

**THE IMPACT OF THE 21ST CENTURY FOREST PRODUCT INDUSTRY ON THE
ECONOMY OF SHIRORO AND BOSSO LOCAL GOVERNMENT AREA OF
NIGER STATE.**

BY

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2016/1/60698TI

**DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION
FEDERAL UNIVERSITY OF TECHNOOLOGY, MINNA**

MARCH, 2023

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**A RESEARCH PROJECT SUBMITTED TO THE
DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION
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AND TECHNOLOGY EDUCATION**

MARCH, 2023

DECLARATION

I hereby declare that this project has been conducted solely by me and that; it is the correct record of my own research work. It has not been presented for any award of a degree anywhere. All sources of information all acknowledged by means of books, journals and internet service or in the bibliography.

OCHEKWU STEPHEN ALI
2016/1/60698TI

Signature & Date

CERTIFICATION

This research project titled **THE IMPACT OF THE 21ST CENTURY FOREST PRODUCT INDUSTRY ON THE ECONOMY OF SHIRORO AND BOSSO LOCAL GOVERNMENT AREA OF NIGER STATE.** “” by OCHEKWU STEPHEN ALI(2016/1/60698TI) meets the regulation governing the award of Bachelor of Technology Degree (B.Tech) in Industrial and Technology Education, Federal University of Technology, Minna, and is approved for its contribution to knowledge and literary presentation.

Dr. B.M Mohammed
Project Supervisor

Signature & Date

Dr. T. M. Saba
Head of Department

Signature & Date

External Supervisor

Signature & Date

DEDICATION

I dedicate this work to God the source of life, the fountain of knowledge, my help and my refuge who is ever faithful and to my immediate family whose support cannot be quantified.

ACKNOWLEDGEMENTS

The completion of this project is by the will of God Almighty, on this note I will like to express my sincere gratitude to all the people that contributed towards the success of this project. My sincere thanks goes to the following people Dr. B. M. Mohammed my supervisor whom I have been consulting on how to go about the project, for his necessary advice, assistance and suggestion on this research work.

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ABSTRACT

The purpose of this study was to assess the Impact of the 21st century Forest Product industry on the economy of Shiroro and Bosso Local Government Area of Niger state. Four research questions and three null hypotheses tested at 0.05 level of significance guided the study. A survey research design was adopted for the study. The population for the study comprised of 20 participants in sawmill industry (10 from each local government area); 30 participants in large- and small-scale carpentry (15 from each local government area), 30 households (15 from each local government area) and 10 staffs of ministry of agriculture and rural development (5 from each local government area), making a total of 90 participants. A structured questionnaire consisting of 34 items was used for data collection. Data collected were analyzed using mean and standard deviation for the research questions while t-test was used for testing the null hypotheses. It was found from the study that timber, charcoal, fuelwood, medicinal plants/herbs, wildlife, mushroom, paper, edible nuts, fruits are the major forest product harvested in Shiroro and Bosso local government area of Niger state. The findings of the study revealed that it has increased the creation of many jobs, revenue generation, sustainable development, innovation into local governments, exportation of forest products, carbon sequestration, climate change mitigation, natural trade and also It has led to more ecotourism activities and biodiversity conservation. The findings of the study revealed that It has increased direct employment, indirect employment, seasonal employment (as in transportation, marketing and packaging), small business development, jobs in sustainable forest Management. It was recommended that Establishment of forest information data base since there are no reliable, consistent and comprehensive statistics about forest.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

A forest is a complex ecological system where trees predominate as the main form of life. A forest is the most efficient ecosystem on Earth because it has a high rate of photosynthesis that influences both plant and animal systems through a complex web of biological interactions. Forests can grow in a variety of environments, and the types of soil, plants, and animals that inhabit them vary depending on the severity of environmental impacts (Britannica 2021). Taiga (boreal), temperate, and tropical forests are the three primary types of forests, according to latitude (Britannica, 2021). Taiga (Boreal) forests, one of the world's largest land biomes, are found across Siberia, Scandinavia, and North America, Temperate forests are found across eastern North America and Eurasia, Tropical forests are common to areas near the equator, such as Southeast Asia, sub-Saharan Africa, and Central America. Temperatures in tropical forests have been reported to range between 20 and 31°C (68 and 88°F) (Society, 2020). In Nigeria, there are many forests that are situated in the various forest vegetation belts.

According to Mfonobong, (2020), Rainforest, Mangrove and Guinea Savannah are the types of Forest found in Nigeria. Rainforest, this vegetation is found in the south of the Niger river, which is distinguished by precipitation levels of 1500–2000 mm/8–9 months. The high-mountainous, multi-tiered tropical woods that makeup Nigeria's rainforest have trees that are 40 to 45 meters tall, notable trees in this forest are Walnuts, Iroko's, oil palms, mahogany and obeche trees. Mangrove forest vegetation is found around the marshes of coastal creeks, lagoons, and estuaries of southern Nigeria, trees found here include palm trees, mangroves,

and lianas. Guinea savannah, this vegetation is located in the middle part as it covers half of the country. the Guinea savannah also has a large mixture of trees and grass. All this kind of Forest are useful to Nigerians.

For many Nigerians communities, forests have been their main source of income. In time past, wood from the forest was used for almost everything, from the creation of energy (heat energy for cooking), and the making of chairs, to the building of houses, also the grasses from the forest were used for the roofing of those houses. The forestry is one of the key pillars upon which the welfare of the country was established. Prior to the commercial discovery of crude oil in 1956 in Oloibiri, Bayelsa State, Nigeria was known for its agrarian economy. Agriculture provided the majority of foreign exchange earnings through the exportation of cash crops such as rubber from Delta State in the south-south region, groundnut, hide, and skin from the northern region, cocoa and coffee from the western region, and palm oil and kernels from the eastern region (Okotie 2018). All this raw material gotten from the forest are then processed by the forest industry into bye-products as new material or finish Products.

The forest product industry is a sector of the economy where a collection of businesses manages a sizable tract of woodland, frequently in order to create goods and services including lumber, logging, timber trade, wildlife habitat, clean water, biodiversity, and recreation, and the production of primary forest products and wood products (furniture) and secondary products like wood pulp for the pulp and paper industry(bowe, retrieved 2018). The forest products industry, which includes the harvest, processing, and trade of timber, paper, and other forest-derived materials, has played a significant role in the global economy and society for centuries. In the 21st century, the industry has continued to evolve and adapt to new demands and challenges

The 21st-century forest product industry has undergone significant changes in recent years, driven by a variety of factors including technological advancements, shifts in consumer demand, and changes in global trade patterns. Another trend has been the growing demand for wood products that are both functional and aesthetically pleasing. This has led to the development of new wood products such as engineered wood, which is made by bonding together strands, fibers, or veneers of wood to create a composite material that is stronger and more stable than solid wood. There has also been a shift towards the use of digital technologies in the industry, with companies adopting advanced manufacturing techniques and using data analytics to optimize their operations and supply chains. The 21st-century forest products industry has had a complex and multifaceted impact on global society and the environment. This is characterized by a focus on innovation, and the use of advanced technologies to meet the changing needs and preferences of consumers and improving the economy of countries.

The forest product industry provides a wide range of economic and social benefits to humankind. These benefits include contributions to the overall economy, for example through employment, processing, and trade of forest products, and provision of energy (FAO, 2005). They also involve hosting and safeguarding natural areas with significant cultural, spiritual, or recreational value. These functions are preserved and enhanced through sustainable forest management. The value of the goods and services produced by forests, the income from sector employment, the sector's contribution to the national economy, energy supplies, and global trade are all examples of economic advantages that are typically quantified in monetary terms.

In some regions, the forest industry is a major source of employment and economic activity, particularly in rural areas. The forest products industry supports millions of jobs worldwide, including direct employment in the sector and indirect jobs in related industries such as

transportation and construction (FAO, 2020). This industry generates billions of dollars in economic activity globally, through the sale of products such as lumber, pulp, and paper (Metsä Group, 2019). The industry also contributes to the economies of countries through the payment of taxes and other fees, and through the development of infrastructure and other investments (World Bank, 2018). The forest products industry is a major contributor to international trade, with countries exporting and importing a wide range of forest-derived products (ITTO, 2021). The industry is also subject to trade agreements and policies, which can affect the flow of products and the competitiveness of different countries and regions.

