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Adding Value to Kenaf: Panacea for Economic Diversification II

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

There are clear indications from the article that the development of value additions for kenaf in Nigeria is having significant impact on economic development and diversification of the nation and poverty reduction among the masses. The full potential of the development of value additions for kenaf as an engine for economic diversification must be realized in Nigeria. Adding value to kenaf is the process of changing or transforming it from its original state (plant biomass) to a more valuable state. The overarching strategy of the kenaf value addition is to turn the kenaf sector in Nigeria into a major player in local and international biodegradable packaging materials, pulp and paper, bio-composites and bio-absorbents industries by adopting improved production and processing technologies and organizing farmers and industrialists into efficient value-added chains. From this article, using bio-degradable packaging bags (jute bags) as a case study, it is expected that the importation of produce bags supposed to be terminated by the year 2020. However, the processing capacity would be increased in a progressive manner in 2019, 2020, 2021 and 2022. There would be no processing by the year 2018, it could be expected that this year would be adequately used for the production and stock piling of kenaf plants and fiber (raw material). While the export capacity would be progressively increased in 2020, 2021 and 2022. By this, from the year 2020 upwards there will be exportation of produce bags from Nigeria markets to the international markets. Annual projected number of jobs in the produce bag value chain would be increased in a progressive

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manner in 2018, 2019, 2020, 2021 and 2022. It is evident that as a promising industrial crop, kenaf value addition should draw more attention from the government and private entrepreneurs in combining the national policies on agricultural rebirth and industrial growth for kenaf value chains development as panacea for economic diversification.

Keywords: Agricultural rebirth; bio-degradable; bio-composites; bio-absorbents; policy; pulp and paper.

1. INTRODUCTION

Transforming a product from its original state to a more economically valuable state is known as value-addition [1,2]. The identification of the processes that support the necessary investment in research, processing and marketing is important in value-addition. Value-added agriculture is an important strategy in moving both agricultural entrepreneurship and rural development forward [1,3,4]. According to Coltrain et al. [1], Amanor-Boadu [2] and Kikenny and Schluter [3] value addition is defined as a process of economically adding value to a product by changing its current place, time, and from one set of characteristics to other characteristics that are more preferred in market or consumer. USDA [5] defines value-added agriculture as a portfolio of agricultural practices that enable farmers to align with consumer preferences for agricultural or food products with form, space, time, identity, and quality characteristics that are not present in conventionally-produced raw agricultural commodities. Hence, by this, value-added agriculture assists the farmers the opportunity of changing their position on the supply chain, creating closer or direct linkages between themselves and consumers, or changing production processes to alter or preserve certain intrinsic characteristics of their farm products. To rely on the USDA [5] and Coltrain, Barton, and Boland [1] definitions, these authors believed that it is imperative to demonstrate an inclusive definition of value-added agriculture that underpins a framework that will identify value-added opportunities and evaluating business plans.

Kenaf (*Hibiscus cannabinus* L.) a natural fiber producing plant; grown essentially for both economic and horticultural values [6]. Kenaf originates from Africa, but its production in some of African countries is very low [7,8]. According to FAO [9] in 2002, it was reported that, the total production of Africa was just 2.9% of the world production. The global concern for the increase of environmental awareness, environmental

sustainability, growing waste management problem, initiation of ecological regulations as well as regulations, decrease of fossil fuels, increase of crude oil price have renew general interest in renewable resources like Kenaf. Kenaf is an environmental friendly industrial crop which is recognized by Kyoto Protocol to be effectively mitigating the adverse effects of global climate change [10]. Hence, Mohd Rifaat [10] states that kenaf is a traditional, third world crop that is poised to be introduced as a new, annually renewable source of industrial fiber in the so-called developed economies.

