



Market Study and Value Chain Analysis of **KENAF** in Nigeria



LINKS

Catalysing Economic Growth
for Northern Nigeria



Nigeria remains prominent for its variety of Agricultural resources that, when properly harnessed, can serve as a stimulus to the processing industries and a sustainable economic growth



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The views and opinions expressed in this document are those of the author and do not necessarily represent the views and opinions of LINKS or UK Aid



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ACRONYMS AND ABBREVIATIONS

| | |
|---------|--|
| ABS | Anchor Borrower Scheme |
| ADP | Agricultural Development Program |
| AFAN | All Farmers Association of Nigeria |
| APS | Annual Performance Survey, NAERLS |
| BUK | Bayero University, Kano |
| CBN | Central Bank of Nigeria |
| CDA | Centre for Dryland Agriculture |
| COPMAN | Cotton Producers and Merchants Association of Nigeria |
| DKSM | Defatted Kenaf Seed Meal |
| FCAPT | Federal College of Agricultural Produce Technology, Kano |
| FCT | Federal Capital Territory |
| FGDs | Focused Group Discussions |
| FMARD | Federal Ministry of Agriculture and Rural Development |
| FMITI | Federal Ministry of Industry, Trade and Investment |
| FMWR | Federal Ministry of Water Resource |
| FPO | Farmer Producer Organisation |
| FRIN | Forest Research Institute of Nigeria |
| IAR | Institute for Agricultural Research |
| IAR&T | Institute for Agricultural Research and Training |
| IGS | Intermediate goods and services |
| IH | Industrial Hemp |
| IITA | International Institute for Tropical Agriculture |
| KASCO | Kano Agricultural Supply Company |
| KEDAN | Kenaf Development Association of Nigeria |
| KEPPMAN | Kenaf Producers, Processors and Marketers of Nigeria |
| KIIs | Key Informant Interviews |
| KSF | Kenaf Seed Flour |
| KSPC | Kenaf Seed Protein |
| LSF | Large-scale farmers |
| NFISIWG | National Financial Inclusion Special Interventions Working Group |
| MSF | Medium-scale farmers |
| MSMEDF | Micro, Small and Medium Enterprise Development Fund |



| | |
|---------|---|
| MSME | Ministry of Micro, Small and Medium Enterprises |
| NACOTAN | National Cotton Association of Nigeria |
| NAERLS | National Agricultural Extension and Research Liaison Services |
| NASC | National Agricultural Seed Council |
| NBS | National Bureau of Statistics (Nigeria) |

| | |
|----------|--|
| NDLEA | National Drug Law Reinforcement Agent |
| NEMA | National Emergency Management Agency |
| NESREA | National Environment Standard and Regulation Enforcement Agency |
| NiMET | Nigerian Meteorological Agency |
| NIRSAL | Nigeria Incentive-based Risk Sharing System for Agricultural Lending |
| NNPC | Nigerian National Petroleum Corporation |
| RMRCDC | Raw Materials Research and Development Council |
| SHF | Smallholder Farmers |
| WACOT | West African Cotton Company Limited |
| VCA | Value Chain Analysis |
| ZAMDACOD | Zamfara Accelerated Cotton Development Agency |



Executive Summary

Considering the current global environmental challenges, the need to return green or bioeconomy has become imperative. Kenaf bioeconomy presents one of the most promising ways to secure sustainable economic growth, industrial development and environmental improvement. Hence, the development of the Kenaf value chain and its bioeconomy in Nigeria, is the necessary step towards the green growth of the economy.

Tipped to save Nigeria billions of dollars annually by the Raw Materials Research &

Development Council (RMRDC), the investment prospects that the Kenaf value chain produces in Nigeria are lucrative and numerous to attract both local and foreign investors who seek profit maximization, environmental maintenance, social inclusion and real change in societal welfare. The Nigerian climate and soil provide the enabling environment for more than 26 states (by research) to extensively produce Kenaf each year. With several varieties of hybrid seeds currently produced domestically that can ensure 2 to 3 production cycles in a year and several thousands of hectares of land allocated by the Federal/State governments and individual farmers, Nigeria is setting itself as the next big producer of Kenaf in the world.

IAR&T is the main research institute mandated with the responsibility to develop the Kenaf value chain and the operating associations: KEPPMAN and KEDAN. It has a clear environmental and social mission in identifying and aligning with one or more of the UNSDGs in promoting profitability and sustainability of the Kenaf value chain Nigeria. This sets the right foundation for private and public investors to utilize gaps in seed multiplication & upscaling, mechanical planting, harvesting and processing as well as the mechanization of the entire manufacturing stages of the value chain in producing jute bags, bio-degradable packaging materials, papers and many organic products of high demand in domestic and local markets. With no clear policy on Kenaf in Nigeria, policy development and R&D into management and promotion of the crop is equally an interesting area for investments.

Current research has not fully grasped the extent of product varieties that can be obtained from Kenaf manufacturing and its diverse applications. With a population of more than 200 million people, the Nigeria domestic markets provide the needed demand to absorb the products from Kenaf.

The objectives of the present study was to assess how Kenaf can be complemented with Cotton in Nigeria to meet local and international market demands for national growth and development through the assessment of the market development potentials and commercial viability of Kenaf VCs as well as document the growth inclusiveness; examining the possibilities of substituting or combining Cotton with Kenaf and identify and document gaps in the VCs that provide investment opportunities; determining the social sustainability of the Kenaf VCs and assessing the environmental sustainability of Kenaf VCs.



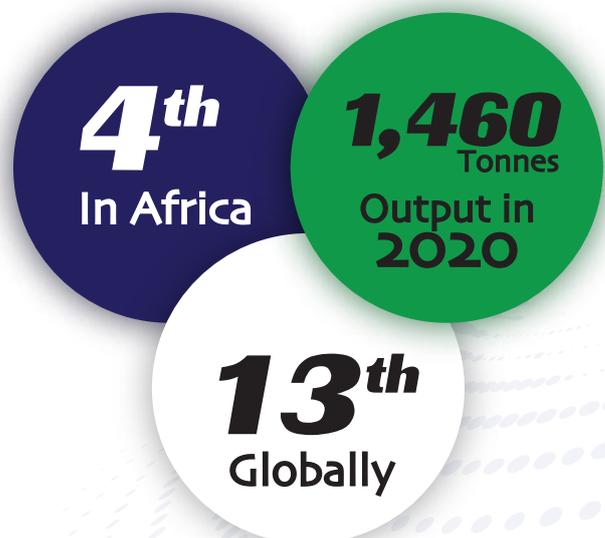
Nigeria remains prominent for her variety of agricultural resources that, when properly harnessed, can serve as a stimulus to the processing industries and a sustainable economic growth. The continuous issues in the cotton industry in Nigeria in the past decades have presented a diversification opportunity for close substitutes, including Kenaf, based on their higher yield potential and the minimal negative impact they tend to have on the environment. Kenaf has also been suggested as a fibre alternative in Northern Nigeria to address downward spiral and degenerative environmental impacts from cotton production while ensuring adequate commercial returns.

This project is focused on assessing the switching opportunities for substituting cotton with Kenaf or combining with economic, social and environmental considerations. It explores the entire Kenaf value chain, bringing out the investment entry points with significantly sustainable profit margins and high impact on the green bioeconomy. Compared to Cotton value chain in Nigeria, Kenaf presents to ensure a more environmentally friendly, socially acceptable, profitable and sustainable crop to grow, process, manufacture and market in Nigeria.

This analysis of Kenaf in the study focuses on fieldwork conducted in ten (10) states: These states are in the LINKS focal states of Kano, Kaduna, Jigawa, and other seven states: Katsina, Zamfara, Oyo, Ogun, Kwara, Benue, and Kogi. With a detailed desk review including literature review, reports, relevant documents, publications, and online databases, data collection was professionally guided. In addition to a robust desk review, Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) were integral in acquiring data from Producers, Traders, Processors and relevant VC stakeholders for analysis that led to the conclusions in the study.

All relevant stakeholders were consulted during the study. These stakeholders include Federal Ministry of Agriculture and Rural Development (FMARD), Agricultural Development Programs (ADPs), the National Agricultural Seed Council (NASC); Institute of Agriculture Research (IAR), Zaria; Institute of Agriculture Research and Training (IAR&T), Ibadan; Forest Research Institute of Nigeria (FRIN), Ibadan; National Drug Law Enforcement Agency (NDLEA); National Environmental Standard and Regulation Enforcement Agency (NESREA); Ministry of Environment, Ministry of Industry, Trade, and Investment, Federal College of Agricultural Produce Technology, Kano (FCAMPT); Centre for Dryland Agriculture, Bayero University, Kano (CDA); All Farmers Association of Nigeria (AFAN); Kenaf Producers, Processors and Marketers of Nigeria (KEPPMAN); Kenaf Development Association of Nigeria (KEDAN); Cotton Producers and Merchants Association of Nigeria (COPMAN); Zamfara Accelerated Cotton Development Agency (ZAMDACOD); National Cotton Association of Nigeria (NACOTAN); Nigeria Incentive-based Risk Sharing Agricultural Lending (NIRSAL); Kano-Office of the International Institute of Tropical Agriculture (IITA).

Global Ranking





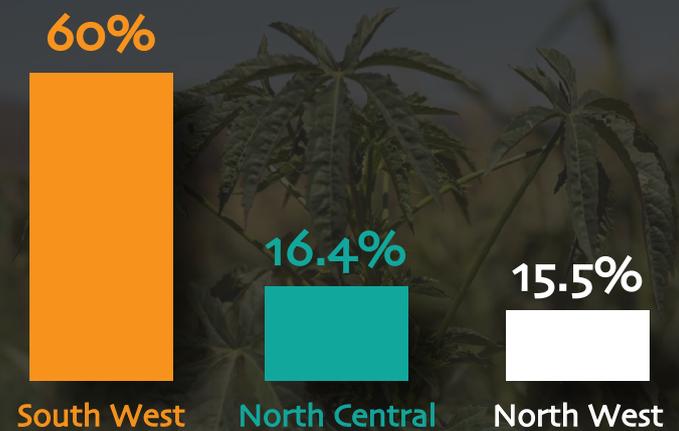
Nigeria is one of the leading producers of Kenaf fibre, 4th in Africa and the 13th globally with an official estimate of the total kenaf fibre output of about 1,460 tonnes in Nigeria by 2020. Currently, kenaf is predominantly grown in the South Western states of Nigeria; Ogun and Oyo, accounting for almost 60 percent of total national output followed closely by North-central that contributes about 16.4 percent and North-West by 15.5 percent. Production of Kenaf in Nigeria has been driven by contract agreements between the farmers and the off-takers. Though exotic varieties such as Tiannung 1, Guatemala 2A (51), Everglades 71/41, Cuba 108 and Salvador yield higher per hectare than the hybrid varieties from IAR&T (Ifeken DI 400, Ifeken 400, ARTKEN 211, Ifeken 100), the hybrid varieties from IAR&T are promoted for production in Nigeria.

Fibre quality determines its selling power based on international standard fabric requirements which therefore suggests that actors involved must invest significant resources in cleaning and retting before delivering to quality-sensitive buyers. Low quality fibre likely stemming from use of hands in planting/harvesting activities and poor retting and decortication processing methods, hinders SHFs and many micro/small-scale aggregators from accessing the high returns from quality-sensitive markets dominated by large-scale aggregators, wholesalers, and exporters who through contracts can ensure good quality through better practices for off taking. Kenaf fibre exports is limited as the sector is still developing, dominated mainly by LSFs and large aggregators operating in the southwest with Malaysia the country identified from consultations as export destination some years back.

Absence of improved planting/harvesting equipment, weed and disease infestation, limited water supply and high cost of fertilizer remain serious on-farm constraints to the development of the kenaf value chain. Inadequate processing facilities, poor storage facilities, and undeveloped markets are identified as major off-farm challenges while poor finance, limited supply of quality seeds, inadequate extension/training have been identified as major non-farm constraints in the kenaf value chain.

The major actors in the kenaf value chain include producers (SHF, MSF, LSF); processors (SCP, MSP, LSP); aggregators (SSA, MSA, LSA), Traders (Wholesalers, retailers, exporters), enablers (IAR&T, FMARD, NASC, KEPPMAN, FMITI). Majority of farmers are smallholder farmers. SHF households earn an average annual Kenaf-based income of about N160,000, which is often complemented by revenue from the production of other crops, considering the unstable nature of the markets mainly created by a lack of off-takers.

KENAF PRODUCTION IN NIGERIA



₦160,000
Average Household Earnings

₦482,400
MSF Estimated Annual Income



MSF makes an estimated annual Kenaf based income of N482,400, far above the official minimum wage per annum. Cultivating kenaf is found to be profitable with LSF enjoying higher returns with kenaf seed producers earning more than fibre producers due to lack of adequate processing sector that reduces quality and price. Like producers, all processors enjoy profit. Micro- medium scale processors have good profit margins with a RoT of about 14.8% but the margins are much lower than the producers' margins. All categories of kenaf trading are profitable with large scale aggregators experiencing the highest RoT of 27%.

A good number of women and youths are getting involved in the kenaf value chain and the interests in participation is increasing by the day. The entire kenaf value chain in Nigeria is economically, socially and environmentally sustainable.

Cotton and kenaf farmers across the country, that combine to amount to more than 50,000 are willing to allocate thousands of hectares of land for kenaf cultivation if off-take and markets are available. A significant growth of more than 100 percent in the membership of KEPPMAN has been noticed in a year, pointing to the increased interest of farmers in involving in kenaf cultivation. With proper capacity building of kenaf value chain actors and an establishment of a sustainable private sector kenaf processing/manufacturing sector, thousand more farmers will be willing to switch to kenaf production considering the

attractive profit margins, social sustainability and environmental sustainability of the the crop. Federal and State government expression of interest and support for the development of kenaf value chain through provision of land has also helped widen the switching chances.

This study described the nature and operations of the Kenaf VC in Nigeria, examining the nature of Kenaf markets and the cost-benefits analysis of the actors - producers, processors, and aggregators – with production presenting the best RoT of the three. Although investment prospects of the Kenaf are vast and attractive, and production presents the best RoT of the three. However, to maximise the full potential of the chain, it is vital to adopt improved production and processing technologies and organize farmers and industrialists into efficient value-added chains. The defining bridge in the entire value chain is the processing unit. Sound investments in this aspect can stimulate very rapid rates of growth in Kenaf markets and the industry. Manufacturing is a massive element in the Kenaf sector and is observed to possess the potential to unlock unlimited benefits of Kenaf through value additions in products, by-products, and waste management.

The profits obtained by the various actors are encouraging. They have attracted, alongside the possibilities of developing the Kenaf value chain, many farmers, processors, and marketers to register with major Kenaf associations. The trends reveal a growth pattern in land cultivated for Kenaf in the country.



Introduction



Background Information and Context of the Study

Nigeria is endowed with a variety of agricultural resources that, if properly harnessed, can serve as a stimulus to the processing industries and a booster to the country's economic growth. The value addition strategy on agricultural produce provides ample opportunity for revenue generation, job creation, reduction of poverty, raising the GDP, and addressing the trade imbalance. The processing of Agro raw materials into various innovative products promotes market acceptability. It generates high product economic value, bringing higher income for value chain (VC) actors and enhancing national economic growth and development. VC presents a business dimension to the production of any commodity and ensures that production is linked to the demand and the critical role of organizing the flow from producers (farmers) to consumer opportunities. However, value subtraction comes to the fore when the end price does not compensate for the investment cost.

The challenges that have accompanied the Cotton industry in Nigeria in the past decades have sufficiently inhibited economic growth in the fabric and associate sectors and diminished supply chain actors' income. Thus, presenting a diversification opportunity for close substitutes like Kenaf is relevant due to its yield potential and positive regenerative impact on the environment. But persuading farmers to substitute Kenaf on acreage traditionally planted with crops like Cotton has not been easy due to the lack of financial performance data, traditional beliefs, rigid government policy, and lack of political will. However, the desirable features are yet to be explored, hence the need for this project.

The LINKS Empowering Economic Growth in Northern Nigeria program is aimed at diversifying the economy of the three core Northern Nigerian States of Kano, Kaduna and Jigawa. The project also aims to support the socioeconomic development of the various states in the northern region through collaboration with international stakeholders and donors. LINKS has identified the need to foster national development in agriculture and related sectors through the application of climate smart techniques that will impact positively on the Northern region along the three main dimensions of sustainable development: economic, social and environmental. This entails sustainably increasing agricultural productivity and incomes, adapting and building resilience to climate change, and reducing and/or removing greenhouse gas emissions. It is an approach for developing agricultural strategies to secure sustainable crop security under climate change. This aims to ensure enormous economic benefits without negatively affecting the welfare of the people and their habitable environment. Bearing this in mind, this project has been propagated and envisioned by the donors' willingness to transform strategic VCs to improve resilience and reduce climate impact through several approaches, including developing sustainable fabric alternatives to Cotton.





Sustainable Fibre alternatives to Cotton: Growing Cotton is degenerative to the environment because conventional Cotton is a heavy feeder, requiring a massive supply of water, mineral fertilizers, and pesticides, thus, harming the planet. The global appeal of Cotton has made it increasingly difficult for farmers to shift into sustainable fabric production alternatives irrespective of the climatic implication of its production. It is assertive to mention that the imminent ban on exporting agricultural commodities in plastic bags will continue to ensure the rise in Cotton production in Nigeria, notwithstanding the damming consequences on the environment. This ban is expected to stimulate demand for Cotton- based sacks, which is expected to trigger Cotton production across Northern Nigeria. Considering the effect climate change already has on agriculture in Northern Nigeria, additional degenerative production practices will exacerbate the downward spiral and harm the environment even more. However, Kenaf has been suggested as fibre alternatives in Northern Nigeria to alleviate this constraint while ensuring adequate commercial returns.

Kenaf has been produced and used as a major source of fibres, paper, and other materials for many years. This fibre crop does not require fertilizers or other agrochemical inputs. It also requires much less water than Cotton during its production cycle. However, realizing the potential of alternative fibres in countries including Nigeria has not been easy. While there is vast potential for using these products for reclamation of degraded lands and for developing industrial products, further research is needed. For instance, which crops offer the best alternatives and which varieties are grown in which conditions? There is also a need to investigate the effectiveness of other aspects of the VC, like aggregation and processing. Work needs to be done around governmental advocacy (particularly IH), which has already been subject to certain national restrictions.





Research Questions for the KENAF VC Study

The project will address the following Questions:

1. What are the market development potentials and commercial viability of the kenaf VC?
2. What are the possibilities of substituting or combining Cotton with Kenaf as gaps in the VCs that Provide Investment Opportunities?
3. Is the KENAF VC socially Sustainable?
4. Is the KENAF VC Environmentally Sustainable?

Objectives of the KENAF VC Study

The broad objective of the project is to access how KENAF can be complemented with cotton in Nigeria to meet local and international market demands for national growth and development. the objective will be met by meeting the following specific objectives:

1. Access the market development potentials and commercial viability of Kenaf VC as well as document the growth inclusiveness.
2. Examine the possibilities of substituting or combining cotton with kenaf and identify and document gaps in the VCs that provide investment opportunities.
3. Determine the social sustainability of kenaf VCs.
4. Access the environmental sustainability of Kenaf VCs.

Rationale for the Kenaf VC Study

The agricultural development initiatives of the past were hinged on production output without adequate consideration of the market and livelihood drivers that holistically promote national and inclusive economic growth. In addition, Nigeria's agricultural development interventions have neglected the relative importance of developing sustainable commodity supply chains within the context of social and environmental impacts, thereby negating the sustainability approach of the entire process. It is important to note that, for any commodity VC to be sustainable, its economic, social, and environmental components must be effectively exhausted for mutual and inclusive benefits.

The VC is pivotal to agricultural development due to its trans-sectorial capacity to add economic value and create employment inclusively and sustainably. It represents an operational framework within the agri-food sector and engages farmers and businesses. VC analysis can help in decision-making by assessing appropriate indicators, setting up baselines, and providing information on the changing situation of the actors related to the intervention.



Methodology and Scope of Work

Study Locations and Data Sources

The fieldwork was conducted in eleven (11) states to collect data on Kenaf and Cotton from stakeholders in the value chains. The initial ten (10) states identified for the study included: the focal states Kano, Kaduna, Jigawa, and other seven states: Katsina, Zamfara, Oyo, Ogun, Kwara, Benue, and Kogi. Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) were conducted in each state. It is important to note that FGDs and KIIs were undertaken concurrently with Kenaf and Cotton VC actors – Producers, Traders, and Processors. The choice of Cotton VC actors was because of the tremendous difficulty we encountered in acquiring information on Kenaf in these states.

We assured respondents of a high level of confidentiality and cleaned and synthesized the data following international best practices. The data were analysed and interpreted using modern software and presented in a suitable format. We adopted mixed methods in undertaking the study. Data and evidence collection involved the use of various tools and resources, including the following:

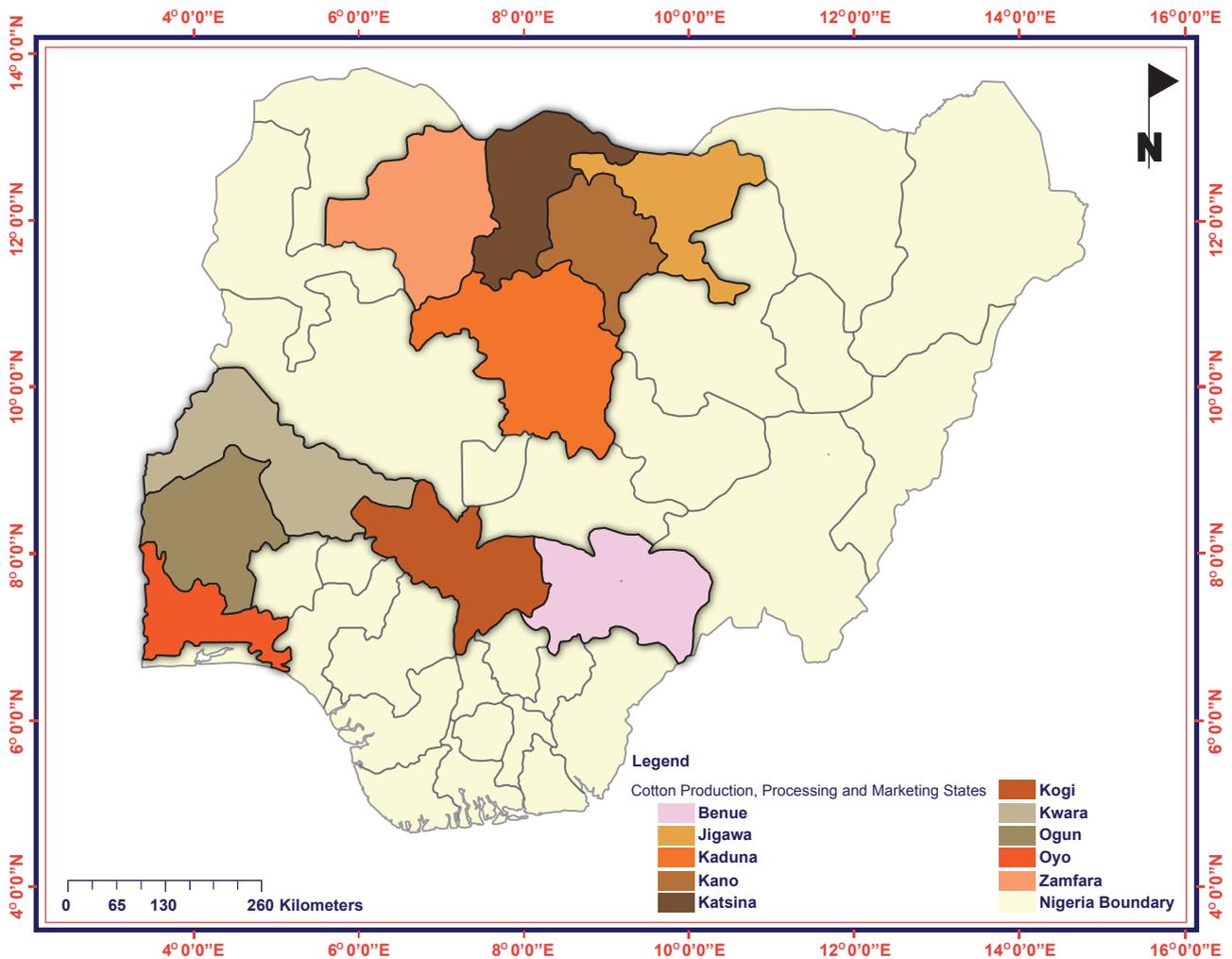
Desk Review. Desk study involves literature review, reports, relevant documents, and online databases. Also reviewed are publications and reports (see references). The desk review entails an analysis of market reports, policy documents, technical reports, journals, newspaper articles, and other relevant documents. The review helps identify the stakeholders, market dynamics, prospects, challenges, solutions, and entry points for Kenaf in Nigeria. Moreso, the task involved a thorough assessment of the local, regional, and global Kenaf VC. Additional information was collected from relevant government ministries, departments, and agencies (MDAs), including research and development institutes, and academic institutions.