In some regions, the industry is a major contributor to the local and national economies. However, the industry has also faced economic challenges, such as fluctuations in demand and competition from other industries (Metsä Group, 2019).

The forest products industry has both positive and negative impacts on local communities and indigenous peoples, depending on factors such as the location and type of operations, and the level of participation and benefit-sharing (DFID, 2017). The industry can provide employment, infrastructure, and other benefits, but it can also lead to conflicts over land use and resource rights, as well as environmental and health impacts (World Bank, 2018).

1.2 Statement of the Problem

The forest product industry plays a significant role in the global economy, but its impact in the 21st century is not well understood by many communities in Nigeria. Reason for this assertion is the high rate of forest depletion resulting from intentional wild fire, arbitrary felling of trees for firewood and construction purpose, resulting in the extinction of the forest ecosystem. The forest product industry encompasses a range of activities, including the cultivation, harvesting, and processing of wood and non-wood forest products, as well as the production of paper and paper products. While the industry has long been recognized as a

major contributor to economic development and employment, the rise of alternative materials and changing consumer preferences in the 21st century have raised concerns about its long-term viability. Consequently, this study seeks to determine the concept of the forest communities of the economic viability of the forest ecosystem to their society.

1.3 Purpose of the Study

The purpose of this research is to examine the economic impact of the 21st-century forest product industry to Shiroro and Bosso local government areas of Niger state. Specifically, the study will determine.

- The economic importance of forest industry in Shiroro and Bosso Local government areas of Niger State
- What are the major forest products that are harvested in Shiroro and Bosso local government areas of Niger state?
- The challenges facing the forest product industry in Shiroro and Bosso local government areas of Niger state?

1.4 Significance of the Study

A better understanding of the economic impact of the 21st-century forest product industry will be beneficial for foresters, Forest industry leaders, technical teachers and students, and researcher and the government and stakeholders who are seeking to support the industry's long-term sustainability and competitiveness. This research will contribute to this understanding by providing an up-to-date assessment of the industry's economic contributions and challenges. The findings of this study will be beneficial to foresters and the forest industries, as the importance of trees and forests for the development of a better economy in our communities will be studied. Upon completion of this study, the findings will

be significant in order to provide accurate and up-to-date literature on the impact of forest product industries and their economic value to Shiroro and Bosso local government areas of Niger State. This research upon completion will be beneficial to technical teachers, students and researcher as it will provide up-to-date data on the economic impact of forestry Product industry. The result of the study can be used for organizing training workshops and seminars for foresters and woodwork teachers in order to update their skills and knowledge in forestry and value. The research will also be valuable to the state government and stakeholders who are willing to invest in the forest product business as it will give them up-to-date information on the economic impact of the forest product industry.

1.5 Scope of the Study

This research will focus on the forest product industry and its impact on Shiroro and Bosso Local Government Area of Niger state Nigeria. According to the State Bureau of Statistics, the Niger State statistics year book 2011 edition, Shiror local government area has 596.9 hectares of forest land while Bosso local government area has 431 hectares of forest land.

1.6 Research Questions

This study is guided by the following research questions:

- What are the major forest products that are harvested in Shiroro and Bosso local government areas of Niger state?
- How has the forest product industry contributed to the economy of Shiroro and Bosso local government area in Niger state?
- How has the forest product industry impacted the employment rate in Shiroro and Bosso local government area of Niger state?

- What are the challenges facing the forest product industry in Shiroro and Bosso local government areas of Niger state?

1.7 Hypothesis

The following null hypotheses were formulated to guide this study and are tested at a 0.5 level of significance.

Ho1: There will be no significant difference in the mean responses of Foresters and the forest Product industry on the economy of Shiroro and Bosso local government area.

Ho2: There will be no significant difference between the mean response of Foresters and sawmill operators towards the forest productivity in Shiroro and Bosso local government are.

Ho3: There will be no significant difference in the mean responses of Foresters and sawmills operators on the challenges facing the forest product industry in Shiroro and Bosso LGA

CHAPTER TWO

LITERATURE REVIEW

The literature for the study will be reviewed under the following subheadings

2.1.An Overview of the Forest Resource of Nigeria.

2.2. An Overview of the Forest Product Industry in Nigeria.

2.3. The Forest Product Economy.

2.4. The Policy on Forest in Nigeria.

2.1An Overview of the Forest Resources in Nigeria

Forests provide numerous benefits to human societies in addition to their critical roles as habitat and environmental regulators in natural ecosystems. These advantages are frequently described as resources that people can use for fuel, lumber, and recreational or commercial purposes. The perception that forests provide resources for people has been a driving force behind efforts to preserve forests. Forest resource means all the benefits derived from forest lands, including forest products, soil productivity, water, fisheries, wildlife, recreation, and aesthetic or other traditional values of forest lands.

Forest resources are an essential part of any community, region, or nation's natural resource and are crucial to the socioeconomic well-being of the residents of those areas. This is especially true in sub-Saharan Africa, where the majority of the nations have sizable rural populations that depend on the exploitation of natural resources for their subsistence.

Over 560 species of trees with girths of 60 centimeters and heights of at least 12 meters may be found in Nigeria's moist forest, which are also home to epiphytic ferns and orchids. Nigeria has been placed 11th in Africa for biodiversity due to the comparatively high number of plant species that have been identified (Borokini et al., 2010). In addition, one of the 25

biodiversity hotspots of significant global importance is the West African Forest, priorities for conservation the Nigerian tropical rainforests form a significant part this (Myers et al., 2000).

People from various humid regions of West Africa utilize their surrounding forests and unused land in a wide variety of ways. Food, medications, household items, building materials, raw materials for manufacturing, and components for agricultural and other equipment are all forests resource. Despite the fact that household usage of forest resources differs by location, it is evident that forest products are still commonly used. The most widely used forest resource on a regional level includes food (bush meat, palm goods, fruits) medicines, fuel wood and building materials.

Wild animal, a forest resource

Variety of goods and services, including food, food security, income, livelihoods, and fuel wood, wildlife and forests are crucial to impoverished rural households, particularly in tropical forest regions (FAO, 2009; Milner-Gulland et al., 2013). A lot of people have also suggested that rural populations depend on wildlife goods or that the forest is essential to their well-being. In many tropical societies, wild ungulates and other animals are widely regarded as valuable sources of meat and other goods. They also make up between 20% and 100% of the animal protein consumed in many West African countries (Jayeoba et al., 2013).

Although foresters rarely view animals as forest products, many rural West Africans place a high value on wild animals, which are also referred to as "bush meat". In both rural and urban households, they serve as a significant source of meat. Numerous regularly eaten animal species have habitats in forests and stretches of fallow land. Bush meat constitute of vast array of species ranging from grass cutter, snakes, duikers, bush pig, snail, guinea fowl, hare, brush tailed porcupine, giant rat, edible frogs and many others. (Abulude, 2007). All these

animals are sometimes sold to generate income for rural dwellers or the population living close to the forest areas.

Some of the individuals living close to the forest are hunters by occupation, these individuals hunt Wildlife, to eat and sell their catch(bushmeat) for income. Bush meat consumption in Nigeria is valued at N30 million annually (Soaga et al. 2014). The annual value of animal protein ingested from wild animals and freshwater fish is considerably over N200 million (Olaoye, 2010). Bush meat is a substantial source of income, particularly where the trade is fueled by rising urban bush meat consumption.

Nigeria has flourishing bush meat markets in major cities selling both legal and illegal bush meat. This trade remains largely unregulated. The process of trapping and transporting wild animals in stressful and unhygienic conditions in which they come into contact with people and domesticated animals greatly increases the risks of new contracting disease and transmission.

