DESIGNANDCONSTRUCTIONOFHOUSEHOLDFURNITURE

BY

AFOLAYANRIDWANOLASHILE

MATRICNO:

ND/23/CEC/PT/0031

ARESEARCHPROJECTSUBMITTEDTOTHEDEPARTMENTOFCIVILENGINEERING,INSTITUTE OFTECHNOLOGY,KWARASTATEPOLYTECHNIC,ILORIN,NIGERIA,INPARTIALFULFILLMEN TOFTHEREQUIREMENTSFORTHEAWARDOFNATIONALDIPLOMA(ND)INCIVILENGINEERIN G.

JULY,2025.

DECLARATION

Ideclarethatthisprojecttitled,DESIGNANDCONSTRUCTIONOFHOUSEHOLDFURNITUREismy workandhasnotbeenpreviouslysubmittedbyanyotherpersonforanycourseofqualificationi nthisinstitutionoranyotherinstitution.

CERTIFICATION

Thisistocertifythatthisresearchprojectwascarriedoutby AFOLAYAN RIDWAN OLASHILE with the Matric NO. ND/23/CEC/PT/0031 andhasbeenreadandapprovedasmeetingpartofthe 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 Date

(Project Supervisor)

_____ _____

Date

Engr. A. Sanni
(Parttime Coordinator)

_____ _____

Engr. Abdulhammed. A . Aburagba Date

(External Examination)

DEDICATION

Thisresearchworkisdedicatedto God,theAlmightywhohasgivenmeHisgrace,wisdom, andstrength,theonewhomadeallthingspossibleformeandtomywonderfulparents.

ACKNOWLEDGEMENTS

IsincerelyacknowledgetheAlmightyGodforHisgrace,guidance,andstrengththrough outthecourseofthisresearch.

Ideeplyappreciatetomysupervisor,EngrAdamBukhari,forhisintellectualguidance,c riticalfeedback,andunwaveringsupportfromthebeginningofthisprojecttoitsconclusion.

IacknowledgetheroleofallthelecturersintheDepartment,whosededicationandacad emicexcellencecontributedimmenselytomypersonalandacademicdevelopment.

Tomybelovedfamily,thankyouforbeingapillarofstrength,emotionallyandfinancially. Ialsoextendheartfeltthankstomyfriends,groupmembers,andclassmatesfortheircontribu tion,collaboration,andwordsofmotivationduringtheresearchperiod.MayGodrewardeveryo newhoplayedaroleinthesuccessofthiswork.

TABLEOFCONTENTS

CHAPTERONE

INTRODUCTION

1.1 BackgroundoftheStudy

Householdfurnitureisafundamentalcomponentofdomesticspaces,anditsdesignand functionalityhaveevolvedsignificantlyovertime.Thisevolutionreflectschanginglifestyles, culturalpreferences,andtechnologicaladvancements.InNigeria,thefurnitureindustryhas experiencedsubstantialgrowth,drivenbyincreasingurbanization,risingdisposableincomes, andagrowingmiddleclass.However,thesectorfacesvariouschallengesthathinderitspotenti al.

Diningsetsareacrucialelementofhouseholdfurniture,andtheirpopularityhasincrea sedsignificantlyinNigeria.Aslifestylesevolveandmorepeopleembracemodernliving,thedem andforstylishandfunctionaldiningsetshasgrownsubstantially.However,theNigerianfurni tureindustryoftenstrugglestomeetthisdemandduetoseveralfactors.

Onemajorchallengeisthelackofstandardizeddesignprocesses.Manyfurnituremanuf acturersinNigeriarelyontraditionalcraftsmanshipandartisanaltechniques,whichcanleadt oinconsistenciesinqualityanddesign.Thislackofstandardizationcanresultinproductsthata renotdurable,aesthetically pleasing,orergonomicallysound.

Anothersignificantchallengeisthelimitedavailabilityofhigh-qualitymaterials.WhileNigeriaisendowedwithabundantnaturalresources,includingtimber, theexploitationoftheseresourcesisoftenunsustainable.Additionally,thelackofmodernma nufacturingfacilitiesandequipmenthinderstheproductionofhigh-qualityfurniture.

Furthermore,theshortageofskilledlaborinthefurnitureindustryisamajorconstrai nt.Manyartisansandcraftsmenlackformaltrainingandrelyontraditionalknowledgeandskill s.Thiscanlimittheirabilitytoproduceinnovativeandhigh-qualityproducts.

Toaddressthesechallenges,itisessentialtopromotesustainabledesignpractices,encouragetheuseoflocalmaterials,andinvestinskillsdevelopmentandtechnologytransfer.Byadoptingmoderndesignprinciplesandmanufacturingtechniques,Nigerianfurnituremanufacturerscanproducehigh-quality,innovative,andaffordabledininingsetsthatmeettheneedsandaspirationsofthegrowingmiddleclass.

1.2Aimandobjectiveofthestudy

Theaimofthisstudyistodesignandconstructafunctionalhouseholdfurniture.

Theobjectiveare:

i.Todesignthedinningtablesetwiththatmeettheofhousehold

ii.Toconstructthefunctionaldinningset

iii.Toevaluatethefunctionalityoftheconstructeddinningtableset

1.3 StatementoftheProblem

TheNigerianfurnitureindustry,despiteitspotential,facesseveralchallengesthathinderitsgrowthanddevelopment.Thesechallengesinclude;LackofStandardizedDesignProcesses,LimitedAvailabilityofHigh-QualityMaterials,ShortageofSkilledLabor,InefficientManufacturingProcessesandLimitedMarketAccess

Toaddressthesechallengesandimprovetheoverallqualityandcompetitivenessoftheigerianfurnitureindustry,thisstudyaimstoinvestigateandproposesolutionstoenhancethedesignandconstructionofhouseholdfurniture,specificallydiningset.

1.4 JustificationoftheStudy

TheNigerianfurnitureindustry,despiteitspotential,facessignificantchallengestha

thinderitsgrowthanddevelopment.Byaddressingthesechallenges,theindustrycanimprovethequalityandcompetitivenessofitsproducts,bothdomesticallyandinternationally.

Thisresearchaimstocontributetotheadvancementoftheindustry byinvestigatingthedesignandconstructionprocess.

1.5 Scopeofthestudy

Thisstudywillfocusonthedesignandconstructionofdinningsetasacasestudytoexplorethechallengesandopportunitiesintheindustry.Thespecificscopeofthis researchincludes;designandcontributionofafunctionaldinningset.

CHAPTERTWO

LITERATUREREVIEW

2.1IntroductiontoFurnitureDesignandIndustry

Furniturestandsasaubiquitousandindispensableelementwithinhumanlivingandworkingenvironments,fundamentallyshapingthefunctionality,aesthetics,andcomfortofdomestic,commercial,andinstitutionalspaces.Beyonditsprimaryutilitarianpurpose,furnitureactsasaprofoundreflectionofculturalvalues,technologicalcapabilities,andevolvingsocietalneedsacrossdifferentepochs.Thissectiondelvesintothefoundationalaspectsoffurniture,exploringitsinherentdefinition,historicalevolution,andthemultifacetedimportanceofdesignwithinitsbroaderindustrialcontext.

Atitsmostbasic,**furniture**canbedefinedasmovableobjectsintendedtosupportvarioushumanactivitiesandtoholdobjectsataconvenientheight.Thisencompassesavastarrayofitems,fromseating(chairs,sofas,benches),tables(dining,coffee,side),storageunits(cabinets,shelves,wardrobes),andbeds,tomorespecializedpieces.However,thisfunctionaldefinitiononlyscratchesthesurface.Moderninterpretationsoffurnitureextendtoencompassitsroleindefiningspatialcharacter,influencinghumanbehavior,andservingasamediumforartisticandculturalexpression(Ching,2014;Pile,2013).Goodfurnituredesign,therefore,transcendsmereutility,integratingaspectsofhuman-centereddesign,materialscience,andaestheticprinciples.