Key Informant Interviews and Focus Group Discussions. Interviews with key actors at all stages in the Kenaf value chain, including experts and resource persons, on themes related to the study's specific components, including functional, economic, social, and environmental issues. The interviews were either semi-structured or unstructured and centred around key issues in the value chain. In identifying stakeholders, we considered factors such as category, role, and influence in the Kenaf VC and their relevance to the study. We designed a participatory framework for stakeholder engagement during the KIIs and FGDs. The FGDs were conducted with primary industry association stakeholders - farmers, processors, and aggregators. The KII activity was undertaken with MDAs and the top representatives of national, regional, and global industry associations, resulting in a robust VC data analysis for Kenaf.





Figure 1: Map of States in Nigeria Covered in Kenaf VC Study - 2022



Furthermore, we conducted the surveys with the mapped stakeholders at the agreed time and venue. We used suitable probing methods to record our pre-designed data entry templates and expert interviewers. Notetakers were engaged to take notes and provide the research team with an accurate and full account of the information conveyed (responses and observations) in interview sessions. Also, we provided modalities for virtual interviews and adhere to the COVID-19 prevention guidelines for physical KIIs and FGDs by using face masks and hand sanitizers where required.

Participants in the study were interviewed using structured checklists that were pre-tested. The purpose of pre-testing was to identify problems with the data collection instrument and find possible solutions. Our approach has allowed appropriate adjustments to be made before full-scale administration of the instrument, helping to ensure that standardized procedures are applied during data collection.

We adopted a mix of analytical tools, including the following:

- a) Basic statistical analysis to underpin the functional analysis.
- b) Basic accounting framework for the financial analysis of the operations of key actors.
- c) Basic excel spreadsheets were used for the economic and marketing analysis, including computing the total value added in the chain.





Stakeholders consulted and analytical scope of the study

The fieldwork occurred from February to April 2022. Overall, the exercise was fruitful and enabled the team to obtain essential data relevant to the study. At the beginning of the study, we had a briefing session with FCDO-LINKS officials in Kano. The discussion was quite insightful and thoughtfully guided the fieldwork. Other stakeholders consulted included those below (also see Appendix 1 for the complete list of stakeholders consulted):

- **Government:** FMARD, Abuja; ADPs (Kano, Katsina, Kogi, Benue, Jigawa, Kwara, Kaduna, Zamfara); the National Agricultural Seed Council (NASC); Institute of Agriculture Research (IAR), Zaria; Institute of Agriculture Research and Training (IAR&T), Ibadan; Forest Research Institute of Nigeria (FRIN), Ibadan; National Drug Law Enforcement Agency (NDLEA); National Environmental Standard and Regulation Enforcement Agency (NESREA); State Ministry of Environment (Kano, Jigawa, Kaduna, Katsina, Kogi); State Ministry of Health (Kano, Kaduna, Jigawa, Katsina)
- **Education Institutions:** Federal College of Agricultural Produce Technology, Kano; Centre for Dryland Agriculture, Bayero University, Kano.
- **NGOs/Representative Organisations:** All Farmers Association of Nigeria (AFAN); Kenaf Producers, Processors and Marketers of Nigeria (KEPPMAN); Kenaf Development Association of Nigeria (KEDAN); Cotton Producers and Merchants Association of Nigeria (COPMAN); Zamfara Accelerated Cotton Development Agency (ZAMDACOD); National Cotton Association of Nigeria (NACOTAN).
- **Private Companies:** Arewa Textiles, Murada Ventures Limited, WACOT, Zamtex Limited.
- **Others:** Nigeria Incentive-based Risk Sharing Agricultural Lending (NIRSAL); Kano-Office of the International Institute of Tropical Agriculture (IITA).

The VC study is national in scope. Still, we focused on the three target states – Kano, Kaduna, and Jigawa – and eight top fibre-producing states, covering three major agroecological zones. The Federal Capital Territory, Abuja (FCT), is of interest because it hosts relevant policymaking institutions.





OVERVIEW OF KENAF VALUE CHAIN IN NIGERIA

KENAF PRODUCTION IN NIGERIA

NIGERIA IS A LEADING KENAF PRODUCER IN AFRICA

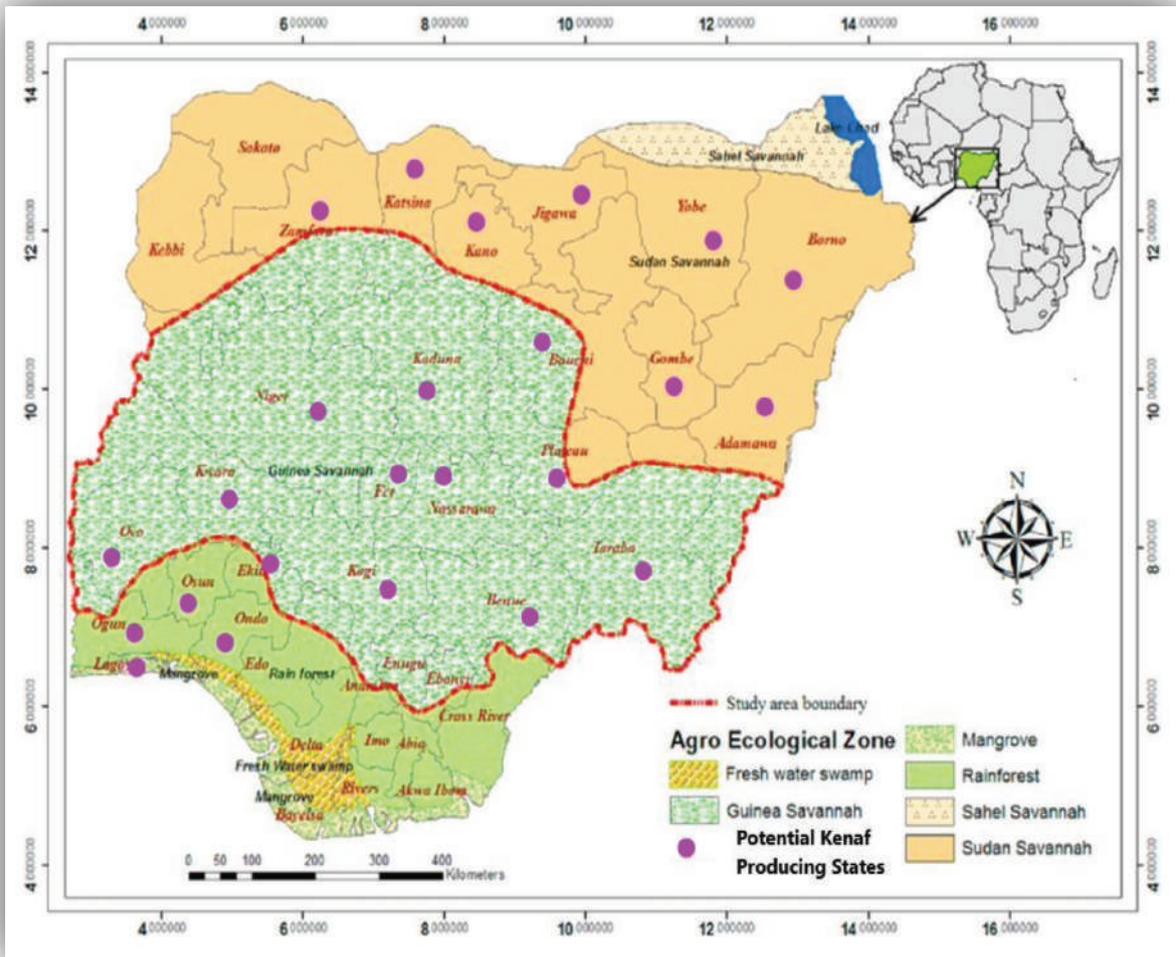
Nigeria is one of the top producers of Kenaf in Africa. Globally, Africa is still at the beginning stages of accepting Kenaf as an economic crop. The official estimate of the total output of the Kenaf fibre crops in Nigeria in 2020 is about 1,460 tonnes, placing the country only marginally below Mali, which is ranked 12th globally in terms of volume of Kenaf produced per annum. The global output in 2020 is estimated at approximately 230,803 tonnes (FAOSTAT, 2020). However, production is dominated by a few countries, with the top five accounting for almost 85 percent of global output. Evidence from the FAO shows that the leading producers are India (44.1 percent), Russia (21.5 percent), China (9.9 percent), Cuba (5.2 percent), and Chile (4.13 percent). Nigeria ranks fourth in Africa behind Mali, which produces about 1,482 tonnes of Kenaf crops. However, the country’s share of global output is estimated at 0.6 percent and exceeds that of the next largest African producer, South Africa, by almost 4.0 percent.

South-west Nigeria dominates Kenaf production, accounting for almost 60 percent of total national output. Oyo and Ogun are top producers, contributing about 19.2 percent and 17.3 percent of total annual output, respectively. North-central contributes about 16.4 percent, followed closely by 15.5 percent produced in the North-west and 9.0 percent in the North-east. Kano is Nigeria's fourth-largest producer of Kenaf, accounting for 7.4 percent of national output in 2020. Nigeria can potentially increase Kenaf cultivation by more than 1 million hectares of land by raising awareness about its economic and business benefits (FAO, 2014).

GEOGRAPHY OF KENAF PRODUCTION IN NIGERIA

Kenaf is one of the few crops that grow across Nigeria. It thrives under the different agro-climatic conditions in the country depicted in Figure 2. In this study, the states covered cut across most agroecological zones. The sublocations selected include Sudan Savannah (Kano, Jigawa, and Katsina in the North); Guinea Savannah (Kaduna, Kogi, Benue Kwara, Oyo); and the Rainforest (Oyo and Ogun).



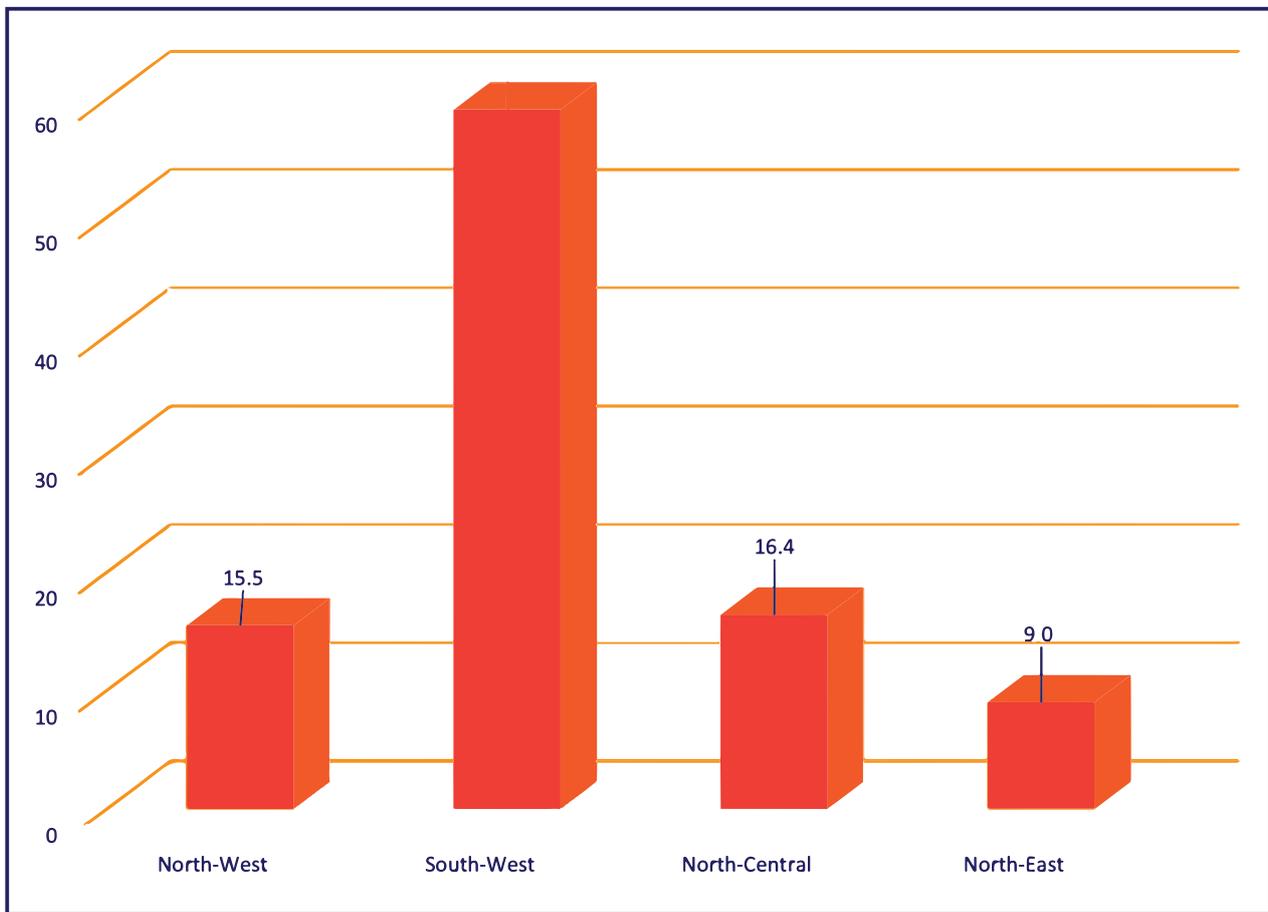


The rise in productivity and the expansion in area under cultivation has increased total Kenaf output in Nigeria, as shown in figure 4 Kenaf output more than doubled to over 1,000 tonnes per annum, from an average of 500 tonnes per annum in the 1980s. Growth in Kenaf output has trended upwards at an average rate of 6.0 percent from 2000 to 2020. It is important to note that Kenaf production in Nigeria has fluctuated since 2004. Output was slightly above 1,200 tonnes in 2005 but declined to above 600 tonnes in 2008, only to peak at 1,300 tonnes in 2017. However, the FG targets an annual output of about 130,000 tonnes by 2020 and 320,000 tonnes by 2025 (FMITI, 2019). There is no evidence to suggest this target has been reached, or there is an absence of interest by farmers to produce and supply Kenaf when the demand exists.

The observed growth in Kenaf output is partly due to rising farm productivity. Data from the FOASTAT (2020) indicates that Kenaf yields remain relatively low and vary over time, and across the zones, the value ranges from 9.5 tonnes per hectare in the north to as high as 14.4 tonnes in the south. The national average yield is estimated at 10.7 tonnes per hectare, and this is over 90 percent higher than in 1985, when Kenaf's yield per hectare was about 5.4 tonnes per hectare. The current yields remain well below attainable levels of more than 60.0 tonnes per hectare reported in China and Cuba. Table 1 shows the available varieties of Kenaf crop in Nigeria and their quality attributes.



FIGURE 3: GEOGRAPHICAL DISTRIBUTION OF KENAF PRODUCTION IN NIGERIA (2022)



Source: Author's computation from RMRDC/FAOSTAT/USDA

Figure 4 shows the percentage share of Kenaf output in Africa with Nigeria accounting for 9 percent, DRC is 7.9 percent, Mozambique (5.4 percent), South Africa (7.2 percent), and Mali (5.7 percent). With the renewed interest of the FG of Nigeria in promoting the production of Kenaf as a critical multipurpose crop, there is potential to revitalize the value chain to take advantage of the enormous opportunities in Africa. The FG's effort to support and promote Kenaf can be seen through mandates assigned to RMRDC and IAR&T to commercially develop the Kenaf value chain (BusinessDay, 2021). The development of the National Policy on Kenaf by KEPPMAN in collaboration with the FMITI is an additional indication of the government's interest in developing the Kenaf value chain in Nigeria.

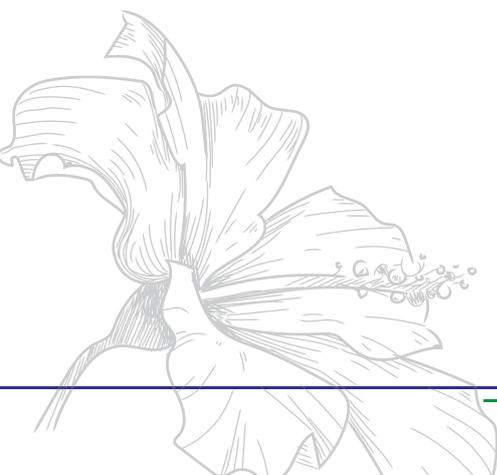
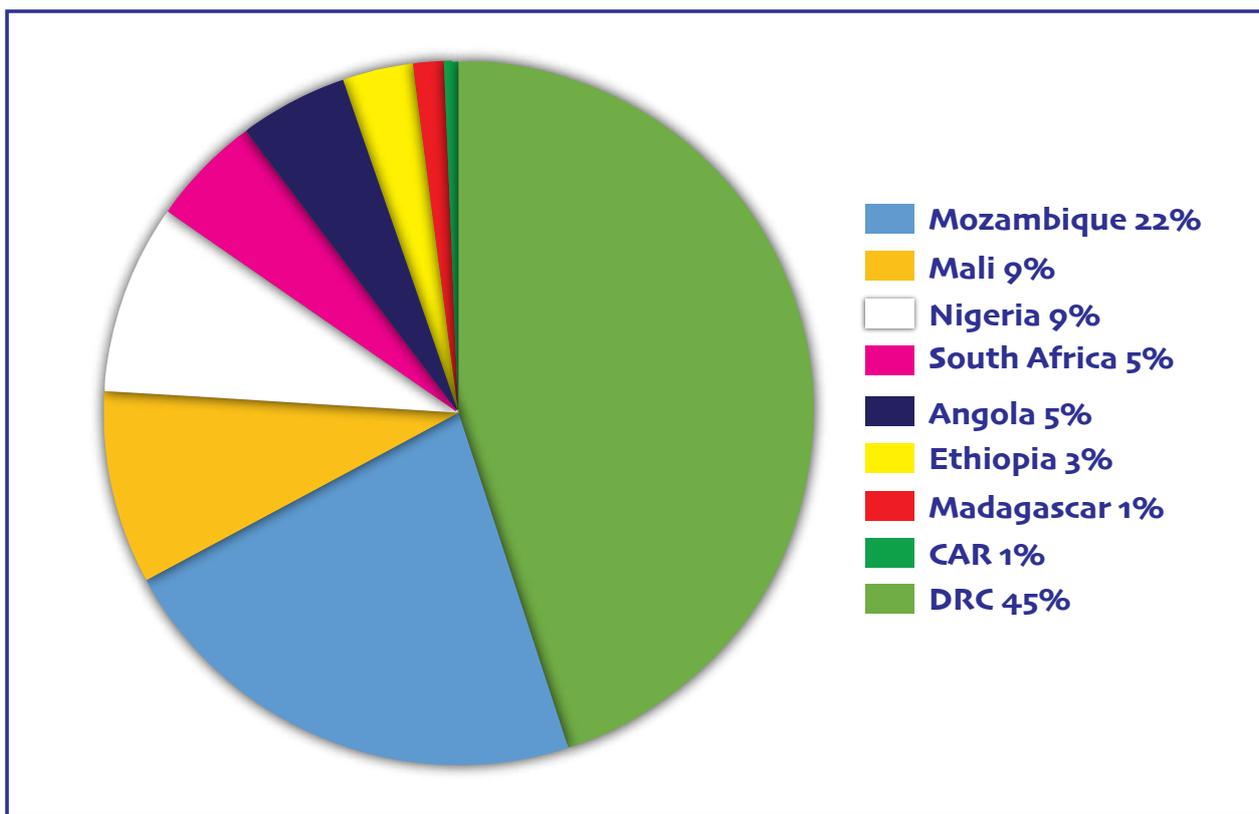




FIGURE 4: PERCENTAGE SHARE OF KENAF PRODUCTION IN AFRICA (2020)



Source: Statista, 2020

In 2021 the FMARD stated that it was seeking collaboration with the Ministry of Finance, Budget, and National Planning in ensuring that appropriate policy measures and counterpart funding are put in place to fast track the setting up of jute bag factories across the nation as well as commence the cultivation of Kenaf, which can grow in any part of the country, being raw material for the production of jute bags (Vanguard, 2021).

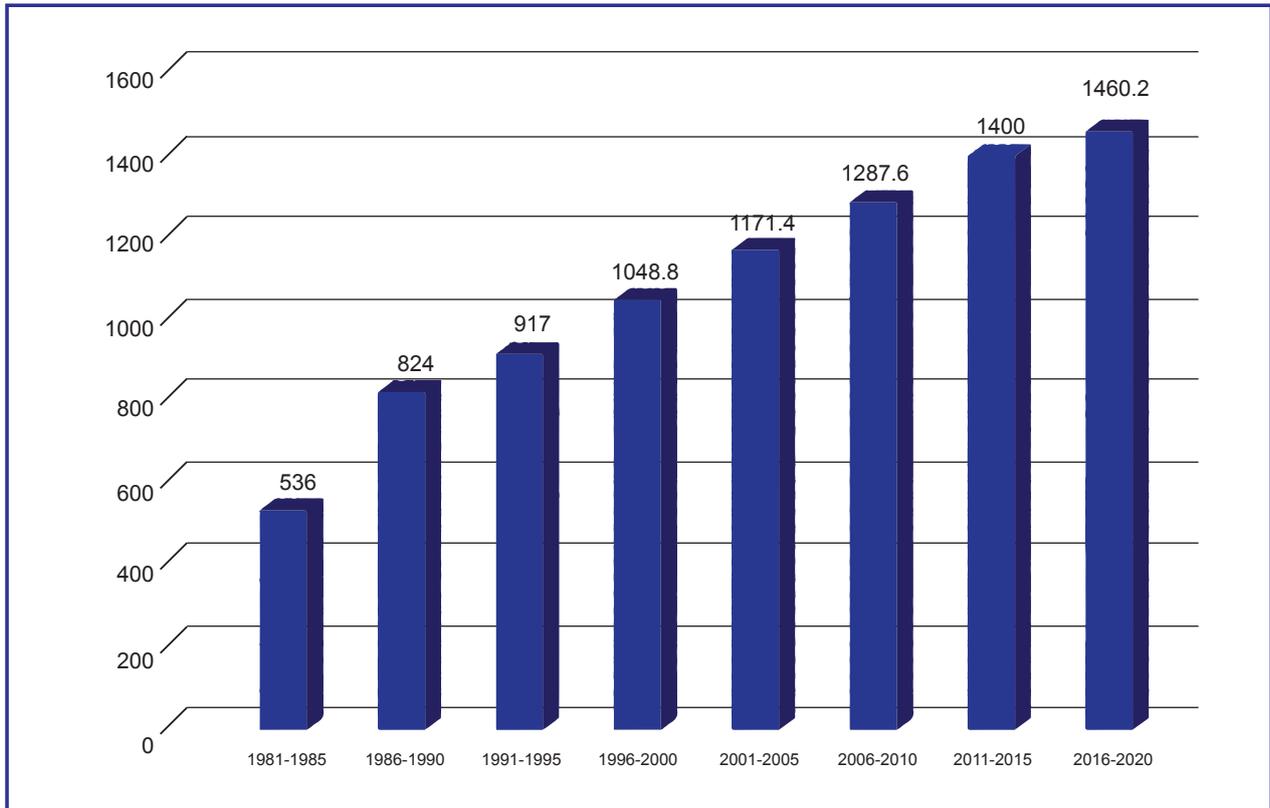
The climate and soil enable most agroecology of the country to produce Kenaf each year extensively, as several varieties of Kenaf hybrid seeds are currently available for distribution. Some varieties could allow 2 to 3 production cycles in a year. To elicit the interest of farmers, many Jute bag manufacturers are backing their operations with organized extension advisory services in Nigeria, such as the NAERLS. Kenaf associations just like any other crop producing associations can employ the services of EAs. EAs are trained agents in NAERLS to provide extension advisory services to farmers.