Palm products

The palm tree produces a vast array of goods, some of which are known to us and others which we are completely unaware of. When it comes to forest resources, palms are among the richest trees on the planet. Every part of a palm tree can be used to make money; nothing is wasted (Jimoh 2020). Some of these several items that can be made from various palm tree parts are: palm wine, brooms, frond stalls, timber or boards, palm kernels Mats, a basket, palm oil.

- Palm Oil- The most well-known commodity made from palm trees is palm oil. It is obtained from the fruit of the palm tree and used as cooking and frying oil. Consuming palm oil is incredibly wholesome and nourishing for people. Additionally,

it is used industrially in the production of cosmetics, soaps, toothpaste, lubricants, inks, and waxes. (EWG 2018)

- Palm wine- Palm wine is a sweet and flavorful beverage that's gotten from the sap of different types of palm trees, including date palms, Palmyra, and coconut palms. It is one of the most consumed beverages in Africa and has many advantages. It has the power to prevent and treat cancer, improve eyesight, lower the risk of cardiovascular disease, encourage lactation, and support the maintenance of healthy skin, hair, and nails (Nwokolo 2019)
- Brooms- No home, whether wealthy or poor, is without a broom. In Nigeria, brooms are used for sweeping, clearing cobwebs.
- Palm kernel- The edible seed of the palm fruit is the palm kernel. Palm kernel oil softens the skin, supports the body's detoxification process, lowers blood pressure, and treats body odor when applied to the skin and hair. It also makes hair thicker and less prone to breakage. Epilepsy can be effectively treated using palm kernel oil, which is made from palm kernel seeds. It is also a rich antioxidant agent that contains vitamin E and prevents symptoms and signs of aging.
- Mats – leaves fiber obtained from the leaves of raffia palm are used for mats, baskets hats for commercial purpose and for tying plants and other objects.
- Baskets – baskets are made from leaves fiber of palm trees, it is being sold in bulk most times to distance places where they are being used for different purposes.

Because every part of the palm tree—fruits, kernels, trunks, leaves, and sap—can be used to make a variety of products, it is a fantastic forest resource.

Medicine.

Medicinal plants are both the oldest known source of human and livestock healthcare products and an important component of global biodiversity (Lambert 2005). There are many different systems of traditional medicine, and philosophy and practice of each are influenced by the prevailing conditions, environment, and geographic area within which it first evolves (WHO 2005). Forests and trees benefit people's physical, emotional, and social wellbeing in a variety of ways. Urban forests also offer restorative environments, places where people can unwind, reduce stress, and block out noise.

Traditional healthcare systems are based on significant local knowledge of medicinal plants. Traditional medicine is therefore often highly available and accessible to people in developing countries, especially those in rural areas that are close to the forest.

The most popular plant "medicine" throughout all of West Africa is undoubtedly chew sticks. They offer dental care in its most basic form. To clean and refresh teeth, people chew sticks made from stems, bark, or roots of various species multiple times every day. In rural areas, chew sticks are frequently employed. There are over 300 types of plants used as chew sticks (kkhemet 2018) and each has unique properties and flavors (such as bitter, sweet, and antiseptic) (hard and soft). Chewing sticks are a very efficient, effective, and dependable way for many people to clean their teeth when they are used without dental paste. The teeth of chewing stick users are often healthy, strong, clean, and free of dental plaque and bacteria.

Tropical forest species are the source of many pharmacological compounds; some of these products are now manufactured, while others are still harvested from the wild. The economic value of traditional medicines derived from forest species (mainly plants) is considerable: the global market value of medicinal plant products exceeds \$100 billion per annum (Sofowora 2013).

Fuel.

According to the Centre for International Forestry Research (2005), at least 70% of households in Africa utilize wood fuel as their main source of energy. In rural areas, it serves as the main energy source for home, commercial, and small-scale traditional industries. In Nigeria, the wood fuel sector primarily consists of the production of wood charcoal and firewood, which is the primary residential fuel source in both urban and rural areas and accounts for more than half of domestic energy consumption (Enete and Agbugba, 2008)

Firewood is the cheapest and most accessible source of heat energy in many locations, particularly those that are close to forest area. Branches, fallen limbs, and dead trees are typically collected from forests. These downed trees are frequently used by people as fuel for cooking food and other purposes.

Traditionally, wood has been a significant source of fuel for homes. The use of wood as a fuel, declined in developed nations after the discovery of oil. However, in recent years, the advantages of using wood energy have been discussed, particularly in light of global warming and finite fossil fuel resources. Due to wood's low energy density, cost-effective intense use is heavily dependent on the availability of local forest biomass resources.

A significant portion or component of wood fuel is charcoal. Wood and wood products from the trunk, branches, and other portions of trees and plants are burned and passed through fire to create wood charcoal. Charcoal is the solid waste produced when a variety of materials are burned under controlled conditions when there is a restricted supply of oxygen (FAO, 1983).

So many small communities have mastered the skill of charcoal manufacture; charcoal is practically always available throughout Nigeria. There are some well-known charcoal depots

in the western regions of the nation, including Oyo, Iseyin, Saki, Igbo-Ora, and Ogbomoso (Awoyemi et al. 2006).

House construction/ Timber

The majority of rural populations in the West African forest zone rely on forests resource for their supply of building supplies, which typically include poles, leaves (for roofing), palm petioles (also known as "bamboo"), lianas, and bark. The most prevalent type of home in the humid West African region is one made of mud and wattle ("Poto-poto" style) (FAO 1990). Wattle cross-slats are attached to standing poles in the Poto-poto type homes and are typically made of the leaf petioles of the Raphia palm, other palms, or bamboo (which are young tree stems). The species that are typically favored are termite resistant. Mud is then added to the resulting frame to complete it. Petioles and palm leaf tiles made from palm leaves are used to construct the roofs (for the roofing beams). Traditional thatched roofs are being replaced with galvanized metal sheet roofing in modern times.

Timber is a vital forest resource that is all around us. It is the house that shelters us, the furniture we relax in, the books we read, the paper we print, the disposable diapers for our babies, and the boxes that contain our cereal, detergent, and new appliances. Timber is a widely used building material in construction, and it has several advantages as a resource for house construction. Some of the benefits of using timber in house construction include:

- **Sustainability:** Timber is a renewable resource that can be sustainably harvested and replanted. This makes it an environmentally friendly choice for building materials.
- **Durability:** Timber is a strong and durable material that can last for decades with proper care and maintenance. **Versatility:** Timber can be used in a variety of construction applications, including framing, flooring, roofing, and cladding. **Ease of**

use: Timber is relatively easy to work with, which makes it a popular choice for both professional builders and DIY enthusiasts.

- **Thermal insulation:** Timber is a good insulator, which helps to keep homes warm in the winter and cool in the summer. **Aesthetically pleasing:** Timber has a natural and attractive appearance that can add character and warmth to a home.

There are also some potential drawbacks to consider when using timber in construction. For example, it can be prone to damage from pests such as termites and wood rot, and it may require regular maintenance to keep it in good condition. Additionally, the sourcing of timber can be a controversial issue, as some types of timber may come from unsustainable or illegally harvested sources.

Timber is a popular and versatile building material that can be an excellent choice for house construction, provided it is sourced sustainably and properly cared for.

2.2. An overview of the Forest Product Industries in Nigeria.

In Nigeria, the forest products sector of the economy was one of the most developed from the 1960s to the early 1970s. More than 70% of the nation's gross domestic product at this time was derived from the export of agricultural and timber products (GDP). But until practice was outlawed in 1976, the oil glut of the 1970s encouraged widespread exploitation of round logs for export. (Ogunwusi, 2012) The growth of the forest products sector has been adversely affected by the overexploitation of the wood supplies. This has led to the country's timber industry's declining fortune, along with a number of other reasons including outdated equipment.