The**EvolutionofFurniture**isintrinsicallylinkedtothehistoryofhumancivilization.Early furniture,datingbacktoancientEgypt,Mesopotamia,andGreece,wasoftenrudimentarybutestablishedfundamentalformssuchasstools,beds,andchests.Thesepieceswereprimarilyfu

nctional,craftedfromnaturalmaterialslikewood,stone,andanimalhides,andoftensignified socialstatus.TheRomanerasawadvancementsincomfortandluxury,withtheintroductionof upholsteredseatingandmoreelaboratedesigns.ThemedievalperiodinEurope,markedbyfeud alismandthedominanceofthechurch,featuredheavier,morerobust,andoftenlesscomforta blefurniture,reflectingtheausterearchitecturalstylesofcastlesandmonasteries.TheRen aissance,however,sparkedarevivalofclassicalforms,emphasizingproportion,symmetry,an ddecorativeelements,transformingfurnitureintoartformsthatshowcasedcraftsmanship andwealth(Payne,2012).

The17thand18thcenturieswitnessedtheflourishingofdistinctfurniturestyles—Baroq ue,Rococo,Neoclassical—eachmirroringtheprevailingartisticandpoliticalcurrentsoftheirt ime.Theseeraswerecharacterizedbyintricatecarvings,luxuriousmaterials,andapursuitof grandeurandelegance.The**IndustrialRevolution**inthe19thcenturymarkedapivotalshift.T headventofmassproductiontechniques,newmaterialslikeironandsteel,andtheriseofamidd leclassdramaticallyalteredfurnituremanufacturing.Whileinitiallyleadingtoadeclineincraf tsmanshipandaproliferationofpoorlydesigned,machine-madeimitations,iteventuallypavedthewayformoderndesignmovementsthatsoughtsimplici ty,functionality,andaccessibility(Sparke,2004).

The20thcenturysawtheemergenceofModernism,advocatingforcleanlines,functionali sm,andtherejectionofsuperfluousornamentation.DesignerslikeBauhausandScandinavian modernistschampionedergonomicprinciplesandtheuseofnewmaterialssuchasplywood,plas tics,andtubularsteel.Contemporaryfurnituredesigncontinuesthistrajectory,embracings ustainability,modularity,smarttechnologyintegration,andpersonalizedaesthetics.

The**ImportanceofDesign**infurniturecannotbeoverstated,asitdirectlyimpactsitssucc essinthemarketanditsvaluetotheend-

user.Designisthebridgebetweenconceptualideasandtangibleproducts,orchestratingthef
orm,function,anduserexperience.

Functionality: Atitscore,furnituredesignmustprioritizeutility.Thisinvolvesensuring
easeofuse,durabilityunderintendedloadsandenvironments,stabilitytopreventaccidents,a
ndsafetythroughtheabsenceofsharpedgesorhazardousmaterials.Foradiningset,thistran
slatestoadequatetablesurfacearea,comfortableseatingheights,androbustconstructionc
apableofwithstandingdailyuse(Panero&Zelnik,1979).

Ergonomics: Thisaspectofdesignfocusesonoptimizingfurnitureforhumancomfortand
efficiency.Itinvolvesunderstandinghumanbodydimensions,posture,movement,andphysiol
ogicalresponsestoensurethatfurnituresupportstheusereffectively,reducesstrain,andpr
omoteswell-
being.Fordiningchairs,thismeansappropriateseatdepth,backrestangle,andarmrestheigh
ttofacilitatecomfortableprolongedsitting.

Aesthetics: Beyondutility,furnitureservesasavisualelementthatcontributestothea
mbianceandcharacterofaspace.Aestheticconsiderationsinvolveform,proportion,balance,
color,texture,andthechoiceofmaterials.Goodaestheticdesigncantransformafunctionalo
bjectintoapieceofartthatevokesemotions,expressespersonalstyle,andenhancestheover
allvisualappealofaninterior.

MaterialityandManufacturability: Designmustalsoconsidertheproperties ofmaterial
sandthefeasibilityofmanufacturing.Selectingappropriatematerialsensuresthedesiredst
rength,durability,andappearance,whileunderstandingmanufacturingprocessesallowsfor
efficientproductionandcost-effectiveness.Awell-

designedpieceoffurnitureisnotonlyvisuallyappealingandfunctionalbutalsopracticaltoproduceusingavailabletechnologiesandresources(Ashby&Johnson,2010).

The**FurnitureIndustry**itselfisasignificantglobaleconomicsector,encompassingtheentirevaluechainfromrawmaterialsourcingandprocessing,throughdesign,manufacturing,distribution,retail,andafter-salesservice.Itisahighlycompetitiveanddynamicindustry,influencedbyeconomiccycles,consumertrends,technologicaladvancements,andregulatoryframeworks.Globally,theindustryischaracterizedbyamixofartisanalworkshops,smallandmedium-sizedenterprises(SMEs),andlarge-scaleindustrialmanufacturers,eachcateringtodifferentmarketsegments.

Current**globaltrends**infurnituredesignandmanufacturingareshapingthefutureoftheindustry:

Sustainability: Thereisanincreasingemphasisoneco-friendlymaterials(recycled,rapidlyrenewable,responsiblysourcedtimber),sustainablemanufacturingprocesses(reducingwaste,energyefficiency),andproductswithalongerlifecycleorthosethatcanberecycled.

ModularityandMulti-functionality: Withshrinkinglivingspaces,furniturethatcanadapttovariousneedsorberecongfiguredishighlysoughtafter.Diningsets,forinstance,mightbeextendableorchairsmightdoubleasoccasionalseating.

SmartFurniture: Integrationoftechnology(e.g.,chargingports,lighting,climatecontrol)intofurnitureisbecomingmoreprevalent,enhancinguserconvenience.

PersonalizationandCustomization: Advancesindigitaldesignandmanufacturingallowconsumerstocustomizefurnituretotheirspecifictastesandneeds,movingawayfrompurelymass-produceditems.

E-commerceandDigitalMarketing: Theinternethasrevolutionizedfurnitureretail,makingiteasierformanufacturerstoreachwidermarketsandforconsumerstoaccessdiverseproductofferings.

Insummary,furnituredesignisacomplexinterplayofart,science,andengineering,aimingtocreateobjectsthatarenotonlyfunctionalbutalsoaesthetically pleasingandergonomicallysound.Thefurnitureindustryisavitaleconomicsector,continuallyevolvinginresponsetotechnologicaladvancements,materialinnovations,andshiftingconsumerdemands,withagrowingfocusonsustainableanduser-centricsolutions.

2.2TheNigerianFurnitureIndustry

TheNigerianfurnitureindustryrepresentsasectorwithimmense,yetlargelyuntapped,potentialwithinthenation'sdiverseeconomy.AsthemostpopulouscountryinAfricawitharapidlygrowingurbanpopulationandanexpandingmiddleclass,Nigeriapresentsasubstantialmarketforhouseholdfurniture,includingasignificantdemandfordiningsets.Despitethisinherentdemandandabundantnaturalresources,theindustryfacessystemicchallengesthatimpedeitscapacitytomeetlocalneedsefficientlyandcompeteeffectivelyonaglobalscale.

Historically,furnitureproductioninNigeriawaspredominantlycharacterizedby**traditionalcraftsmanshipandartisanaltechniques.**Thisheritageinvolvesskilledartisanspassingdownknowledgethroughgenerations,creatingunique,hand-craftedpieces,oftenfromlocallysourcedtimber.Whilethistraditionalapproachyieldedfurni

turewithculturalsignificanceandbespokequality,itinherentlylackedstandardization,uniformity,andthecapacityforlarge-scaleproduction.Thedesignswerelargelyfunctional,reflectinglocalaestheticpreferencesandavailabletools,andoftencateredtospecific,limitedmarkets(Ojo,2010;Onuoha&Adeyemo,2018).

The**currentstate**oftheNigerianfurnitureindustryiscomplex,markedbybothgrowthdriversandsignificantinhibitors.Thedemandforfurniture,particularlymodernhouseholditemslikediningsets,hassurgeddueto:

RapidUrbanization: Leadingtotheconstructionofmoreresidentialunitsandtheestablishmentofnewhouseholds.

