreads them on table in an enclosed room to dry and in Plate 4.22, the dried waste leaves were ground into powder form.

Plate 4.20: Showing researcher collecting waste leaves

Source: Photo taken by the researcher

Plate 4.21: Showing Drying waste leaves on a flat surface under a shed.
Source: Photo taken by the researcher

Plate 4.22: Showing grinding waste leaves with a commercial grinder

Source: Photo taken by the Researcher

4.3.3 Studio Experimentation with the material

The researcher was able to test the ground waste leaves with different adhesives to find out which adhesive works better with the waste leaves. The researcher tested the material with cassava porridge, office glue, tough bond, wood glue, wood glue with cassava porridge, wood glue with tough bond, office glue with wood glue and the mixture of all the four adhesives together. The researcher mixed material with different adhesives and observed the time this material takes to dry with different adhesives. The firmness of samples and the weight of the finished products

as indicated in Plate 4.23 and 4.24 below shows the final test of waste leaves with wood glue make a durable plastic material for making indoor sculpture.

Plate 4.23: Showing researcher mixing the material with adhesives

Source: Photo taken by the researcher

Plate 4.24: Showing researcher mixing the material with another type of adhesives

Source: Photo taken by the researcher

Plate 4.25: Showing samples of tests of the material with different adhesives

Source: Photo taken by the researcher

Plate 4.26: Showing the final test of waste leaves with wood glue

Source: Photographs taken by the researcher

4.3.4 Characteristics of the material mixed with different adhesives

When testing waste leaves with different adhesives, the researcher was able to identify the following;

1. Waste leaves with cassava porridge could not work because the mixture takes very long to dry and sometimes it decays.
2. Waste leaves with office glue also takes long to dry and the sculpture from the mixture remains soft. That is, does not harden fully.
3. Waste leaves with tough bond works well but it is too tough and after sometimes it crumbles besides, it dries quickly and when applied on sculpture, it shrinks, changes the shape of the sculpture, size and weight of the sculpture when it dries fully. Tough bond also sticks on the fingers and takes long to peel off.
4. Waste leaves with wood glue works well with the material, dries quickly and does not change the shape, size and weight of the sculpture, it does not cause shrinkage on the sculpture, it is user friendly and not very expensive.
5. Waste leaves with all the four types of adhesives could not work because these adhesives did not have the same quality of toughness; the cassava porridge caused the whole mixture to decompose and was discarded.

4.3.5 Testing the material with the three major techniques of making sculpture

The researcher was able to test the material extracted from waste leaves on producing sculpture. Using these techniques as demonstrated in projects II, III, IV and V. the projects used additive, subtractive and casting techniques.

Additive technique

The researcher tested the material using the additive technique with an armature. An armature is a framework around which the sculpture is built, when the sculpture could not stand on its own. (Wikipedia, 2022).

Project II

Additive technique with armature (Construction)

The researcher made an armature with binding wires, he wrapped it with expanded metal and paper strips and finally applied material extracted from waste leaves with wood glue in Plate 4.27 below, the researcher shows some of the materials used to produce sculpture by addition from waste leaves. The binding wires and expanded metal were used in the construction of an armature on which material from waste leaves and glue was to be built.

Materials used

Plate 4.27: Showing Expanded Metal and binding wire for making Armature and wood glue for mixing the material

Source: Photograph taken by the researcher

In the same way, in Plate 4.28, 4.29, 4.30 and 4.301, the researcher displays some of the tools he used to process the material from waste leaves and those he used in the process of making sculpture by addition. The motor and pestle were for grinding waste leaves into powder form, the bucket was for storing waste leaves and for containing them during the washing, the domestic blender was for grinding the waste leaves and the pair of pliers was used to bend and cut wires when making armature.