During our consultation with KEPPMAN in Oyo and Ogun state, the leadership revealed that efforts from the Oyo state government has put nearly 30,000 acres of land into Kenaf production around the Ibadan- Oyo areas of the south. Also, the FG, some State governments, and individual farmers have allocated several thousands of hectares of land for Kenaf cultivation. Efforts like this from other states and the Federal government could Nigeria major player in the Kenaf global industry. So much is still required for this to be realized but proper private and public investments in processing/manufacturing to open up domestic and foreign markets for Kenaf products is certainly a step in the right direction.





FIGURE 5: KENAF PRODUCTION IN NIGERIA - 1981-2020 ('TONNES)



Source: Author's computation from FAOSTAT

Production of Kenaf has been driven by contract agreements between the farmers and the off takers. Recently, the awareness of energy diversification and the use of renewable energy has awakened the collaboration of various organizations, including the Federal Ministry of Agriculture and Natural Resources (FMARD), and the Federal Ministry of Investment, Trade, and Industry (FMITI), to promote and increase Kenaf cultivation locally. In recognition of the huge industrial potential of Kenaf, the Raw Material Research and Development Council (RMRDC) sponsored the Institute of Agricultural Research and Training (IAR&T) to produce five tonnes of foundation seeds that were distributed to Kenaf Growers, Processors, and Marketers Association in 2017 for planting. The IAR&T is the research institute with the official mandate by the Federal Government of Nigeria to champion the development of the Kenaf value chain in Nigeria. This is structured under the Project of the Kenaf and Jute Development Programme.

It is important to note that average yields per hectare from IAR&T varieties are significantly lower relative to yields from Cuba 108, Tiannung 1, and 2, and other exotic varieties adopted in major producing countries like China and Cuba. The seeds from IAR&T have an average yield of 3.5 tonnes per ha, while the exotic types have 22 tonnes per ha. However, farmers report that the exotic varieties are expensive and rarely available.



**TABLE 1: KENAF SEED VARIETIES AVAILABLE IN NIGERIA**

| S/N | Varieties | Quality Attributes | Yield (Tons/Ha) | Agroecological Zone |
|-------------------------------|---|---|--------------------------------------|--|
| A. IAR&T VARIETIES | | | | |
| 1 | Ifeken DI 400 (Mutant from Cuba 108) | High fibre yield, high core yield, Stalk diameter is relatively uniform, enhance mechanical processing, has no branching of the stalk, & is daylight insensitive. | 0.7 | Rainforest S. Guinea Savanna |
| 2 | Ifeken 400 | Tolerant to root nematode disease. | 1.1 | Rainforest S. Guinea Savanna |
| 3 | ArtKen 211 | High Yielding High fibre quality Adapts to rain forest and Guinea Sava Tolerant to flea beetle & aphids; and photo insensitive (late maturity). | 2.9 (Bast fibre) 4.7 (Core fibre) | Rainforest N. Guinea Savanna S. Guinea Savanna |
| 4 | Ifeken 100 (Mutant from Tiannung 1) | Daylight insensitive, tolerant to most insect pests, including flea beetle & aphids, and resistant to most soil-borne nematode | 1.85 | Rainforest S. Guinea Savanna |

Source: Webber et al. (1993); Oloruntoba et al. (2014); www.seedportal.org.ng

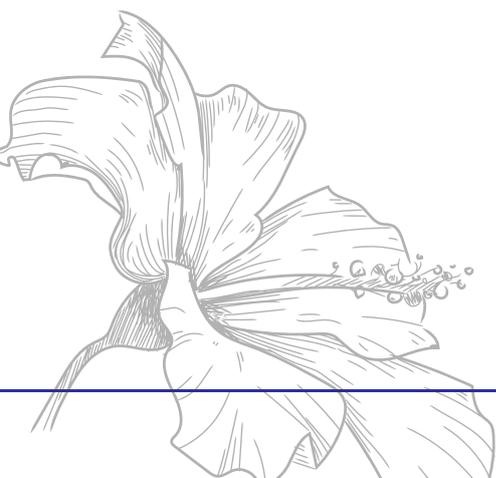




| S/N | Varieties | Quality Attributes | Yield (Tons/Ha) | Agroecological Zone |
|----------------------------|-------------------|---|-----------------|---------------------------------|
| B. EXOTIC VARIETIES | | | | |
| 1 | Tiannung 1 | High Stalk Yields, Fibre Production for cordage & jute | 13.8 | All |
| 2 | Guatemala 2A (51) | High leaves yields High foliage production for livestock feeds | 11.4 | Rainforest S. Guinea Savanna |
| 3 | Everglades 71 | High leaves yields High foliage production for livestock feeds | 12.4 | Rainforest S. Guinea Savanna |
| 4 | Everglades 41 | High leaves yields High stalk height yields | 11.8 | Rainforest S. Guinea Savanna |
| 5 | Cuba 108 | High Seed, leaf and fibre yields High seeds yield for multiplication and industrial lubricants | 10.8 | All |
| 7 | Salvador | High Seed and fibre yields | 7.1 | Rainforest S. Guinea Savanna |

Source: Webber et al. (1993); Oloruntoba et al. (2014); www.seedportal.org.ng

Meanwhile, over the years, the FG has been promoting the production and distribution of Kenaf seed varieties from IAR&T through several interventions and subsidy packages. Through the Central Bank of Nigeria's Anchor Borrower program, the government has distributed Kenaf improved varieties produced by the IAR&T to KEPPMAN farmers. It is worth noting that the varieties introduced by IAR&T are produced using gamma irradiation in the plant mutation breeding from the imported parent seed varieties. Experts consulted from IAR&t during this study indicate that due to metabolic disorders in the seeds after irradiation, the IAR&T seeds are unable to have higher or equal yield as the parent seeds. That the Kenaf crop's yield depends on the nature and extent of chromosomal damage after irradiation.





Kenaf Utilization in Nigeria

Nigeria has a very diverse food system and a need for fibre. With the global awareness of the use of plastics, bio-degradable packaging materials have become necessary to build a green economy that protects the environment. The country is a net importer of fibre materials. Evidence has shown that Jute sack requirements have increased from 2 million to more than 5 million pieces (FMITI, 2019). The current cost of Jute sack importation is about USD 9.5 million at current prices, according to a Bloomberg calculation. (Ajoy, 2021). During our consultations, some commodity exporters in Kano and Katsina mentioned that they have resorted to importing “second-hand” Jute sacks (i.e., used sacks) from Ghana to meet the surging demand in the country. The challenge is that the packaged commodities for exports are often rejected due to the fragility and compromised quality of the used sacks. Also, adopting used sacks severely affects the spread of disease, pests, and impairment of the quality of export produce. As shown in Figure 6, actors report that Cotton accounts for more than 45 percent of fibre currently used by manufacturing companies, and fibre from Kenaf constitute only 14 percent. Many manufacturers commonly use less expensive synthetic materials to complement the fibre from plant sources.

TABLE 2: UTILISATION OF KENAF IN NIGERIA (2020)

| <i>Items</i> | <i>Volume (Tons)</i> | <i>Share of Output (%)</i> |
|---|----------------------|----------------------------|
| Household consumption of Kenaf leaves | 432 | 30 |
| Household consumption of Kenaf fibre and fibre products | 288 | 20 |
| Kenaf fibre for textile industries | 29 | 2 |
| Kenaf fibre for Jute bag manufacturing | 144 | 10 |
| Kenaf fibre as oil absorbent powder | 360 | 25 |
| Kenaf leaves for animal feed | 43 | 2.5 |
| Kenaf leaves for in medicine | 7 | 0.5 |
| Kenaf fibre exported | 72 | 5 |
| Kenaf seed and seed products sold in open markets | 72 | 5 |
| TOTAL | 1447 | 100.0 |

Source: Author’s computation from field data (2022)



¹The effects of high doses of radiation on plants is lethal, although different species of plants vary greatly in their sensitivity to ionizing radiation. There are reports, however, of a stimulating effect on growth when seeds or seedlings are exposed to light doses of ionizing radiation.

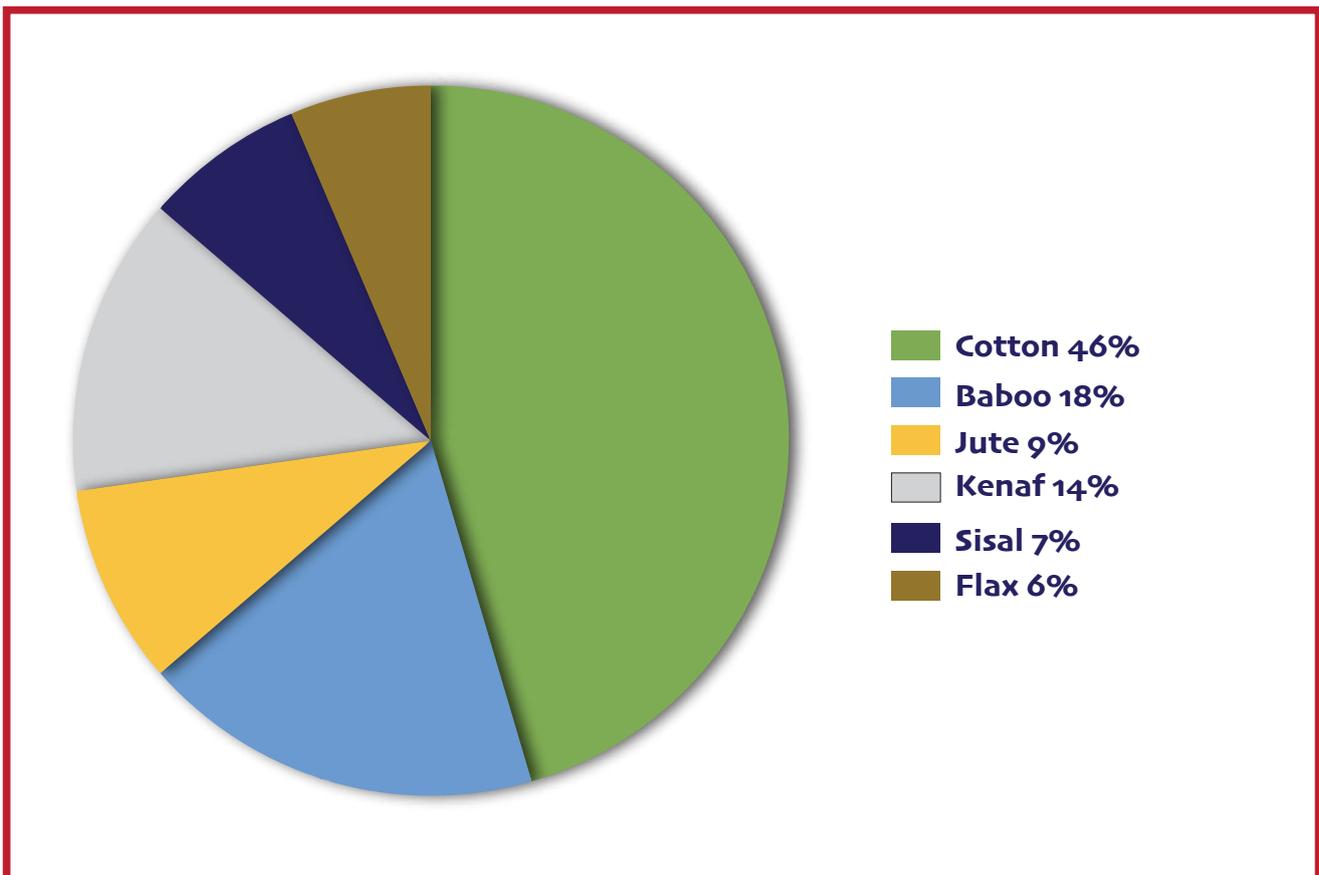


Similarly, the large-scale processors reported that the most critical raw materials-related problem in producing paper and paper products is sourcing long fibre pulp. Since 1991, Nigeria has had an ever-increasing demand for paper usage. The pulp and paper mills at Jebba, Oku Iboku, and Iwopin have been unable to satisfy the local markets, while the importation of long fibre pulp continues to rise yearly. Furthermore, it is expected that the FG's effort toward a principal market replacement of 100 percent synthetic petrochemical packaging materials for agricultural produce and agro-allied commodities would further create significant demand.

Adeniyani (2018) projected that there would be an annual increase in bag demand in Nigeria due to the rise in agricultural production for domestic and international markets. We present the utilization of the Kenaf crop in Table 2.



FIGURE 6: PROPORTION OF PLANT FIBRE USED BY MANUFACTURERS OF SACKS AND FABRICS IN NIGERIA



Source: Author's Computation from field data (2022)





Postharvest loss is a significant challenge in Nigeria. The losses occur during harvesting, postharvest handling, and primary processing and vary across actors. The gross PHLs of smallholder producers and processors are as high as 20 percent, primarily due to manual labour and substandard equipment. The more mechanised actors attract higher margins and are less affected by quality problems.

Historically, the Nigeria Fibre Company (NIFINCO) at Badagry and the Nigerian Fibre Product Limited, Jos (NNFPL) that produced Jute bags operated on mostly imported fibre until 1970/71 after which the former was closed down and the later operated until 1992. Even though Kenaf production was mainly carried out in the western region, NNFPL sourced its fibre through the Northern Nigeria Development Corporation's Plantation at Jama'are, Bauchi. The factories with a total processing capacity of about 20,000 metric tonnes of retted fibre per annum could only obtain less than 10 percent of the raw materials from local sources, leading to the closure of the plants. NNFPL was later acquired by NASCO group of Industries, producing rugs and carpets. The factory was operated until late 1980s when it was finally closed due to shortage raw material and erratic power supply. Currently parts of the NNFPL's industrial estate is now being planned as a logistics centre with warehouses, offices and shopping facilities.

Murada vetures limited located in Kaduna state is an emerging fibre processing company in Nigeria. The company produces Jute bags depending on 100 percent imports of its raw materials (i.e., yarn) from Bangladesh. However, they have closed production due to erratic and high currency exchange rate. We find that there ongoing effort by the FMARD to acquire yarn producing machine from China with a throughput capacity of 1-2 tonnes per day (see Table B2 in the appendices for a copy of the quotation).



General Description of KENAF Products:

It is important to note that most of the Kenaf products are still experimental except for fibre and leaves that have been in use over time. These products have shown great market value in other Kenaf producing countries due to its health and nutritional benefits to households. Expectations are that they the same value can be appreciated in Nigeria. Apart from Kenaf leaves which are directly processed at household and micro levels, especially in rural and peri-urban areas of the north, the main products supplied from the Kenaf value chain are:

Kenaf Seeds: Kenaf seeds have many nutritional functions and are being used as a valuable natural ingredient for some farmers' production of functional foods. Kenaf seeds are essential for dietary fibres, oil, and proteins. The excellent nutritional qualities of Kenaf seed are used in food applications as a whole seed.

Kenaf Seed Oil: has been suggested to be a new source of functional edible oil with high antioxidant activity. It has a relatively high oil composition like Cottonseed oil, and appreciable quantities of phospholipids and phytosterols suggest that Kenaf oil can be used for culinary purposes. The seeds could serve feed and food purposes. In the southwestern part of Nigeria, a few Kenaf farmers have been able to extract oil from Kenaf at the individual level for household consumption. The Kenaf seed oil is also used for cosmetics, industrial lubricants, and biofuel production.



Kenaf Seed Milk: Kenaf seed milk appears similar in appearance and texture to soymilk with creamy white. The unflavoured Kenaf seed milk taste is thin with a hint of earthy flavour. It contains 1.93– 2.48 percent of protein and 2.10–2.60 percent fat, comparable to almond milk in terms of protein and fat contents. From consultations, a few farmers have been able to produce and consume Kenaf seed milk. As is the case of the seed oil has only been done domestically for only household consumption.

Kenaf Seed for Medicine: Kenaf seeds have been used in treating metabolic diseases like atherosclerosis, liver disease, cancer, and diabetes. Kenaf seeds have also helped lower blood pressure by helping increase nitric oxide and reducing oxidized lipids in the blood. They have very high in vitamin-C, antioxidants, and phytochemicals.

Kenaf Seed-Derived Products: Other potential products derivable from Kenaf seed include Kenaf seed flour (KSF), defatted Kenaf seed meal (DKSM), and Kenaf seed protein concentrates (KSPC) with significant health-supporting activities.

Kenaf Leaves: Kenaf leaves have numerous functions that are of vital importance to rural household nutrition security. Its shoots and young leaves are cooked as soup and eaten with well-prepared flour, rice, yam, or sweet potato. The leaves are rich in crude protein containing between 14 to 34 percent protein, while the stalk has 2 to 12 percent protein content. In addition, powdered leaves are used to treat sores and boils, and a leaf infusion is used to treat coughs. The top leafy portion of the Kenaf plant is also used as forage to feed livestock. In northern Nigeria and other parts of the southwest region, Kenaf leaves are sold in local markets as a source of food and medicine (because of their purgative properties).





TABLE 3: PRODUCTS DERIVED FROM KENAF IN NIGERIA

| <i>Primary Product</i> | <i>Secondary Product</i> | <i>Description</i> | <i>Uses</i> | <i>Other Information</i> |
|------------------------|--------------------------|--|---|---|
| Kenaf Seeds | Kenaf seed oil | Relatively high oil composition like Cottonseed oil, and appreciable quantities of phospholipids and phytosterols suggest that Kenaf oil can be used for culinary purposes. It has a relatively high oil composition like Cottonseed oil, and appreciable quantities of phospholipids and phytosterols suggest that Kenaf oil can be used for culinary purposes. | <ol style="list-style-type: none"> 1. Essential for dietary fibres, oil, and proteins. 2. Could be used in food applications as a whole seed. 3. Used as a valuable natural ingredient for some farmers' production of functional foods. 4. Also used for cosmetics, industrial lubricants, and biofuel production. | In the southwestern part of Nigeria, a few Kenaf farmers have been able to extract oil from Kenaf at the individual level for household consumption. |
| | Kenaf seed milk | Looks similar in appearance and texture to soymilk with a creamy white color. The unflavoured Kenaf seed milk taste is thin with a hint of earthy flavour. It contains 1.93–2.48 percent of protein and 2.10–2.60 percent fat, comparable to almond milk in terms of protein and fat contents. | <ol style="list-style-type: none"> 1. Can be used as milk for direct consumption in households | <ol style="list-style-type: none"> 1. As is the case of the seed oil has only been done domestically for only household consumption. 2. Also helps lower blood pressure by helping increase nitric oxide and reducing oxidized lipids in the blood. |
| | Kenaf seed flour (KSF) | Is gluten-free and includes a high content of protein; and a food product made of wheat flour or the like by using the Kenaf seed powder. The Kenaf seed powder includes: 1) a ground and milled whole Kenaf | <ol style="list-style-type: none"> 1. Flour used as an additive to baking products | This product is purely experimental |



| | | | | |
|--|--|---|---|--|
| | | seed, or a mixture of the ground and milled whole Kenaf seed and a different type of a powder; and 2) a powder manufactured by grinding defatted Kenaf seed meal (DKSM), | | |
| | Defatted Kenaf seed meal (DKSM) | DKSM is rich in proteins and carbohydrates. DKSM contains essential minerals. DKSM possesses higher phenolic content than the selected edible flours. DKSM exhibited higher antioxidant activity than the selected edible flours. | Defatted Kenaf seed meal (DKSM) is a rich source of proteins and carbohydrates. Presence of essential minerals suggests its vital role in regulating various physiological functions in the body. DKSM is suggested as alternative source of dietary protein. Protein concentrates prepared from DKSM have been reported as playing the roles of powerful antioxidants in different foods | This product is not yet in the Nigerian market |
| | Kenaf seed protein concentrates (KSPC) | Kenaf seed protein concentrate (KSPC) is a potential source of protein that could be added to food products and differential scanning calorimetry had been used to verify the potential of KSPC as functional ingredients | 1. It is an excellent ingredient in many food products requiring high water retention could be used as an ingredient in food products like mayonnaise, salad dressings, sausages and | This product is not yet in the Nigerian market |



| | | | | |
|-------------|-----------------------------------|---|--|--|
| | | | cake batter due to its high oil absorption capacity 2. It also can be used as a suitable ingredient in whipped toppings, cake batters, frozen desserts, confections, and beverages | |
| | Kenaf Seeds Yellow (DKSY) Noodles | DKSY noodles have higher mineral, fibre and total phenolic content. | 1. Source of Food | This product is not yet in the Nigerian market |
| Kenaf Leaf | | The leaves are rich in crude protein containing between 14 to 34 percent protein, while the stalk has 2 to 12 percent protein content. | 1. Its shoots and young leaves are cooked as soup and eaten with well-prepared flour, rice, yam, or sweet potato. 2. powdered leaves are used to treat sores and boils, and a leaf infusion is used to treat coughs. 3. Also used as forage to feed livestock. | In northern Nigeria and other parts of the southwest region, Kenaf leaves are sold in local markets as a source of food and medicine (because of their purgative properties). |
| Kenaf Fiber | Bast fibre | These textile products are aesthetically pleasing, strong, lightweight, and have an excellent soft feel. Textile products made from Kenaf have the appearance of linen. Kenaf fibre is also processed to produce jute bags, ropes, twines, baskets, and sackcloth. | | In developed Kenaf markets in Europe and North America, newspaper prints, garments, sacking, and cordage are equally valuable products that are derived from processed Kenaf fibre. Kenaf pulping techniques are |



| | | | | |
|--|----------------------|---|--|--|
| | | | | employed to make several paper grades, including newsprint, bond, and coating raw stock. |
| | Oil Absorbent Powder | Hurds fibre with a natural oleophilic characteristic and tendency is ground into powder. The fine form makes it suitable to be used as bio-absorbent material – allowing it to absorb oil effectively, while hydrophobic- oleophilic properties of the fibre provide an efficient means of separating oil from water. | | |





Kenaf Fibre: Kenaf fibre (both bast and core fibre) is in high demand for its multiple uses. Evidence from case studies in the US have shown that Kenaf could be blended with

FIGURE 7: A BAG OF IAR&T CERTIFIED KENAF SEED



In particular terms of paper quality, durability, print quality, and ink absorption, it shows better results than any other fabric. Newsprint papers made from Kenaf pulp are brighter and better looking, with better ink laydown, reduced rub-off, richer colour photo reproduction, and good print contrast. Oil Absorbent Powder. Hurds fibre with a natural oleophilic characteristic and tendency is ground into powder. The fine form makes it suitable to be used as bio-absorbent material – allowing it to absorb oil effectively, while hydrophobic- oleophilic properties of the fibre provide an efficient means of separating oil from water.