Morphologically, kenaf is similar to flax straw, jute and hemp by having two different regions of fibers; bast fiber and core fiber in a stalk [11,12]. These two fibers can be used for the production of so many products such as pulp, paper, cardboard, panels, traditional cordages, absorbent agent, packing materials, soil-less potting mixes, grass and flower mats and natural fuels [13]. Webber and Bledsoe [14] reported the commercial importance and environmental benefits derivable from kenaf in the areas of soil remediation, toxic waste cleanup, removal of oil spills on water. They went further to report that the industrial utilization of kenaf brings about reduced use of fiberglass in industrial products and the increased use of recycled plastics. In recent time, the use of synthetic fiber like polyethylene and propylene for the packaging of agricultural products worldwide brought a decline in the demand for natural fiber like bio-degradable produce bags. However, with the re-awakening of international interest in natural fibers, following the prohibition on haulage of agricultural commodities in synthetic bags, there is hope for increased demand for bio-degradable produce bags now and in the nearest future. The Nigeria market for kenaf products is, and will likely remain, a small, thin market since there is no commercial production and industrial utilization of kenaf in Nigeria. Therefore, this paper reviews the development of value addition for kenaf to enhance its production for economic diversification.

2. DEVELOPED KENAF VALUE ADDITIONS TO DRIVE ECONOMIC DEVELOPMENT

2.1 Packaging Materials Value Addition: High Quality Bio-degradable Produce Bags (Jute Bags)

Jute bags are bio-degradable packaging materials made from plant fiber called Jute and Kenaf. They are usually used for storing and holding produce from agricultural production. Heavy duty jute bags or sacks are popular for packaging agricultural commodities. The major commercial use of jute bags in Nigeria is for the packaging of farm produce such as sugar, grains, coffee, cocoa seeds, cashew nuts, cotton and other agricultural products, which are packed in weight ranging from 50 to 100 kg. Due to their bio-degrade nature jute bag is becoming an eco-friendly alternative. As a result of high demand for sacks and the foreign exchange involvement, two factories for producing sacks were established in the 1960s at Badagry and Jos. Both had processing capacity for over 20,000 tons of retted fiber per year. The average annual production of one factory was then over 20 million pieces of sacks. Only one of these was into production of sacks till early 80s, while the other folded up earlier than that due to political insensitivity of the then government. The supply of jute bags in Nigeria as at today is dominated by importation. According to the report of the BusinessNews [15] in 2016, non-oil exporters of cash crops like cocoa seeds and cashew nuts have raised alarm over non-availability of jute bags. The report further indicated that, the exporters revealed that over 1.5 million jute bags are needed to package the produce for the month of March 2016 shipping. In the same report, the President, National Cashew Association of Nigeria, intimated that, the bags have implications for quality and reputation. He said that in the past, polypropylene bags were used to package cashew but they spoiled the cashew nuts. The President said that the association had approached the Federal Minister of Agriculture and Rural Development for a bail out. The Chief Executive Officer, Nigerian Export Promotion Council had also contacted the Honorable Minister on behalf of the exporters and received a promising assurance [15]. The report of the BusinessNews [15] indicated that, 98% of the jute bags that are used in Nigeria are imported from Bangladesh and India. The report stated that, although, Nigeria grows fiber

producing plants which are the raw materials for making jute bags and that, there is no jute bag manufacturing company in Nigeria. EagleOnline (16) reported that, the Minister of State for Industry, Trade and Investment reiterated that Nigeria spent about \$20 million (about ₦4 billion) on importation of jute bags in 2015. The Minister disclosed further that, the importation of jute bags into the country was in spite of the country's potential of becoming a net exporter of jute bags and other derivate products from kenaf. The Minister noted further, that, translating the huge potential of kenaf into economic benefits must be a task that all stakeholders must rise up to and right mechanism must be put in place to attract investment at both the upstream and downstream sectors of kenaf [16]. Therefore, there should be a principal market-replacement of 100% synthetic petrochemical packaging materials for agricultural produce and agro-allied commodities. Hence, principal market-replacement of 20, 45, 75 and 100 % by 2018, 2019, 2020 and 2021 respectively of imported jute bags to the Nigerian economy for packaging materials for agricultural produce and agro-allied commodities is proposed.

2.2 Pulp and Paper Value Addition: High Quality Pulping and Paper Making

The initial plan of the government was to promote optimal production of pulp and relevant grades of paper locally by manufacturers within the sector. Thus, the first National Development Plan between (1962 and 1968) gave prominence to the establishment of three pulp and paper mills, with high dependence on imported raw materials, expertise, machinery and spare parts. The Nigerian Paper Mill, Jebba, commenced production in 1969, with an initial production capacity of 12,000 tons of apex per annum. By 1985, the mill had undergone considerable expansion with the production capacity raised to 65,000 tons per annum of kraft paper, liner and chipboards, sack kraft, fluting media and corrugated cartons [17]. From 1996 to 2006, the company was out of production [18].