Tools used in the production process

Plate 4.28 & 4.29: Showing Motor and Pestle for grinding and Bucket (Container) for containing waste leaves

Source: Photograph taken by the researcher

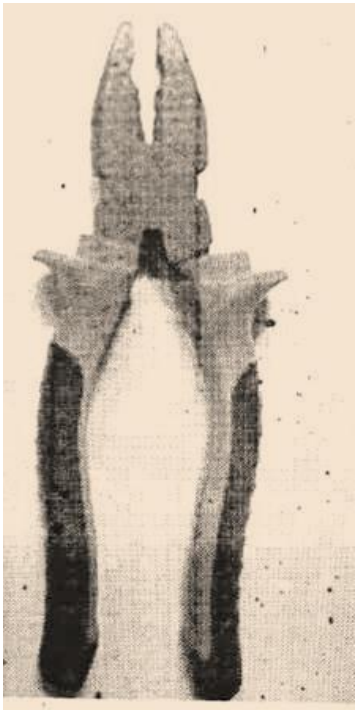

Plate 4.30 & 4.31: Showing Electric Domestic Blender for Grinding waste leaves and pair of pliers

Source: Photograph taken by the researcher

Plate 4.32, shows a finished armature made with binding wire and expanded metal for giving sculpture shape and for easy application of material

Plate 4.32: showing the researcher making an armature

Source: Photo taken by the researcher
Material: Binding wire and expanded metal

Stages of the process of production of sculpture by addition with armature (construction). In Plate 4.33, 4.34 and 4.35, the researcher shows the process of making sculpture by addition, from armature to finish sculpture as shown below;

Plate 4.33: showing the process of production of sculpture with an armature
Source: Photo taken by the researcher

Plate 4.34: Wrapping paper strips on the Sculpture

Plate 4.35: Finished Armature Material: Paper & Cassava past Technique: Additive
Source: Photo taken by the researcher

Plate 4.36: Finished Sculpture Material: Waste leaves Technique: Additive Source: Photo taken by the researcher

Project III

Additive technique without armature

The researcher was able to make another project of sculpture by addition without an armature. To find out whether material extracted from waste leaves can be used without armature for support. In this project, the researcher used the material by adding bits of it until when the required form was built. This was done on both relief sculpture and sculpture in the round as shown in Plate 4.37 below;

Plate 4.37: Showing the process of making sculpture in the run

Material: Waste Leaves
Source: Photo taken by the researcher

Plate 4.38: Showing: Researcher making Relief sculpture

Material: waste leaves
Technique: Additive technique
Source: Photo taken by the researcher

Findings from the additive technique

Additive technique is very effective and easy to use, the sculpture dries quickly with armature and the armature gives it shape and makes it to stand, besides it consumes little material, however, additive technique without armature takes time to dry but makes a very good sculpture with the required weight. Having experimented with the additive technique, project IV explains the subtractive technique of sculpture production.

Project IV

Sculpture by subtraction

In this project, the researcher was able to produce sculpture by the subtractive method. The researcher produced logs or blocks of material like logs of wood for wood curving through casting the material in a bucket and when the log was dry, he curved it into a sculpture the way wood curving is done. In Plate 4.39, 4.40 and 4.41, the researcher shows the process of making logs/blocks for curving and these are made by casting as earlier indicated, in the same way, the researcher in Plate 4. 42 shows the process of making sculpture by subtraction from the logs casted as illustrated below;

Plates 4.39, 4.40 & 4.41: Shows Log being casted, block (logs) for curving and Log & Bricks for curving

Material: Waste leaves
Technique: Casting
Source: Photo taken by the researcher

Plate 4.42: Shows the process of making sculpture by subtraction from waste leaves

Material: Waste leaves
Technique: Subtraction
Source: Photo taken by the researcher

Findings on the technique

i) Waste leaves can be used to make indoor sculpture by subtractive technique and it's very effective.

ii) Great care must be taken when making sculpture by subtraction because the process is irreversible

Project V

Sculpture by casting

The researcher was also able to establish the possibility of using the material extracted from waste leaves with the casting technique of sculpture production. According to Daney, C.J. (2009), casting is a manufacturing process in which a liquid material is usually poured into a mould which contains a hollow cavity of the desired

shape and then allowed to solidify. The solidified part is ejected or broken out of the mould to complete the process. In the second project, the researcher made logs from which he made sculpture by subtraction which he casted into a bucket as the mould. The researcher realised therefore, that it was possible to produce indoor sculptures for mass production with a mould of a required shape. Although, the researcher was not able to acquire a mould of required shape to produce sculpture by casting for project IV, the process was proved possible. In Plate 4.43, the researcher displays the process of the casting method. The bucket acts as the mould into which material extracted from waste leaves was poured. In Plate 4.44, the researcher was interested in showing us the complete process of casting technique in sculpture production.