The intense exploitation of the resources is one of the causes of the decline in the availability of forest resources. Planning for economic growth included the exploitation of forest

resources as early as 1899. (Adeyaju, 1975). Between 1950 and 1960, 1960 and 1970, and 1970 and 1980, respectively, the export earnings from forestry increases at 4.1%, 8.0%, and 28.8%. (Aribisala, 1993). During this time, a thriving forest products sector with well-organized saw mills, wood panel and furniture businesses, match and paper manufacturers, and pulp and paper industries developed.

Sawn mills

Nigeria's forest product industry plays a significant role in the country's economy, and saw mills are an important part of this industry. Saw mills are facilities that process logs into lumber, which is used for a variety of purposes such as construction and furniture making.

The history of saw mills in Nigeria dates back to the colonial era, when the British introduced the concept of commercial forestry in the country. However, the saw mill industry in Nigeria really began to develop in the 1950s and 1960s, when the government established a number of state-owned saw mills to meet the increasing demand for lumber. In the 1980s, the government began to liberalize the saw mill industry, allowing private companies to enter the market.

Today, the saw mill industry in Nigeria is a significant contributor to the country's economy, with numerous small, medium, and large-scale saw mills operating throughout the country. According to data from the Nigerian Timber Association, the saw mill industry in Nigeria currently employs over 100,000 people and generates an estimated \$500 million in revenue per year (Nigerian Timber Association, 2021). However, the saw mill industry in Nigeria also faces a number of challenges.

The challenges faced by the saw mills in Nigeria, one this challenge is competition from imported products, which are often cheaper than locally produced lumber. Another challenge

is the difficulty in obtaining raw materials, as many saw mills rely on illegal logging or the illegal trade of timber (World Bank, 2020). In addition, regulatory issues, such as the lack of clear policies and enforcement of illegal logging, have also posed challenges for the saw mill industry in Nigeria (World Bank, 2020).

Despite these challenges, there are also a number of opportunities for the saw mill industry in Nigeria. For example, there is increasing demand for locally produced products, as consumers are becoming more aware of the environmental and social impacts of imported products (Nigerian Timber Association, 2021). In addition, there is potential for growth in export markets, as Nigeria's saw mills are well-positioned to take advantage of the increasing demand for tropical hardwoods in other parts of the world (Nigerian Timber Association, 2021).

Saw mills are an important part of the forest product industry in Nigeria, and have played a significant role in the country's economy for many years. While the saw mill industry in Nigeria faces a number of challenges, there are also many opportunities for growth and development. With the right policies and support, the saw mill industry in Nigeria has the potential to continue to thrive and contribute to the country's economic development.

Furniture industry

Furniture is an inevitable part of human existence. It is used for beautification of both private and public spaces while also providing significant opportunities for income generation, employment and development of craftsmanship. Furniture is made in various forms, such as doors, tables, chairs, decorations, cabinets and shelves, cupboards, beds, windows, roofing and other items (Adedokun et al., 2017)

The furniture industry in Nigeria is a subset of the forest products industry, which includes a wide range of products made from wood and other forest materials. The furniture industry is one of the largest wood industries in Nigeria. The industry is ranked to be among the top ten major wood-based industries in country. It represents about 80% of the wood-based industries in the country. Wooden furniture industry is reported to be the most widely distributed of all the wood-based industries in Nigeria (Abdullahi, 1999; Alao and Kuje, 2012).

The Furniture industry plays a major role in the development of Nigerian economy. This is because it generates income to local players in the industry and also serves as source of employment for significant proportion of Nigerians (Ogunjobi, et al., 2018). Many furniture businesses run their own factories, while others outsource production to smaller manufacturers, which results in a huge number of people being employed in the sector.

The furniture industry in Nigeria is an important part of the country's forest products industry, and its success is closely tied to the sustainability and responsible management of our forests. Ensuring the sustainable management of forests is crucial for the long-term success of the industry and the well-being of the people and communities that depend on it.

Particle board mills

Particleboard is a type of engineered wood product that is made from wood chips, sawdust, or shavings that are mixed with a resin binder and formed into sheets under high pressure (Mart 2022). It is used in a variety of applications, including furniture, construction, and packaging.

Particleboard mills play a significant role in the Nigerian forest products sector. Particleboard is one of the primary goods produced in the nation, which has a long history of forestry and

wood-based industries. Nigeria's particleboard sector, which contributes significantly to the nation's economy, uses raw materials from forests and sawmills.

The shortage of raw materials is one of the problems the Nigerian particleboard sector is facing. The country has a high demand for wood products, but logging and changes in land use are putting stress on its forests. Due to this, raw materials that are imported now tend to be more expensive and of inferior quality. To address this challenge, some particleboard mills in Nigeria have implemented sustainable forestry practices and are working to promote the use of alternative raw materials, such as agricultural waste and recycled wood.

The particleboard industry in Nigeria plays a vital role in the country's economy and is an important part of the forest products sector. However, it is facing challenges related to raw material supply and sustainability, and efforts are underway to address these issues.

Rubber industries

Around 1876, the local wild rubber plant was exploited to start natural rubber production in Nigeria (*Funtumia elastica*). While the demand for natural rubber products increased globally, the plant was discovered to have weak latex output and poor bark regeneration after tapping. Rubber used to rank after cocoa, groundnuts, and palm kernels as the fourth most important agricultural export from Nigeria in the 1960s to the early 1970s. (Umar, Giroh, Agbonkolor, and Mesike 2011). Prior to the discovery of crude oil in the 1970s, it used to account for around 6% of Nigeria's overall export revenues. As a result, the annual export revenue from natural rubber was reduced to only 0.02%.

The rubber industry in Nigeria is classified as a forest product industry, as rubber trees are grown primarily in forests and wooded areas. According to the Food and Agriculture

Organization of the United Nations (FAO), Nigeria is the world's ninth largest producer of natural rubber, with an estimated production of 190,000 metric tons in 2019.

Rubber is an important export commodity for Nigeria, with the majority of production coming from smallholder farms. The rubber industry in Nigeria plays a significant role in the country's economy, providing employment and income for many rural communities.

Numerous obstacles, such as poor infrastructure, restricted access to loans and extension services, and low productivity, have hampered the growth of the rubber industry in Nigeria. To address these issues and encourage the industry's expansion, the government has recently put in place a number of programs.

Nigeria's rubber business plays a significant role in the nation's economy and provides jobs for several rural residents. Despite obstacles, the government and business groups like the RDA are trying to promote the expansion and development of the sector.

Paperboard, paper and pulp industries.

Paperboard, paper, and pulp are important forest products that are widely used in a variety of industries. In Nigeria, the forestry sector has the potential to contribute significantly to the country's economic development, as it is a major source of raw materials for the paper and pulp industry. However, the industry faces numerous challenges, including access to raw materials, infrastructure, and financing.

Nigeria is faced with a dire paper crisis. This crisis is largely caused by two reasons. One is the comatose state of the three integrated pulp and paper mills that were established in the country in the 1960s and 1970s. These paper mills are the Nigerian Paper Mill in Jebba; the Nigeria Newsprint Manufacturing Company, Oku Iboku; and the Iwopin Pulp and Paper

Company. Only the Jebba mill still has a show of breath of life. The number two factor is that virtually no new investments were made in establishing new ones. (Onwuamaeze 2022)

One of the main challenges facing the paperboard, paper, and pulp industry in Nigeria is access to raw materials (Isaac 2022). Many of the country's forests have been degraded or converted to other land uses, which has led to a shortage of raw materials for the industry. Additionally, there are issues with infrastructure, including poor roads and a lack of access to electricity, which make it difficult for companies to transport raw materials and finished products. Finally, the industry faces challenges with financing, as it is difficult for companies to secure the necessary funding to invest in new equipment and expand their operations.

Like any industrial sector, the paperboard, paper, and pulp industry in Nigeria has the potential to have both positive and negative impacts on the environment and local communities. On the positive side, the industry provides employment and economic benefits to local communities, and can contribute to the development of infrastructure and other amenities. However, the industry also has the potential to have negative impacts, including deforestation and water pollution. Deforestation can lead to the loss of biodiversity and the degradation of ecosystems, while water pollution can have harmful effects on human health and the environment.