Cotton and made into yarn & woven into fabrics (Poonfodi et al., 2021; Berger et al, 1999; and Ramaswamy et al, 1995). These textile products are aesthetically pleasing, strong, lightweight, and have an excellent soft feel. Textile products made from Kenaf have the appearance of linen. Kenaf fibre is also processed to produce jute bags, ropes, twines, baskets, and sackcloth. In developed Kenaf markets in Europe and North America, newspaper prints, garments, sacking, and cordage are equally valuable products that are derived from processed Kenaf fibre. Kenaf pulping techniques are employed to make several paper grades, including newsprint, bond, and coating raw stock.



Source: From the field study at IAR&T, Ibadan (2022)



FIGURE 8: KENAF FIBRE PRODUCTS IN NIGERIA



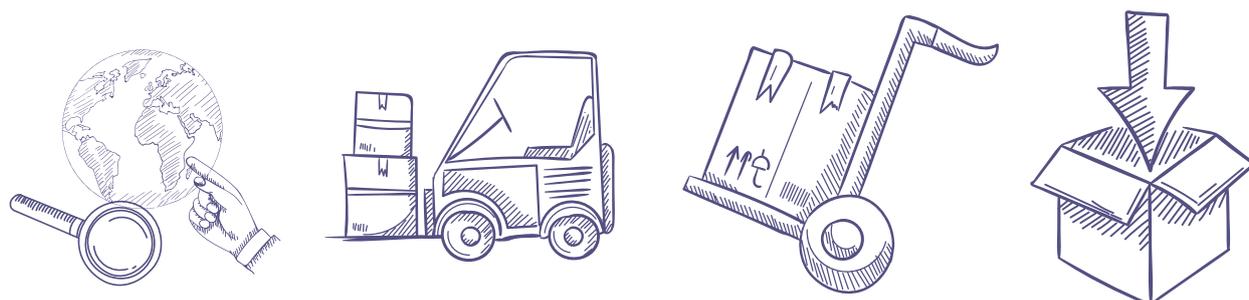
Source: Study during a visit to IAR&T, Ibadan (2022)

KENAF MARKETING IN NIGERIA

Informal Market - Kenaf Leaves and Fibre Segments:



The informal market segment is based on a laissez-faire market governance system, and prices drive transactions. The actors mentioned no barrier to entry, and the marketing system is considered highly inclusive. However, the lack of transaction-defining rules creates inefficiencies that negatively impact the entire value chain. For instance, there are no enforceable commodity quality standards for the leaves. Thus, producing leaves of high quality does not attract premium prices. However, during our consultation, off-takers and contractors indicated that Kenaf fibre harvested using machines produces uniform fibre and tend to attract premium prices. Overall, the existing pricing regime for the leaves and stalks is based on fair average quality (FAQ). This system does not encourage farmers to adopt postharvest handling practices that improve the quality of their produce.





SEMI-FORMAL - KENF SEED AND FIBRE SEGMENT

An interesting dynamic in the Kenaf value chain is the emergence of the semi-formal distribution segment. It has emerged partly because of opportunities to supply the key off-takers with quality fibre consistently. Evidence from the consultations shows that the system centres around a few actors with visible market power, in this case, a major off-taker such as an exporter, oil exploring company, jute bag manufacturer, defining and enforcing terms under which suppliers can deliver to it. The entry requirements bar most actors, but the hierarchical control exercised by the off-taker offers some benefits.

Quality variability hinders SHFs and many micro/small-scale aggregators from accessing the remunerative but quality-sensitive markets dominated by large-scale aggregators, wholesalers, and exporters. Many of the large-scale intermediaries are large scale farmers that also engage in aggregation and trading. Fibre is different because the quality determines its selling power based on international standard fabric requirements. Actors involved, therefore, must invest significant resources in cleaning and retting before delivering to quality-sensitive buyers. Standardised volume measures exist in this market segment, and seeds are measured by volume (kg or bag for seed and tonnes for fibre), which are the same across locations and between different parties with whom players are transacting. However, vegetables are measured in bundles with varying sizes depending on the location and the familiarity of transacting parties.

The LSFs who serve as aggregators mentioned that while there may not have firm contracts, supply terms are transparent and include minimum volumes that can be delivered, applicable quality parameters, and payment terms. Notably, the credibility of the off-taker allows suppliers to leverage working capital finance, including, for example, invoice discounting. The need to ensure a consistent supply has prompted them to invest in postharvest handling and storage facilities, reducing postharvest losses in their operating segment.

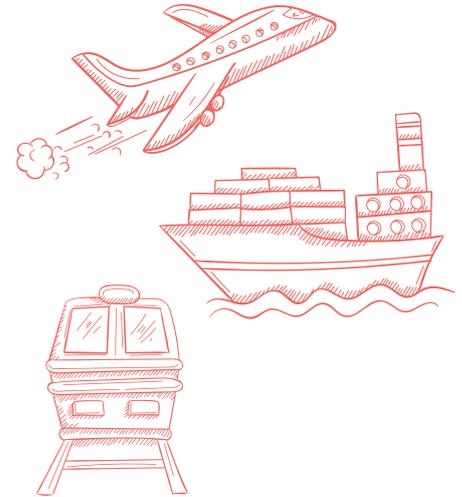
However, farmers under the KEPPMAN in Ogun and Oyo states indicate that the main challenge in upscaling this model is the perception among some farmers (SHFs and MSFs) concerning the terms of agreement with aggregators. The terms for repayment of inputs credit are considered not transparent and fair to the farmers. The farmers suggest that there is the need for capacity building of the union leaders to enhance their abilities to represent the interests of members adequately. This will allow for the emerging transactional relationship between the farmers and the off-takers to be sustainable.

Overall, the governance system is trust-based and usually does not involve formal contracts. The consultations with the transactors in the formal chain segment indicate that contracting with a credible party sometimes opens up opportunities to secure access to resources, including finance and other essential inputs that can add significantly to variable production costs. Furthermore, we observe that the dominance of cash-based trade has created some disadvantages. For example, enabling trade credit in transactions with small/medium-scale aggregators and wholesalers makes it possible to build up inventories and supply to large-scale off-takers quickly. Wholesalers' extension of trade credit in markets is often how under-capitalized traders manage entry into the business. These options tend to be rare, except between close relatives and parties with whom long-term transactional relationships have been developed.



EXPORT OF KENAF PRODUCE

Information on Kenaf fibre exports is limited as the sector is still developing. During the consultation, some actors reported that they export Kenaf fibre to Malaysia. The trade is dominated mainly by LSFs and large aggregators operating in the southwest. However, it is not a regular transaction because the exporters often complain of facing challenges due to the low-quality standard of the fibre. The poor-quality level is attributed to the harvesting, retting, and decorticating processes done manually and sometimes with sub-standard equipment. Also, raw Kenaf bast fibre bundles are too coarse and brittle to process through conventional textiles equipment. Thus, to produce suitable textile quality fibres from Kenaf, new chemical retting processes are being studied and developed by the IAR&T to ensure improved chemical and physical uniformity.



Constrints In Nigeria’s Kenaf Zvalue Chain and Governemnt Strategies

Here, we describe the key factors militating against the sustainable growth of the Kenaf value chain in Nigeria as identified by actors during the consultation. The issues are disaggregated, and the FG’s policies and strategies to address them are presented as follows:

Weed and disease infestation. Excessive rainfall and humidity during the growing season of the Kenaf plant in the southwest have led to fungal diseases. Kenaf plants are prone to fungal pathogens, which attack seedlings four weeks after germination. This infestation has destroyed flower buds, developing fruits, and young shoots. Also, the Kenaf plant is sometimes attacked by a high population of flea beetles and other insects attacking leaves and pods, causing stunted growth and death of plant seedlings. Processors lament that plants that survived high nematode infestation have low dry matter yield. Absence of improved harvesting technology. The predominant practice in Nigeria, the unmechanised harvesting of Kenaf plants, is back-breaking, expensive, and inefficient. Some of the actors we consulted indicate that mechanized harvesting is more feasible and effective for large-scale production and ensures quality fibre. They argued that mechanization of the harvesting process in Kenaf production is a must if commercialization is the goal. Several types of foreign machines are available for cultivation according to the uses of the end

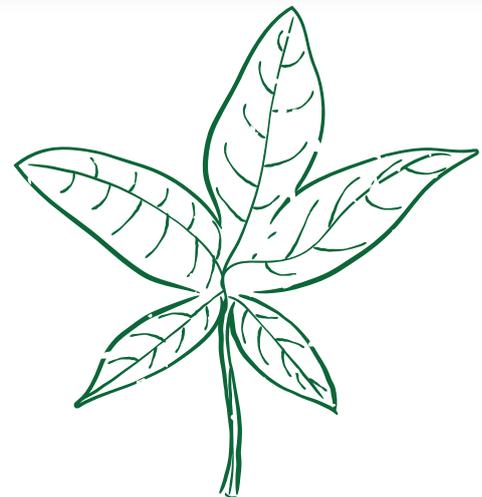


product. Limited water supply and irrigation facilities. Kenaf cultivation and the farming system in Nigeria are predominantly rain-fed, making it susceptible to weather inconsistent changes. Most Kenaf varieties are sensitive to water scarcity as they can significantly reduce their height and collar diameter growth. Under drought conditions, Kenaf crop biomass production is markedly decreased; however, the crop can recover when water becomes available. Also, researchers at IAR&T mentioned that Kenaf plants could be grown successfully on saline soil when the irrigation water is good.

Inadequate Fertilizer supply. The seasonal lack of fertilizer supply raises the prices, and Kenaf farmers face difficulty purchasing suitable fertilizers for the farms. The high commodity cost has always been a significant cause of low fertilizer usage in the country. Even with subsidies, fertilizer prices remain high due to excessive intermediation links and official corruption.

Strategic Government Intervention to the on-farm constraints.

■ The FG plans to spend \$175 million to create 1,300 kilometres of irrigation water canals, which will be 230 kilometres in Kano State, 220 kilometres in Niger State, and 195 Kilometres in Jigawa State. Kenaf farmers and investors interested in cultivating the crop in the ecological regions covering Bauchi, Plateau, Kano, Niger, Kwara, Kogi, and Borno can and should take advantage. The intervention is under the World Bank/FG 7-year Transforming Irrigation Management in Nigeria (TRIMING). The project aims to improve access to irrigation and drainage services.



■ Similarly, the FG, through the FMARD, is implementing a National Irrigation Programme under the Water Resources Sector Road-map titled “Immediate and Long-term Strategies for Water Sector (2016- 2030)”. One of the objectives of this grand strategy is to develop irrigation potential to 500,000 hectares through direct government intervention to facilitate the development of 1 million hectares by large- scale commercial farmers through community and public partnerships and create jobs through irrigation farming.

■ The FG is equally poised to promote widespread adoption of irrigation techniques by small-scale farmers as there are almost 1 million hectares of potentially suitable land for its adoption. Through this strategy, the government hopes to make 4 percent of arable land available to Kenaf and other agricultural crop farmers to boost annual agricultural output and annual income of more than \$600 million in the dry season.

■ During the consultation, officials cited that the FG, through the FMARD, is committed to ensuring access to and making fertilizers available to Kenaf farmers within the framework of the National Fertilizer Policy. Also, the government will continue encouraging organic fertilizers and compost plus for organic Kenaf farming. Their strategy is to use official extension workers networks and bodies related to organic agriculture, like the Organic Farmers Association of Nigeria (OFAN), to enhance farmers’ education and awareness of the advantages of organic fertilizer.



■ The FG also recognizes some constraints in mechanised farming in Nigeria, such as lack of technical know-how and insufficient spare parts for fertilizer-making machines. Thus, several relevant agencies such as FMARD, Federal Ministry of Science and Technology, Federal Institute of Industrial Research, Oshodi (FIIRO), and the National Centre for Agricultural Mechanization (NCAM), Ilorin, IAR&T, and KEPPMAN have been encouraged to research, develop and commercialise these technologies. The aim is to allow Kenaf farmers and private investors to take advantage of the vast potential in the country's organic fertilizer value chain.

Off-Farm Constraints in the Kenaf Value Chain

Poor storage facilities and postharvest losses. The Kenaf value chain is often associated with two kinds of postharvest, handling and storage losses. These are the storage of multiplication seeds for use in the next round of harvest and the contamination of seeds for export resulting from recycled jute bags. Local research shows that Kenaf seeds, high in oil content, are prone to deterioration if improperly kept. Maintenance of rigour and viability in oil seeds is a significant constraint to Kenaf production, particularly under unfavourable storage conditions. Studies have also shown that Kenaf seeds could deteriorate physiologically by exhibiting slower germination and reduced seedling growth even in good conditions. This means even when care is exercised during storage, deterioration occurs at variable speed and intensity, according to the initial physiological quality of the seeds and the storage environment. Inadequate processing facilities. The traditional methods of processing Kenaf for long-term seed storage are common practice among the actors consulted. Experts report that more than 25 percent of Kenaf seeds lose their viability because of these suboptimal storage conditions. Kenaf seed requires drying for storage at 50c in a controlled humidity and temperature environment. Mechanised or artificial dryers are necessary for this purpose. However, currently, processing practices are manual or, at best, using small machines that do not ensure the needed quality of the fibre and other secondary products. Undeveloped marketing process. One key challenge cited by the actors is the missing link created by the lack of proper processing and manufacturing units that can create the right fit for off-taking and producing consumable products from Kenaf. Until recently, Kenaf as an agricultural crop was not on the priority list of FMARD as a cash crop and agricultural commodity for processing and industrial purposes. Other factors listed during the consultation as militating against agro-industrial products' relative competitiveness in local and international markets include: poor infrastructure, high cost of inputs and production, lack of standardization, and inadequate package.



Strategic Government Intervention to the Off-farm constraints

■ The government continues to strengthen the R&D capacity of relevant research centres, institutes, and faculties of agriculture in the Nigeria Universities through increased funding and other incentives to improve existing Kenaf varieties and further enhance their shelf life. The FG is equally committed to facilitating technology acquisition and transfer to Kenaf processing companies in the Special Economic Zones (SEZs) by making available research output from relevant local research institutes.

■ Also, FG provides concessional incentives for manufacturing concerns in any Special Economic Zones and encourages alternative and environmentally friendly packaging media for storage by farmers and distributors of Kenaf seeds, such as airtight bags. The aim is for private investors interested in establishing factories to locally produce hermetic or improved and treated bags.

■ To facilitate import substitution, the FG will discourage the importation of new and used Jute bags into the country by 2025 through appropriate legislation and review of relevant duties and tariffs on agricultural products, equipment, and machinery.

Non-Farm Constraints in the Kenaf Value Chain

Limited Supply of Quality Seeds: Availability and accessibility of high-yielding quality seeds are significant obstacles to an optimal yield of Kenaf production in Nigeria. Farmers cite the lack of improved seeds to boost output per hectare as a severe limitation. The current yield averaging 3 tonnes per ha is well below the average of leading Kenaf-producing countries, like China and Cuba, consistently producing around 60 tonnes per ha.

Poor Finance and Investment Literacy: The demand for collateral, high-interest rate charges, and short repayment periods on credit hinder investment in the VC. Also, the size of the domestic market for Kenaf by-products remains undeveloped as only a few off-takers are willing to invest. Many investors cite infrastructure deficits and difficulty obtaining land titles for medium to large-scale farming and multi-taxation regimes as disincentives. In addition, there is a general perception of corruption, and inconsistent trade regulations among the processors and large-scale traders consulted.

Inadequate Extension and Training Delivery: Among the factors cited by farmers and other actors as militating against sustainable growth of the Kenaf is the absence of a well-defined extension policy in Nigeria for the Kenaf. Also, inadequate staffing of extension staff vis-à-vis geographical spread and the Kenaf farming population was an issue for farmers in remote Kenaf-producing areas in the southwest. Grossly inadequate, irregular, and untimely release of funds for agricultural extension and advisory services has been a big problem for extension services in Nigeria. The research-extension farmer-inputs linkage system (REFILS) aimed to bring key public and private sector stakeholders together in the technology development, adaptation, dissemination, and utilization process has remained weak.



Strategic Government Intervention to the Non-farm constraints

■ In recognition of the central role of developing local high varieties of seeds locally and making them accessible to categories of farmers, the FG created the Kenaf and Jute Improvement Programme in the Institute of Agricultural Research and Training (IAR&T) at Obafemi Awolowo University, Ile-Ife, Nigeria. The IAR&T is mandated to conduct and report research activities related to the genetic improvement of Kenaf for farmers and industrial uses. The institute has already developed, through convention breeding, high-yielding varieties.

■ The National Agricultural Seed Council (NASC) will continue to regulate the volume of Kenaf seeds produced and supplied to the market to ensure competitiveness and control over seed quality to protect existing and prospective crop cultivators and the environment. In this regard, the strategy of the FG is to build a market-driven seed industry by making the production and distribution of high quality varieties and improved plant materials available, accessible and affordable to all farmers. The government will also continue to support the IAR&T as it has demonstrated the capacity and technical know-how for large-scale production of Kenaf viable seeds.

■ To enhance their financial standing and capacity, farmers and investors in the Kenaf value chain can take advantage of the agricultural intervention funds at the Central Bank of Nigeria (CBN), such as the Agricultural Credit Guarantee Scheme (ACGS), the Commercial Agriculture Credit Scheme (CACGS), the SME Credit Guarantee Scheme (SMECGS) and the Anchor Borrower Programme (ABP). The government also encourages actors in the Kenaf value chain to utilize the National Collateral Registry and Credit Bureau in accessing investment funds and addressing the collateral requirements of financial institutions.

■ The government will consider designing Kenaf as qualified for the CBN's 'not-valid-for-forex' product category. Similarly, the Nigerian Export Promotion Council (NEPC) will continue to include Kenaf in its export promotion to showcase Nigeria's export potential. Again, the FG created SEZs and industrial business parks as one-stop-shops to address the problems of business and investment security, infrastructure deficit, multiple- and over-taxation, capital controls, and investment and trade policy inconsistencies. However, it is unclear the extent of activities on these proposed interventions.

■ Also, the FG, through its Federal Department of Agricultural Extension (FDAE) developed and implemented a special programme in 2018 to employ and engage the services of graduate youth to provide extension services to farmers under the Social Investment Programme (SIP).

■ As shown In Table 3, the FG will continue to sustain and deepen its collaboration with umbrella organizations of Kenaf farmers, processors, marketers, and exporters such as KEPPMAN, KEDAN, and KEAN to ensure availability, accessibility, and distribution of improved seeds. Other support includes disseminating knowledge of new technologies for growing and processing Kenaf and educating farmers, processors, and industrial product manufacturers on modern techniques and processes.



■ In furtherance of the information dissemination effort of the FG regarding the business and investment potential in the Kenaf value chain, relevant public agencies and research institutes have been mandated to bring together stakeholders periodically. The agencies are to share information and experiences, assess progress and constraints, and identify new initiatives to grow small and medium- scale businesses in Kenaf VC.

TABLE 4: NATIONAL POLICY ON KENAF (2020-2030): STRATEGIES AND ASCRIBED AGENCIES

| ON-FARM PRODUCTION | |
|---|---|
| Strategy | Lead agency and actor |
| <ol style="list-style-type: none"> Promote increased Kenaf seed, bast, and cor production. Increase in the number of Kenaf farmers. | FMARD, FEPPMAN, KEDAN, KEAN, State ministries and local Government departments of agriculture farmers cooperatives, and investors. |
| INPUT PRODUCTION, SUPPLY, AND DISTRIBUTION | |
| Strategy | Lead agency and actor |
| <ol style="list-style-type: none"> Production and availability of quality seeds. Land reform and administration. Access to fertilizers by farmers. Irrigation and water supply. | FMARD, IAR&T, National Seed Council, RMRDC, fertilizer companies, FMWR, OFAN, FFD, FMS&T State ministries and local Government departments of agriculture, private investors, and industrialists. |
| TRAINING AND EXTENSION SERVICES | |
| Strategy | Lead agency and actor |
| <ol style="list-style-type: none"> Resuscitating the national agricultural trainin and extension services network. Increase funding for extension services Promotion of REFILS. Reduction of the EA-FH ratio. | FMARD, NAERLS, FDAE, IAR&T, RMRDC, KEPPMA KEDAN, KEAN, State ministries and local Government departments of agriculture, private investors, and marketers. |
| POSTHARVEST HANDLING AND STORAGE | |
| Strategy | Lead agency and actor |
| <ol style="list-style-type: none"> Funding R&D to improve seed varieties and manufacture mechanized seed dryers. Promote the use of hermetic and treated jutbags for seed storage. | FMARD, FIIRO, State ministries and local Government departments of agriculture, private investors, and industrialists. |
| AGRO-PROCESSING | |
| Strategy | Lead agency and actor |



| | |
|---|---|
| 1. Increase R&D in processing technologies 2. Encouraging foreign and local investment inflow to process high-quality seeds and indust products. | FMARD, FMS&T, MFITI, NEPZA, NEPC, State ministries and local Government departments o agriculture, private investors, and industrialists. |
| MARKETING AND COMPETITIVENESS | |
| Strategy | Lead agency and actor |
| 1. Promote local demand and virile domestic market for Kenaf fibre and industrial products. 2. Promote export of Kenaf seed, fibre, and industrial products. | FMARD, NIPCP, NEPC, FMITI, NEPZA, NCX, KEPPMAN, KEDAN, KEAN, State ministries and lo Government departments of agriculture, and private investors. |
| TECHNOLOGICAL INNOVATION AND DEVELOPMENT | |
| Strategy | Lead agency and actor |
| 1. Promote the acquisition, development, and application of science, technology, and innovation. 2. Ensure local R&D results are commercialisedincrease productivity and produce Kenaf agroindustrial products. | FMARD, FMS&T, FIIRO, NCAM, IAR&T, State ministries and local Government departments o agriculture, and private investors. |
| INVESTMENT PROMOTION, FINANCE, AND RISK MANAGEMENT | |
| Strategy | Lead agency and actor |
| 1. Increase public awareness of the business an investment opportunities in the Kenaf value chain. 2. Substantially increase the number of investo(local and foreign) in the Kenaf value chain. 3. Increase farmers’ and investors’ access to credit. 4. De-risk agricultural lending and provide insurance cover to farmers and investors in the Kenaf value chain. | FMARD, NIPC, FMITI, CBN, BOA, BOI, NAIC, KEPPMAN, KEDAN, KEAN, State ministries and lo Government departments of agriculture, farmer cooperatives, and private investors. |

Source: Nigeria’s National Policy on Kenaf (2019)



FUNCTIONAL ANALYSIS OF KENAF VALUE CHAIN IN NIGERIA



Typology of actors in Nigeria's Kenaf value chain

The common typology of actors in the fibre value chains studied are defined as below:

Kenaf producers

Farmers/Producers: This constitutes the different categories of Kenaf producers based on the area cultivated.

1

Smallholder Farmers (SHFs): They cultivate from 0.2 to 5.0 hectares employing crude implements. Resource-poor farmers require support, especially in inputs credit, to acquire and utilize improved seed, fertilizer, and other inputs needed to increase yield. According to the stakeholder account, about 90 percent of the Kenaf produced in Nigeria is cultivated by smallholder farmers.

2

Medium-Scale Farmers (MSFs): these cultivate Between 5 and 10 hectares. They are better endowed than the SHFs, can afford yield-enhancing inputs, and follow good agronomic practices (GAPs) more closely than the SHFs. Consequently, they obtain higher yields than SHFs.