Plate 4.43: Showing the process of casting technique

Material: Waste leaves
Technique: Subtraction
Source: Photo taken by the researcher

Plate 4.34: Showing Liquid material being poured into the mould and Solid sculpture being from the mould

Material: Wax
Technique: Casting
Source: Lost- wax casting Wikipedia (Internet)

Findings with the casting technique

i) It is possible to produce sculpture by the casting technique. However, the sculpture takes a little longer to dry than in the additive and the subtractive technique.

ii) It is expensive to produce a mould of a required shape for mass production with the material by casting.

iii) It is a suitable technique for mass production of sculpture from waste leaves.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Overview

The main purpose of this study was to explore the possibility of turning waste leaves into an alternative and reliable material for making indoor sculpture mainly to reduce on the cost of materials for sculpture and to restore the environment which is destroyed due to acquisition of materials for sculpture. In this study, the researcher based on the following objectives; To investigate the type of materials used to make indoor sculpture in Kyambogo University School of Art and Industrial Design, to investigate how waste leaves can be used as an alternative material for producing indoor sculpture and to produce sculpture samples from waste leaves as a reliable and alternative material for indoor sculpture. In this chapter therefore, the researcher gives summary, conclusion and recommendations basing on the above objectives.

5.1 Summary

The study of exploring waste leaves as an alternative material for indoor sculpture which was carried out in Kyambogo University School of Art and Industrial Design was aimed at finding an alternative material that can be used to substitute the conventional materials which most of them have been proved dangerous and distractive to the environment. The study was based on three objectives, that is, to investigate the type of materials used to produce indoor sculpture in Kyambogo University School of Art and Industrial Design, to explore how waste leaves can be used as an alternative material for producing indoor sculpture and to produce sculpture samples from waste leaves as a reliable alternative material.

In chapter four, the researcher analysed data collected from respondents and he made the following observations basing on the objectives of the study.

5.1.1 Materials used to make indoor sculpture

In relation to objective I, the researcher noted that Art students in Kyambogo University School of Art and Industrial Design produce indoor sculpture from conventional and none conventional materials. The researcher was also able to observe that, the first-year respondents produce their indoor sculptures mostly from clay, the second year students use clay, wood, cement and other found objects, and the third-year Art Students explore both conventional and none conventional materials such as waste metallic objects, waste plastic materials, polythene paper and found objects, the respondents were able to disclose that they acquire these materials mostly by buying. The researcher however noted with concern that none of the Art Students has ever used waste leaves to produce indoor sculptures. The researcher observed that Art Students mostly use two techniques of production of sculpture, that is, additive and subtractive techniques. The researcher found no evidence that there are students using the casting technique. This is so, because in his investigation the researcher found no students producing sculpture by casting an even there were no traces of a mould and the respondents also shared that they had never used the technique.

5.1.2 How waste leaves can be used as an alternative material for producing indoor sculpture.

In this study, the researcher explored the waste leaves and noted the following; The waste leaves can be ground into powder form and mixed with adhesive to form a

plastic material suitable for indoor sculpture. Under this, the researcher experimented the ground waste leaves with tough bond, cassava porridge, office glue and wood glue to find out which adhesive works well with the waste leaves. From this investigation, the researcher found out that wood glue works well with the waste leaves. The results of the study also show that material extracted from waste leaves can be used to produce indoor sculpture by using the major techniques of producing sculpture namely; by casting, subtraction and addition.

5.1.3 Producing sculpture samples from waste leaves as a reliable and alternative material for indoor sculpture.

In relation to objective three, the researcher was able to carry out various experiments with waste leaves to find out concrete evidence on the possibility of using waste leaves as an alternative material for indoor sculpture. The researcher tested the waste leaves with different adhesives and concluded that waste leaves work well with wood glue. In this study, the researcher was also able to experiment the material with the three major techniques of sculpture formation, that is, subtractive, additive and casting techniques, with these experiments, the researcher realised that if the material is just applied as an embellishment on armature, it takes a shorter time to dry and in just one day, it is possible to add another layer of material unlike with the casting and additive technique without armature.