2.3. The Forest Product Economy

In Nigeria, according to Azeez, 2002, more than 75% of people live in rural areas, and more than 70% of those people work as farmers. In 1996, Nigeria had a total land area of 91,077 hectares, of which 17,800 hectares were, forested (FAO 1999). With the supply of employment, particularly for rural households, and insurance against crop failure and drought, woods play a significant role in many rural areas in supporting agricultural

productivity. Numerous forestry-related activities thus have an effect on the quality of life for rural people, both directly and indirectly.

Forests and trees contribute to guarantee the long-term viability of agricultural output and, as a result, guarantee food security (Uzuegbu 2022). The benefits of forests range from environmental preservation, such as maintaining and restoring soil fertility and soil improvement, keeping biodiversity, controlling erosion, producing food, supplying fuel wood and farm inputs, as well as generating revenue and creating rural jobs.

According to Pearce, 2001, the values that forests provide are divided into direct use values (such as timber and fuel, genetic material extraction, tourism, etc.), indirect use values (such as the protection of watersheds and the storage of carbon, etc.), option values, and nonuse value. As one of the main building materials and a source of fuel in both rural and urban parts of Nigeria, forests also serve as the raw material for charcoal, an alternate or refined fuel source (Oriola, 2009). The forestry industry is crucial to the economic health of the nation since it is one of the businesses that generate the most income and jobs while also serving as a resource foundation for several forest-related industries. Adeniyi (2016). Numerous forest-related activities this have an effect on the quality of life for rural people, both directly and indirectly.

For several states in Nigeria, forest resources have been a significant source of development. In addition to providing for the needs of wood, wild foods, medicines, soil conservation, carbon dioxide storage, and the beauty of the landscape, they also support foreign exchange earnings, employment, and economic growth, according to the Food and Agricultural Organization (FAO), which estimates that the forest sector contributed \$468 billion to national income in 2006, or 1% of the world's gross domestic product (GDP) (Jaunky and Lundmark, 2016). The world's woods have benefited national economies in a variety of ways.

The Nigerian economy has benefited from the forests in sectors relating to employment, exports, foreign exchange gains, industry formation and many more.

Job creation

The forestry industry has given Nigerians sources of employment opportunities. Estimates of the number of people engaged in forestry activities range from 170000 in 1933 to 568000 in 1961, including management staff and the labor force in all forest-based industries. And 80% of people living in rural areas work in agriculture, forestry, and other related industries (Kalu and Okojie 2009). Ehiagbanare (2007) showed that forests have contributed significantly to the economy of Edo State. He stated that a total of 217 mills using wood as raw materials have been established in the state employing about 10000 workers which are separate from the number of workers on the government's payroll. He further mentioned that the Edo State government has gained revenue of over N250 million between 1991 and 2002.

Exportation

The export earnings from forestry grew at 4.1% from 1950 –1960, 8.0% from 1960 – 1970 and 28.8% from 1970 – 1980 and from 2011 to 2015, Nigeria exported \$400.2 million worth of timber (Idumah and Awe, 2017). Timber products have result in the foreign exchange and also in socio – economic development. Additionally, forests have spawned a value-chain sector that starts with loggers and ends with carpenters and other wood-manipulating businesses. The economy of Nigeria has benefited from the forests for as long as there have been forests.

The National Cashew Association of Nigeria (NCAN) showed that Nigeria exported a total of 160,000 metric tons of raw cashew nuts valued at \$300 million in 2016. However, if only 130 000 tons of raw cashew were roasted and supplied annually to Walmart Super Market chain

in the United States, Nigeria could earn US\$ 7 billion (Agbota 2017). In Nigeria, cashew is grown in smallholder farms and plantations. It provides livelihoods to over 300,000 families and 600,000 jobs in 28 of 36 states in Nigeria 38 (Agbota 2017).

Sales of Non-timber forest Product

Many rural dwellers in the West African forest zone rely on the forests (and uncultivated trees) as significant sources of income. Bush meat and fuel wood are two examples of forest goods that are collected, exchanged, and often used by urban customers. Additionally, raw materials for processing and artisanal operations are provided by forests. Forest goods are marketed to satisfy the demands of both rural and urban consumers and are traded in both local and metropolitan marketplaces.

Provision of Food

Food provision is an essential aspect of the economic value of the forest product industry. In addition to providing important resources such as wood, the forest product industry also plays a crucial role in food production. Forests and trees contribute to food security and nutrition through four main channels: direct provision of food and protein supplementation; provision of energy, especially for cooking and the provision of ecosystem services that are essential for Food security and nutrition, human health and well-being (HLPE 2017)

The economic benefits of the forest product industry for food production are significant. The industry creates jobs and generates income for local communities, which can support food security and improve the standard of living. In addition, the economic benefits of the forest product industry can help to support the development of infrastructure and services in rural.

Industrialize Africa

Forest products (wood and non-wood) are vehicles of industrialization. They contribute to industrialization through forward and backward linkages, capital accumulation and investments, value addition, green growth and employment creation (ANRC 2018). Aside from forest industries linked to forest concessions in natural forests, private commercial forest plantations drive huge industrial complexes in Eastern and Southern Africa.

More locally produced value-added or "downstream" goods like doors, windows, furniture, and joinery will be produced from raw wood in a nation, creating jobs for more locals and, more crucially, providing compelling justifications for conserving the forest resource. (ITTO 2006). African countries will reap the rewards of adding value to their forest products through the creation of green jobs, improved livelihoods, higher revenue, enhanced foreign exchange profits, and industrialization, among other things.

2.4 Policy on Forest in Nigeria

Nigeria's forest product sectors are governed by a number of laws and regulations that support sustainable forest management, safeguard biodiversity, and guarantee that local communities receive an equal share of the benefits. Forest goods have a vibrant and fiercely competitive domestic market, especially in the manufacturing and construction industries. Yet, a number of market distortions and deterrents are leading to inefficiencies, a disproportionate waste of resources, and prior investment in the forest industry. (OECD 2020)).

According to Pathak (2021) waste exists as a result of ineffective machinery. Currently, timber is undervalued because the royalty rates applied to it do not adequately account for the full value of the forest products and services it provides. The fees are set administratively. Low revenues for further investment in forest management as well as insufficient incentives to increase processing efficiency are the results of this. A rise in illegal harvesting as a result

of lax rules is hurting legitimate markets by distorting pricing and further lowering government income(Brashares2011).

The private sector will be primarily responsible for the growth and management of the industries that process forest products, and it will also be responsible for capturing the potential for value addition through superior processing. Government's job is to facilitate and control these activities. The State Government will be urged to create and uphold a robust regulatory system that will stop illegal activities, track best practices, evaluate the effects on the environment and society, and collect fees. To stimulate private investment in the processing industry, the federal and state governments will also foster a favorable investment climate.

Policy Statement: To encourage a sustainable management and utilization of forest resources and to guarantee the perpetual supply of raw materials to the forest industries. (National forest policy 2006)

The need for sustainability of tropical rain forest

According to Steinbrink 2019, Sustainable development is defined as "development that satisfies present demands while not impairing the capacity of future generations to satisfy their own needs." In utilization of the tropical rain forests, the activities associated with this utilization must not irreversibly compromise the potential of the forest to regenerate and continue to provide the industrial wood and non-wood forest products, environmental services, social benefits and global values (such as the maintenance of biodiversity) that are essential for the well-being of both current and future generations (Dykstra 2013), In addition, they stated that the objective should be to maximize the forest's overall capacity to provide these goods and services over the long term. This implies that, in cases where industrial wood needs to be removed from tropical forests, harvesting operations must be

carried out in a way that leaves the forest in a condition that encourages a quick return to its pre-harvest state or to another state that is silviculturally, ecologically, and sociologically desirable. The regeneration of the forest and the long-term health of the forest should be taken into account when harvesting wood sustainably. Up until a new forest of younger, healthier trees starts to grow beneath it, the best trees can be left standing.