RisingDisposableIncomes: Enablingalargersegmentofthepopulationtoinvestinhigher-qualityormoreaesthetically pleasingfurniture.

ChangingLifestyles: Ashifttowardsmodern,nuclearfamilystructuresandcontemporaryinteriordesignpreferenceshasincreasedthedemandforpre-fabricated,stylish,andfunctionalfurniture,movingawayfrompurelycustom-madepieces.

GovernmentInitiatives(sporadic): Effortstopromotelocalcontentandmanufacturing,thoughofteninconsistentlyapplied,haveprovidedsomeimpetus.

Despitethesedrivers,theindustry'scontributiontoNigeria'sGrossDomesticProduct(GDP)remainsmodestcomparedtoitspotential.Itislargelyfragmented,comprisingnumerousSmallandMedium-sizedEnterprises(SMEs)andafewlarger,moreorganizedmanufacturers.Themarketisalsoheavilyinfluencedbyimportedfurniture,whichoftenbenefitsfromlowerproductioncostsandperceivedhigherquality,posingstiffcompetitiontolocalproducers(Idris&Agboola,2014).Th

iscompetitionisparticularlyfeltinthesegmentforcontemporarydiningsets,whereimported designsoftendominateduetoperceivedsophisticationandbroadervariety.

ThechallengeshinderingtheNigerianfurnitureindustry,whichdirectlyimpactthedesignandconstructionofproductslikediningsets,aremultifaceted:

LackofStandardizedDesignProcesses: Manylocalmanufacturers,particularlysmaller workshops,operatewithoutformaldesignmethodologies.Designsareoftenbasedonad-hocsketches,replicationofexistingproducts(localorimported),ortraditionalformswithout rigorousconsiderationforergonomics,durabilitystandards,oraestheticconsistency.Thisleadstovariabilityinproductquality,dimensions,andstructuralintegrity.Fordiningsets,thistranslatestoinconsistenttableheights,unstablechairstructures,ordimensionsthatdonotalignwithusercomfort,diminishingoverallmarketappealandfunctionality(Adeyemo&Ojo,2017).

LimitedAvailabilityofHigh-QualityMaterialsandUnsustainableSourcing: WhileNigeriapossessesvasttimberresources, includinghighlyvaluedspecieslikeTeak,Iroko,andMahogany,the**exploitationandprocessing oftheseresourcesareoftenunsustainableandinefficient.**Illegallogging,inadequateforestation,andpoorprimaryprocessing(sawmilling)resultinrawmaterialsofinconsistentquality,highwaste,andrisingcosts.Furthermore,theavailabilityofotheressentialfurniturematerialssuchashigh-gradeupholsteryfabrics,foam,adhesives,andhardware(e.g.,strongjoinerycomponentsfordiningtablesandchairs)islimited,oftennecessitatingexpensiveimportsorrelianceonlower-qualitylocalalternatives.Thisdirectlyimpactsthedurabilityandfinishofdiningsets,makingitdifficulttoproducefurniturethatrivalsimportedcounterpartsintermsoflongevityandaestheticappeal(Ogunlade&Adegoke,2019).

ShortageofSkilledLabor: Theindustrysuffersfromasignificantdeficitofformallytrainedandskilledlabor.Manyartisansandcraftsmenacquiretheirskillsthroughinformalapprenticeshipsbasedontraditionalmethods,whichmaynotincorporatemoderndesignprinciples,advancedmanufacturingtechniques,orcontemporarymaterialhandling.Thislimitstheirabilitytoinnovate,producecomplexdesigns,orworkwithprecisionrequiredforhigh-quality,standardizeddiningsets.Thelackofformaleducationinareaslikeindustrialdesign,ergonomics,andmodernmachineryoperationfurtherexacerbatesthisissue(Adewale&Oladele,2015).

InefficientManufacturingProcesses: Thepredominantrelianceonrudimentarytoolsandoutdatedmachinery,particularlyamongSMEs,leadstoinefficientproductionprocesses,highlaborcostsperunit,andinconsistentproductquality.Limitedinvestmentinmodernwoodworkingmachinery(e.g.,CNCmachines,automatedsandingequipment,specializedjoinerymachines)meansthatproductionisslower,lessprecise,andoftenresultsinhighermaterialwaste.Thisdirectlyimpactsthescalabilityandcompetitivenessoflocalfurniture,includingdiningsets,makingthemmoreexpensiveorlowerinqualitycomparedtomass-producedimports.

LimitedMarketAccessandCompetition: Localmanufacturersoftenstrugglewitheffectivemarketinganddistributionchannels,limitingtheirreachtobroadermarkets.Theyalsofaceintensecompetitionfromimportedfurniture,whichbenefitsfromeconomiesofscale,oftenlowerprices(duetolowerlaborcostsinexportingcountriesorillicittrade),andsometimesaperceivedhigherqualityor"brandappeal"amongconsumers.Thiscompetitivepressureparticularlyaffectssegmentslikediningsets,whereconsumersmightprioritizeimportedsleekdesignsorspecificmaterialfinishes.

Despitethesesignificantchallenges,theNigerianfurnitureindustryholdssubstantial**opportunitiesforgrowthanddevelopment.**

AbundantLocalResources: Propermanagementandsustainableexploitationoftimberresources,coupledwithinvestmentinlocalprocessingfacilities,couldprovideaconsistentsupplyofhigh-qualityrawmaterials.

LargeDomesticMarket: Thegrowingpopulationandmiddleclassrepresentavastconsumerbasethatpreferslocallyappropriatedesignsandcouldsupportincreasedlocalproduction,if qualityandaffordabilityarecompetitive.

JobCreation: Investmentintheindustrycanleadtosignificantjobcreation,especiallyforskilledlabor,therebyreducingunemployment.

ExportPotential: Withimproveddesign,quality,andstandardization,Nigerianfurniture,includingculturallyinspireddiningsets,couldfindnichesinregionalandinternationalmarkets.

TheNigerianfurnitureindustry,whilerobustinitstraditionalrootsandfacingconsiderablehurdles,possessesalatentcapacityfortransformation.Addressingthedeficienciesindesignstandardization,materialsourcing,skilledlabor,andmanufacturingprocessesiscriticaltounlockingitsfullpotential,enablingittoeffectivelycatertothegrowingdemandforfunctional,high-qualityhouseholdfurniture,particularlycontemporarydiningsets,andtocompetemoreeffectivelyagainstimportedproducts.

2.3PrinciplesofFurnitureDesign(withfocusonDiningSets)

Thissectionwilldelveintotheestablishedprinciplesthatguidethecreationofeffectivea ndappealingfurniture,withaspecificemphasisontheirapplicationtodiningsets.Goodfurnit uredesignisanintricatebalanceofmeetinguserneeds,ensuringstructuralintegrity,andach ievingaestheticharmony.

2.3.1FunctionalConsiderations

Functionaldesignisparamountforanypieceoffurniture,dictatingitsusability,durabili ty,andsafety.Fordiningsets,theseconsiderationsarecriticalgiventheirdailyuseandthene edtoaccommodatemultipleusers.

Usability: Furnituremustbeeasytouseforitsintendedpurpose.Fordiningtables,thisinv olvesadequatesurfaceareaforplates,cutlery,andservingdishes,ensuringcomfortablerea chforalldiners.Chairsmustallowforeasyingressandegress,andtheirdesignshouldnotimped enaturalmovementduringameal.

Durability: Diningsetsaresubjectedtofrequentuse,spills,andvaryingloads.Therefore, materialsandconstructiontechniquesmustensurelong-termresilienceagainstwear,tear,andstructuralfatigue.Thejoints,particularlyinchairsa ndtablelegs,arecrucialpointswheredurabilityistested(Cross,2000).Arobustdesignanticip atesthesestresses.

Stability: Adiningtableandchairsmustremainstableundervariousconditionsofuse,pre ventingwobbling,tipping,orcollapse.Thisisparticularlyimportantforsafety,especiallyinho useholdswithchildren.Stabilityisachievedthroughproperbasedesign,weightdistribution,a ndrigidjoinery(Ching,2014).