3

Large-scale Farmers (LSFs) cultivate on a highly commercial scale, with the area under cultivation exceeding 10 hectares. LSFs cultivating more than 30 hectares are quite common in the southwest states, where the proximity to IAR&T is an advantage. The large-scale farmers constitute about 10 percent of the total membership of KEPPMAN. It has a membership of over 45,000 members, predominantly farmers. Many of these farmers also trade, supplying to major buyers who are off-takers from oil-producing states.





Kenaf aggregators and traders

The role of these players is to ensure that fibre not consumed by producers or kept as carryover stocks are supplied to off-takers (processors or exporters) and/or textile and manufacturing industries. They include the following:

1

Micro/Small-Scale Aggregators or Rural Collectors: Buying a few kilograms of leaves, seeds, and bundles of fibre up to about half a tonne at a time. They often trade with their capital and sell to.

Medium-Scale Aggregators: Trading volumes of between 1 – 10 tonnes of fibre and 500 – 1500 kg seeds. It is common to aggregate fibre and fresh and dry leaves for supplies to urban households, retailers, and small-scale processors in the north. Also, they supply to large-scale aggregators or wholesalers in informal markets. Sometimes, they operate in the south as "agents" of the large-scale aggregators who may pre-finance their operations.

2

3

Large Scale Aggregators/Wholesalers: Usually trade in a lot of sizes of 30 tonnes (1 truckload) and above and supply mainly to big manufacturing industries or exporters. The bulk of their trade with smaller-scale aggregators and large-scale farmers is on a cash basis. They may, however, benefit from short-term trade credit forward contracting arrangements, for which they offer price premiums.

Retailers usually sell to households who tend to purchase 1-2.5 kg, which is processed at home or by artisanal processors. In the south, these traders sell a range of seeds, seed products, and oil absorbent powder. This category in the north includes sellers of small quantities of leaves, fibre, and fibre products such as ropes, twine, furniture materials, and animal feed.

4

Kenaf Off-takers



This category of players consists of large-scale enterprises and an emerging group of micro/small scale processors in the communities and the markets. Large-scale processors/manufacturers produce jute bags, packaging materials, and refining quality fibre to different forms of fabric set for consumption. They tend to buy in truckloads. Oil exploring firms also off-take the fibre Hurds mainly for transforming into a powder that serves as an oil absorbent. It is important to note that no formal contract is required for delivery, and fibre prices are negotiated based on quality levels that attract a premium. The micro/small-scale processors tend to transform and sell leaves or fibre, and the processed products are sold in urban and local markets and homes. Very few micro/small-scale and medium-scale processors exist, only performing first stage processing: retting and decortication. The majority of them are found in the southwestern part of the country. Exporters are another group of off-takers in the Kenaf value chain. They usually sell fibre and fibre products into the major regional markets – Ghana, Benin, Niger - and international markets such as Malaysia. Fibre exported to the regional markets usually attracts higher prices and are mostly used for making jute bags, fabrics and aesthetics. In the international markets such as Malaysia, it is used as bio-composite in automotive and construction materials.



Service providers and other actors in the Kenaf VC

■ **Seed Producers and Distributors:** some reports indicate that local varieties (landraces) account for less than 10 percent of total Kenaf seed cultivated in Nigeria. This low cultivation is because of a long history of promoting the distribution of improved seeds to farmers in the country. However, the indications are that most of the available landraces were released over 19 years ago and tend to be recycled by farmers. The performance of the bulk of Kenaf seed, especially in terms of yield, tends to be lower. The National Agricultural Seed Council (NASC) reports no registered Kenaf seed suppliers in Nigeria. Evidence from stakeholder consultations indicates that several improved and high-yielding varieties of Kenaf have been researched and produced by IAR&T. The IAR&T, in collaboration with trained KEPPMAN farmers, has been facilitating community seed production and distribution to minimise the effect of the poor uptake and scaling by private seed companies. Also, IAR, Zaria reports meeting with FCDO – LINKS on renewed interest in the development of the value chain.

■ **Breeder seed producers:** mainly research institutions, e.g., IAR&T, Ibadan; IAR, Zaria

■ **Foundation seed producers:** the primary institution mandated to produce this is the IAR&T, Ibadan for Kenaf.

■ **Certified seed producers and distributors:** KEPPMAN (Kenaf); NASC is also promoting Community Seed Development organizations, in collaboration with the state-level Agricultural Development Programmes (ADPs), to ensure the supply of viable seeds to farmers.

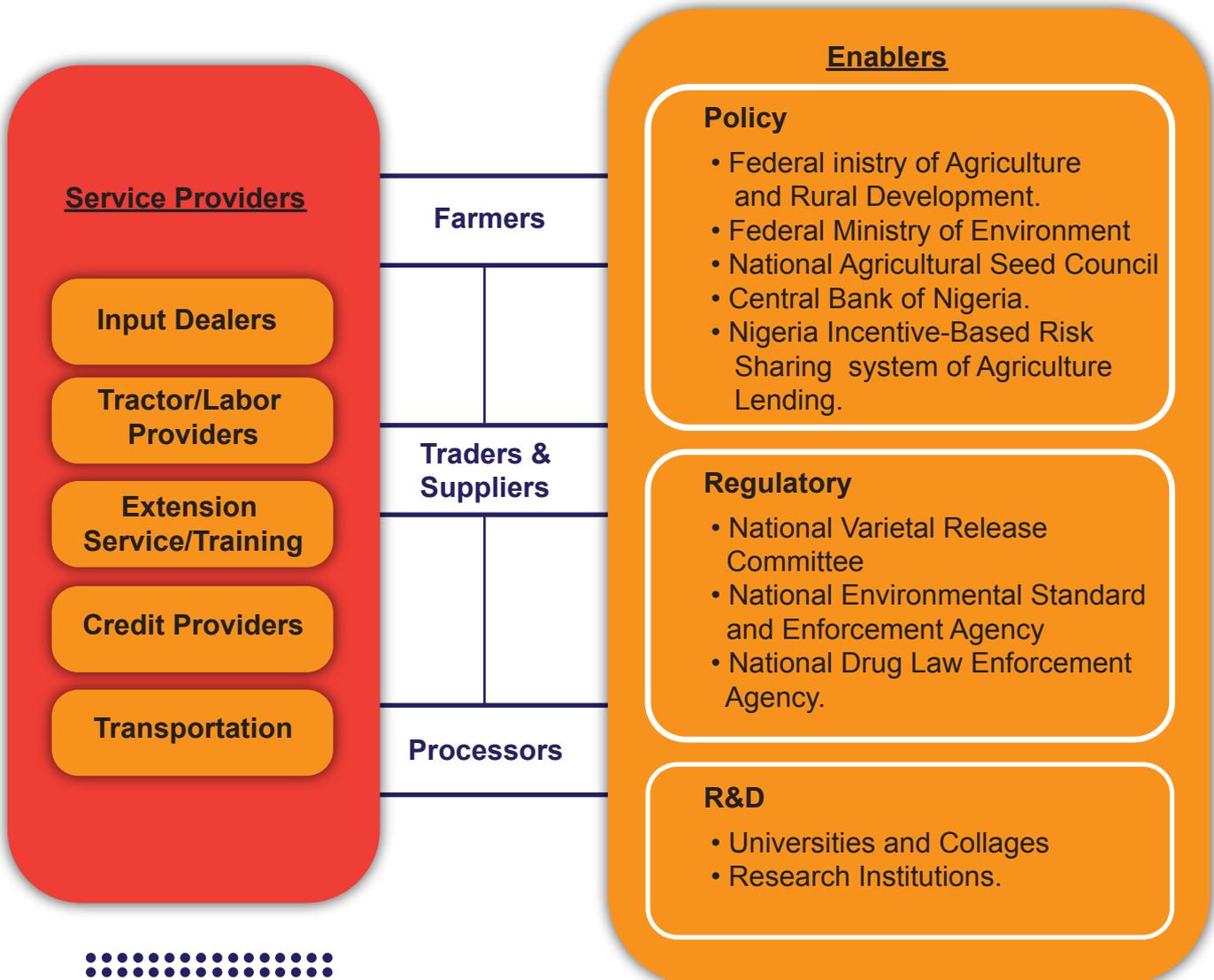
■ **Distributors of fertilizer and other inputs:** Many private companies are involved in this trade, including state-owned enterprises such as KASCO. Another activity that attracts private companies and other actors involved in farm-inputs-for-fibre-output initiatives. The input distribution structure of the farmers in most states is coordinated by associations such as KEPPMAN, NACOTAN and COPMAN.

Other service providers include private tractor service providers for land preparation. Reports indicate that more machine service providers are needed, especially machines such as planters, harvesters, and automatic decorticators, to ensure profitability in Kenaf production. The private sector dominates the provision of transport services. Limited access to finance is a common challenge to SHFs and other players in the Kenaf value chain. It is one reason that interlocked transactions appear to be common, especially at the production level in the chain.

Policy and regulatory agencies: we summarise some of the key MDAs responsible for formulating relevant policy and regulatory frameworks in Figure 9.



FIGURE 9: PROVIDERS OF GOODS & SERVICES IN THE KENAF VC IN NIGERIA, 2022





Focal sub-chains in Nigeria’s Kenaf value chain

The VCA studies focus on Kenaf production and utilization, including their direct transformation into food, feed, personal care (cosmetics), and packaging products. Figure 8 presents the VC's main activities: production, aggregation, and processing.

The Kenaf value chain consists of two main sub-chains. We describe the type of producers, end products supplied to consumers, and the predominant marketing channel. These inter-links are not well- developed in the chains as they are relatively informal. Figure 10 shows sub-chains 1 and 2.

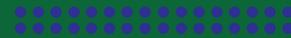
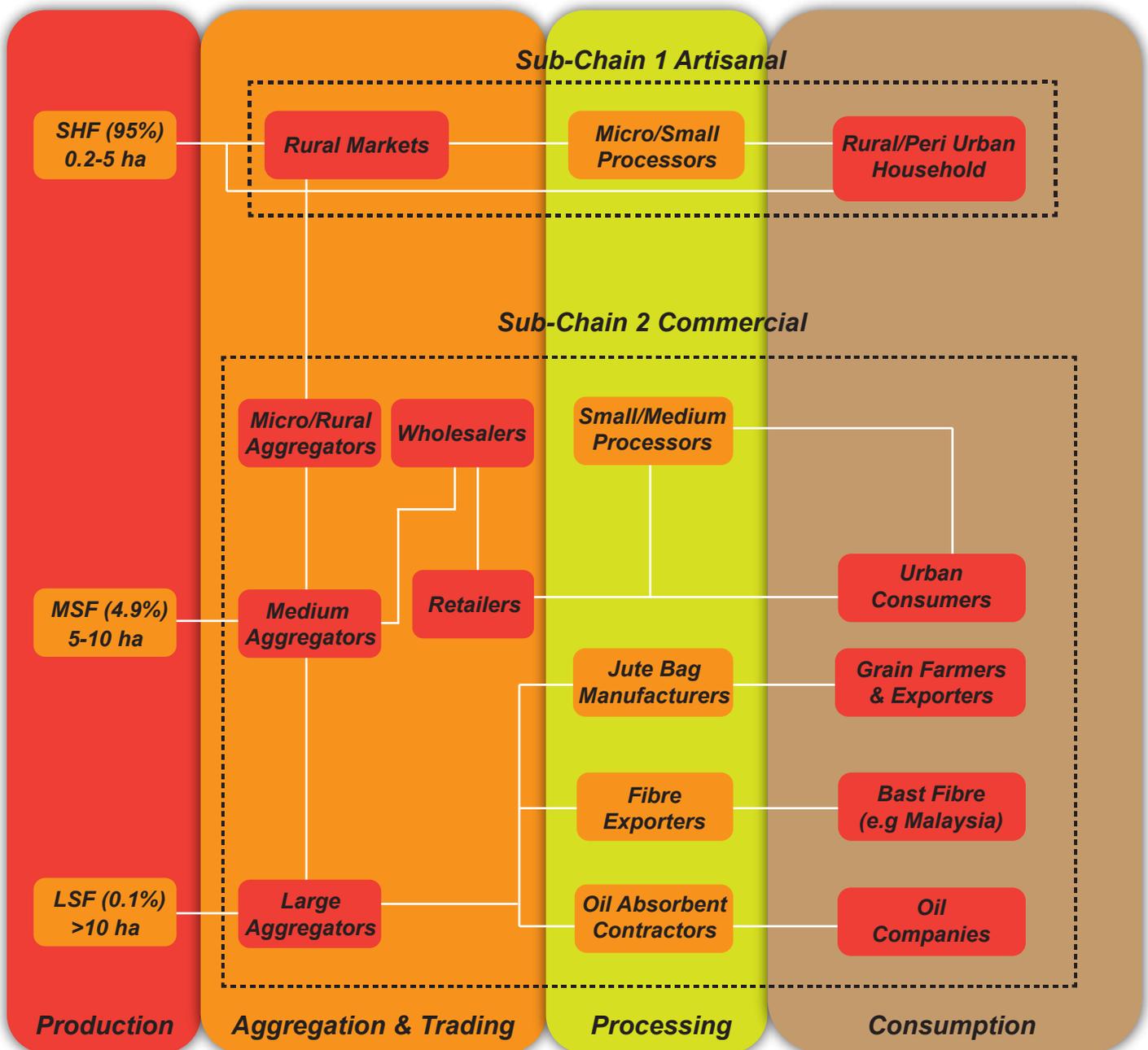


FIGURE 10: KEY ACTORS IN KENAF VALUE CHAIN IN NIGERIA, 2022





Sub-Chain 1 is artisanal in its structure and functions. The sub-chain consists of mainstream smallholder farmers (SHF) who cultivate less than 5 hectares of Kenaf. Their output is sold into the rural communities where they live, including fresh vegetables and seeds. The quantities sold in the rural markets are usually small, matching the type of local demand. The fresh vegetables sold in the rural markets tend to be used as soup and eaten with "tuwo" in households, and sometimes they can be found in rural restaurants. The sale of vegetables by the smallholder farmers is predominantly in northern Nigeria states, where the unretted stalks are left to dry and used as fuelwood. The retted stalks undergo primary processing to produce ropes for bundling farm produce, aesthetics bags, hand fans, twine, etc. The stalk in primary processing goes through retting and decortication processes. This is mainly done manually using simple hand tools by a few local small and medium enterprises (SMEs) that operate within communities.

Secondary processing continues for raw fibre for jute bags made by large-scale manufacturers. Produce from the SHF enters into Sub-chain 2 through the activities of micro/small-scale rural aggregators, who usually buy small quantities of seeds or fresh stalks and leaves and sell them to other aggregators. Similarly, SHFs primarily sell seeds and fibre to micro/small-scale rural aggregators and sometimes small-scale processors in the country's southwest region.

Sub-Chain 2 is commercial. The actors here include SHFs whose produce, as stated above, enters this sub-chain through trade involving micro/small-scale rural aggregators. It is important to note that some SHFs participate in various interlocked farm input for fibre/seed output schemes. They receive input support from the Federal Government through the CBN/Anchor Borrower Program. In the schemes, the out-growers are private aggregators to whom they are linked through the Farmer Producer Organizations (FPOs) such as KEPPMAN. They cultivate 0.1-5 hectares of Kenaf just like the rest.

FPOs also own decortivating machines and sometimes carry out services for members and other households at a fee. Some common decortivating machines used in many Kenaf-producing communities in the south have throughput capacity ranging from 1,500 to 2,000 tonnes/hour. There are no yarn decortivating machine in these locations. Also, we find indications that the type of processing equipment used increases the risk of contamination and reduction of Kenaf fibre and seed quality. Experts consulted indicate that mechanical planting and harvesting tend to lead to higher yield and better-quality fibre and foundation seeds. However, the significant difference is that in the absence of schemes/programs or off-takers contracting them for seeds and fibre, they tend only to cultivate a few plots (less than a hectare). These types of SHF are predominantly found in the south. The north is predominantly known for producing Kenaf for leaves and ropes and eventually fuel wood. Recently, KEPPMAN has been on course to secure a loan for 200 registered Kaduna farmers for fibre production to satisfy a request from a private off-taker in Ondo state for POP materials. Similar to the south, majority of farmers in the north are small-scale, cultivating a few plots here and there, short of hectares most times. The sub chains vary between the north and the south. The flow in the north has been quite simpler than the south in recent years considering that farmers in the south have been more exposed to off-takers that requested fibre from time to time. Additionally, the focus on production for leaves is predominant in the north and quite rare in the south.





Other producers in this sub-chain are medium-scale farmers (MSF), cultivating between 5-10 hectares of Kenaf, and the large-scale farmers, whose average area under Kenaf cultivation is over 10 hectares. Occasionally, LSFs may go as high as 30 hectares and above, especially in southern states such as Ogun. Most MSFs and LSFs primarily produce Kenaf seed and fibre based on forward contracting arrangements.

It is important to mention that the boundaries for these two analyses imply that seed production and distribution and support services will not be considered directly as part of the value chain but rather as intermediate goods and services (IGS). However, we will analyse the challenges in the supply of Kenaf seeds and their impact on production and productivity within the value chains. Other analysed IGS includes the supply of inputs such as fertilizer, agrochemicals for weed control, and services like retting, decortication, and transportation. These providers of IGS are illustrated in Figure 9.

FIGURE 11: KENAF PRIMARY PROCESSING - RETTING AND DECORTICATION



Source: Author's during the field visit to KEPPMAN, Ogun State (2022)



¹This research can be obtained from the office of the Head of Programme (HOP), Jute and Kenaf Improvement programme at IAR&T, Ibadan. The HOP, Dr. O. N. Adeniyani was one of our key informants in this survey.



Kenaf aggregators are mainly seed and fibre aggregators. They play a crucial role in Sub-chain 2, including performing a critically-needed spatial transformation function, i.e., transporting seed and raw fibre from the rural areas where production is concentrated to the major urban and regional export markets. Powder from the Hurd fibre is transported long distances to the southeast (over 570 Kilometres from Ogun state to Rivers state). Many large-scale aggregators have storage rooms for seeds and raw fibre, enabling them to provide an essential temporal marketing function. Similarly, they play a critical role in facilitating access to production finance for SHF and MSF by providing in-kind and cash advances. The main end-users of Kenaf vegetables, seeds, and fibres in Sub-chain 2 are households, farmers, oil exploring companies, and grain exporters.

During consultations with key informants, it emerged that the IAR&T has an elaborate system for researching the entire Kenaf value chain and has been doing so for over five years. They have produced our locally adaptable varieties - Ife-Ken 100, Ife-Ken 400, Ife-D1 400, and ARTKen 211. These varieties have been distributed several times to farmers to promote Kenaf production. However, only KEPPMAN farmers have had access to this information, and until recently, the membership has been significantly higher in the southern part of the country. For example, KEPPMAN has not been launched in Kano and Jigawa states, and the leadership of the Kaduna chapter was only inaugurated a few months ago. Therefore, in the north, access to improved Kenaf varieties is limited. The two varieties of Kenaf that were reported are the predominant landraces and a hybrid that is coined “bini da rani”.

FIGURE 12: KENAF FIBRE PRODUCTS IN NIGERIA



Source: Study during a visit to IAR&T, Ibadan (2022)

The local seeds are recycled and primarily sourced from the other local farmers. The hybrid is purchased from West African Cotton Company (WACOT) (in Katsina), IAR, and Amora Investment Limited in Kaduna. The Kenaf seed is very scarce and expensive, a kilogram is sold at N 1,100. Moreover, upstream actors attribute Kenaf's low aggregate output in the country to shortage of off-takers, and undeveloped markets. Also, there is insufficient coordination of activities between the research institutes (such as IAR&T and IAR), and other stakeholders in the VC.





ECONOMIC ANALYSIS OF KENAF VALUE CHAIN IN NIGERIA

Financial analysis of operations of the key actors

Accounts from the key actors suggest that all the Kenaf activities are profitable. The partial budgeting results show that Kenaf's highest market value lies in industrial applications. Our cost-benefit analysis indicates that the net benefits are higher for producers than processors and traders. Margins are tighter at the large-scale processors level due to the increased processing cost; especially as non-family labour is required. We found that the emerging fibre industry has somewhat followed the pattern of established field crops, where economic viability is concentrated in a region near the contracting and processing companies and where the revenue per hectare is competitive with alternative crops.

The values used for the financial analysis in Tables 5, 6 and 7 are average values from a sample of farmers interviewed during the FGDs and KIIs sessions. It is important to note that output and input market prices considered in computing cost and revenue values for Table 5 are different across typologies due to the differences in the scale of operations that attract discounts (for inputs) or and higher prices (for output). As clearly stated in Table 5, average yields per hectare of fibre for the different farmer typologies are 1.2 tonnes, 1.5 tonnes and 2.4 tonnes for SHF, MSF and LSF respectively. Similarly for seed, average yields per hectare used in the analysis are obtained from the IAR&T: 200kg, 230kg, 250kg for SHF, MSF and LSF, respectively. Generally, more vegetable bundles are harvested when cultivating Kenaf for seeds than for fibre. Return on investments for all the Tables are calculated by simply expressing the percentage of net income on cost of investment. Average values in Table 6 are estimated based on 1 tonne of fibre and 100kg seed of Kenaf. Depending on the volume, seeds are bought at N,2000 - N2,300 and sold at N2,300 – N2,500. Like Table 5, the values are gotten from stakeholder consultations (during FGDs and KIIs sessions) and can be verified.

Producer margins in the Kenaf value chain

Table 4 shows that Kenaf production by all categories of farmers is profitable. The overall average return on investment (RoI) for farmers cultivating Kenaf for seed is 93.46 percent while that for farmers cultivating for fibre is 45.86 percent, and the category of farmers obtaining the highest returns is the large-scale fibre farmers. They post a profit margin of N 381,400 per hectare for fibre and N 426,400 per hectare for seed. They benefit from economies of scale. Notably, Kenaf seed producers appear to have higher returns than producers of Kenaf fibre. Also, there is no significantly wide gap in profit margin between SHF and MSF, though the analysis shows that SHF is less profitable than MSF. This is because they obtain relatively higher prices than farmgate prices offered to SHFs, and the rise in application of inputs results in increased utilization of nonfamily labour and other resources compared to the SHF.





TABLE 5: OPERATING ACCOUNTS OF PRODUCERS OF MARKETABLE VOLUMES OF KENAF FIBRE AND SEED PER HECTARE (IN NAIRA)

| ITEM/PRODUCER TYPE | SHF (Fibre) | SHF (Seed) | MSF (Fibre) | MSF (Seed) | LSF (Fibre) | LSF (Seed) |
|--|----------------|----------------|----------------|----------------|----------------|----------------|
| Total revenues (value of production) | 340,000 | 560,000 | 400,000 | 610,000 | 750,000 | 800,000 |
| Sales (Fibre; Seed) | 240,000 | 400,000 | 300,000 | 460,000 | 600,000 | 600,000 |
| Sales (Vegetables) | 100,000 | 160,000 | 100,000 | 150,000 | 150,000 | 200,000 |
| Self Consumption | | | | | | |
| Self-consumption | 104,000 | 64,000 | 108,500 | 61,000 | 82,100 | 80,000 |
| Intermediate goods and services (total) | 262,250 | 265,250 | 269,500 | 272,500 | 303,600 | 408,600 |
| Seed | 12,000 | 15,000 | 12,000 | 15,000 | 15,000 | 20,000 |
| Ploughing + Harrowing | 59,000 | 59,000 | 59,000 | 59,000 | 59,000 | 59,000 |
| Planting | 3,000 | 3,000 | 5,000 | 5,000 | 25,000 | 25,000 |
| Fertilizer | 37,250 | 37,250 | 42,500 | 42,500 | 50,000 | 50,000 |
| Herbicide + Insecticides | 36,000 | 36,000 | 36,000 | 36,000 | 36,000 | 36,000 |
| Weeding | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 | 20,000 |
| Harvesting + offloading | 75,000 | 75,000 | 75,000 | 75,000 | 75,000 | 75,000 |
| Transport | 7,000 | 7,000 | 7,000 | 7,000 | 8,600 | 8,600 |
| Hand gloves | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 | 5,000 |
| Storage Rent | 8,000 | 8,000 | 8,000 | 8,000 | 10,000 | 10,000 |
| Value added (direct) | 50,000 | 50,000 | 50,000 | 50,000 | 65,000 | 65,000 |
| Value of rented land | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 | 50,000 |
| Depreciation | - | - | - | - | 15,000 | 15,000 |
| Total Cost of Investment | 312,250 | 315,250 | 319,500 | 322,500 | 368,600 | 373,600 |
| Average Yield | 1.2 | 200 | 1.5 | 230 | 2.4 | 250 |
| Net Income (N) | 27,750 | 244,750 | 80,500 | 287,500 | 381,400 | 426,400 |
| Return on Investment (percent) | 8.89 | 77.64 | 25.20 | 89.15 | 103.47 | 114.13 |

The SHF households earn an average annual seed Kenaf-based net income of about N244,750 and fibre Kenaf-based net income of about N27,750 which is often complemented by revenue from the production of other crops, considering the unstable nature of the markets mainly created by a lack of off-takers. MSF makes an estimated annual seed Kenaf-based net income of N 287,500 and fibre income of N 80,500 which is far above the official minimum wage per annum. The sale of Kenaf vegetables contributes significantly to the revenues generated by the actors.





