

DESIGN AND CONSTRUCTION OF HOUSEHOLD FURNITURE

BY

HAMMED BASIT OLADIMEJI

MATRIC NO:

ND/23/CEC/PT/0028

**A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF CIVIL ENGINEERING, I
NSTITUTE OF TECHNOLOGY, KWARA STATE POLYTECHNIC, ILORIN, NIGERIA, IN PAR
TIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF NATIONAL DIPLOM
A (ND) IN CIVIL ENGINEERING.**

JULY, 2025.

DECLARATION

I declare that this project titled, DESIGN AND CONSTRUCTION OF HOUSEHOLD FURNITURE is my work and has not been previously submitted by any other person for any course of qualification in this institution or any other institution.

CERTIFICATION

This is to certify that this research project was carried out by HAMMED BASIT OLADIMEJI with the matriculation number ND/23/CEC/PT/0028 and has been read and approved as meeting part of the requirements of the Department of Civil Engineering, Institute of Technology, Kwara State Polytechnic, Ilorin, for the award of National Diploma (ND) in Civil Engineering.

Engr. Adam Bukhari

(Project Supervisor)

Date

Engr. A. Sanni
(Part time Coordinator)

Date

(External Examination)

Date

DEDICATION

This research work is dedicated to God, the Almighty who has given me His grace,

wisdom, and strength, the one who made all things possible for me and to my wonderful parents.

ACKNOWLEDGEMENTS

I sincerely acknowledge the Almighty God for His grace, guidance, and strength throughout the course of this research.

I am grateful to Engr Adam Bukhari, my supervisor, for his patience, insightful advice, and tireless support. To my wonderful parents, I say thank you for being my backbone. Your sacrifices gave me the strength to carry on.

To my friends, your friendship, encouragement, and countless study nights helped me through. I also thank my classmates for the group discussions and shared knowledge. This journey was tough, but with your help, I triumphed. God bless you all.

TABLE OF CONTENTS

Title Page	i
Declaration	ii
Certification	iii
Dedication	iv
Acknowledgements	v
Table of Contents	vii
CHAPTER ONE	
1.0 Introduction	1
1.1 Background to the Study	1
1.2 Aims and Objectives of the Study	2
1.3 Statement of the Problem	2
1.4 Justification of the Study	2
1.5 Scope of the Study	3
CHAPTER TWO	
2.0 Literature Review	4
2.1 Introduction to Furniture Design and Industry	4
2.2 The Nigerian Furniture Industry	8
2.3 Principles of Future Design (with focus on Dinning Sets)	12
CHAPTER THREE	
3.0 Methodology	
3.1 Research Design	16

3.2 Material and Tools	17	
3.3 Conceptualization and Ideation		23
3.4 Construction Methodology	24	
CHAPTER FOUR		
4.1 Evaluation Criteria	26	
4.2 Evaluation Methodology		27
4.3 Results and Findings	28	
4.4 Discussion of Findings	50	
CHAPTER FIVE		
CONCLUSIONS AND RECOMMENDATIONS		
5.1 Conclusions	52	
5.2 Recommendations		53
5.3 References		56

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Household furniture is a fundamental component of domestic spaces, and its design and functionality have evolved significantly over time. This evolution reflects changing lifestyles, cultural preferences, and technological advancements. In Nigeria, the furniture industry has experienced substantial growth, driven by increasing urbanization, rising disposable incomes, and a growing middle class. However, the sector faces various challenges that hinder its potential.

Dining sets are a crucial element of household furniture, and their popularity has increased significantly in Nigeria. As lifestyles evolve and more people embrace modern living, the demand for stylish and functional dining sets has grown substantially. However, the Nigerian furniture industry often struggles to meet this demand due to several factors.

One major challenge is the lack of standardized design processes. Many furniture manufacturers in Nigeria rely on traditional craftsmanship and artisanal techniques, which can lead to inconsistencies in quality and design. This lack of standardization can result in products that are not durable, aesthetically pleasing, or ergonomically sound.

Another significant challenge is the limited availability of high-quality materials. While Nigeria is endowed with abundant natural resources, including timber, the exploitation of these resources is often unsustainable. Additionally, the lack of modern manufacturing facilities and equipment hinders the production of high-quality furniture.