Wood Harvesting Plan

Planning for sustainable forest management, which is a part of comprehensive land-use planning, includes planning for timber harvests as one of its components. A thorough understanding of the management plan's goals, the harvesting methods at hand, and the logistics involved are necessary for developing meaningful harvest plans. The goals of the harvesting strategy should be to maximize recovered log volume and value, reduce harm to regenerating trees, make it easier to extract logs, minimize ground disturbance, and prevent disturbing areas that won't be harvested. The structure of the forest and the health of the ecosystem are typically severely impacted by harvesting. Hence, environmentally responsible wood harvesting practices are fundamental to sustainable forestry (Grebner, 2013). Proper wood harvesting should begin with proper planning, trained and motivated workers (logging crews) with technically competent supervisors.

According to Okon (2018) Plans for harvesting timber can be classified as strategic, tactical, or operational. The forest planning team created a long-term, extensive plan for strategic harvesting. The main transportation system should be designed, non-harvest areas should be marked off, and the forest that may be harvested should be divided into annual operating areas (coupes). It could involve management policies, facility construction, and managerial rigor. The team immediately in charge of overseeing harvesting operations creates the tactical harvest plan, which is a short-term plan (i.e., covers shorter periods).

Forest Adverse Effect on the Soil

The ecology of forests depends heavily on the soil there. It's crucial to reduce harmful effects on the soil during the wood harvest. Forest soil is severely damaged by the harvesting of timber when there is inadequate planning, poor operational methods, and lack of operational management (Akay et al., 2007; Eroglu et al., 2009). In turn, this may have long-term effects on the soil's productivity, nutrient regime, and capability. Logging alters the physical, chemical, and biological characteristics of soils. Much less soil productivity results from logging operations like landings, access roads, and main skid paths. Poor soil aeration, low root infiltration, constrained water movement, and reduced activity of soil organisms engaged in nutrient cycling are all effects of compaction. In addition to causing more surface water runoff, soil compaction can also cause more silt to accumulate in watersheds and soil erosion. The environment is more vulnerable to the damaging effects of storms and wind when timber is harvested (Fuwape, 2003). Where there had been uncontrolled tree cutting, there had been devastating devastation of farms.

2.5 Summary of Literature Review

The forest product industry has had a significant impact on the economy of the 21st century. The industry has contributed significantly to the country's GDP, with the export of wood and wood products being a source of foreign exchange earnings. The forestry sector has also created employment opportunities for a large number of people, especially in rural areas where the majority of forests are found. The industry has also played a role in improving the livelihoods of local communities, through the provision of income and the development of infrastructure such as roads and schools.

However, the industry has also had some negative impacts on the environment, including deforestation and the degradation of forest ecosystems. There have been efforts to address

these issues, such as the implementation of sustainable forest management practices and the promotion of plantation forestry. Despite these efforts, the forest product industry in Nigeria continues to face challenges, including illegal logging and a lack of investment in the sector.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY.

This chapter focuses on the methodology used in conducting the study. They include; Design of the Study, Area of the Study and Respondents, Population of the Study, Sample and Sampling Technique, Instrument for Data Collection, Validation of instrument, and administration of the Instrument, Method of Data Collection, and Method of Data Analysis.

3.1 Research Design.

The survey research design was adopted for this study. According to Tanny (2018) Survey research design is a procedure in quantitative research that involves collecting data from a sample of individuals through the use of a questionnaire or survey. This method is used to gather information about people's opinions, attitudes, behaviors, beliefs, and experiences. Survey research can be conducted through various means such as paper-and-pencil surveys, online surveys, telephone surveys, and face-to-face interviews (Gaille 202).

Survey research has many advantages. Surveys are useful for gathering large amounts of data from a sample of individuals quickly and efficiently (Dillman et al. 2014). Surveys can also be used to collect data from a geographically diverse group of people. Furthermore, survey research can be used to measure changes over time and to compare data from different populations. Secondary data was gathered from a variety of sources, including academic journals, government reports, industry reports, and other pertinent publications.

Based on the information needed to achieve success in this study, a well-designed questionnaire were used to request an accurate, a complete and necessary information from the respondents on the impact of the 21st century Forest product industry on the economy of Shiroro and Bosso Local government area of Niger state.

3.2 Area of Study.

This study was conducted in Niger state using, Shiroro and Bosso local government area as case study. Niger State is located on 10.2155388 and longitude 5.3939551. According to the 2006 census, Niger State has a total population of 3,954,772 which Shiroro local government area and Bosso local government area has 235,665 and 148,136 respectively.

Shiroro local government area of Niger state, has an area of 5,015 square kilometers (1,936 sqmi) and shares boundaries with Bosso, Muya and Rafi local government area and with Kaduna state. Shiroro has 596.9 hectares of forest land.

Bosso local government area of Niger State has an area of 1,592 km² and 431 hectares of forest land. Bosso local government area shares boundaries with Chanchanga, Shiroro, Paikoro, Wushishi, and Katcha local government area.

3.3 Population of the Study

The population target of the study (90 respondent) is mostly conducted in order to research some significant characteristics related to the study, such as; sawmill owners/operators, large- and small-scale production Carpenters, Households and staff of Niger state ministry of agriculture.

As a result, the population is estimated at 90 respondents total, distributed as follows: 20 participants in sawmill industry (10 from each local government area); 30 participants in large- and small-scale carpentry (15 from each local government area), 30 residential homes (15 from each local government area) and 10 staffs of ministry of agriculture and rural development (5 from each local government area). Which leads to 45 participate in each local government area and a total of 90 participate from the two local government areas.

3.4 Sample and Sampling Techniques

This study adopts purposive sampling. The goal in choosing the research participants was to find people who were engaged and interested, either directly or through their organizations. All the 90 participant was used for the study. The researcher purposively sample 20 participate from the sawmill industry, 30 participate from the carpentry sector, 30 participates from residential homes and 10 participates from ministry of agriculture and rural development.

Purposive sampling aims to select participants in a deliberate manner so that those samples are pertinent to the given research topics.

3.5 Instrument for Data Collection.

Data collection is the act of acquiring precise information from a variety of sources, processing it, and using the results to identify patterns, odds, and potential consequences. The researcher created a well-designed questionnaire specifically for this study as the instrument to be utilized for data collection. One of the main methods for gathering data in quantitative research is the questionnaire (Bhandari 2021).

The questionnaire developed is divided into four (4) sections, namely section, A, B, C, D and E. Section A contains the personal information of the respondent while section B contains 10 items and was designed to obtain information from respondent on the major forest products that are harvested in Shiroro and Bosso local government area of Niger state. Section C this consists of 10 items designed to obtain information on the forest industry contribution to the economy of Shiroro and Bosso local government area. Section D, this consists of 5 items designed to collect data on how the forest product industry impacted the employment relate in Shiroro and Bosso local government area. Section E, consists of 9 items designed to gather

data on the challenges facing the forest product industry in Shiroro and Bosso local government area.

A four point (4) rating scale will be used for the questionnaire.

A four (4) point rating used as shown below

Strongly Agreed SA=4

Agreed A=3

Disagreed D=2

Strongly Disagreed SD=1

3.6 Validation of Instrument

The validation of the questionnaire for this study will be done by three lecturers in the Department of Industrial and Technology Education (ITE), Federal University of Technology Minna, Niger State. The purpose of this is to evaluate the appropriateness and clarity of the questionnaire items. For the final draft, the instrument was modified and reorganized based on their feedback.

3.7 Administration of the Instrument

The questionnaire was administered by the researcher with the help of two research assistants. The research assistants were trained on how to use the instrument to collect data. The participants were given 48 hours to respond to the questionnaire after which the researcher went back to collect the questionnaire. This is to give the participants enough time for response of the items.

3.8 Method of Data Collection

Structured questionnaires with closed-ended questions were used to gather the data. Under the direction of the researcher, two research assistants carried out the distribution and collection. 96 of the 120 copies of the questionnaire that were issued were duly returned and used for data analysis.