Though the sale of leaves is typical in the north, actors in the south also take advantage of the northern markets and use the leaves as fodder for livestock and mulch on the farm. Selling fresh vegetables minimize postharvest losses; however, the marketing window is relatively short, except when farmers dry it to preserve it. Moreso, Kenaf seed production is mainly done based on demand by either IAR&T directly or through KEPPMAN for onward delivery to private contractors. Transactions of this type are widespread in the southwest, where KEPPMAN is well established. Hence, this further underscores the near absence of a pronounced market for Kenaf seed and other products in the country.

In the case of cotton producers, the average return on investment (RoI) for farmers cultivating Cotton is 164.3 percent, and the category of farmers obtaining the highest returns is the largescale farmers. They post a profit margin of N770, 402 per hectare from fibre, mostly because the benefits they receive as a result of economies of scale. As presented in Table A1 (see appendices), there is no significantly wide gap in profit margin between SHF and MSF, though the analysis shows that SHF is less profitable than MSF. This is similar in the case of Kenaf as shown in figure 6. This is because they obtain relatively higher prices than farmgate prices offered to SHFs, and the rise in application of inputs results in increased utilization of non-family labour and other resources compared to the SHF. The SHF households earn an average annual Cotton-based net income of about N514,167 which is more than 16 times the net income realized by Kenaf SHFs producing for fibre. This income is regularly complemented by revenue from the production of other crops, considering the unstable nature of the markets and the production challenges. MSF makes an estimated annual Cotton-based net income of N532,350 which is about 6 times as much as the income realized by MSFs producing Kenaf for fibre (N80,500). Net income for LSFs is just about twice as much as that realized in Kenaf fibre production.

Margins of Kenaf aggregators and traders

Table 5 shows that the aggregation and trading functions are also profitable, but the margins are much lower than the producers' margins. The average RoI for this group of actors is about 12.3 percent, compared to the over 93.64 and 45.86 percent observed for the producers. The relatively tighter margins reflect the high costs involved in purchasing the needed Kenaf raw materials, i.e., fibre, vegetable, or seed. It is also a reflection of the fact that traders focus mainly on spatial transformation functions and hardly engage in intra-seasonal storage. Also, the logistics required to ensure produce gets to the desired customers is limited among small-scale traders.

The absence of efficient intermediaries leaves the extra burden on SHFs that often have binding liquidity constraints and lack physical storage facilities. Rural collectors are community-based intermediaries and constitute the first line of aggregation in the Kenaf primary products trade. They trade in small volumes, 3 to 5 tonnes per season, and are exposed to similar financial constraints as smallholder farmers. However, the large-scale aggregators generate 2.5 to 3 times more income than other traders' average income. In addition to trading, they also cultivate Kenaf at a small-scale level.





Margins of Kenaf fibre processors

We present the analysis of Kenaf processors in Table 6. While only a few processing machines are available in the country, we observe that investment in Kenaf fibre processing generates attractive returns, with profits estimated at N 171,133 for Jute bag manufacturers per tonne and N134,631 for oil absorbent contractors per tonne, and N 116,633 per tonne for those processing for exports. The margins for micro and medium-scale processors show profitability in Nigeria's Kenaf processing. There are still very few of these operators in the country. The average RoT for this category is 14.8 percent.

It is important to note that due to difficulties in obtaining details on actual capital investments by the key actors, we used return on turnover (net profit/market output) as the primary benchmark to estimate the overall financial performance of the actors. In our calculations, we included household consumption and applied producer price obtained at the respective levels. The RoT is particularly relevant as it indicates efficiency in the operations of larger actors, while the net income appears more suitable for smaller actors. We decided to present both indicators for uniformity. Another source of caution is that our analysis of processors and marketers is conditioned on best-case industry projections. For example, estimates of the exports were limited to the Kenaf VC's contribution to foreign exchange gains. The reason is that there was commercial confidentiality among mid and upstream actors, making it difficult to obtain detailed data.

The information collected from aggregators and traders during the FGDs and KII sessions was mainly from wholesalers and retailers who mostly doubled as aggregators. Table 9 shows that the trading functions are profitable with equally good margins similar to those from producers. The average RoI for this group of actors is about 112.65 percent, compared to the 12.3 percent observed for the aggregators and traders in the Kenaf value chain shown in Table A2 in the appendices. Also, the net income values for wholesalers and retailers observed as N 371,500 and N 424,500 for Kenaf in Table 6 in comparison with N 532,350 and N 514,167 in cotton, show relatively small differences considering how underdeveloped the Kenaf markets are. It therefore brings to reason the fact that with developed markets linked by an improved mechanized processing sector, Kenaf marketing can ensure better net income values than those from cotton.





TABLE 6: OPERATING ACCOUNTS OF TRADERS OF MARKETABLE VOLUMES OF KENAF IN NIGERIA PER TONNE OF FIBRE AND 100KG OF SEED (IN NAIRA)

| ITEM/TRADER TYPE | Rural Marketers | Micro Scale Aggregators | Medium Scale Aggregators | Large Scale Aggregators | Retailers | Wholesalers |
|--|-----------------|-------------------------|--------------------------|-------------------------|----------------|----------------|
| Total revenue (value of production) | 420,000 | 450,000 | 450,000 | 470,000 | 450,000 | 405,000 |
| Sales – Seeds | 240,000 | 250,000 | 250,000 | 245,000 | 250,000 | 230,000 |
| Sales – Fibre | 180,000 | 200,000 | 200,000 | 225,000 | 200,000 | 175,000 |
| Intermediate goods and services (total) | 390,000 | 400,000 | 387,000 | 365,000 | 420,000 | 367,000 |
| Kenaf Seed | 230,000 | 230,000 | 200,000 | 200,000 | 230,000 | 200,000 |
| Kenaf raw fibre | 140,000 | 150,000 | 170,000 | 150,000 | 170,000 | 150,000 |
| Transport | 5,000 | 5,000 | 4,000 | 5,000 | 5,000 | 5,000 |
| Loading and offloading | 15,000 | 15,000 | 13,000 | 10,000 | 15,000 | 12,000 |
| Value added (direct) | 6,500 | 6,500 | 6,000 | 5,000 | 4,500 | 4,500 |
| Value of hired labour | 2,000 | 2,000 | 2,000 | 1,800 | 2,000 | 2,000 |
| Value of Rent Stores/Shops | 1,000 | 1,000 | 1,000 | 700 | 1,000 | 1,000 |
| Financial charges | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Local council levies | 500 | 500 | 500 | 500 | 500 | 500 |
| Taxes/duties | 2,000 | 2,000 | 1,500 | 1,000 | 2,000 | 2,000 |
| Total Investment Cost | 396,500 | 406,500 | 393,000 | 370,000 | 424,500 | 371,500 |
| Net Income (N) | 23,500 | 43,500 | 57,000 | 100,000 | 27,500 | 33,500 |
| Return on Investment Rol | 6 | 11 | 15 | 27 | 6 | 9 |



**TABLE 7: OPERATING ACCOUNTS OF FIBRE PROCESSING IN NIGERIA– 2022 (IN NAIRA)**

| Item/producer | Micro-Small Processors | Medium Scale Processors | Jute Bag Manufacturers | Fibre Exporters | Oil Absorbent Extractors |
|--|------------------------|-------------------------|------------------------|-----------------|--------------------------|
| Total revenues (value of production) | 21,000 | 35,000 | 375,000 | 332,000 | 350,000 |
| Decorticating fee (per 1000 Kg) | 16,000 | 20,000 | - | - | - |
| Washing and retting fee (per 1000kg) | 15,000 | 15,000 | - | - | - |
| Fibre sales (per 1000kg) | - | - | - | 332,000 | - |
| Sale of absorbent materials (per 1000kg) | - | - | - | - | 350,000 |
| Jute bag sales (100 pieces) | - | - | 375,000 | - | - |
| Intermediate goods and services (total) | 4,000 | 3,500 | 198,000 | 208,000 | 208,000 |
| Transportation | 1,000 | 1,000 | 5,000 | 5,000 | 5,000 |
| Utilities (water/electricity) | 2,000 | 1,500 | 1,000 | 1,000 | 1,000 |
| Loading and off-loading | 1,000 | 1,000 | 2,000 | 3,000 | 3,000 |
| Kenaf Fibre | - | - | 190,000 | 200,000 | 200,000 |
| Value added (direct) | 4,378 | 3,678 | 5,867 | 7,367 | 7,367 |
| Value of rented land | 1,000 | 800 | 1,500 | 1,000 | 1,500 |
| Value of hired labour | 2,500 | 2,000 | 3,000 | 4,000 | 3,000 |
| Taxes/duties | 500 | 500 | 1,000 | 2,000 | 1,000 |
| Depreciation | 378 | 378 | 367 | 367 | 367 |
| Net profit (N) | 12,622 | 27,822 | 171,133 | 116,633 | 134,631 |
| Return on turnover (percent) | 150.66 | 387.60 | 83.94 | 53.44 | 61.76 |





SOCIAL ANALYSIS OF KENAF VALUE CHAIN IN NIGERIA

Social considerations are evident in the involvement of smallholder farmers as primary producers, mainly male farmers in the north. Women and youth are responsible for trading and small-scale processing in local markets (village and town level). The primary producers are divided into several categories based on landholdings and production output. These categorizations enable their engagement with different actors in the value chain. Benefits are commensurate with the level and nature of engagement.



Farmers' representative organizations

Several farmers' representative organizations in Nigeria appear ineffective in addressing some key challenges facing members, especially among smallholder farmers. However, the Kenaf associations seem to be better at coordinating members to participate in interventions irrespective of the category of the actor. The notable ones include the following:

The Kenaf Producers, Processors and Marketers Association of Nigeria (KEPPMAN), formally known as the Kenaf Development Association of Nigeria (KEDAN), was inaugurated in 2016 and is the sole organization specific to the advancement of the Kenaf VC. The membership of KEPPMAN includes producers, processors, marketers, researchers, extension, and mechanization services providers. Working closely with IAR&T and RMRDC, KEPPMAN has assured proper training of her members in the Kenaf value chain, good agricultural development practices, and delivery of quality seeds for planting.

KEPPMAN is mandated to promote information-sharing and facilitate farmers' linkage to various agricultural finance programs, including CBN's Anchor Borrower Programme, FMARD, FMITI intervention schemes, NIRSAL, etc. It has a membership of over 45,000 members, predominantly farmers. KEPPMAN is a part of the All Farmers' Association of Nigeria (AFAN), an umbrella body. AFAN's approach mainly involves delegating VC-specific issues to commodity based organizations, including state-level ones.

It has branches in more than 18 states in Nigeria (mainly in the south) with administrative structures similar to the national executive council (NEC). The launching of new state chapters is ongoing in the north (e.g., in Kaduna), and membership registration is growing.

The organizations mentioned above represent only a fraction of Kenaf farmers. Their main functions include sharing information on inputs (e.g., fertilizer and agrochemicals) and other good agricultural practices and disseminating market data.





Participation of women

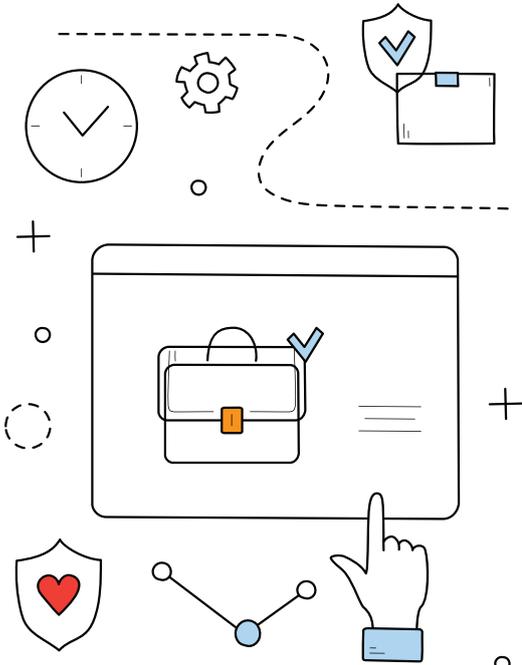
The Kenaf value chain provides women with access to income generation through participation in different stages in the value chain. It is worth noting that women's participation in these operations largely depends on the farms' socio-cultural and agricultural settings and tends to vary from the north to south. Women in northern Nigeria are primarily engaged in Kenaf production for the leaves. They are more involved in leaves processing and trading than their men counterparts, whose activities revolve around pre-production, actual production, and postharvest operations such as retting and decortication. In south, women are engaged in tasks that require dexterity, consistency and patience such as sorting of long fibre to ensure quality.

There are no uniform working conditions across the states. Farm workers from different farms experience varying working conditions. Wages for skilled labour are generally higher, indicating better working conditions than unskilled labour, irrespective of gender. Wage rates are determined by the employer negotiating with the individual labourer. We find evidence that unequal wage rate for male and female labourers. Women being paid lower rate relative to men performing similar tasks such as planting. Also, most contracts are verbal – this makes the farm wage labourers vulnerable and liable to exploitation. There are no pre-set criteria to determine the minimum wage. Wages are also relatively low for most small and medium-scale actors. The wage varies by the activity undertaken.





Access to resources and services



Since 1992, RMRDC has promoted Kenaf seed development by sponsoring multilocation trials of available Kenaf seed varieties through research institutes such as IAR&T, Ibadan. The Council also supported KEPPMAN undertaking seed multiplication in Ilorin, Kwara state. Evidence from the consultations also reveals that many associations have engaged with federal and state agencies to secure resources for their members. For instance, in 2020, about 19,672 kg of Kenaf foundation seeds were distributed to farmers through KEPPMAN and KEDAN across the country. Similarly, the representatives of these organizations report that they had recently concluded a stakeholder meeting in March 2022 in Abuja. The associations advocate for agricultural sector policies, focusing on input supply and sub-regional trade in Kenaf and other fibre crops.

- KEPPMAN, in particular, has organized several stakeholder meetings with the FMARD, FMITI, IAR&T, RMRDC, NNPC, and other relevant stakeholders to advocate for strengthening the potential collaboration in the Kenaf VC. Kenaf seed is obtained from IAR&T through the FMARD and RMRDC programs. Most Kenaf farmers are smallholders who do not have particular preferences for varieties due to the subsistence level of their cultivation. They are comfortable with the foundation seeds supplied to them from IAR&T. Moreover, both men and women farmers use their recycled seeds saved from the previous season. It was noticed that farmers preferred varieties with good quality traits such as high yields, limited inputs requirement, and readily available and suited to their farm conditions. The most common varieties with farmers are lfeKen D1 400 and lfeKen 400 varieties. The varieties were said to have relatively high yield and tolerant to typical tropical plant diseases in Nigeria.





Financial inclusion

KEPPMAN constitution makes it possible for both men and women producers to access finance through banks (commercial banks & non-interest banks), other formal sources (insurance companies, capital markets, microfinance banks, pension schemes or shares, remittance through other formal channels), and informal sources (microfinance institutions, money lenders; thrift; savings). However, the reach of banking and other formal (non-bank) financial services in rural areas is limited. KEPPMAN officials claim that loans can be obtained and shared equally with members irrespective of gender through the association.

From consultations, it was realized that as regulators and a coordinating and liaison office for all financial inclusion stakeholders in Nigeria, CBN, through its Financial Inclusion Secretariat (FIS), is always on the lookout for stakeholders that can further accelerate the inclusion of women. The Central Bank, in turn, enacts policies and partners with stakeholders to develop products and continuously facilitates an environment for recommendations from stakeholders.

Collateral security increases the chances of obtaining loans from financial institutions, especially banks. The selection criteria are based on creditworthiness and collateral to support the applicant's ability. These requirements often relegate smallholder farmers from the process. Culture plays a significant role in female farmers accessing finances for non-institutional/informal sources of acquiring funds, such as moneylenders, traders and commission agents, relatives and landlords, etc. Generally, in the south, the ability to pay back and status in society earns you access to the necessary finances irrespective of gender. Some women groups empower themselves through savings systems and lend to each other.





ENVIRONMENTAL ANALYSIS OF KENAF VALUE CHAIN

The environmental credentials of Kenaf is constantly being researched and updated. Few of the relative advantage of the Kenaf value chain include following:

Adaptability to different agroecology.

Multiple landrace strains exist in almost all climates and soil conditions, making Kenaf an extraordinarily flexible and unfussy plant to cultivate. The plant is easily hybridised, and cultivars and varieties can be bred to support specific plant characteristics within just seven generations. The plant is a fast grower, meaning it naturally suppresses weeds and hence largely eliminates the need to use expensive herbicides. The plant also improves soil health—especially aeration. The plant’s ability to improve the quality of the soil plus its rapid growth make it a perfect rotational crop, and it has been found that food crops can be grown on a plot used for Kenaf immediately after the harvest with no fallow period required. In addition, research shows that wheat and soybean yields improve sharply when Kenaf is the preceding crop (Amaducci et al., 2015). Kenaf grows well when rain-fed and requires little or no irrigation. Finally, much is made of Kenaf potential to produce an income stream for farmers above current agricultural crops in general.



Low-input, low-management, and low-technology crop

This is primarily related to the argument that Kenaf is typically a low-input, low-management, and low-technology crop. Kenaf is highly pest-resilient and disease-free, resulting in the need for fewer pesticides. The plant’s fast growth pattern makes it a natural weed suppressant, meaning no herbicides are required. It is also argued that the crop needs less fertilizer than competing agricultural crops such as cotton. The crop cultivation footprint of Kenaf is superior to cotton because of higher yields for Kenaf (1.5 tonnes/hectare versus 1.35 tonnes/ha for cotton) and lower water usage (3,400 litres/kilogram for Kenaf versus 9,750 l/k for cotton). These three facts, taken together, support the argument that the crop requires lower levels of inputs, thus decreasing its negative environmental impact during cultivation (Amaducci et al., 2015; Fortenbery, 2014; Heister, 2008). Also, Kenaf is planted in a relay, which makes it possible to grow two crops on a piece of land in one calendar year.





High carbon sequestration properties

Environmentalists also argue that Kenaf has excellent carbon sequestration properties and that one hectare of Kenaf can absorb 30-40 tonnes of carbon dioxide. However, the low-input usage of Kenaf is contested, the general counter-argument being those input requirements will depend on the intended final use of the crop. If it is grown for fibre, input requirements and management demands will be low. On the other hand, if it is grown for seed, the inputs and management are required to increase substantially, thus diminishing the environmental benefit of the crop (Coogan 2016; Dietz 2013; Fortenbery 2014; Heister 2008).

Sustainable alternatives to fossil fuel-derived mainstream products

The focus here with regards to the environmental argument has less to do with Kenaf's green credentials as an agricultural crop and more to do with the green credentials of downstream Kenaf products and the ability of Kenaf-based products to provide sustainable alternatives to fossil fuel-derived mainstream products such as polyester, concrete form blocks, insulation, and lubricants. For example, it is argued that Kenaf provides a potentially lower-impact feedstock for paper manufacture than trees; that Kenaf fibres have a lower environmental impact than cotton in the textile industry; and that Kenaf substitute products increase the recyclability of final products at the end of their useful life.





OVERVIEW OF FIBRE INDUSTRY AND POTENTIALS FOR KENAF VALUE CHAIN IN NIGERIA

Insight into cotton value chain in Nigeria

Cotton is the most important fibre crop in Nigeria. It is the country's most extensive fibre crop - per volume of output produced. Cotton development started in Nigeria in 1903 and can be grown in 24 States across four agroecological zones. Its fibre is the primary cost driver in the Nigerian Textile Industry, contributing 69 percent to spinning, 75 percent to weaving, and 57 percent to dyeing, printing, and finishing. Cotton has diverse uses, provides thousands of valuable products, and supports millions of jobs as it moves from field to fabric. Cotton is a source of fibre for the textile mills, edible oil for human and industrial uses, and a by-product for livestock feed. The crop offers an avenue for raising incomes and improving livelihood in rural areas with high poverty.

The main products supplied from the Cotton VC in Nigeria are:

Cotton lint. Cotton lint is the primary driver of the flow in the cotton market. Cotton lint is the soft hair around the seed called floss, which is made of cellulose that serves as a raw material in the textile industries to manufacture large proportions of adsorbent fabric for clothing as a natural textile fibre. The lint is also used to produce thread after spinning. This forms the basis of the textile and fabric industries, which depend on the mass utilization of thread to weave and make fabric and cloths (apparel). A higher concentration of Cotton lint factories resides in Nigeria's North-west and South-West regions. Over 95 percent of cotton lint used in Southern factories is supplied from the north. Zamfara state used to have 17 cotton processing industries, the highest in the country. However, only 4 of these industries are operational and operating at 10 percent capacity.

FIGURE 13: BAG OF COTTON LINT FOR SALE IN A RURAL MARKET IN KADUNA



Source: Study during a visit to Kaduna (2022)



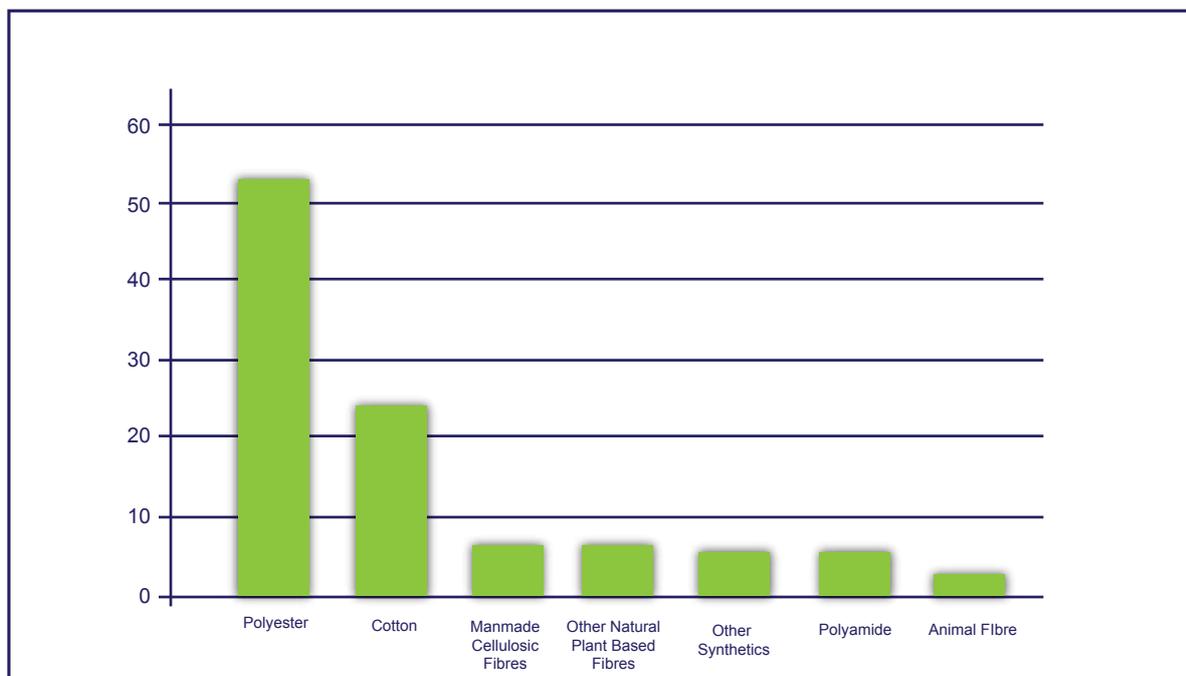


Cotton Seed. The cottonseed market consists of the processors that transform it into raw oil and cake. The major drivers for the Cottonseed market are demand in food processing and other industrial processes, growing awareness about the health benefits, and low prices of cottonseed oil. The global cottonseed oil market is expected to grow by 2-4 percent CAGR from 2020 to 2025. The oil is important for human consumption; it is mainly processed in food industries for salad oils, cooking oil, and margarine or shortening for baked goods, cake icings, and as a substitute for other edible oil sources. The cottonseed cake is a by-product of oil extraction from cotton seeds. A protein-rich feed, cottonseed meal is a common source of protein for ruminants, and they are used as a partial substitute for soybean meal. The market for cottonseed in Nigeria has been spurred by increased awareness of its nutrient-rich nature and low-cost price.