5.2 CONCLUSION

The information that was collected as per exploring waste leaves as an alternative material for making indoor sculpture obtained from the School of Art and Industrial Design in Kyambogo University revealed that;

The continuous use of conventional materials in the production of indoor sculpture has a negative impact on environment.

The continuous negative impact of human activities on environment reduce the availability of materials for sculpture because the different materials for sculpture such as wood, clay, silver, Gold, bronze among others are obtained from the environment therefore, there is no future for the future sculptor.

Well prepared waste leaves with a suitable adhesive, produces a suitable, reliable and alternative material for indoor sculpture.

5.3 RECOMMENDATIONS

After carrying out a research on the topic “Exploring waste leaves as an alternative material for making indoor sculpture,” the researcher made the following recommendations;

Art students and heads of institutions of learning should encourage the use of environmentally friendly materials such as waste leaves to produce sculpture.

The innovation of using waste products to produce sculpture should be emphasised to increase production, cut the cost of production of sculpture and to preserve and restore the environment.

The researcher recommends that the government should finance the project of using waste products such as waste leaves, waste plastic, waste metallic objects, and waste glass among others to solve the problem of scarcity of materials for production of domestic and commercial products and to preserve the environment.

5.4 Areas for further research

In the interest of proper utilization of the material from waste leaves, further research should be carried out to make this material used even on outdoor sculptures for example using weather friendly ingredients and preservatives to enable it withstand outdoor weather conditions.

REFERENCES

Sai. A. O., Quansha, S.A, & Acquaye, R. (2022). Recycling Fabric Waste Into Functional Interior Decoration Pieces. Journal of Art and Design, 15-32.

Andrews, O.(1988). Living Materials: a sculptor's handbook. Univ of California Pres.

Ashby, M., & Johnson, K. (2003). The art of Materials Selection. Materials today, 6(12), 24-35.

Bolden IV, J.J. (2013). Innovative uses of recycled and Waste Materials in Construction application (Doctoral Dessertation, North Carolina Agricultural and Technical State University).

Bronwen, E(2010). Contemporary African Art. https://www. Contemporaryafricanart.com/contemporary-african-art.html

Bash, C.E.,& Gold, R.S. (1985). The validity of reliability assessments. Burnal of school health, 55(5), 191-195.

Conrad, K. (1997). A theory of production with waste and recycling. Discussion papers/institute fiir volkswirtschaftslehte Und Statistik, 550.

Data, R., Joshi, D., Li, J.,& Wang, J.Z. (2006). Studying aesthetics in photographic Images using a computational approach in computer vision- ECCV 2006: 9th European conference on computer vision, Graz, Austria, May 7-13, 2006, Proceedings, Part III 9 (Pp.288-301). Springer Bertin Heidelberg.

Davey,C.J. (2009). The early history of lost-wax casting. Metallurgy & Civilisation: Eurasia and beyond, 147-154.

Digolo,O.,&Mazrui,O.(2016). Art and Design for Forms land 2. East African Publishers.

Faltermeier, R.B. (2014). An Easy Guide to Care for Sculpture and Antique Art Collections. Berlin, Germany: Springer International Publishing.

Freud, S.(1909). Analysic of a phobia in a five-year old boy. Sc.

Hamed, T.(2016)- Validity and Reliability of the Research Instrument. How to Test the Hawari, F., Sachari, A.,& Nugraha, A.(2017). Urban Waste as an Alternative Mater Elements for Interior Design that Represent Indonesian Ornamental pattern.

Hawley, N.J.(2018). Waste as a resource: an exploration of Sustainable process in the ceramics studios of UKZN through the practice and Creative production of Natasha Jane Hawley (Doctoral dessertation).

Roberta Heale, R.N.E.C., James, S.,&Garceav, M.L.(2016). A multiple-case study in nurse practitioner-led clinics: an exploration of the quality of care for palients with multimorbidity. Nursing leadership. 29(3).

Rich, J.C.(1988). The materrials and methods of sculptore courier corporation. Kawulich, B.(2012). Collecting data through observation. Doing social research: A global context, 6(12), 150-160.