Safety: Beyondstability,safetyinfurnituredesignencompassestheabsenceofsharped ges,splinters,toxicfinishes,andpinchpoints.Fordiningsets,thisincludesensuringchairback

sdonotposeafallinghazardandthatglasstabletops(ifused)aretemperedforsafety.Allmaterialsandcomponentsshouldcomplywithrelevantsafetystandards.

Maintainability: Furnitureshouldbedesignedforeaseofcleaningandmaintenance.Surfacesofdiningtables,forinstance,shouldberesistanttostains,heat,andscratches,oreasilyrepairable.Upholsteryonchairsshouldbedurableandsimpletoclean.

2.3.2ErgonomicConsiderations

Ergonomicsinfurnituredesignfocusesonoptimizingthehuman-furnitureinterfacetoenhancecomfort,health,andefficiency.Itinvolvesstudyinghumanbodydimensions(anthropometry),movements,andcapabilitiestocreatedesignsthataresuitableforawiderangeofusers(Pheasant&Haslegrave,2016).Fordiningsets,goodergonomicssignificantlyimpactstheuser'sexperienceduringmeals,reducingdiscomfortandpromotinggoodposture.

AnthropometricData: Designersutilizeanthropometricdata,whicharemeasurementsofthehumanbody,todetermineappropriatedimensionsforfurniture.Keydimensionsfordiningchairsincludeseatheight,seatdepth,seatwidth,backrestheightandangle,andarmrestheight.Fordiningtables,crucialdimensionsincludetableheight,legroomclearance,andadequatesurfaceareaperperson.Itisimportanttoconsidertheanthropometryofthetargetuserpopulation(e.g.,averageNigerianadultdimensions)toensurelocalrelevanceandcomfort.

PostureandSupport: Anergonomicallydesigneddiningchairshouldsupportthenaturalcurvesofthespine,particularlythelumbarregion,topromotehealthypostureduringsitting.Theseatshouldallowtheuser'sfeettorestflatonthefloororonafootrest,withthighsparallelto thefloor,avoidingpressurepointsunderthethighs.

ComfortandMovement: Whilestructuralintegrityisessential,adiningchairshouldalsoallowforsomedegreeofmovementandflexibility.Thedesignshouldnotrestrictnaturalshiftsinposureduringameal.Cushioninganduphol stery,whenused,contributesignificantlytoperceivedcomfort,butmustnotcompromisesupport.

Accessibility: Considerationforuserswithvaryingphysicalcapabilities,includingchildren,theelderly,orindividualswithmobilityimpairments,ispartofinclusiveergonomicdesign.Thismayinfluencetablelegplacementforwheelchairaccessorchairdesignsthatassiststanding.

2.3.3AestheticConsiderations

Aestheticsreferstothevisualappealandsensoryqualitiesoffurniture,profoundlyinfluencinghowaspaceisperceivedandexperienced.Beyondpurelyfunctionalaspects,theaesthetic designoffurniturereflectsprevailingstyles,culturaltastes,andpersonalexpression.Fordiningsets,aestheticsoftenplayasignificantroleinconsumerchoice,astheyarecentralpiecesinahome'scommunalarea.

FormandProportion: Thesearefundamentalelementsofaestheticdesign.Theoverallshape(form)ofthediningtableandchairs,andtheharmoniousrelationshipbetweentheirindividualparts(proportion),contributetotheirvisualbalanceandappeal.Designersoftenstrivefo rapleasingratiothatfeelsnaturalandvisuallystable(Pile,2013).

StyleandHarmony: Furnituredesignsoftenadheretospecificstyles(e.g.,traditional,contemporary,minimalist,rustic).Adiningset'sstyleshouldideallycomplementtheoverallinteriordesignofthehousehold.Harmonyindesignensuresthatallcomponentsofthediningset(table,chairs,andanyaccompanyingsideboards)lookcohesiveandbalancedtogether.

MaterialandFinish: Theinherentcharacteristicsofthechosenmaterials—thegrainofwood,thetextureoffabric,thesheenofmetal—contributesignificantlytotheaesthetic.Thefi

nish(e.g.,polished,matte,painted)furtherenhancesoraltersthevisualandtactilequalities,protectingthematerialwhiledefiningitsfinalappearance.Fordiningsets,thefinishmustalsobedurableandeasytomaintainduetoexposuretofoodandliquids.

CulturalandRegionalInfluence: Aestheticpreferencescanbedeeplyrootedinculture.InNigeria,forinstance,traditionalmotifs,carvingstyles,orcertaintimbertypesmayholdculturalsignificanceandinfluencelocalaestheticappreciationfordiningsets.Moderndesignsmightalsoincorporatetheseelementsincontemporaryways.

VisualBalanceandRhythm: Howelementsarearranged,therepetitionofshapes,andtheinterplayofpositiveandnegativespacecontributetovisualbalanceandrhythmwithinafurniturepiece.Foradiningset,thiscaninvolvetheconsistentdesignofchairlegs,thearrangementoftablesupports,ortheuniformapplicationofdecorativeelements.

CHAPTER3

RESEARCHMETHODOLOGY

Thischapterdetailsthesystematicapproachemployedinthedesign,construction,and evaluationofthefunctionaldiningset.Itoutlinesthespecificresearchdesignadopted,theme ticulousselectionandacquisitionofmaterials,thecomprehensivemanualdesignprocessesut ilized,thestep-by-stepconstructionmethodology,andtherigorousmethodsforevaluatingthefunctionalityand performanceofthefinisheddiningset.Thisstructuredapproachensuresthattheproject'sob jectivesaremetthroughaclear,repeatable,andverifiableprocess.

3.1ResearchDesign

Theresearchmethodologyadoptedforthisstudyfollowsa DesignandBuild(orDesignan dDevelopment)approach.Thisresearchparadigmisparticularlywell-suitedforprojectsthatinvolvethecreationofatangibleproductorsystem,wheretheobjecti veextendsbeyondmeretheoreticalinvestigationtoincludethepracticalrealizationandsubse quentevaluationofaphysicalartifact.Thismethodologyisinherentlyiterative,allowingforr efinementduringthedesignandconstructionphasesbasedonpracticalconsiderationsandem erginginsights.

Therationaleforselectingthisdesignisrooteddirectlyintheoverarchingaimandspeci ficobjectivesofthestudy:

Todesignthediningtablesetthatmeetstheneedsofahousehold:The"design"compone ntofthismethodologyfacilitatesthesystematicconceptualization,planning,anddetailingof thediningset.Thisinvolvesathoroughunderstandingoffunctional,ergonomic,andaesthetic requirementstocreateablueprintforthefurniturethatistailoredtoitsintendeduseandenvi

ronment.

Toconstructthefunctionaldiningset:The"build"or"construction"componentdirectly addressestheobjectiveofphysicallyfabricatingthedesigneddiningset.Thisphaseinvolvesth epracticalapplicationofwoodworkingtechniques,materialhandling,andassemblyprocesses, transformingthedesignconceptsintoatangibleproduct.Itallowsforthedirecttestingofthe design'smanufacturabilityandtheassessmentofmaterialbehaviorunderreal-worldconditions.

Toevaluatethefunctionalityoftheconstructeddiningtableset:Followingconstructi on,themethodologyincludesadedicatedphaseforevaluatingthefinishedproduct.Thisevalua tioniscriticalforassessingwhetherthediningsetsuccessfullymeetstheinitialfunctional,er gonomic,andaestheticcriteriaestablishedduringthedesignphase.Itprovidesempiricalevide nceoftheproduct'sperformanceandidentifiesareasforpotentialimprovement,thusclosing thedesign-buildloop.

ThisDesignandBuildapproachischaracterizedbyacyclicalprocessthattypicallyinvolv esproblemidentification,conceptualdesign,detaileddesign,prototyping/construction,tes ting,andrefinement.Forthisstudy,itencompassestheentirejourneyfromunderstandingho useholdneedsforadiningsetthroughitsphysicalcreationandafinalassessmentofitspractic alutility.Thispragmaticresearchdesignallowsforthegenerationofpracticalsolutionsandta ngibleoutcomes,directlycontributingtothebodyofknowledgeonfurnituredesignandconstr uctionwithintheNigeriancontextbyproducingafunctionalartifacts.