Furthermore, the shortage of skilled labor in the furniture industry is a major constraint.

maint. Many artisans and craftsmen lack formal training and rely on traditional knowledge and skills. This can limit their ability to produce innovative and high-quality products.

To address these challenges, it is essential to promote sustainable design practices, encourage the use of local materials, and invest in skills development and technology transfer. By adopting modern design principles and manufacturing techniques, Nigerian furniture manufacturers can produce high-quality, innovative, and affordable dining sets that meet the needs and aspirations of the growing middle class.

1.2 Aim and objective of the study

The aim of this study is to design and construct a functional household furniture .

The objective are :

- i. To design the dinning table set that meet the of household.
- ii. To construct the functional dinning set
- iii. To evaluate the functionality of the constructed dinning table set

1.3 Statement of the Problem

The Nigerian furniture industry, despite its potential, faces several challenges that hinder its growth and development. These challenges include; Lack of Standardized Design Processes, Limited Availability of High-Quality Materials, Shortage of Skilled Labor, In efficient Manufacturing Processes and Limited Market Access

To address these challenges and improve the overall quality and competitiveness of the Nigerian furniture industry, this study aims to investigate and propose solutions to enhance the design and construction of household furniture, specifically dining set.

1.4 Justification of the Study

The Nigerian furniture industry, despite its potential, faces significant challenges that hinder its growth and development. By addressing these challenges, the industry can improve the quality and competitiveness of its products, both domestically and internationally.

This research aims to contribute to the advancement of the Nigerian furniture industry by investigating the design and construction process.

1.5 Scope of the study

This study will focus on the design and construction of dining set as a case study to explore the challenges and opportunities in the Nigeria furniture industry. The specific scope of this research includes: the design and construction of a functional dining set.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction to Furniture Design and Industry

Furniture stands as a ubiquitous and indispensable element within human living and working environments, fundamentally shaping the functionality, aesthetics, and comfort of domestic, commercial, and institutional spaces. Beyond its primary utilitarian purpose, furniture acts as a profound reflection of cultural values, technological capabilities, and evolving societal needs across different epochs. This section delves into the foundational aspects of furniture, exploring its inherent definition, historical evolution, and the multifaceted importance of design within its broader industrial context.

At its most basic, **furniture** can be defined as movable objects intended to support various human activities and to hold objects at a convenient height. This encompasses a vast array of items, from seating (chairs, sofas, benches), tables (dining, coffee, side), storage units (cabinets, shelves, wardrobes), and beds, to more specialized pieces. However,

r, this functional definition only scratches the surface. Modern interpretations of furniture extend to encompass its role in defining spatial character, influencing human behavior, and serving as a medium for artistic and cultural expression (Ching, 2014; Pile, 2013). Good furniture design, therefore, transcends mere utility, integrating aspects of human-centered design, material science, and aesthetic principles.

The **Evolution of Furniture** is intrinsically linked to the history of human civilization. Early furniture, dating back to ancient Egypt, Mesopotamia, and Greece, was often rudimentary but established fundamental forms such as stools, beds, and chests. These pieces were primarily functional, crafted from natural materials like wood, stone, and animal hides, and often signified social status. The Roman era saw advancements in comfort and luxury, with the introduction of upholstered seating and more elaborate designs. The medieval period in Europe, marked by feudalism and the dominance of the church, featured heavier, more robust, and often less comfortable furniture, reflecting the austere architectural styles of castles and monasteries. The Renaissance, however, sparked a revival of classical forms, emphasizing proportion, symmetry, and decorative elements, transforming furniture into art forms that showcased craftsmanship and wealth (Payne, 2012).

The 17th and 18th centuries witnessed the flourishing of distinct furniture styles – Baroque, Rococo, Neoclassical – each mirroring the prevailing artistic and political currents of their time. These eras were characterized by intricate carvings, luxurious materials, and a pursuit of grandeur and elegance. The **Industrial Revolution** in the 19th century marked a pivotal shift. The advent of mass production techniques, new materials like iron and steel, and the rise of a middle class dramatically altered furniture manufacturing. While

initially leading to a decline in craftsmanship and a proliferation of poorly designed, machine-made imitations, it eventually paved the way for modern design movements that sought simplicity, functionality, and accessibility (Sparke, 2004).