Iwopin Pulp and Paper Company Limited, Iwopin, Ogun State, was planned to produce fully bleached pulp. It was designed to produce 68,000 metric tons of various grades of finished fine writing, printing and cultural papers on a yearly basis. Efforts to run the mill on imported raw materials on one of the paper machines had to stop in 1998 because of the high cost of diesel as the company required approximately 52,000

liters of diesel per day as it was not connected to the national grid [17].

The Nigerian Newsprint Manufacturing Company, Oku Iboku, a newsprint mill, using the chemo-mechanical process, has an installed capacity of 100,000 metric tons of newsprint per annum. Of course, due to the establishment of the mill, import of newsprint reduced drastically to 17.5% in 1986; 12.5% in 1987 and the mill faded out in 1988 [18]. The supply of paper products in Nigeria as at today is dominated by importation. However, production stopped in 1993 due to scarcity of fund to refurbish the equipment and to purchase raw materials [19]. Today, Nigeria imported paper and allied products worth over 27 billion naira between 1998 and 2002 [19]. This has increased to over N150 billion per annum [20]. Hence, there is need for principal market-replacement of 100% imported paper products is proposed. Therefore, principal market-replacement of 20, 45, 75 and 100% by 2018, 2019, 2020 and 2021 respectively of imported paper products is proposed.

2.3 Bio-composites Value Addition: Wood-Plastic Bio-Composite Materials (WPC)

The term wood-plastic composite (WPC) refers to any composite that contains wood and thermo-sets or thermo-plastics. Thermo-sets are plastics that once cured cannot be melted by reheating. These include resins such as epoxies and phenolic plastics with which the forest products industry is most familiar. Kenaf offers a wide variety of environmentally sound wood-plastic product flows that can be marketed at many levels from raw material to finished products. Unlike other products, kenaf product provides a unique eco-friendly product that already has brand recognition as being natural and environmentally sound. Forest products industries are changing their perspective as well. They view WPCs as a way to increase the durability of wood with little maintenance on the consumer's part (one of the greatest selling points). Some forest products companies in developed countries are beginning to manufacture WPC from kenaf. These ventures are being driven by customer demand and opportunities based on the industry's experience in building materials. The greatest growth potential for WPCs is in building products that have limited structural requirements. WPC products include decking, fencing, industrial

flooring, landscape timbers, railings, lightweight board, embankment support, shuttering and moldings. Other applications include doors and door frames, decorative profiles, returnable transit packaging and furniture reel cores in marine applications. Pressure-treated lumber remains by far the most commonly used decking and railing material by this, the market for WPC products is growing rapidly in America, Europe and Asia. The supply of WPC products in Nigeria as at today is dominated by importation. Hence, there is need for domestic production of wood-plastic composites. There should be a principal market-replacement of 100% imported WPC products. Principal market-replacement of 20, 45, 75 and 100% by 2018, 2019, 2020 and 2021 respectively of imported WPC products is proposed.

2.4 Bio-absorbents Value Addition: Industrial Bio-absorbent Materials Production

The kenaf bio-sorbs granular absorbent is one of the first absorbent that contains natural bioremediation capabilities. The core fiber of the kenaf plant has indigenous oil eating microbes that solve many long term spill disposal solutions. The product is all natural, non-toxic, and completely biodegradable. Recently, however, natural organic materials have made their ways in specific markets. Several reasons are cited for such a shift, including the following:

- a. They are biodegradable, which means the used product could be disposed of in a compost facility if the spilled/absorbed liquid could legally be discarded in such a manner.
- b. They are mostly renewable resources, such as kenaf, wool, corn cobs and wood by-products.
- c. They have lower per-unit costs than the polypropylene fabrics.
- d. They have less of an impact on the environment if released or lost during spill clean-up operations.

The supply of bio-absorbent materials in Nigeria as at today is dominated by importation. Hence, there is need for domestic production of bio-absorbent materials. Principal market-replacement of 100% imported absorbent materials is therefore proposed. Principal market-replacement of 20, 45, 75 and 100% by 2018, 2019, 2020 and 2021 respectively of imported bio-absorbent materials is proposed.