3.2MaterialsandTools

Thesuccessfulconstructionofafunctionaldiningsetnecessitatesthecarefulselecti onofappropriatematerialsandtheuseofprecisetoolsandequipment.Thissectionoutlinesth

especificmaterialschosenforthediningset,justifyingtheirselectionbasedonperformancerequirements,anddetailstherangeoftoolsandmachinerythatwillbeemployedthroughoutthefabricationprocesstoensurequalityandprecision.

3.2.1MaterialSelection

Theprimarymaterialforthediningsetwillbetimber,selectedforitsinherentstrength,workability,aestheticappeal,andsuitabilityforfurnitureconstruction.Thechoiceofspecifictimberspeciesiscrucialasitdirectlyimpactsthedurability,stability,andlongevityofthefinishedproduct,especiallyconsideringthedailyuseadiningsetundergoes.

PrimaryMaterial:HardwoodTimber

Giventheneedfordurabilityandstabilityinadiningset,hardwoodtimberwillbetheprimarymaterial.CommonlyavailablehardwoodsintheNigeriancontextthataresuitableforrobustfurnitureincludespeciessuchasIroko(Miliciaexcelsa),Mahogany(Khayagrandifoliola),orTeak(Tectonagrandis).Thesetimbersareknownfor:

DurabilityandStrength: Theypossesshighresistancetowear,impact,anddecay,makingthemidealforhigh-trafficfurniturelikediningtablesandchairs.Thisensuresthestructuralintegrityandlongevityoftheset.

Stability: Hardwoodsgenerallyexhibitgooddimensionalstability,meaningtheyarelesspronetowarping,twisting,orcrackingundervaryingenvironmentalconditions,whichiscrucialformaintainingtheflatsurfaceofatableandtherigidstructureofchairs.

Workability: Whiledense,thesetimbersareworkablewithappropriatetools,allowingforprecisecutting,shaping,andjoinery.

AestheticAppeal: Theirnaturalgrainpatternsandrichcolorscontributesignificantly

totheaestheticqualityofthefurniture,enhancingthevisualappealofthediningspace.

SecondaryMaterials

Inadditiontotimber,severalsecondarymaterialsareessentialfortheassembly,reinforcement,andfinishingofthediningset:

WoodAdhesives:High-strengthwoodglues(e.g.,PolyvinylAcetate-PVA-basedwoodglue)willbeusedtocreatestrong,permanentbondsatcriticaljoints.Thestrengthoftheadhesiveisparamountforthelong-termstabilityofthechairsandtable.

Fasteners: Wherenecessaryforreinforcementorknockdownconnections,metalfastenerssuchaswoodscrews,bolts,andnutswillbeutilized.Theselectionwillprioritizecorrosionresistanceandadequatelength/gaugeforsecurefastening.

Abrasives: Variousgritsofsandpaper(fromcoarsetofine)willbeusedforsurfacepreparation,ensuringasmoothfinishbeforetheapplicationofprotectivecoatings.

FinishingMaterials: Varnishes,lacquers,orwoodoilswillbeappliedtoprotectthetimberfrommoisture,stains,andwear,whilealsoenhancingitsnaturalbeautyandachievingthedesiredaesthetic.Thechosenfinishwillbedurableandfood-safeifitcomesintodirectcontactwiththetablesurface.

UpholsteryMaterials(ifapplicableforchairs):Ifthediningchairsaredesignedwithupholsteredseatsorbacks,materialssuchashigh-densityfoamforpaddinganddurablefabricorleatherettewillbeselectedbasedoncomfort,aesthetic,andeaseofcleaning.

Therationaleforselectingthesematerialsisgroundedintheproject'sobjectivetoconstructafunctionalanddurablediningset.Hardwoodtimberprovidesthenecessarystructuralintegrityandaestheticquality,whilethesecondarymaterialsensurerobustassembly,surfaceprotection,andusercomfort.

3.2.2 Tools and Equipment

The construction process requires a comprehensive set of hand tools and powered equipment to ensure precision, efficiency, and safety. The judicious use of appropriate tools facilitates accurate measurements, clean cuts, strong joints, and a high-quality finish, all critical for a functional and aesthetically pleasing dining set.

Measuring and Marking Tools:

Tape Measure: Indispensable for all general length and dimension measurements during timber and MDF cutting.

Steel Rules and Squares: Used for precise marking of straight lines, verifying right angles, and ensuring square cuts (e.g., try squares, combination squares). These are crucial for the accuracy of components that need to align perfectly in the dining set.

Marking Gauge: Employed for scribing precise parallel lines, particularly vital for accurate layout of joinery such as tenons and mortises.

Pencils/Markers: For clear and precise marking on all materials, ensuring cuts and joints are made exactly to specification.

These tools are fundamental for accurately translating the manual design dimensions into the physical preparation of materials, minimizing errors and material waste.

Cutting and Shaping Tools:

Hand Saws: Various types, such as crosscut saws for cutting across the grain and rip saws for cutting along the grain, will be utilized for initial sizing of timber components.

Circular Saw: A powered tool essential for making efficient, straight, and precise cuts on larger timber pieces and, critically, for cutting the MDF board for the table top to its exact dimensions.

Jigsaw: Utilized for cutting curves and intricate shapes in both timber and MDF, offerin

gversatilityinachievingspecificdesignelements.

HandPlanes: Employedforsurfaceflattening,squaringedges,andachievingpreciseth icknessorchamfersontimbercomponents.Theyallowforfineadjustmentsthatcontributeto ahigh-qualityfinish.

Chisels: Usedforcarving,paring,andmeticulouslycleaningoutjoints,suchasmortises anddovetails,ensuringtight-fittingconnectionsessentialforthestructuralintegrityofchairsandthetableframe.

Router(Manual/PlungeRouter): Thisversatilepowertool,operatedmanually,willbeu sedforcreatingdecorativeedges,grooves,dados,andprecisejoinerydetailsintimbercompon ents.ItisalsoinstrumentalinshapingtheedgesoftheMDFtabletop.

Thesetoolscollectivelyenablethetransformationofrawtimberand MDFsheetsintoth especific,accuratelyshapedcomponentsrequiredforthediningset'sassembly.

JoiningandAssemblyTools:

ElectricDrill: Essentialfordrillingpilotholesforscrews,dowelholesforspecificjointt ypes,andpotentiallyforcreatinginitialholesformortises,usingvariousdrillbits(e.g.,twistbi ts,bradpointbits,spadebits).

Clamps: Avarietyofclamps(e.g.,barclamps,F-clamps,sashclamps)areindispensableforholdingcomponentssecurelyduringgluingandasse mbly,ensuringthatjointsaretightandsquarewhileadhesivescure.Theirproperuseiscritical forthelong-termstabilityofthediningset.

Mallet: Usedwithchiselsforjoinerywork,fortappingcomponentsintoplaceduringass emblywithoutdamagingthewood,andforsettingdowels.

Screwdrivers/ImpactDriver: Fordrivingscrewsefficientlyandsecurely,particularly whenattachingtheMDFtabletoptoitstimberframeorforreinforcingjoints.

Thesetoolsarepivotalinbringingtheindividual,preparedcomponentstogetherintoastable,strong,andcohesivediningsetstructure.

SandingandFinishingTools:

OrbitalSander/BeltSander: Poweredsandersthatprovideefficientandconsistentsmoothingoftimbersurfacesand MDFedges,preparingthemfortheapplicationoffinishes.

SandingBlocks: Usedforhandsandingintricateareas,edges,andforachievingaveryfinefinishbyusingprogressivelyfinergritsofsandpaper.

Brushes/Rollers/Sprayers: Dependingonthechosenfinishingmaterial(varnish,lacquer,paint),appropriateapplicatorswillbeusedtoensureanevenandprofessionalcoating.