3.9 Method of Data Analysis

The data gathered by the researcher was computed using the mean, standard deviation and t-test. Mean and standard deviation were employed for the research question items, The cut-off point test was the mean score of 2.50 and higher on a four-point rating system. Any item that attracts up to 2.50 and above was deemed agreed or available. While anything that attracts less than 2.50 will be deemed disagreed or unavailable.

The t-test was used to analyze the null hypotheses. When t-calculated is less than the t-table value, hypotheses are accepted; where t-calculated is equal to or more than the t-table value, hypotheses are rejected

Data collected was analyzed using mean, A four (4) point rating scale was used to analyze data as shown below.

Strongly Agreed	SA=4
Agreed	A=3
Disagreed	D=2
Strongly Disagreed	SD=1

The above rating point scales, was used to determine and to analyze the outcome of the research questions, to note the level of response from the respondent when the questionnaire was presented.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF DATA

4.1 Research Question 1

What are the major forest products that are harvested in Shiroro and Bosso local government areas of Niger state?

Table 4.1: mean responses of Foresters and the forest Product industry on the economy of Shiroro and Bosso local government area.

S/N	ITEMS	\bar{X}	SD	Remark
1	Timber	3.59	.579	Agreed
2	Charcoal	3.43	1.061	Agreed
3	Fuelwood	3.79	.530	Agreed
4	Medicinal plants/herbs	3.67	.540	Agreed
5	Wildlife	2.98	1.263	Agreed
6	Honey	2.12	.819	Disagreed
7	Mushroom	3.77	.562	Agreed
8	Paper	2.07	1.003	Disagreed
9	Edible Nuts	3.49	.768	Agreed
10	Fruits	3.56	.672	Agreed

N=90

\bar{X} = mean of the respondents

N₁ = No. of forest Product industry

N₂ = No. of foresters

SD = standard deviation of the respondents

Table 4.1 showed that both the Foresters and the forest Product industry agreed on most of the items. Items 6 and 8 was disagreed which means that paper and honey were not major forest product in shiroro LGA. This is because none of the mean response was below 2.50 which was the beach mark of agreed on the 4-points response options. The standard deviation score ranged between 0.530 and 1.263. This showed that the responses of the Foresters and the forest Product industry on the items were not divergent.

4.2 Research Question 2

How has the forest product industry contributed to the economy of Shiroro and Bosso local government area in Niger state?

Table 4.2: mean response of the Foresters and the forest Product industry on forest product industry contributed to the economy of Shiroro and Bosso local government area in Niger state.

		N ₁ = 50	N ₂ =40		
S/N	ITEMS	\bar{X}	SD	Remark	
11	It has lead to creation of many jobs	3.56	.522	Agreed	
12	It has increased revenue generation	3.63	.485	Agreed	
13	It has increased sustainable development	3.62	.510	Agreed	
14	It has increased innovation into local governments	3.63	.589	Agreed	
15	It has increased exportation of Forest products	2.27	.519	Disagreed	
16	It has increased Carbon Sequestration	3.67	.519	Agreed	
17	It has increased Climate Change Mitigation	3.66	.544	Agreed	
18	It has increased natural trade	3.71	.480	Agreed	
19	It has lead to more ecotourism activities	3.57	.637	Agreed	
20	It has lead to more biodiversity conservation.	3.76	.432	Agreed	

N=90

\bar{X} = mean of the respondents

N₁ = No. of forest Product industry

N₂= No. of foresters

SD = standard deviation of the respondents

Table 4.2 showed that both the Foresters and the forest Product industry agreed on most of the items. Item 15 was ranked disagree because no any exportation of forest product in shiroro LGA. This was because none of the mean response was below 2.50 which was the bench mark of agreed on the 4-point response options. The standard deviation score ranged between 0.432 and 0.637. This showed that the responses of the Foresters and the forest Product industry on the items were not divergent.

4.3 Research Question 3

How has the forest product industry impacted the employment rate in Shiroro and Bosso local government area of Niger state?

Table 4.3: mean responses of the Foresters and the forest Product on the forest product industry impacted the employment rate in Shiroro and Bosso local government area of Niger state

		N ₁ = 50		N ₂ =40
S/N	ITEMS	\bar{X}	SD	Remark
21	It has increased direct Employment	3.38	.943	Agreed
22	It has increased inderect Employment	3.54	.603	Agreed
23	It has increased Seasonal Employment as in transportation, marketing and packaging	3.61	.513	Agreed
24	It had increased small business development	3.58	.636	Agreed
25	It has increased jobs in sustainable forest Management	3.68	.516	Agreed

N=90

\bar{X} = mean of the respondents

N₁ = No. of forest Product industry

N₂= No. of foresters

SD = standard deviation of the respondents

Table 4.3 showed that both the Foresters and the forest Product industry agreed on all items. This was because all the items had mean response above 2.50 which was the bench mark of agreed on the 4-point response options. The standard deviation score ranged between 0.513 and 0.636. This showed that the responses of the Foresters and the forest Product industry on the items were not divergent.

4.4 Research Question 4

What are the challenges facing the forest product industry in Shiroro and Bosso local government areas of Niger state?

Table 4.3: mean responses of the Foresters and the forest Product on the challenges facing the forest product industry in Shiroro and Bosso local government areas of Niger state

		N ₁ = 50	N ₂ =40		
S/N	ITEMS	\bar{X}	SD	Remark	
26	Increased in rate of deforestation	3.39	.803	Agreed	
27	Illegal logging	3.58	.703	Agreed	
28	Unsustainable forest management	3.63	.608	Agreed	
29	Volatile market of Forest product	3.57	.765	Agreed	
30	Increased in climate change	3.66	.523	Agreed	
31	Inconsistency in regulations and certification	3.63	.550	Agreed	
32	Poor technical tools and equipment in use	3.64	.547	Agreed	
33	Poor community engagement	3.68	.516	Agreed	
34	Lack of funding	3.56	.672	Agreed	

N=90

\bar{X} = mean of the respondents

N₁ = No. of forest Product industry

N_2 = No. of foresters

SD = standard deviation of the respondents

Table 4.4 showed that both the Foresters and the forest Product industry agreed on all items. This was because none of the mean response was below 2.50 which was the bench mark of agreed on the 4-point response options. The standard deviation score ranged between 0.516 and 0.803. This showed that the responses of the Foresters and the forest Product industry on the items were not divergent.

4.5 Hypothesis 1

There is no significant difference in the mean responses of Foresters and the forest Product industry on the economy of Shiroro and Bosso local government area

Table 4.5 T-test on the forest product industry contributed to the economy of Shiroro and Bosso local government area in Niger state.

$N_1 = 50$ AND $N_2 = 40$

Respondents		N	X	SD	Df	Tcal	P-value	Remark
Forest	Product	50	3.70	.463	88	1.632	0.007	NS
Industry								
Foresters		40	3.53	.554				

$N=90$

\bar{X}_1 = mean of forest product industry

\bar{X}_2 = mean of foresters

N_1 = No. forest product industry

N_2 = No. foresters

SD₁= standard deviation of forest product industry

SD₂ = standard deviation of foresters

NS=Not Significant

Table 4.5 showed that there was no significant difference in the responses of Foresters and the forest Product industry on most of the items as the forest product industry contributed to the economy of Shiroro and Bosso local government area in Niger state; therefore the null hypothesis of no significant difference was upheld at 0.05 level of significance.

4.6 Hypothesis 2

There is no significant difference between the mean response of Foresters and sawmill operators towards the forest productivity in Shiroro and Bosso local government area.

Table 4.5 T-test on the forest productivity in Shiroro and Bosso local government are.

N₁ = 50 AND N₂ = 40

Respondents	N	X	SD	Df	Tcal	P-value	Remark
Saw mail Operators	50	3.76	.431	88	1.936	0.001	NS
Foresters	40	3.55	.597				

N=90

\bar{X}_1 = mean of forest product industry

\bar{X}_2 = mean of foresters

N₁ = No. forest product industry

N₂= No. foresters

SD₁= standard deviation of forest product industry

SD₂ = standard deviation of foresters

NS=Not Significant

Table 4.6 showed that there was no significant difference in the responses of Foresters and the forest Product industry on most of these items as the forest productivity in Shiroro and Bosso local government area; therefore the null hypothesis of no significant difference was upheld at 0.05 level of significance.