Kayoed, F.(2006). From "Waste to Want": regenerating art from discarded objects. FUTY Journal of the Environment, 1(1), 68-85.

Majid, U.(2018). Research fundamentals: Study design, population, and sample size. Undergraduate research in natural and clinical science and technology Journal, 2,1-7.

Namwebe, R.(2010). Solid Waste as a Material for sculpture. An Innovation for Environmental Conservation (Masters Dissertation, Kyambogo University).

Odoh, G.C., Odah, N.S.,& Anikpe, E.A.(2014). Waste and Found Objects as Potent Creative Resources a Review of the Art-is- Everywhere project. International Journal of Humanities Social Sciences, 3(6).1-14.

Olotah, A.(2020). Production of Sculpture Using Waste Materials: a Tool for Addressing Environmental Degradation in Onitsha, Anambra State Nigeria. AWKA JOURNAL OF FINE AND APPLIED ARTS, 6(2).

Pizarro, I.O.(2014). Turning waste into resources: Rethinking the way we discard things. Chalmers Tekrish Hogskola (Sweden).

Oppenheimer, D.A. (2014). Rural Studio: Samuel Mockbee and an architecture of decency. 34-38.

Ravo,N.V., RajaseKhar, M.,& Rao, G.C.(2014). Detrimental effect of air pollution, corrosion on building materials and historical structures. Am.J.Eng. Res, 3(3), 359-364.

Rossol, M.(2001). The artist's complete health and Safety guide. Skyharse publish Inch.

Seadon, J.K.(2010). Sustainable waste management systems. Journal of Cleaner production, 18(16-17), 1639-1651.

Straoger, M.(2015), Air Pollution damage to store P. Brimble Combe (Ed), Urban UKZN through the practice and creative Production.

Yhdego, M.(2021). The circular economy in Tanzania: A self-referential system. In circular economy: recent trends in global perspective (Pp.69-112). Singapore: Springs Nature Singapore.

Yin, R.K.(1994). Case Study Research. Design and Methods, "(2nd ed.) sage publications, Newbury Park, CA.

Anbarasu, J.(2008), Materials, Bishop Heber College and Bharathidasan University, India.

Nandala, M.& Yiga, A.P.(2017), Stylistic Tendencies Charactering Ugandan Visual Arts, Nkumba University.

Ameer, A.(2021). Quantitative Data Analysis; University of Sindh.

Barbara, W.V.(2021), Analysis of 2021 US FDA 483 GMP Observation/Radical Systems.

Mayyadah, F.H(2012), Journal of Civil engineering and Architecture 6(8).1047.

Nandala, M.&Yiga, A.P.(2017). Stylistic Tendencies, Charactering Uganda Visual Arts. Nkumba University.

Glenn, A.& Julia, B.W.(2016), Art in the Making Artists and their materials from the studio to crowdsourcing, e book.

APPENDIX I

CHECKLIST FOR THE OBSERVATION METHOD

(To be filled by the researcher)

1. Types of indoor sculpture in the research area?

2. Themes normally reflected in indoor sculpture?

3. Types of materials used to produce these indoor sculptures?

4. The pricing of available indoor sculpture

5. Can indoor sculptures be produced from locally obtained materials?

6. Alternative materials that can be used to produce indoor sculptures?

7. Can indoor sculptures be made from waste materials?

8. Type of waste materials that can be found in the research area?

9. Availability of waste materials

4 Are indoor sculptures expensive?

5 Are indoor sculptures imported or can be made locally?

6 Possibility of exporting locally made indoor sculpture.

APPENDIX II

INTERVIEW GUIDE (FOR FOCUS GROUP DISCUSSION)

My name is **Ssettimba Ben**, I am a Masters student at **Kyambogo University Kampala**, specializing in **Art and Industrial Design**, I am carrying out a study titled "**EXPLORING WASTE LEAVES AS AN ALTERNATIVE MATERIAL FOR INDOOR SCULPTURE**"

NB: The information given will be kept confidential

SECTION A: BIO DATA

4 Year of study: ……

5 Sponsorship: …….

6 Electives: ……

SECTION B:

7 What activities do you do to earn a living?

……

8 What do you understand by sculpture?

……

9 What are the materials used to make sculpture?

…….