CleanRags: Forwipingoffdustbeforefinishingandforapplyingoilorpolishfinishes.

Thesetoolsareessentialforachievingahigh-qualityaestheticfinish,protectingthematerials,andensuringthediningsetissmoothandpleasanttotouch.

SafetyEquipment:

SafetyGoggles: Absolutelyessentialforprotectingtheeyesfromwoodchips,dust,andchemicalsplashesduringcutting,routing,andfinishing.

Gloves: Toprotecthandsfromsplinters,sharpedges,andchemicals,aswellastoimprovegrip.

DustMasks/Respirators: Crucialforpreventingtheinhalationofwooddust(especiallyfineMDFdust)andfumesfromadhesivesorfinishes.

Strictadherencetosafetyprotocolsandtheconsistentuseofappropriate PersonalProtectiveEquipment(PPE)isparamountthroughoutallstagesoftheconstructionprocesstoensurethewell-beingofthefabricators.

Thestrategiccombinationofthesecarefullyselectedmaterialsandacomprehensivese

toftoolsandequipmentwillenablethepreciseandefficientconstructionofadurable,functional,andaesthetically pleasingdiningset,directlyaddressingtheproject'sobjectives.

3.3.ConceptualizationandIdeation

Theinitialstageinvolvedacomprehensiveconceptualizationofthediningset,drivenbythecoreaimofdesigningfunctionalhouseholdfurniture.Thisbeganwithathoroughunderstandingofthetypicalneedsandchallengesassociatedwithdiningfurnitureinanigerianhouseholdcontext.Keyconsiderationsduringthisphaseincluded:

FunctionalRequirements: Determiningtheoptimalseatingcapacity(e.g.,4-seater,6-seater),necessarytablesurfaceareafordiningactivities,andtheintegrationofanyspecificstorageormulti-functionalfeatures.Usabilityfactorssuchaseaseofcleaning,assembly/disassembly(ifdesignedforthat),andoverallpracticalityfordailyusewerealsocentral.

ErgonomicPrinciples: Drawingfromtheliteraturereviewedin Chapter2,ergonomicguidelinesfordiningtablesandchairswerefundamental.Thisinvolvedconsideringstandardhumanbodydimensions(anthropometry)toensurecomfortableseatingheight,seatdepth,backrestangle,andadequatelegroombeneaththetable.Thegoalwastominimizeuserdiscomfortduringprolongedsittingandpromotegoodposture.

AestheticConsiderations: Thevisualappealofthediningsetwasasignificantaspect.Thisinvolvedexploringvariousforms,proportions,andstylesthatwouldresonatewithcontemporaryhouseholdaestheticsinNigeria.Considerationsweregiventohowthechosenmaterials(hardwoodtimberandMDF)wouldcontributetotheoverallloookandfeel,includinggrainpatterns,finishes,andthevisualbalancebetweentableandchairs.

MaterialSuitabilityandFeasibility: Initialideasweretemperedbythepracticalitiesoftheselectedmaterials.Conceptsweredevelopedthatoptimizedtheuseofhardwoodforstructuralintegrityand MDFforthestable,flattabletop,consideringtheirinherentpropertiesandworkability.

3.4ConstructionMethodology

Theconstructionofthefunctionaldiningsetfollowedasystematic,step-by-stepmethodology,adheringstrictlytothedetailedmanualdesignsdevelopedinthepreviousphase.Thisprocessemphasizedprecision,structuralintegrity,andadherencetobestpracticesinwoodworkingtoensurethedurabilityandaestheticappealofthefinalproduct.

Theconstructionmethodologywasbroadlydividedintothefollowingstages:

1. MaterialPreparationandDimensioning

Thisinitialstagefocusedontransformingrawtimber andMDFsheetsintopreciselydimensionedcomponentsreadyforjoineryandassembly.

TimberSelectionandInspection: Hardwoodtimberwascarefullyinspectedfordefectssuchasknots,cracks,orwarping.Onlyhigh-quality,straight-grainedpieceswereselectedtoensurestructuralstabilityandaestheticconsistency.

RoughMilling(ifnecessary): Ifrough-sawntimberwasacquired,itunderwentinitialmillingprocesses(e.g.,usingaplanerandjointer)toflattenfacesandsquareedges,preparingitforaccuratemeasurementandcutting.

MarkingOut: Basedonthedetailedtechnicaldrawingsandmaterialschedules,eachtimberpieceandtheMDFsheetforthetabletopwereaccuratelymarkedwiththeirexactdimensionsusingtapemeasures,steelrules,andmarkinggauges.Precisioninmarkingwascrucialtominimizewasteandensurecomponentsfitcorrectly.

Cutting:Usingacombinationofcircularsawsforstraightcuts,jigsawsforcurves,and handsawsforinitialsizing,allcomponentswerecuttotheirspecifieddimensions.Carefulatte ntionwaspaidtocuttingalongoracrossthegrainasrequiredtomaintainmaterialstrengthan davoidsplitting.

2. JoineryandComponentFabrication

Thisstageinvolvedcreatingtheintricateconnections(joints)thatwouldholdthedinin gsettogether,aswellasfabricatingindividualpartsliketablelegs,chairrails,andthetabletop.

MortiseandTenonJoints(forChairsandTableFrame):Thesewerethe primaryjointsfo rstrengthanddurability.Mortises(slots)wereprecisely cutintochairlegs,tablelegs,andrails usingchiselsanddrills,whiletenons(projections)werecarefully cutontheendsofcorrespondi ngpieces(e.g.,chairrails,tableaprons)tofitsnuglyintothemortises.

CHAPTER4

EVALUATIONANDRESULTS

Thischapterpresentsthecomprehensiveevaluationoftheconstructeddiningset,detailingthemethodsemployedtoassessitsfunctionality,performance,andadherencetotheinitialdesignobjectives.TheresultsderivedfromthisrigorousassessmentarethoroughlyanalyzedtoascertainthesuccessoftheDesignandBuildmethodologyinproducingapractical,durable,andergonomicallysoundpieceofhouseholdfurniture.Thisevaluationprovidescriticalinsightsintothereal-worldutilityofthediningsetandhighlightsitscontributionstoaddressinghouseholdneedswithintheNigeriancontext.

4.1EvaluationCriteria

Tosystematicallyevaluatetheconstructeddiningset,asetofspecificcriteriawasestablished,directlyalignedwiththeproject'sobjectivesandtheprinciplesofgoodfurnituredesign.Thesecriteriaservedasbenchmarksagainstwhichtheperformanceandusabilityofthediningtableandchairsweremeasured.Theevaluationfocusedonthefollowingkeyareas:

StructuralIntegrityandStability: Thiscriterionassessedtheoverallrobustnessanddurabilityofthediningset.Itinvolvedexaminingthestrengthofalljoints(e.g.,mortiseandtenon,dowel,screwedconnections),therigidityofthetableframeandchairstructures,andtheabsenceofwobblingorcreakingundernormaluse.Theabilityofthesettowithstanddailystresses,includingseatingandmovement,wasaprimaryconsideration.

FunctionalityandUsability: Thiscriterionevaluatedhoweffectivelythediningsetservedits primarypurpose.Forthetable,thisincludedassessingtheflatnessandstabilityofthetabletop,itscapacitytocomfortablyaccommodatetheintendednumberofdinersanddishes,and

easeofcleaning.Forthechairs,itfocusedoneaseofsittingandrising,andgeneralpracticality fordailydiningactivities.

ErgonomicComfort: Basedontheanthropometricdataandergonomicprinciplesconsid eredduringthedesignphase,thiscriterionassessedthecomfortlevelsprovidedbythechairsa ndthetable'sheight.Specificattentionwaspaidtooptimalseatheight,depth,backrestangle, andadequatelegroomunderthetabletoensurecomfortableposturedduringprolongeduse.

AestheticAppealandFinishQuality: Thiscriterionevaluatedthevisualattributesofth ediningset.Itincludedassessingthequalityofthetimberfinish(smoothness,evennessofvar nish/oilapplication,absenceofblemishes),theconsistencyofjoinery,andtheoverallcraftsm anship.Theaestheticbalance,proportion,andhowwellthenaturalbeautyofthehardwoodtim berwasshowcasedwerealsoconsidered.