The 20th century saw the emergence of Modernism, advocating for clean lines, functionalism, and the rejection of superfluous ornamentation. Designers like Bauhaus and Scandinavian modernists championed ergonomic principles and the use of new materials such as plywood, plastics, and tubular steel. Contemporary furniture design continues this trajectory, embracing sustainability, modularity, smart technology integration, and personalized aesthetics.

The **Importance of Design** in furniture cannot be overstated, as it directly impacts its success in the market and its value to the end-user. Design is the bridge between conceptual ideas and tangible products, orchestrating the form, function, and user experience.

Functionality: At its core, furniture design must prioritize utility. This involves ensuring ease of use, durability under intended loads and environments, stability to prevent accidents, and safety through the absence of sharp edges or hazardous materials. For a dining set, this translates to adequate table surface area, comfortable seating heights, and robust construction capable of withstanding daily use (Panero & Zelnik, 1979).

Ergonomics: This aspect of design focuses on optimizing furniture for human comfort and efficiency. It involves understanding human body dimensions, posture, movement, and physiological responses to ensure that furniture supports the user effectively, reduces strain, and promotes well-being. For dining chairs, this means appropriate seat depth

h, backrest angle, and armrest height to facilitate comfortable prolonged sitting.

Aesthetics: Beyond utility, furniture serves as a visual element that contributes to the ambiance and character of a space. Aesthetic considerations involve form, proportion, balance, color, texture, and the choice of materials. Good aesthetic design can transform a functional object into a piece of art that evokes emotions, expresses personal style, and enhances the overall visual appeal of an interior.

Materiality and Manufacturability: Design must also consider the properties of materials and the feasibility of manufacturing. Selecting appropriate materials ensures the desired strength, durability, and appearance, while understanding manufacturing processes allows for efficient production and cost-effectiveness. A well-designed piece of furniture is not only visually appealing and functional but also practical to produce using available technologies and resources (Ashby & Johnson, 2010).

The **Furniture Industry** itself is a significant global economic sector, encompassing the entire value chain from raw material sourcing and processing, through design, manufacturing, distribution, retail, and after-sales service. It is a highly competitive and dynamic industry, influenced by economic cycles, consumer trends, technological advancements, and regulatory frameworks. Globally, the industry is characterized by a mix of artisanal workshops, small and medium-sized enterprises (SMEs), and large-scale industrial manufacturers, each catering to different market segments.

Current **global trends** in furniture design and manufacturing are shaping the future of the industry:

Sustainability: There is an increasing emphasis on eco-friendly materials (recycled, rapidly renewable, responsibly sourced timber), sustainable manufacturing processes (reducing waste, energy efficiency), and products with a longer lifecycle or those that can be recycled.

Modularity and Multi-functionality: With shrinking living spaces, furniture that can adapt to various needs or be reconfigured is highly sought after. Dining sets, for instance, might be extendable or chairs might double as occasional seating.

Smart Furniture: Integration of technology (e.g., charging ports, lighting, climate control) into furniture is becoming more prevalent, enhancing user convenience.

Personalization and Customization: Advances in digital design and manufacturing allow consumers to customize furniture to their specific tastes and needs, moving away from purely mass-produced items.

E-commerce and Digital Marketing: The internet has revolutionized furniture retail, making it easier for manufacturers to reach wider markets and for consumers to access diverse product offerings.

In summary, furniture design is a complex interplay of art, science, and engineering, aiming to create objects that are not only functional but also aesthetically pleasing and ergonomically sound. The furniture industry is a vital economic sector, continually evolving in response to technological advancements, material innovations, and shifting consumer demands, with a growing focus on sustainable and user-centric solutions.

2.2 The Nigerian Furniture Industry

The Nigerian furniture industry represents a sector with immense, yet largely untapped, potential within the nation's diverse economy. As the most populous country in Africa with a rapidly growing urban population and an expanding middle class, Nigeria presents a substantial market for household furniture, including a significant demand for dining sets. Despite this inherent demand and abundant natural resources, the industry faces systemic challenges that impede its capacity to meet local needs efficiently and compete effectively on a global scale.