Cotton Lint and Seed Exports. The bulk of the Cotton, exported from Nigeria originates from the Northern states. Medium-scale cotton trading companies dominate the trade, and the centre is in the Kano State, with the Dawanau market being the biggest physical commodity trading market in West Africa. Top export destinations of Cotton from Nigeria include Pakistan with a share of 65 percent, followed by Bangladesh and Vietnam with 19.6 and 3.81 percent shares, respectively.

Figure 9 shows the dominance of synthetic fibre in the textile industry in Nigeria. Synthetic fibre accounts for almost 62 percent of the textile fibre used in Nigeria. Polyester alone has a market share of 52 percent, while polyamide and other synthetics account for 5 and 5.2 percent, respectively. Cotton is the most important natural fibre, accounting for 24.2 percent. Changing petroleum into polyester is a long, toxic, nasty process that leads to environmental externalities and causes debilitating health problems affecting consumers and factory workers.

FIGURE 14: FIBRE TYPES CONSUMED BY INDUSTRIES IN NIGERIA ('000 TONS)



Source: Statista (2022)



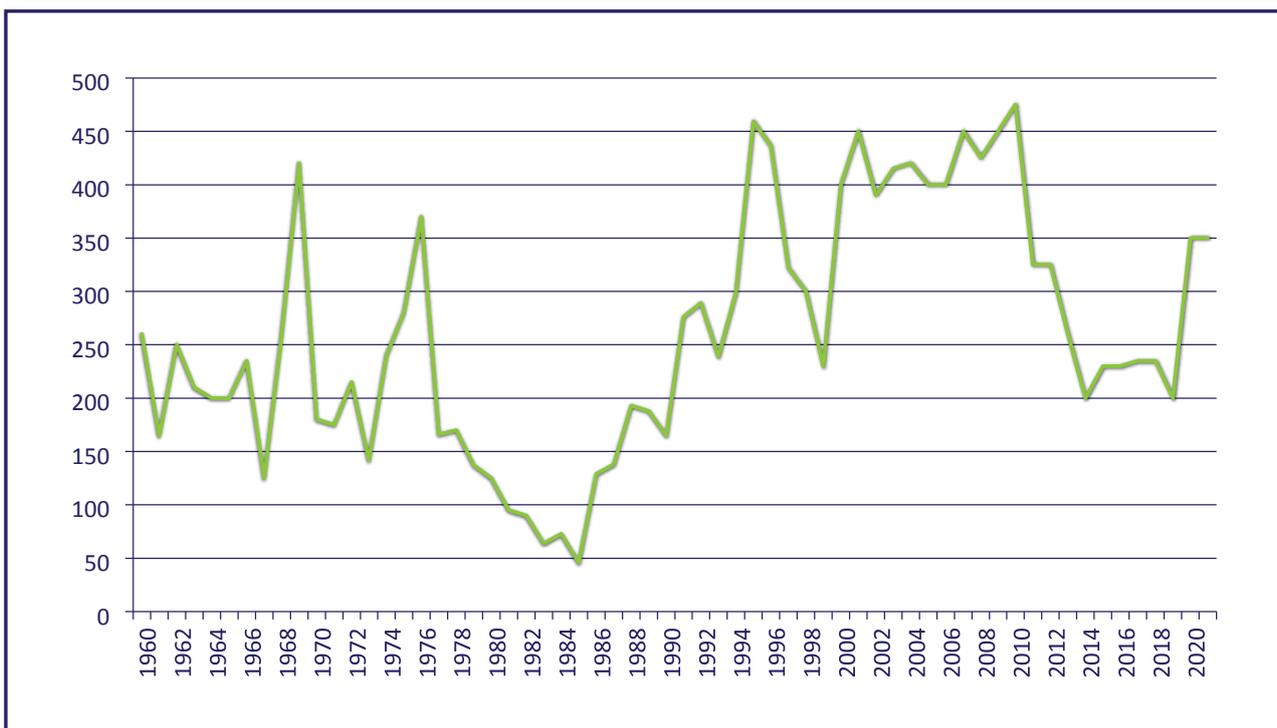


Way forward for the fibre value chain

For decades cotton production has been a driving force for economic development in Nigeria. The neglect of the agricultural sector during the oil boom years (1970 to 1980s) directly impacted the cotton sector. In recent years, the cotton sector has slackened due to poor management and reduced production of both lint and seed. Nigeria, Africa’s leading cotton producer and 12th largest in the world, will likely account for a paltry 20.29 percent of Africa’s cotton production by 2029. The country’s share of Africa’s cotton production by the end of 2020 stood at 27.89 percent. Compared with projected Africa’s cotton production share in 2029 is expected to decline by about 7.60 percent.

Cotton Production is concentrated in the northern states, where the average land under cotton cultivation is much bigger than in the country's south. The main feature of Nigerian cotton cultivation is that peasant farmers are 80 percent of total production under rain-fed conditions with simple tools and animal-drawn implements. Cotton in Nigeria has strong linkages with the domestic industries that consume up to 50 percent of the total production. At the same time, the remaining is exported to the EU, China, South Korea, and Taiwan.

FIGURE 15: NIGERIA COTTON PRODUCTION – 1961-2020 ('000 TONS)



Source: Indexmundi.com (2021)

³ OECD-FAO Agricultural Outlook 2020 Report



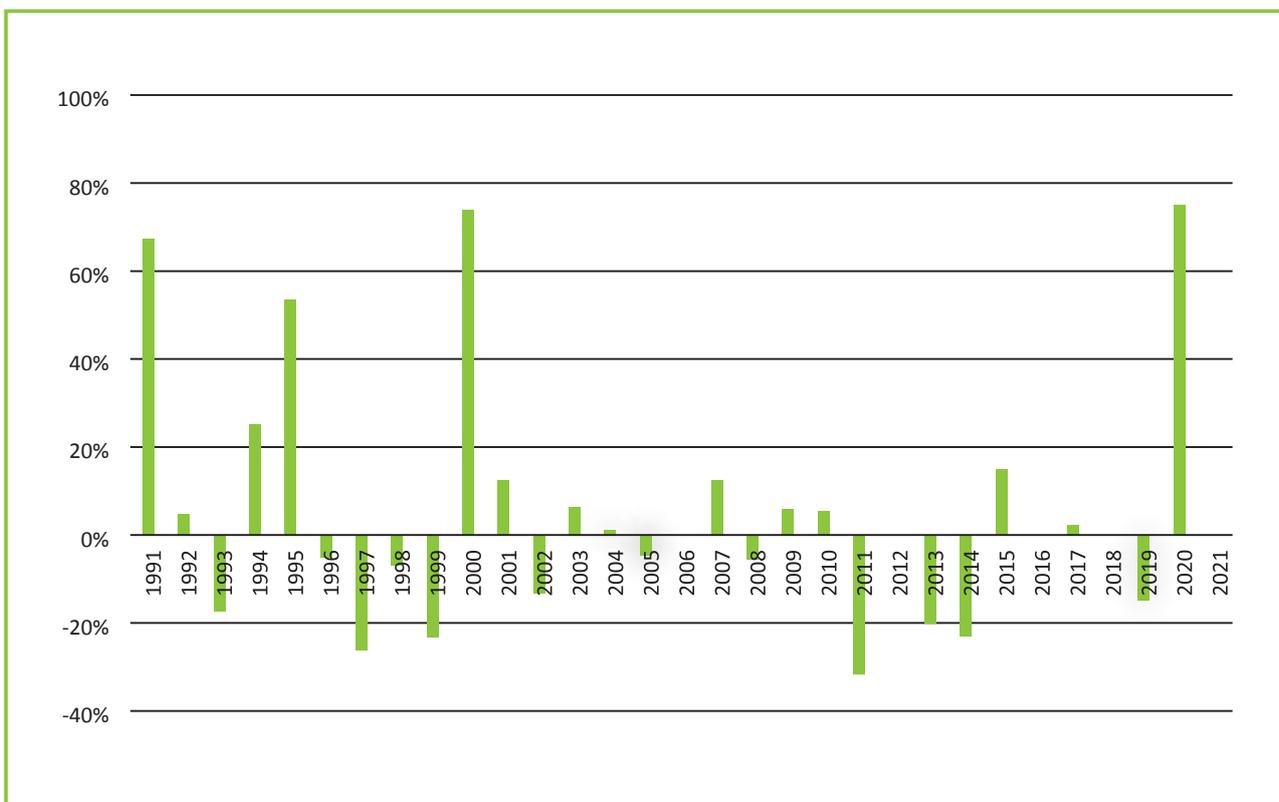


According to Institute for Agricultural Research (IAR), the contribution of Cotton to Nigeria's gross domestic product (GDP) has dropped from 25 percent to 0.4 percent in the last two decades. It had a well-developed textile industry until the 1980s and was one of the world's most refined and vibrant industries. At its peak in the 1980s, the industry provided about 500,000 direct jobs with well over 250 functional factories. The industry started to decline after 2000, followed by closures of the major factories due to operational difficulties.

It is important to note that Cotton output growth in the country has been rather erratic, as shown in Figure 11. There are almost as many positive rates of growth recorded over the period (14) as negative rates (12). The supply uncertainty created by this situation affects industrial off-takers, especially the textile industry with many subsectors that depend on it. The Federal government has gotten wind of the deficit and is designing programmes and interventions and drawing policies to promote the cotton industry.

The Central Bank of Nigeria is keen on promoting the Cotton industry through numerous programs. A slight growth of production output in 2020 has shown a promising side of the Cotton industry in Nigeria. The Bank has been working with the National Cotton Association of Nigeria (NACOTAN). They have promised to deliver 350,000 metric tonnes of Cotton from their members alone in the following years.

FIGURE 16: GROWTH RATES (%) IN COTTON OUTPUT IN NIGERIA (1991-2020)



Source: NAERLS (2019)





The unsatisfactory growth in Cotton output is attributed to the close down of textile factories and low-quality key inputs. Most farmers report producing an average of 0.2 tons/Ha, significantly lower than the potential 1.5 tons/Ha. Data published by NAERLS (2020) indicate that Cotton yields remain relatively low and vary across the states, ranging from 0.19 tons/ha in Taraba 2020 to as high as 3.14 tons/ha in Kaduna. The national average yield is estimated at 0.6 tons per hectare. As noted by IAR, the current yields are still well below attainable levels of about 5 tonnes per hectare.

Shrinking local markets and low seeds available to farmers have inspired Nigeria's cotton farmers to shift to other crops, resulting in the fast slide towards extinction, as shown in Figure 11. During the consultations, about 70 percent of the Cotton farmers in the north express willingness to allocate one-third of their Cotton farms to Kenaf production. Likewise, farmers in the south who cultivate relatively smaller areas indicate intent to convert 100 percent from Cotton to Kenaf. However, the switching is conditioned on some factors, including the availability of forward contracting arrangements with clear and transparent terms, plans for continuous sensitization and capacity building on good agronomic practices, and timely access to quality inputs at affordable prices. Several factors constrain the cotton value chain in Nigeria, making it environmentally unsustainable, labor intensive to cultivate and unstable to depend on as a business or means of livelihood sustenance. Among these constraining factors are:

Water Quantity and Quality Issues: Under poor management practices cotton can contribute to over-consumption of water. The global average water footprint of seed cotton is 3,644 cubic metres per tonne. Unless managed well, cotton production can use and pollute significant amounts of water. Exposure to increased risk from drought will add extra pressure to a fibre already under scrutiny for its water footprint, affecting yields and potentially threatening to cause conflict and societal unrest.

Inappropriate and Excessive use of Chemicals: Cotton production in most cases is an intensive user of pesticides and petroleum-based fertilisers. Cotton uses 2.5% of the world's arable land, yet 10% of all agricultural chemicals such as those in pesticides and fertilisers. Pesticides and fertilisers, inappropriately used, can seriously pollute water sources, and decrease soil fertility.

Soil Depletion: Cotton farming can lead to land clearing, soil erosion and contamination, and loss of soil biodiversity. Poorly managed soils can lead to the loss of soil infertility and declines in productivity.

Price Volatility and Uncertain Markets: Cotton prices are volatile, due to a range of factors such as national regulation, stockpiling, and government subsidies for farmers. This, combined with other factors, creates an uncertain market for farmers, which can make cotton a less attractive crop to grow.

The above mentioned constraints open up investment opportunities in providing solutions that can; address the constraints, combining the cultivation of cotton with other fibre crovaluable economic importance or simply switching to produce Kenaf which is more environmentally sustainable.





Farmers' switching conditions and contract arrangements for fibre crops.

Evidence from our consultation in Nigeria shows that the production of novel fibre crops, such as Kenaf, centers around a limited number of processing plants or contracting companies. This is because many specialty or novel crops often have no cash or “spot” market and are only grown by growers who have contracts - formal or informal - with processing companies. Also, studies indicate that cultivating a novel crop without a contracted buyer can be financially risky if no established alternative cash market exists. Producers selling their commodity into a thin market can be disadvantaged by a lack of price transparency for decision-making and risk reduction and a lack of alternative buyers. Few contract arrangements described in the literature for Kenaf are as follows:

TABLE 8: CONTRACT ARRANGEMENT OPTIONS FOR FIBRE CROPS

| Arrangement | Offer | Yield outcome |
|---------------------------|---|---------------|
| Contract selling | <ul style="list-style-type: none"> i. Off-taker agrees to buy ii. No support services | Lower |
| Contract buying | <ul style="list-style-type: none"> i. Off-taker agrees to buy ii. Limited support services – seeds, some extension | Medium |
| Integrated product system | <ul style="list-style-type: none"> i. Off-taker agrees to buy ii. Complete support services – seeds, fertilizer, extension, funds, transportation, etc. | Higher |

Source: Moyer-Lee, 2013

Forward Contracting Arrangement. This depicts a binding contract agreement to buy or sell Kenaf products and bi-products at a specific price on a specified date in the future. These types of contracts when properly practiced, have the potentials to lock in a specific price to avoid volatility in pricing of farm inputs and output. The aggregators, as buying partners buy a forward contract and enter into a long position, and the farmers, as selling partners in a forward contract enter into a short position. If the price of the underlying product increases, the long position benefits. If the underlying product price decreases, the short position benefits. Clarity and transparency are key in ensuring the success of any forward contracting agreement between Kenaf farmers, aggregators or and marketers.





The forward contract agreement has four main components to consider for sustained growth. These includes the following:

Product: This is the underlying product that is specified in the contract. The quantity of the agreed product must be clearly stated.

Expiration Date: The contract will need an end date when the agreement is settled and the product is delivered and the deliverer is paid.

Quantity: This is the size of the contract, and will give the specific amount in units of the product being bought and sold.

Price: The price that will be paid on the maturation/expiration date must also be specified. This will also include the currency that payment will be rendered in.

The essence for forward contracts is mainly to hedge against potential product losses. It enables the participants to lock in a price in the future and guaranteed price can be very important, especially for novel crops such as Kenaf that commonly experience significant volatility in prices.

Continuous Sensitization and Capacity Building for Kenaf Farmers. There is really no over emphasizing the importance of continuous capacity building, the process of developing and strengthening the skills, instincts, resources and ability that farmers need for them to survive, adapt and thrive in the fast-changing world of technology through appropriate knowledge, skills, system, attitude and resources that will enable farmers especially the women farmer to be effective and efficient in processing of their farm produce.

The different categories of Kenaf farmers, but specially the smallholder farmers and processors require proper and continuous training to address production and processing problems as well as meet the needs of potential domestic and export markets. The trainings can streamline farmers to focus on Kenaf best agronomic practices for best quality and quantity outputs. Many Kenaf smallholder farmers do not have adequate knowledge, skills and experiences required to participate and benefit from the whole agricultural value chain. Agricultural institutions such as the NAERLS, IAR&T, NASC and other relative capacity building private and public agencies can provide relevant training to farmers.

Kenaf Farmers' Access to Farming Inputs. Access and affordability of inputs is equally as important as the availability of and accessibility to output markets. Private sector input supplies have proven, in other crop value chains, to have effective models to deliver sustainable results in ensuring continuous access to inputs for farmers. It is expedient to note that private and public sector collaboration in ensuring farmers' access to affordable quality input is imperative for a strategic increase in the productivity and sustainable income for Kenaf farmers.





Potential for establishing an Kenaf value chain in Nigeria

Nigeria has capacity and capabilities in almost all activities related to potential Kenaf end uses. However, the lack of needed processing and manufacturing sector to transform kenaf seeds and fibre to the desired end uses still limits the potentials of the kenaf value chain in the country. This report considers the potential for developing an Kenaf value chain in Nigeria, highlighting the upstream value addition and downstream capabilities and areas that require further support and upgrade. It is obvious that public-private partnership is essential in realizing this potential in the value chain.

Suitable for production in most Nigeria's agroecology. IAR&T has successfully tested different kenaf varieties across the country using limited inputs and rain-fed growing techniques. Kenaf has been in production across 24 states in Nigeria for decades. Thus, kenaf crop cultivation has proved successful from an agronomical perspective. Also, based on what has emerged, there is technical know-how and experience of cotton and Kenaf producers in rural Nigeria, which we believe that with continuous capacity building efforts can be significantly valuable in transforming the kenaf value chain.

Higher profit margin. Depending on the end-use chosen, the margins per acre possible with this alternative rotational crop suggest that diversification into kenaf would be commercially viable for all categories of stakeholders. This is particularly true in light of the likely pressure on cotton prices caused by decreases in demand. The market demand for some fibre products is currently a niche and a good number of them are prospective, including those from seeds. Studies attribute this to limited awareness of uses, supply, and marketing. Margins obtainable at present from the kenaf value chain have been detailed in the financial analysis under economic sustainability section of the report. It shows good margins with potentials to increase significantly if the processing and manufacturing sectors are bridged in the kenaf value chain. Though the analysis in this report shows higher margins for farmers cultivating kenaf for seed, this is only so because of the off-taking leakages within the value chain that significantly affect the fibre markets. With the proper processing sector, off-taking can be assured and better margins realized for fibre producers.

Lower environmental impact. Researches have shown that kenaf in terms of input requirements and effects on soil suggest that, environmentally, the crop would be superior to cotton. However, given the structure and history of smallholder agriculture in Nigeria, a shift to kenaf as an agricultural commodity would need to occur within a system of value chain upgrading and support, as well as contract buying or offtake agreements.





Processing capacity and technology. Downstream processing capability and capacity in Nigeria would vary across different uses of kenaf. Fortunately, capacity and capabilities are highest in the current niche markets of fibre extraction for POP, ropes, bags, oil absorbent, and jute bags production, which exhibit the highest levels of demand and are viewed as having the most significant potential to grow. Private investors and the FG are not starting from scratch even though they will be significantly upgraded, especially for valuable end-use products. Due to a decline in the demand for cotton, several moribund processing facilities such as cotton seed oil plants have been converted and upgraded to produce other vegetable oils. This further confirms that Nigeria has created structures similar to handle processing and manufacturing capabilities and capacities as is the case with kenaf. There is no reason not to assume that a similar process could be undertaken for industrial hemp.

Many textile plants are old and not set up to work with natural fibres:

However, FG's agencies and research institutes (e.g., IAR&T) are already mandated to undertake R&D in producing, processing, and alternative uses of novel fibre crops, such as Kenaf. Experts consulted at IAR&T suggested that existing growing and harvesting techniques and knowledge for Cotton transferable and applicable to Kenaf. Also, they have been undertaking R&D to adapt cotton-based processing equipment for processing kenaf, natural hemp, and others.

Nigeria's downstream processing capacity and capabilities are weakest in textile manufacture. This sector has been negatively affected by cheap import leakages and a failure to produce cost-competitive output for export. The import to domestic production ratio has been high, and sectoral real gross domestic fixed investment (GDFI) has been declining consistently for years. In 1990, GDFI contracted by 39 percent to 53 percent, and in 2013 and 2020, it was 14 percent and 29 percent, respectively.

Leakages and low demand for domestically produced items have resulted in low-capacity utilization rates, implying that the spare capacity exists.

Only a few food companies in Nigeria meet GMP: the international standard for preparing foods for human consumption. Meeting these international standards has been a severe challenge for many African countries. The resources necessary for kenaf farmers to meet GAP standards if the crop were to be used for human food preparations and oil consumption is enormous. Hence, short-term practical and commercially feasible solutions for developing Nigeria's kenaf sector would be for external contract buyers to purchase secondary unprocessed kenaf and export it for further secondary value addition to various uses. As demand grows in Nigeria, we could attract the value-adding activities back into the domestic market. Still, interviews with some experts in the packaging and food industry suggested that if kenaf processing sector is properly bridge, there would be no problem producing fibre, seed, oil, flours, pastes, and meals from the inputs supplied postharvest at a commercial scale.





The greatest opportunity for Nigeria industrial structure relates to producing kenaf-based cosmetics, food, pharmaceutical, and dietary supplements. This opportunity exists because of its biodiversity, Nigeria has always had a large number of herbals, homeopathic, **and natural plant-based personal care products** and therapy producers that are very popular in region. They cater of niche market.

Existence of farmer input support programmes that aids diversification. Anchor Borrower Programme (ABP) is a support programme introduced by the FG and made available for different crops to facilitate cash crop diversification. These policies and programmes bode well for potential diversification into kenaf, as there is, in principle, a tried and tested mechanism to support a shift into alternative crops. Support programming allows such a shift using existing outreach, extension service, and input subsidization programming. Also, since kenaf requires relatively lower inputs than cotton, it is a cheaper support alternative. It would decrease the absolute and relative resources required through the ABP. Similarly, because kenaf can be successfully grown using natural rainfall, the limited financial resources earmarked for irrigation for small farms could be focused on maize production and improve food security.

Willingness to switch from cotton to alternative fibre crops. During our consultations for this study, almost 70 percent of cotton farmers express the desire to allocate one-third of their cotton farms to alternative fibre crops such as kenaf production. Producers' willingness to switch is based on the availability of offtake contract arrangements and capacity building on good agronomic practices.