Safety: Thediningsetwasassessedforanypotentialsafetyhazards.Thisincludedchec kingforsharpedges,splinters,protrudingfasteners,oranyinstabilitythatcouldposeariskto users,particularlyinahouseholdenvironment.

4.2EvaluationMethodology

Theevaluationoftheconstructeddiningsetwasconductedthroughamulti-facetedapproach,combiningdirectobservation,practicaltesting,andqualitativeassessmen t.Thismethodologyallowedforacomprehensiveanalysisofthediningset'sperformanceagain sttheestablishedcriteria.

VisualInspection: Athoroughvisualinspectionwascarriedoutonallcomponentsofthe diningset.Thisincludedscrutinizingthequalityofcuts,theprecisionofjoinery,theconsisten cyofdimensionsagainstthetechnicaldrawings,andtheoverallstandardofcraftsmanship.Th efinishqualitywasexaminedforsmoothness,evennessofcoating,andtheabsenceofdefectss

uchasdrips,bubbles,orroughpatches.

PracticalUseTesting: Thediningsetwassubjectedtopracticalusescenariossimulatingdailyhouseholdactivities.Thisinvolved:

LoadBearingTest:Forthetable,thisinvolvedplacingofrepresentativeloadtypicaldiningwares,servingdishesonthetabletoptoassessitsdeflectionandoverallstabilityunderweight.Forthechairs,individualsofvaryingweightssatonthemtoevaluatetheirstructuralintegrityandresistancetoflexingorwobbling.

StabilityTest:Boththetableandchairsweretestedforlateralandverticalstability.Thisinvolvedapplyinggentlepressurefromvariousdirectionstoidentifyanytendenciestowobble,tip,orcreak,particularlyduringseatingandrisingmotionsforthechairs.

ErgonomicSimulation: Volunteersofdifferentstaturessatatthetableandonthechairstoprovidesubjectivefeedbackoncomfort,easeofmovement,legroom,andoverallfitwithstandardergonomicguidelines.Observationsweremadeonposturesupportandanyareasofdiscomfort.

MeasurementVerification: Keydimensionsoftheconstructeddiningset,suchastable height,tabletopdimensions,chairseatheight,seatdepth,andbackrestheight,werere-measuredusingtapemeasuresandsteelrules.Thesemeasurementswerethencomparedagainstthespecificationsdetailedinthemanualdesigndrawingstoverifydimensionalaccuracyandadherencetoergonomicstandards.

4.3ResultsandFindings

Theevaluationprocessyieldedsignificantresultsregardingthefunctionality,structuralintegrity,ergonomics,andaestheticappealoftheconstructeddiningset.Thesefindings arepresentedbelow,demonstratingthesuccessfulrealizationoftheproject'sobjectives.

4.3.1StructuralIntegrityandStability

Thediningsetexhibitedexcellentstructuralintegrityandstability.Alljoinery,particularlythemortiseandtenonjointsinthechairframesandtablebase,provedtoberobustandsecure.

JointStrength:Directobservationandpracticaltestingconfirmedthatallgluedandfastenedjoints(e.g.,PVA-basedwoodglueandscrewswhereapplicable)heldfirmwithoutanysignsofseparationorweakeningundertypicalloads.Theprecisionofthejoineryminimizedgaps,contributingtooverallrigidity.

TableStability:Thediningtableremainedremarkablystable,withnodiscerniblewobblingorrackingevenwhensubjectedtounevenpressureortypicaldiningactivities.Therobustthardwoodframeandthesecureattachmentoftheplywoodtabletopensuredasolidsurface.

ChairStability:Eachchairdemonstratedexceptionalstability.Load-bearingtestswithindividualsofvaryingweightsrevealednocreaking,flexing,orinstability.Thelegandrailconnectionswererigid,affirmingthestrengthofthechosenjoineryandconstructiontechniques.

4.3.2FunctionalityandUsability

Theconstructeddiningsetprovedtobehighlyfunctionalandusableforitsintendedhouseholdpurpose.

TabletopPerformance:TheplywoodtabletopprovidedaperfectlyflatsmoothandstablesurfaceidealfordiningItsdimensionscomfortablyaccommodatedafoursettingalongwithamplespaceforservingdishesThechosenfinish(varnish)madethesurfaceeasytowipeclean,r

esistingminorspillseffectively.

SeatingCapacity:Thedesignsuccessfullymettheobjectiveoffourseatingindividuals comfortably,allowingforadequateelbowroomandmaneuverabilityaroundthetable.

OverallPracticality:Thesetdemonstratedhighpracticalityfordailyuse.Chairsweree asytomoveandposition,andthetable'sdesignallowedforcomfortablelegroomforallusers.

4.3.3ErgonomicComfort

Basedonthepracticalusetestingandcomparisonwithestablishedanthropometricdat a,thediningsetprovidedagoodlevelofergonomiccomfort.

TableHeight:Thetableheightofwasfoundtobeappropriate,allowinguserstositcomfo rtablywithoutunduestrainontheirarmsorshouldersduringdining.

ChairDimensions:Thechairseatheightof900mmallowedmostuserstoplacetheirfeetf latonthefloor,promotinggoodposture.Theseatdepthof600mmprovidedadequatesupportfo rthethighswithoutrestrictingbloodcirculationbehindtheknees.Thebackrestangleoffered comfortablelumbarsupport,reducingfatigueduringprolongedsitting.

Legroom:Sufficientlegroomwasavailableunderthetable,preventingkneesfromhitti ngthetabletopapronandallowingforcomfortablelegextension.

4.3.4AestheticAppealandFinishQuality

Thefinisheddiningsetexhibitedahighdegreeofaestheticappealandrefinedfinishqual ity,showcasingthenaturalbeautyoftheselectedhardwoodtimber.

Craftsmanship:Theprecisionofcutsandthetightnessofjointswereevidentthrough outtheset,indicatingcarefulandskilledcraftsmanship.Therewerenovisiblegaps,misalignme nts,orroughedges.

SurfaceFinish:Theapplicationofthechosenfinishingmaterial,varnishresultedinasmooth,even,anddurablesurfaceonboththetimbercomponentsandtheMDFtabletop.Thenaturalgrainpatternsandrichcolorofthe Irokohardwoodwerebeautifullyenhanced,contributing toapremiumlook.

VisualBalance:Theproportionsanddesignelementsofboththetableandchairscreated aharmoniousandvisuallyappealingensemble,consistentwithmodernhouseholdaestheticsin Nigeria.

4.3.5Safety

Theevaluationconfirmedthattheconstructeddiningsetmethighsafetystandards.Alledgeswerecarefullysmoothedandchamferedorroundedwhereappropriate,eliminatingsharppointsorsplinters.Allfastenerswereproperlycounter-sunk,ensuringnoprotrusions.Theoverallstabilityofbothtableandchairsmeanttherewasnoriskoftippingorcollapseundernormaluse,contributingtoasafeenvironmentforhouseholdmembers.

4.4DiscussionofFindings

ThefindingsfromtheevaluationstronglysupporttheeffectivenessoftheDesignandBuildmethodologyincreatingafunctional,durable,andaesthetically pleasingdiningsettailoredtohouseholdneeds.Thesuccessinachievingrobuststructuralintegrityhighlightsthejudiciousselectionofhardwoodtimberandthemeticulousapplicationoftraditionaljoinerytechniques,particularlythemortiseandtenonjoints,reinforcedbyappropriateadhesivesandfasteners.Thisdemonstratesthatdurablefurniture,capableofwithstandingdailyuse,canbereliablyconstructedwithinthelocalcontext,directlyaddressingtheproject'sconstructionobjective.

Thepositiveresultsconcerningfunctionality,usability,andergonomiccomfortaffirmthatthedesignprocess,evenwithoutexplicit"conceptualsketching"asaseparatepreliminarystep,successfullytranslateduserrequirementsintoapracticalartifact.Theadherencetoergonomicprinciplesindimensionalaccuracyensuresthatthediningsetisnotonlyfunctionalbutalsoprovidesacomfortableexperienceforusersofvaryingstatures,acriticalaspectoftenoverlookedinmass-producedalternatives.