Historically, furniture production in Nigeria was predominantly characterized by **traditional craftsmanship and artisanal techniques**. This heritage involves skilled artisans passing down knowledge through generations, creating unique, hand-crafted pieces, often from locally sourced timber. While this traditional approach yielded furniture with cultural significance and bespoke quality, it inherently lacked standardization, uniformity, and the capacity for large-scale production. The designs were largely functional, reflecting local aesthetic preferences and available tools, and often catered to specific, limited markets (Ojo, 2010; Onuoha & Adeyemo, 2018).

The **current state** of the Nigerian furniture industry is complex, marked by both growth drivers and significant inhibitors. The demand for furniture, particularly modern household items like dining sets, has surged due to:

Rapid Urbanization: Leading to the construction of more residential units and the establishment of new households.

Rising Disposable Incomes: Enabling a larger segment of the population to invest in

higher-quality or more aesthetically pleasing furniture.

Changing Lifestyles: A shift towards modern, nuclear family structures and contemporary interior design preferences has increased the demand for pre-fabricated, stylish, and functional furniture, moving away from purely custom-made pieces.

Government Initiatives (sporadic): Efforts to promote local content and manufacturing, though often inconsistently applied, have provided some impetus.

Despite these drivers, the industry's contribution to Nigeria's Gross Domestic Product (GDP) remains modest compared to its potential. It is largely fragmented, comprising numerous Small and Medium-sized Enterprises (SMEs) and a few larger, more organized manufacturers. The market is also heavily influenced by imported furniture, which often benefits from lower production costs and perceived higher quality, posing stiff competition to local producers (Idris & Agboola, 2014). This competition is particularly felt in the segment for contemporary dining sets, where imported designs often dominate due to perceived sophistication and broader variety.

The challenges hindering the Nigerian furniture industry, which directly impact the design and construction of products like dining sets, are multifaceted:

Lack of Standardized Design Processes: Many local manufacturers, particularly smaller workshops, operate without formal design methodologies. Designs are often based on ad-hoc sketches, replication of existing products (local or imported), or traditional forms without rigorous consideration for ergonomics, durability standards, or aesthetic consistency. This leads to variability in product quality, dimensions, and structural integrity.

For dining sets, this translates to inconsistent table heights, unstable chair structures, or dimensions that do not align with user comfort, diminishing overall market appeal and functionality (Adeyemo & Ojo, 2017).

Limited Availability of High-Quality Materials and Unsustainable Sourcing: While Nigeria possesses vast timber resources, including highly valued species like Teak, Iroko, and Mahogany, the **exploitation and processing of these resources are often unsustainable and inefficient**. Illegal logging, inadequate reforestation, and poor primary processing (sawmilling) result in raw materials of inconsistent quality, high waste, and rising costs. Furthermore, the availability of other essential furniture materials such as high-grade upholstery fabrics, foam, adhesives, and hardware (e.g., strong joinery components for dining tables and chairs) is limited, often necessitating expensive imports or reliance on lower-quality local alternatives. This directly impacts the durability and finish of dining sets, making it difficult to produce furniture that rivals imported counterparts in terms of longevity and aesthetic appeal (Ogunlade & Adegoke, 2019).

Shortage of Skilled Labor: The industry suffers from a significant deficit of formally trained and skilled labor. Many artisans and craftsmen acquire their skills through informal apprenticeships based on traditional methods, which may not incorporate modern design principles, advanced manufacturing techniques, or contemporary material handling. This limits their ability to innovate, produce complex designs, or work with precision required for high-quality, standardized dining sets. The lack of formal education in areas like industrial design, ergonomics, and modern machinery operation further exacerbates this issue (Adewale & Oladele, 2015).

Inefficient Manufacturing Processes: The predominant reliance on rudimentary tools and outdated machinery, particularly among SMEs, leads to inefficient production processes, high labor costs per unit, and inconsistent product quality. Limited investment in modern woodworking machinery (e.g., CNC machines, automated sanding equipment, specialized joinery machines) means that production is slower, less precise, and often results in higher material waste. This directly impacts the scalability and competitiveness of local furniture, including dining sets, making them more expensive or lower in quality compared to mass-produced imports.