Due to the existing low levels of capital intensity and the long-term introduction of input supply packages supported by donors and the FG, adequate capital and access to inputs are not considered binding constraints to crop diversification. The Anchor Borrower Programme (ABP) is a form of offtake agreement, and the current system for cotton under ABP fits well with existing international market practice and experience. This business model is transferable, and a similar process could be undertaken for kenaf in Nigeria.





EMERGING CONCLUSION AND FORWARD ISSUES

In this study, we describe the nature and operations of the Kenaf VC in Nigeria. We equally examined the nature of Kenaf markets and the cost-benefits analysis of the actors - producers, processors, and aggregators – with production presenting the best RoT of the three. Although investment prospects of the Kenaf are vast and attractive, and production presents the best RoT of the three. However, to maximise the full potential of the chain, it is vital to adopt improved production and processing technologies and organize farmers and industrialists into efficient value-added chains.

Also, we present a summary of the strengths, weaknesses, opportunities, and threats (see Table 7), which are prevalent in the value chain. These have been discussed in some depth in the preceding chapters. Some actions can enable actors to address identified weaknesses and constraints and/or better exploit existing/emerging opportunities are discussed. Based on our findings, we are highlighting the following issues for consideration.

1

Kenaf bio-economy and revenue generation potentials present one of the most promising ways to secure sustainable socioeconomic growth, industrial development, and environmental improvement. The existing approach to attracting commercial farmers to grow Kenaf occurs under contract farming systems, where farmers supply raw materials to anchor companies through aggregators. It has ensured relative employment in the processing activities and profit in the downstream activities.

2

The defining bridge in the entire value chain is the processing unit. Sound investments in this aspect can stimulate very rapid rates of growth in Kenaf markets and the industry as a whole. We submit that Kenaf development cannot manifest without having standard processing and manufacturing components in the Kenaf value chain.

3

Manufacturing is a massive element in the Kenaf sector, and we observe that it possesses the potential to unlock unlimited benefits of Kenaf through value additions in products, by-products, and waste management. The absence of large-scale manufacturing has limited the usefulness of Kenaf to only rope, bags, and vegetables that are obtainable after primary processing.





4

As is evident, the lack of consistent off-takers hinders the growth of the Kenaf value chain in Nigeria.

5

The profits obtained by the various actors are encouraging. They have attracted, alongside the possibilities of developing the Kenaf value chain, many farmers, processors, and marketers to register with major Kenaf associations.

6

The presented trends reveal a growth pattern in land cultivated for Kenaf in the country, an increase in output prices, an increase in the number of Kenaf farmers and an increase in the participation in the Kenaf value chain.

7

The IAR&T, as the leading research institute mandated with the responsibility to develop the Kenaf value chain, has a clear environmental and social mission in identifying and aligning with one or more of the UNSDGs. Also, it is mandated to promote a profitable and sustainable Kenaf value chain in Nigeria. They have worked with other MDAs such as RMRDC, IAR, FMITI, and operating associations like KEPPMAN and KEDAN. However, effective categorization of the actors is missing, making it quite difficult to develop targeted policy recommendations to bring out the investment entry points with sustainable profit margins and a high impact on the green bio-economy.

8

Evidence from the consultations reveals yawning gaps in the following key issues: level of awareness of Kenaf; drudgery in the production and processing operations; seed multiplication and upscaling; and reliable market linkages. Many SHFs grow Kenaf in their backyard in the north and on the farms as a border crop. Also, the level of mechanization, especially during the transformation stages in producing Jute bags, bio-degradable packaging materials, and papers, are plagued with inefficiencies.





9

A supply of high-quality seeds is needed for continuous and reliable Kenaf production. However, seed production needs a particular climate and harvesting time. About 35 percent of Kenaf seeds lose their viability because of suboptimal storage. Therefore, it is necessary to clean and dry the seed thoroughly for successful long-term storage. Artificial dryers recommended for this purpose are mostly expensive and limited in supply in the country. While the same scenario is presented in Nigeria for Kenaf, the input distribution of Cotton is relatively organized. The distribution structure of the Cotton farmers is coordinated by associations such as NACOTAN and COPMAN at national- and state levels, respectively. The umbrella Kenaf Association, KEPPMAN, could adopt a similar approach.

10

With the ongoing effort toward institutionalizing clear policy on Kenaf in Nigeria, R&D in management and promotion of the crop is equally an interesting area for investment. Current research has not fully grasped the extent of product varieties that can be obtained from Kenaf manufacturing and its diverse applications. More than 200 million people provide the much-needed domestic markets to absorb the products from the Kenaf value chain. Also, it sets the proper foundation for private and public investors to bridge the noticeable gaps in the VC. Thus, private investors and government could target investment in the Kenaf VC to achieve the dual objective of societal welfare (e.g., environmental maintenance and social inclusion) and profit maximization.

11

Although there is evidence of growing investment in processing infrastructure by traders/aggregators at individual and FPO levels, scale diseconomies and the absence of a market appear to hinder effective exploitation of the facilities in improving marketing and inventory-based financing. Uncertainty in energy supply is also a significant challenge facing fibre processors. Like farmers, small and medium-scale processors appear to be more constrained than larger-scale operators.





GOING FORWARD

1

First, if profit maximization is the objective, processing and manufacturing must be strategically considered priority investment options. This approach should acknowledge the increasing need to promote relationships with the value chain's production and marketing actors. Also, there should be a mechanism to evaluate the structural and functional components of the approach to ensure continuous business success.

Second, a realistic assessment of the business cases is presented in the report to decide what is possible and impossible to achieve proper planning vis-à-vis the prevailing policy environment in

2





| Strengths | Weakness |
|---|--|
| <ul style="list-style-type: none"> ■ Kenaf has been found to be an effective crop that can be used to achieve the positive outcome of an emerging technology called 'Phytoremediation' which uses plants to remove pollutants from the environment. ■ Kenaf can be grown in all parts of the country across all agro-ecological zones ■ There are encouraging prospects for growth in the agro-processing industries and more chances for increased investments. ■ Kenaf protects the environment. It has high ability to fix CO₂, absorb nitrogen, phosphorus and heavy metals from the soil and consequently can be used for soil rehabilitation purposes. ■ With the largest market in Africa, Nigeria has the ready demand for surplus fibre and cosmetic products supplies. ■ Increased interventions from government, CSOs, CBOs, NGOs and private/public sector investors, helps advance chances of scaled production and processing to satisfy the domestic and foreign market needs. ■ There is available skilled and unskilled labour for Kenaf production, processing and marketing. There are equally available and qualified Kenaf value chain experts to train stakeholders for the sustainable growth of the value chain. ■ Nigeria has the available land (in millions of hectares) and favourable climate to increase Kenaf production. ■ An indication of rise in private sector interests and involvement, increased women and youth participation signifies economic and social improvement in the entire value chain. ■ Availability and affordability of improved kenaf varieties. ■ Kenaf has proved to be effective in water purification and pollution control. It is salt tolerant, and a rapidly growing crop. | <ul style="list-style-type: none"> ■ Due to the coarseness and stiffness of fibre bundles, Kenaf processing remains a challenge. ■ Kenaf single fibres are too short for textiles processing, thus; inhibiting production of high-quality yarns and fabrics that contain Kenaf. ■ Raw Kenaf bast fibre bundles are too coarse and brittle to process through conventional textiles equipment. ■ Excessive chemical treatment damages fibre bundle integrity, loosening short Kenaf fibres, resulting in rougher yarn of fabric. ■ Products are not consumable before processing. This makes the existence and growth of the manufacturing industry a must Kenaf production. ■ Low yields per hectare in Nigeria compared to other larger producing countries. ■ No steady production/supply over the years ■ Limited access to public extension services on relevant aspects of the value chain ■ Lack of finance ■ Postharvest challenges/food waste ■ Deforestation due to expansion of the arable land area for Kenaf and other crops ■ Flooding causes yield losses and land degradation |





| Opportunities | Threats |
|--|---|
| <ul style="list-style-type: none"> ■ There has been rapid growth in research and innovation of Kenaf fibres utilisation in Nigeria. The interest warranted by advantages of Kenaf fibre materials compared to others such as synthetic fibre composites includes low environment impact, low cost and support for their potentials across the wide range of applications. ■ The global awareness for Kenaf sustainability has presented it as a cleaner option for different industrial uses thus providing a good international market opportunity. Many companies also continue to develop new technologies for processing and diversifying the use of Kenaf fibres, with the aim to create a viable market for Kenaf textiles which indicates a good opportunity for the Nigerian Kenaf industry. ■ The Kenaf blended fabric displays the highest air permeability. Kenaf good tensile property and resistance to mildew and rot may open markets for industrial textiles in line with the Federal Government diversification plans. ■ Kenaf yields 6-10 tons of dry fibre per acre and reaches 5 metres in 150 days giving it an advantage over other fibre sources ■ Kenaf can be put into different uses. The ability of Kenaf to be put into different uses which indicates good profit potentials for different value chain actors at different stages. ■ Considering that majority of the fibre needed for jute bags and other alternative products are imported, the local production intensification of Kenaf will lead to the preservation of national foreign exchanging earnings. ■ Kenaf production will significantly contribute to job creation both on and off farm for men, women and youths ■ The growing demand for natural bags for export economy presents a goof opportunity | <ul style="list-style-type: none"> ■ Erratic rainfalls and other climate change effects that cause regular unplanned shifts. ■ The decline of the fabric industry is particularly lamentable. Today, most of the mills are old and the technology for textile production remains obsolete. ■ The importation of inferior textile materials at low prices into the country can make the survival of domestic firms difficult. ■ Offering low prices for Kenaf to farmers may tend to pose a threat due to the increasing production costs in the textile industries. This might make the farmers prefer close substitutes over Kenaf production. ■ The batch-to-batch variation in properties, fibre-matrix compatibility and limited mechanical strength of natural fibres are some of the limiting elements that may affect Kenaf commercialisation. ■ The short permanence period of Kenaf in the ground, makes it as well a burden as other annual crops regarding erodibility and biodiversity. ■ Natural risks originate from the crop production environment. <ul style="list-style-type: none"> ● Weather risks e.g. drought, floods, erratic rainfall, and hailstorms. ● Biological risks: crop and livestock diseases and pests. ■ Market risks arise from imperfections in inputs and output markets, including: <ul style="list-style-type: none"> ● Uncertain access to inputs. ● variability in inputs quality, and volatility in prices. ● Uncertain access to remunerative markets; volatility in output prices (affect both producers and consumers). ■ Human health risks affect the availability of family/non-family labour. Including endemic diseases (e.g., malaria), epidemics (e.g. Ebola) and pandemics (e.g. COVID-19). ■ Policy and regulatory risks can cause volatility in prices and/or uncertainty in transacting. Includes macroeconomic policies which drive up inflation and affect interest rates and exchange rates. |





| Opportunities | Threats |
|---|---------|
| <p>for Kenaf to be utilized in this regard. The present sack requirement for the country is estimated at about 90million bags per annum and demand is yet to be met.</p> <ul style="list-style-type: none"> ■ Farmers associations can improve their organization to improve yields and reduce postharvest losses. ■ Improve access to extension services ■ Improve access to finance ■ Mobile apps for warnings and advice on pests, flooding, rainfall, varieties, fertilisers ■ Index-based insurance piloting and promotion nationwide, due to occurrence of drought and flooding. ■ Increased investment opportunities across the Kenaf value chain through the Nigerian Investment Promotion Commission | |





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Appendix

TABLE A1: OPERATING ACCOUNTS OF PRODUCERS OF MARKETABLE VOLUMES OF COTTON FIBRE PER HECTARE (IN NAIRA)

| ITEM/PRODUCER TYPE | SHF | MSF | LSF |
|--|----------------|----------------|------------------|
| Total revenues (value of production) | 900,000 | 906,750 | 1,125,000 |
| Sales (Fibre) | 900,000 | 906,750 | 1,125,000 |
| Intermediate goods and services (total) | 355,833 | 344,400 | 324,898 |
| Seed | 10,000 | 10,000 | 8,000 |
| Harrowing | 30,000 | 29,000 | 25,000 |
| Planting | 10,000 | 9,000 | 7,500 |
| Fertilizer and fertilizer application | 142,000 | 141,200 | 141,000 |
| Ridging | 20,000 | 20,000 | 15,000 |
| Thinning | 4,500 | 4,500 | 4,500 |
| Herbicide | 10,000 | 9,000 | 10,000 |
| Insecticides | 30,000 | 30,000 | 30,000 |
| Weeding | 60,000 | 54,000 | 51,000 |
| Hipping | 10,000 | 10,000 | 8,400 |
| Harvesting + offloading | 20,000 | 20,000 | 16,998 |
| Transport | 5,333 | 4,500 | 4,000 |
| Spraying | 4,000 | 3,200 | 3,200 |
| Value added (direct) | 30,000 | 30,000 | 30,000 |
| Value of rented land | 30,000 | 30,000 | 30,000 |
| Total Cost of Investment | 385,833 | 374,400 | 354,598 |
| Average Yield | 2,000kg | 2,015kg | 2,500kg |
| Price per kg | 450 | 450 | 450 |
| Net Income (N) | 514,167 | 532,350 | 770,402 |
| Return on Investment (percent) | 133.3 | 142.2 | 217.3 |





Appendix

TABLE A2: OPERATING ACCOUNTS OF MARKETERS OF MARKETABLE VOLUMES OF COTTON FIBRE 1,000KG (IN NAIRA)

| ITEM/PRODUCER TYPE | Retailers | Wholesalers |
|---|----------------|----------------|
| Total revenues (value of production) | 500,000 | 550,000 |
| Sales (Fibre) | 500,000 | 550,000 |
| Total Cost on Investment | 464,520 | 464,520 |
| Loading | 3,300 | 3,300 |
| Unloading | 3,300 | 3,300 |
| Transportation | 6,600 | 6,600 |
| Commission | 1,320 | 1,320 |
| Purchase price | 450,000 | 450,000 |
| Selling Price per kg | 500 | 550 |
| Net Income (N) | 514,167 | 532,350 |
| Return on Investment (percent) | 110.7 | 114.6 |



**TABLE B1: FARMER REPRESENTATIVE GROUPS**

| SN | Association | Description |
|----|--|--|
| 1. | COPMAN (Cotton Producers and Merchants Association of Nigeria) | COPMAN is an amalgam of producers and merchants of cotton establish some 20 years ago with a view to addressing the sharp decline in cot production in Nigeria. COPMAN was formed to address the poor cot production that contributed to the collapse of the textile industries. Th have partnered with CBN-ABP, NIRSAL, NAELRS, FMITI and FMARD in quest to effectively address the issues plaguing the production in cotton sector. The association has organized many stakeholder meeting workshops and liaised with relevant organizations to improve cot production in Nigeria. COPMAN currently has a membership strength more than 50,000 from 19 states. |
| 2. | NACOTAN (National Cotton Association of Nigeria) | The National Cotton Association of Nigeria is an umbrella organization that brings together any Nigerian or group of Nigerians, Corporate bodies or organizations involved in the production, marketing, processing or exportation of cotton in Nigeria as well as textile manufacturing organizations. The National Cotton Association of Nigeria is a registered association with Registration No:10600, established under the instrumentality of the Federal Government of Nigeria through the Ministry of Industry Trade and Investment, September 1997. |
| 3. | KEPPMAN (Kenaf Producer and Marketers Association of Nigeria) | KEPPMAN is a umbrella association for Kenaf farmers, processors and marketers of all categories. It was established more than 10 years ago under the name Kenaf Development Association of Nigeria (KEDAN). In 2016, the name was changed to KEPPMAN. The essence for the change was to include all the actors in the Kenaf value chain to drive towards a holistic development of the Kenaf sector. KEPPMAN currently has a membership strength of more than 45,000 members. |
| 4. | AFAN (All Farmers Association of Nigeria) | The above three associations are under AFAN, which is a federal-level organisation. AFAN's approach mainly involves delegating value chain specific issues to commodity based organisations, including those at the state level. |





TABLE B2: SMALL SCALE AND LARGE SCALE KENAF PROCESSING MACHINES

| Machine Variable | Small Scale | Industrial Scale |
|----------------------------|---|--|
| 1. Name of machine | Kenaf Ramie fibre processing | Air Coil Winding Kenaf Fibre Rapier Loo Vamatex Fabric Machine |
| Cost of machine | \$1,000 – \$1,500 / Piece | \$627,000 - \$1,144,000 / set |
| Brand/Model | SL-550 | YP-SS-3.2 |
| Source of Machine/place | Sichuan Guangxin Machinery of Gr & Oil Processing Co., Ltd. | Wenzhou, Zhejiang |
| Capacity of machine | 0.15-0.2mu/H | 18-19T/Day |
| Energy Use and requirement | 5.5Kw/ (15HP diesel engine) | |
| Weight of machine | 255kg | 10-150g/m2 |
| Warranty | 1 year | |
| 2. Name of machine | Roll Brushing machine for Kenaf | Jute Flax Opening Machine for Recyclin Flax Kenaf |
| Cost of machine | \$5,000 / piece | \$25,000 - \$50,000/ set |
| Brand/Model | HR 4410 | |
| Source of Machine/place | Qingdo Huarui Jiahe Machinery Co Ltd. | Gaomi Rongda Machinery Co., Ltd |
| Capacity of machine | 0.15-0.2mu/H | 180-230 Kg/H |
| Energy Use and requirement | 7.5 | 22kw, 11kw, 7.5kw (Adjustable) |
| Weight | 1500kg | |
| Warranty | 1 year | |





TABLE B3: QUOTATION FOR KENAF YARN PRODUCTION NEW EQUIPMENT

| QUOTATION FOR KENAF YARN PRODUCTION NEW EQUIPMENT (1 2TONNES/DAY) | | | | | | | |
|---|---|--|------------------|----------|------------------|--------------|--|
| S/No. | Product | Specs | Measurement unit | Quantity | Unit Price (USD) | Amount (USD) | Remark |
| 1 | <p>Kenaf soften oil tank</p>  | | set | 1 | 17700.00 | 17700.00 | |
| 2 | <p>Soft linen machine</p>  | <p>Power: 7.5kw(380v/50hz) Capacity: 150kg/h Size: 8800x1750x1400mm Weight: 7000kgs</p> | platform | 1 | 52600.00 | 52600.00 | Used to mechanically wash, squeeze and shake, straightening the fabric |
| 3 | <p>Carding machine(1)</p>  | <p>Power: 15kw(380v/50hz) Speed: 110-170rpm Doffer diameter: 301.63mm Cylinderdin: 1219.2mm Drafting range: 12/15 Weight:10T</p> | platform | 1 | 52800.00 | 52800.00 | Used for fiber individualization and parallelization of fibre as first stage spinning. |



| | | | | | | | |
|---|---|---|----------|---|----------|----------|--|
| 4 | <p>Carding machine(2)</p>  | <p>Power: 7.5kw(380v/50hz) Speed: 110-170rpm Doffer diameter: 454.03mm Cylinderdin: 1524mm Drafting range: 10/12 Weight:14T</p> | platform | 1 | 57200.00 | 57200.00 | Used for fiber individualization and parallelization of fibre as second stage spinning. |
| 5 | <p>Drawing frame(1)</p>  | <p>Power: 4.5kw Speed: 110rpm Size: 3274x2940mm Weight: 3200kgs</p> | platform | 1 | 34800.00 | 34800.00 | Used to transform the sliver coming from the carding in cotton spinning mill. It is used for stretching, pulling and drowing the fibre |
| 6 | <p>Drawing frame(2)</p>  | <p>Power: 4.5kw Speed: 110rpm Size: 6000x3260mm Weight: 5500kgs</p> | platform | 1 | 34800.00 | 34800.00 | Used to transform the sliver coming from the carding in cotton spinning mill. It is used for stretching, pulling and drowing the fibre |



| | | | | | | | |
|---|---|--|----------|---|----------|----------|--|
| 7 | <p>Drawing frame(3)</p>  | <p>Power: 5.5kw Speed: 110rpm Size: 5215x3210mm Weight: 5500kgs</p> | platform | 1 | 35500.00 | 35500.00 | Used to transform the sliver coming from the carding in cotton spinning mill. It is used for stretching, pulling and drowing the fibre |
| 8 | <p>Drawing frame(4)</p>  | <p>Power: 4.5kw Speed: 110rpm Size: 4470x3240mm Weight: 2500kgs</p> | platform | 1 | 36000.00 | 36000.00 | Used to transform the sliver coming from the carding in cotton spinning mill. It is used for stretching, pulling and drowing the fibre |
| 9 |  <p>Roving frame</p> | <p>Power: 10kw(380v/50hz) Speed: 150rpm Size: 12093x1680mm Weight: 8600kgs</p> | platform | 1 | 49500.00 | 49500.00 | Used to convert fibre into low twist lea called roving. |



| | | | | | | | |
|-----------|--|--|-----------------|------------|-----------------|-----------------|---|
| <p>10</p> | <p>Spinning frame</p>  | <p>Power: 10kw(380v/50hz) Speed: 150rpm Size: 11920x1532mm Weight: 7400kgs</p> | <p>platform</p> | <p>2</p> | <p>49100.00</p> | <p>98200.00</p> | <p>Used for spinning kenaf fibre thread or yarn</p> |
| <p>11</p> | <p>Doffing machine</p>  | <p>Power: 5.5kw(380v/50hz) Speed: 170rpm Size: 5300x1040mm Weight: 1800kgs</p> | <p>platform</p> | <p>1</p> | <p>39000.00</p> | <p>39000.00</p> | <p>Used for structurally removing and replacing bobbins</p> |
| <p>12</p> | <p>Stranding machine</p>  | <p>Power: 4.5kw(380v/50hz) Speed: 110rpm Size: 5411x1300mm Weight: 3800kgs</p> | <p>platform</p> | <p>1</p> | <p>42000.00</p> | <p>42000.00</p> | <p>Used for layer winding of fibre</p> |
| <p>13</p> | <p>Materials bucket</p> | | <p>pcs</p> | <p>188</p> | <p>73.00</p> | <p>13724.00</p> | |



| | | | | | | | |
|----|-------------------------------|--|------|-------|----------|----------|--|
| 14 | Materials bucket | | pcs | 156 | 68.00 | 10608.00 | |
| 15 | Laboratory instrument | | 1set | 1 | 12900.00 | 12900.00 | |
| 16 | Bobbin | | pcs | 30000 | 2.90 | 87000.00 | |
| 17 | backup spare parts for 1 year | | set | 1 | 20603.00 | 20603.00 | |
| 18 | Auxiliary equipment | | set | 1 | 17300.00 | 17300.00 | |

| | | | |
|--|---|---------------------|--|
| | | Total amount | US\$712,235.00 FOB Qingdao port, China |
| Shipping freight to Apapa port, Nigeria(8x40HC) (valid two weeks) | | | 74,600.00USD |
| | Date of Quotation | | 18/07/2022 |
| | Total amount-CIF Apapa port, Nigeria | | US\$786,835.00 |
| | Workshop area required | | 2500-3000 m² |
| | Engineers required | | 4 engineers, installation time 6 months |
| | Engineer salary | | 150 USD/person/Day |

Kenaf Yarn Process flow chart:

Kenaf,hemp raw materials--->Fiber raw materials extraction--->hemp raw materials high-temperature cooking, degumming--->cooked jute dehydrated--->jute loosen--->Dry--->Storage--->select jute raw materials--->stir in emulsified oil--->Soften jute raw materials--->Batch fermentation--->Carding jute raw materials(1st time)---> Carding jute raw materials(2ed time)--->Jute recovery--->Drawing spinning(1st time)--->Drawing spinning(2ed time) --->Drawing spinning (3rd time)--->Drawing spinning(4th time)--->Textile roving--->Spin, fine yarn--->Drop ingot--->Yarn plying

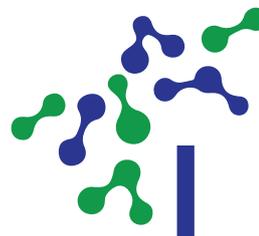




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