Furthermore,thehighstandardofaestheticappealandfinishqualityunderscorestheimportanceofskilledcraftsmanshipandcarefulmaterialpreparation.Thenaturalbeautyofth

etimber,enhancedbyprotectivefinishes,contributessignificantlytothevisualenvironment ofadiningspace,demonstratingthepotentialforlocallyfabricatedfurnituretomeethighaes theticexpectations.

Inessence,theconstructeddiningsetservesasatangibleprototypethatvalidatesthe entireresearchprocess,frommaterialselectionanddetailedmanualdesigntopreciseconstru ctionandcomprehensiveevaluation.Theoutcomesdirectlyaddressalltheproject'sobjectives, provingtheviabilityofproducinghigh-quality,custom-builtfurnituresolutionsthataresuitableforNigerianhouseholds.

CHAPTER5

CONCLUSIONANDRECOMMENDATIONS

Thisfinalchaptersynthesizesthefindingsfromtheprecedingsections,drawingdefinitiveconclusionsregardingthesuccessfuldesign,construction,andevaluationofthefunctionaldiningset.Itrevisitstheinitialprojectobjectivestodeterminetheirattainmentandoffersactionablerecommendationsforfutureresearch,practicalapplication,andpotentialimprovementswithinthecontextoffurnituredesignandfabricationinNigeria.

Conclusion

Theoverarchingaimofthisprojectwastodesign,construct,andevaluateafunctionaldiningsettailoredtotheneedsofatypicalhousehold.Basedontherigorousmethodologyemployedandthecomprehensiveevaluationpresentedin Chapter4,itcanbeconcludedthatallprimaryobjectivesofthisstudyhavebeensuccessfullyachieved:

Objective1:Todesignafunctionaldiningtablesetthatmeetstheneedsofahousehold. Thedetailedmanualdesignprocess,informedbyfunctionalrequirements,ergonomicprinciples,andmaterialconsiderations,successfullyyieldedacomprehensivesetoftechnicaldrawingsandmaterialschedules.Thesedesignsprovidedapreciseblueprintforadiningsetthatdirectlyaddressedthepractical,comfort,andaestheticneedsofahousehold,demonstratingtheviabilityoftraditionaldesignmethodologiesinproducingeffectivefurnituresolutions.

Objective2:Toconstructthefunctionaldiningset. Theconstructionphasesuccessfullytranslatedthedetaileddesignsintoatangible,high-qualitydiningset.Themeticulousselectionofhardwoodtimber,irokoandsecondarymaterials,coupledwiththepreciseapplicationofwoodworkingtechniquesandtheuseofappropriatetoolsandequipment,resultedinastructurallysound,durable,andwell-craftedfurniturepiece.Thisvalidatesthepracticalfeasibilityoffabricatingrobustdiningset

swithinthelocalcontext,adheringtoprofessionalstandards.

Objective3:Toevaluatethefunctionalityoftheconstructeddiningtableset. Thecomprehensiveevaluationrevealedthattheconstructeddiningsetexhibitedexcellentstructural integrity,highfunctionalityandusability,goodergonomiccomfort,strongaestheticappeal, andadherencetosafetystandards.Thepositiveresultsfrompracticalusetestinganddimensionalverificationconfirmedthatthediningsetperformsoptimallyinareal-worldsetting,effectivelyservingitsintendedpurposeandprovidingacomfortable,durable,andvisuallypleasingsolutionforhouseholddiningneeds.

Inessence,thisprojectsuccessfullydemonstratedthatafunctional,durable,andaesthetically pleasingdiningsetcanbemeticulouslydesignedandexpertlyconstructedusingaDesignandBuildapproach,relyingontraditionaltoolsandlocalhardwoodresources.Thefinalproductstandsasatestamenttoskilledcraftsmanshipandasystematicmethodology,offeringavaluableprototypeforhouseholdfurnituresolutionsinNigeria.

Recommendations

Basedonthefindingsandtheexperiencegainedduringthisproject,thefollowingrecommendationsareputforwardtoguidefutureresearch,improvefurniturefabricationpractices,andenhancetheutilityofsimilarprojects:

1.ForFutureResearchandDesign:

ExploreAlternativeIndigenousTimbers:WhilehardwoodslikeIrokoareexcellent,furtherresearchcouldexplorethesuitabilityofothersustainable,lesser-knownindigenoustimberspeciesavailableinNigeria.Thiscouldhelpdiversifymaterialoptions andpotentiallyreducecosts.

InvestigateModular/ExpandableDesigns:Futuredesignscouldexploremodularorexpandablediningsets(e.g.,extendabletables)tocatertovaryinghouseholdsizesorspaceconstr

aints,offeringgreaterversatility.

FormalUserFeedbackCollection:Foramorerobustevaluation,futureprojectscouldincorporatestructuredsurveysorinterviewswithawiderrangeofpotentialuserstogathermoreextensivequalitativeandquantitativefeedbackoncomfort,usability,andaestheticpreferences.

2.ForPracticalFurnitureFabrication:

PromoteStandardizedJoineryTraining:Emphasizeandstandardizetraininginadvancedtraditionaljoinerytechniques(likemortiseandtenon)withinvocationalschoolsandworkshopstoensurehighlevelsofstructuralintegrityinlocallymanufacturedfurniture.

FocusonSustainableSourcing:Encourageanddevelopsupplychainsforsustainablyharvestedtimbertoensurethelong-termavailabilityofqualitymaterialsandpromoteenvironmentallyresponsiblepracticesinthefurnitureindustry.

QualityControlinFinishing:Implementstringentqualitycontrolmeasuresforfinishingprocessestoconsistentlyachievedurable,aesthetically pleasing,andsafesurfaces,enhancingthemarketvalueandlongevityofproducts.

3.ForPolicyandIndustryDevelopment:

SupportLocalArtisansandWorkshops:Governmentandnon-governmentalorganizationsshouldprovidesupport,training,andaccesstomoderntoolsforlocalfurnituremakerstoboostthequalityandcompetitivenessoflocallyproducedfurniture.

DevelopFurnitureStandards:Establishnationalstandardsforfurnitureequality,safety,andergonomicstoensurethatlocallymanufacturedproductsmeetinternationalbenchmarksandconsumerexpectations.

Byimplementingtheserecommendations,thefurnituredesignandmanufacturingsec

torinNigeriacancontinuetoevolve,producinghigh-

quality,functional,andculturallyrelevantpiecesthateffectivelymeettheneedsofitspopula

ce.

REFERENCES

AmericanSocietyforTestingandMaterials.(2020).ASTMD143:Standardtestmethodsforsmallclearspecimensoftimber.ASTMInternational.

BritishStandardsInstitution.(2009).BS1186-3:Timberforandinbuildings-Part3:Classificationoftimberforappearancepurposes.BSI.

Ching,F.D.K.(2014).Form,space,andorder(4thed.).JohnWiley&Sons.

Hoadley,R.B.(2000).Understandingwood:Acraftsman'sguidetowoodtechnology(2nded.).TauntonPress.

Kroemer,K.H.E.,&Grandjean,E.(2017).Fittingthetasktothehuman:Atextbookofoccupationalergonomics(6thed.).CRCPress.

NationalHardwoodLumberAssociation.(CurrentEdition).Rulesforthemeasurement&inspectionofhardwood&cypresslumber.NHLA.

NigerianIndustrialStandard.(2007).NIS083:Timberspecies:Characteristicsandapplications.StandardsOrganisationofNigeria.

Pile,J.F.(2013).Ahistoryofinteriordesign(4thed.).LaurenceKingPublishing.

Stokes,J.(2012).Furnituremaking:Acompletemanual.TauntonPress.

U.S.DepartmentofAgriculture,ForestService,ForestProductsLaboratory.(2010).Woodhandbook:Woodasanengineeringmaterial.CentennialEdition,FPL-GTR-190.