4.7 Hypothesis 3

There is no significant difference in the mean responses of Foresters and sawmills operators on the challenges facing the forest product industry in Shiroro and Bosso LGA.

Table 4.6 T-test on the challenges facing the forest product industry in Shiroro and Bosso LGA.

N₁ = 50 AND N₂ = 40

Respondents	N	X	SD	Df	Tcal	P-value	Remark
Saw mail Operators	50	3.62	.530	88	0.472	0.077	NS
Foresters	40	3.68	.572				

N=90

\bar{X}_1 = mean of forest product industry

\bar{X}_2 = mean of foresters

N₁ = No. forest product industry

N₂= No. foresters

SD₁= standard deviation of forest product industry

SD₂ = standard deviation of foresters

NS=Not Significant

Table 4.6 showed that there was no significant difference in the responses of Foresters and sawmills operators on all the items as strategies for overcoming the challenges facing the forest product industry in Shiroro and Bosso LGA; therefore the null hypothesis of no significant difference was upheld at 0.05 level of significance.

Findings of the study

The following are the main findings of the study; they are prepared based on the research questions and hypothesis tested.

What are the major forest products that are harvested in Shiroro and Bosso local government areas of Niger state?

The findings show that timber, charcoal, fuelwood, medicinal plants/herbs, wildlife, mushroom, paper, edible nuts, fruits are the major forest product harvested in Shiroro and Bosso local government area of Niger state.

How has the forest product industry contributed to the economy of Shiroro and Bosso local government area in Niger state?

The findings shows that, there is increased creation of many jobs, revenue generation, sustainable development, innovation into local governments, exportation of forest products, carbon sequestration, climate change mitigation, natural trade, It has lead to more ecotourism activities and biodiversity conservation in Shiroro and Bosso local government area of Niger state.

How has the forest product industry impacted the employment rate in Shiroro and Bosso local government area of Niger state?

The findings of this research shows that, there is increased in direct employment, indirect employment, seasonal employment (as in transportation, marketing and packaging), small business development, jobs in sustainable forest management in Shiroro and Bosso local government area of Niger state.

What are the challenges facing the forest product industry in Shiroro and Bosso local government areas of Niger state?

The findings shows that Increased in rate of deforestation, Illegal logging, unsustainable forest management, Volatile market of Forest product, Increased in climate change, Inconsistency in regulations and certification, Poor technical tools and equipment in use, Poor community engagement, Lack of funding are challenges facing the forest product industry in Shiroro and Bosso local government area of Niger state.

Discussion of findings.

The result from table 4.1 showed the findings on the major forest products that are harvested in Shiroro and Bosso local government areas of Niger state. Revealed timber, charcoal, fuelwood, medicinal plants/herbs, wildlife, honey, mushroom, paper, edible nuts, fruits are products harvested. The findings of the study is inline with Caspaet *al.* (2020) reported *Garcinia kola*, *Aframomium melagueta*, *Agaricus* species, *Irvingia gabonensis*, *Baphianitida*, *Thaumatococcus danielli*, *Cola nitida*, *Megaphrynium macrostachyum*, *Alstonia boonei*, *Rauwolfia vomitoria*, *Pycnanthus angolensis*, *Milicia excelsa* and *Newboldia laevis*. All these species in addition to others were also encountered at the Ehor Forest Reserve.

Table 4.2 shows the result of the findings on the forest product industry contributed to the economy of Shiroro and Bosso local government area in Niger state. The findings of the study revealed that it has increased the creation of many jobs, revenue generation, sustainable development, innovation into local governments, exportation of forest products, carbon sequestration, climate change mitigation, natural trade and also It has lead to more ecotourism activities and biodiversity conservation. The findings of the study is inline with Ojha *et al.* (2016) who stated that Forest products form a significant natural resource component of the poor people particularly in the rural areas. Edo state in particular is regarded as rich in forest resources. Wood based industries hold second place in the provision of employment opportunities with about 14% of the total employees in the state engaged in it.

The result of the hypothesis on the the forest product industry contributed to the economy of Shiroro and Bosso local government area in Niger state showed that there was no significant difference in the responses of Foresters and the forest Product industry on the forest product industry contributed to the economy of Shiroro and Bosso local government area in Niger state.

The result from table 4.3 revealed the findings on the forest product industry impacted the employment rate in Shiroro and Bosso local government area of Niger state. The findings of the study revealed that It has increased direct employment, indirect employment, seasonal employment (as in transportation, marketing and packaging), small business development, jobs in sustainable forest Management. The findings of the study isinline with Hetemäki and Hurmekoski (2016) Formal employment generated by the paper and wood products industry was analysed, as were global employment trends in 35 countries.

The result of the hypothesis on the forest productivity in Shiroro and Bosso local government are showed that there was no significant difference in the responses of Foresters and sawmill operators towards the forest productivity in Shiroro and Bosso local government area.

The result from table 4.4 reveal the findings on the challenges facing the forest product industry in Shiroro and Bosso local government areas of Niger state. The findings of the study revealed the Increased in rate of deforestation, illegal logging, unsustainable forest management, volatile market of forest product, increased in climate change, Inconsistency in regulations and certification, poor technical tools and equipment in use, poor community engagement, Lack of funding. The findings of the study isinline with Ketema (2015) Despite the potential opportunities, there are a number of challenges in development and conservation of forest resources in Ethiopia.

The result of the hypothesis on the challenges facing the forest product industry in Shiroro and Bosso LGA shows that there was no significant difference in the responses of Foresters and sawmills operators on the challenges facing the forest product industry in Shiroro and Bosso LGA.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of the Study

The main focus of this research study was to find out the economic impact of the 21st-century forest product industry to Shiroro and Bosso local government areas of Niger state.

The study discussed the background of the study, the statement of problem, purpose, significance, scope and the research questions were all stated and discussed for the conduct of this research.

The review of related literature looked into overview of the forest resource of Nigeria, The 21st century forest products, the concept of forest product industry in Niger State, The economic value of forest product industry. Various views of different authors concerning the topic were harmonized in a comprehensive literature review and empirical studies.

A survey approach was used to developed instrument for the study; the respondents identified as the population of the study were the Foresters and the forest Product industry. The entire respondents were used. A number of 90 questionnaires were administered. The research questions were discussed base on the findings from the responses and results of the instrument used.

Implication of the study and conclusions were also drawn from the findings discussed. Recommendations and suggestions for further study were formulated and stated according to the findings of the study.

○ **Implication of the Study**

The findings of the study had implications for government, foresters, forest product industry. This research reveals that forest product mills that utilize residual fibre such as pulp mills, cogeneration plants, and value added product mills are important in maintaining a healthy and vibrant forest economy. These entities assist in ensuring that producers with high fibrespecificity and high quality fibre needs are able to sell their residual product and achieve cost recovery on fibre that cannot be utilized in production processes. As such, policies that encourage the establishment and success of forest product mills that utilize residual fibre should be encouraged and enhanced.

5.3 Conclusion

Based on the findings of the study, the following conclusions were drawn: Attention has been drawn to the variety of forest products available in Shiroro forest reserve and their uses. These products contribute significantly to the economy of Niger state so they should be exploited with caution to avoid their depletion from the forests.

5.4 Recommendations

Based on the findings of the study, the following recommendations were made:

- Establishment of forest information data base since there are no reliable, consistent and comprehensive statistics about forest.
- Improving the effectiveness of policies, regulations and agreements that are important for the development and conservation of forest resources.
- Sustainable protection and management of the existing natural forests needed through the collaborative effort of the government, NGO and the local community for reduction of tree cutting and production of charcoal.

5.5 Suggestion for Further Study

The following are suggested for further studies:

- i. Economic impact of the 21st-century forest product industry in other local government areas.
- ii. Economic impact of the 21st-century forest product industry in other state.

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