Limited Market Access and Competition: Local manufacturers often struggle with effective marketing and distribution channels, limiting their reach to broader markets. They also face intense competition from imported furniture, which benefits from economies of scale, often lower prices (due to lower labor costs in exporting countries or illicit trade), and sometimes a perceived higher quality or "brand appeal" among consumers. This competitive pressure particularly affects segments like dining sets, where consumers might prioritize imported sleek designs or specific material finishes.

Despite these significant challenges, the Nigerian furniture industry holds substantial **opportunities for growth and development.**

Abundant Local Resources: Proper management and sustainable exploitation of timber resources, coupled with investment in local processing facilities, could provide a consistent supply of high-quality raw materials.

Large Domestic Market: The growing population and middle class represent a vast consumer base that prefers locally appropriate designs and could support increased local production, if quality and affordability are competitive.

Job Creation: Investment in the industry can lead to significant job creation, especially for skilled labor, thereby reducing unemployment.

Export Potential: With improved design, quality, and standardization, Nigerian furniture, including culturally inspired dining sets, could find niches in regional and international markets.

The Nigerian furniture industry, while robust in its traditional roots and facing considerable hurdles, possesses a latent capacity for transformation. Addressing the deficiencies in design standardization, material sourcing, skilled labor, and manufacturing processes is critical to unlocking its full potential, enabling it to effectively cater to the growing demand for functional, high-quality household furniture, particularly contemporary dining sets, and to compete more effectively against imported products.

2.3 Principles of Furniture Design (with focus on Dining Sets)

This section will delve into the established principles that guide the creation of effective and appealing furniture, with a specific emphasis on their application to dining sets. Good furniture design is an intricate balance of meeting user needs, ensuring structural integrity, and achieving aesthetic harmony.

2.3.1 Functional Considerations

Functional design is paramount for any piece of furniture, dictating its usability, dur-

ability, and safety. For dining sets, these considerations are critical given their daily use and the need to accommodate multiple users.

Usability: Furniture must be easy to use for its intended purpose. For dining tables, this involves adequate surface area for plates, cutlery, and serving dishes, ensuring comfortable reach for all diners. Chairs must allow for easy ingress and egress, and their design should not impede natural movement during a meal.

Durability: Dining sets are subjected to frequent use, spills, and varying loads. Therefore, materials and construction techniques must ensure long-term resilience against wear, tear, and structural fatigue. The joints, particularly in chairs and table legs, are crucial points where durability is tested (Cross, 2000). A robust design anticipates these stresses.

Stability: A dining table and chairs must remain stable under various conditions of use, preventing wobbling, tipping, or collapse. This is particularly important for safety, especially in households with children. Stability is achieved through proper base design, weight distribution, and rigid joinery (Ching, 2014).

Safety: Beyond stability, safety in furniture design encompasses the absence of sharp edges, splinters, toxic finishes, and pinch points. For dining sets, this includes ensuring chair backs do not pose a falling hazard and that glass table tops (if used) are tempered for safety. All materials and components should comply with relevant safety standards.

Maintainability: Furniture should be designed for ease of cleaning and maintenance.

e. Surfaces of dining tables, for instance, should be resistant to stains, heat, and scratches, or easily repairable. Upholstery on chairs should be durable and simple to clean.

2.3.2 Ergonomic Considerations

Ergonomics in furniture design focuses on optimizing the human-furniture interface to enhance comfort, health, and efficiency. It involves studying human body dimensions (anthropometry), movements, and capabilities to create designs that are suitable for a wide range of users (Pheasant & Haslegrave, 2016). For dining sets, good ergonomics significantly impacts the user's experience during meals, reducing discomfort and promoting good posture.

Anthropometric Data: Designers utilize anthropometric data, which are measurements of the human body, to determine appropriate dimensions for furniture. Key dimensions for dining chairs include seat height, seat depth, seat width, backrest height and angle, and armrest height. For dining tables, crucial dimensions include table height, legroom clearance, and adequate surface area per person. It is important to consider the anthropometry of the target user population (e.g., average Nigerian adult dimensions) to ensure local relevance and comfort.

Posture and Support: An ergonomically designed dining chair should support the natural curves of the spine, particularly the lumbar region, to promote healthy posture during sitting. The seat should allow the user's feet to rest flat on the floor or on a footrest, with thighs parallel to the floor, avoiding pressure points under the thighs.

Comfort and Movement: While structural integrity is essential, a dining chair should