10 Do you know some of the materials used to make sculpture?

……

11 How many materials do you use when making sculpture?

……..

12 Can local materials be used to make sculpture other than modern and conventional materials?

……

13 Are conventional materials still available in your environment?

……

14 What is the source of conventional materials for sculpture?

……

15 Does the extraction of conventional materials destroy the environment?

……

16 What human activities do you know that destroy the environment?

……..……

17 Can waste materials be used to make indoor sculpture?

.....

18 Can waste materials used for sculpture destroy environment?

……..……

19 Is recycling of waste materials a method of protecting the environment?

……..……

20 Can waste leaves be used to make materials for indoor sculpture?

……..……

21 Why do you think sculpture is important in our environment?

……

22 Have you ever bought a sculpture?

……

23 How much is indoor sculpture?

……

24 What themes are common in indoor sculpture?

……..……

……

25 Apart from religious themes, do you know any other themes that can be used to make indoor sculpture to be put in homes and offices?

……..……

……..……

APPENDIX III

QUESTIONNAIRE FOR ART STUDENTS

My name is **Ssettimba Ben**, I am a Masters student at **Kyambogo University Kampala**, specializing in **Art and Industrial Design**, I am carrying out a study titled "**EXPLORING WASTE LEAVES AS AN ALTERNATIVE MATERIAL FOR INDOOR SCULPTURE**"

NB: The information given will be kept confidential

SECTION A: BIO DATA

(a) Year of study:……..……

(b) Electives: ……...…

SECTION B: RESEARCH QUESTIONS

1a) What is the nature and type of materials used to make indoor sculpture?

……..……

..……

b) How do you obtain these materials?

……..……

..……

c) Are the materials used to make indoor sculpture readily available?

……..……

..……

d) What is the impact of convention materials on the environment?

……..……

..……

2a) Can materials used for indoor sculptures be changed?

……..……

..……

b) How can these materials be used to suite the environment?

……..……

..……

c) Can waste materials be used to produce indoor sculpture and can they be used to substitute the convention materials?

……..……

..……

d) How can waste leaves be used as an alternative material for indoor sculpture?

……..……

..……

3a) How effective is the use of waste leaves as a reliable material for sculpture?

……..……

..……

b) Can waste leaves be available in your area?

……..……

..……

APPENDIX IV

ESTIMATED BUDGET FOR RESEARCH

NO.	ITEM	QUANTITY	COST PER ITEM	TOTAL COST
1.	**Stationary**			
	Ream of paper	2 pcs.	20,000@	40,000
	Typing	200 pages	500@	100,000
	Printing	200 pages	500@	100,000
	Binding	1 book	40,000	40,000
	Drawing books	3pieces	30,000@	90,000
	Sub-total			**370,000**
2	**Materials and tools to be used for experiment**			
	Binding wires	4 kgs.	7,000@	28,000
	Expanded metal	1 mitre	20,000	20,000
	Paper	1 ream	20,000	20,000
	Cassava flour	1kg.	2,200	2,200
	Wood glue	6 tins	5,000	30,000
	Pair of scissors	1 piece	3,000	3,000
	Pair of pliers	1 piece	5,000	5,000
	Tape measure	1 piece	3,000	3,000
	Gloves	5 pairs	2,000	10,000
	Sieve	1 piece	10,000	10,000
	Motor and pestle	1 piece	20,000	20,000
	Sub-total			**151,200**
3	Internet(MBs)			50,000
	Power/electricity			20,000
	Miscellaneous			200,000
	Transport			300,000
	Sus-total			**570,000**
	Grand-total			**1,091,200**

APPENDIX V

RESEARCH WORK PLAN

ACTIVITIES	**DULATION (MONTHS)**					
	JAN-APRIL 2022	**APRIL-MAY 2022**	**MAY-JULY 2022**	**JULY- AUG 2022**	**AUG-SEPT 2022**	**SEPT-OCT 2022**
PROPORSAL WRITING						
COLECTING DATA FROM THE FIELD						
ANALYSING AND PRESENTING OF DATA						
DISCUSSION OF FINDINGS						
SUBMISSION OF REPORT						
DISSERTATION VIVA