3. A PROPOSED AGRO-COMMODITY PRODUCE BAGS (JUTE BAGS) VALUE-CHAIN IN NIGERIA AS A CASE STUDY

Kenaf is an important industrial crop that can revolutionize the packaging sub-sector of the Nigeria economy. The crop has to be repositioned by assessing its value chains and identify bottle necks to production and utilization in line with the government policy on agricultural and industrial development. Over the years, Nigeria economy depends on the recognition of small and medium scale enterprises. Developing an agricultural commodity largely depends on the size and level of its industrialization. The supply of agro-commodity produce bags in Nigeria as at today is dominated by importation. It is expected that demand for agro-commodity produce bags would be driven by a combination of increased agricultural produce like cocoa, oil palm seeds, cashew seeds and grain food crops for domestic and international markets. In addition there would be demand for jute bags by the export market to other countries in Africa.

3.1 Annual Projected Demand, Import, Export and Local Processing for Jute Bags

It is observed from Fig. 1 that, there would be progressive annual increase of produce bags demand capacity in 2018, 2019, 2020, 2021 and 2022 respectively. This indicates that there would be increases in the produce bags demand on

yearly basis due to a combination of increased agricultural produce and export markets. The import capacity would be reduced in a regressive manner in 2018, 2019, 2020, 2021 and 2022 respectively. It is expected that the importation of produce bags supposed to be terminated by the year 2020. However, the processing capacity would be 0, 19000, 59000, 98000 and 150000 MT in 2019, 2020, 2021 and 2022 respectively. There would be no processing by the year 2018, it could be expected that this year would be adequately used for the production and stock piling of kenaf plants and fiber (raw material). While the export capacity would be 0, 0, 17000, 29000 and 40000 in 2018, 2019, 2020, 2021 and 2022 respectively. By this from the year 2020 onwards there will be exportation of produce bags from Nigeria markets to the international markets.

3.2 Annual Projected Supply of Fresh Kenaf Plants for Jute Bags Production

Due to high core fiber content of kenaf plant compared to the rettable bast fiber the conversion rate is approximately 35% of the total plant biomass [22]. This low conversion rate leads to a very high quantity of kenaf plants requirements. From Fig. 2, the supply of fresh kenaf plants to be processed for the retted fiber for the production of produce bags would be increased in a progressive manner in 2018, 2019, 2020, 2021 and 2022. This is in line with the projected demand for produce bags as indicated above.

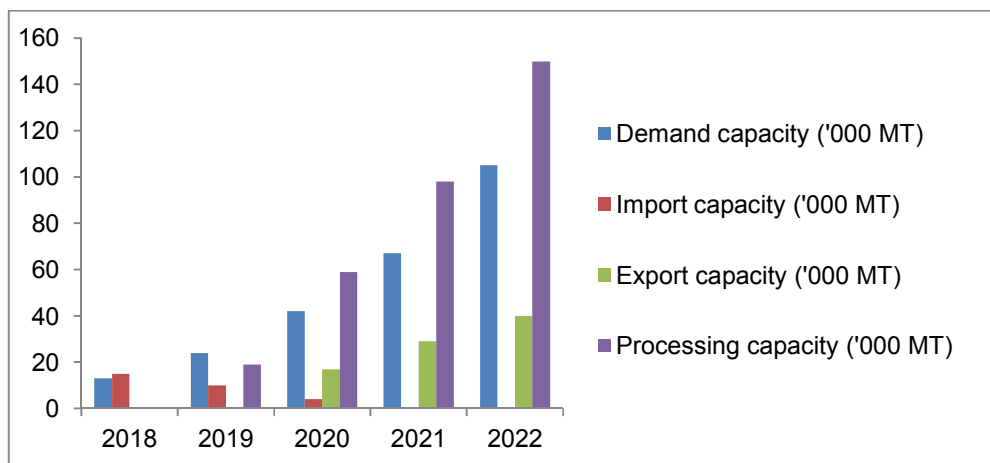


Fig. 1. Annual projected demand, import, export and local processing for jute bags measure in thousand metric tons

(Source: Adapted from 21)

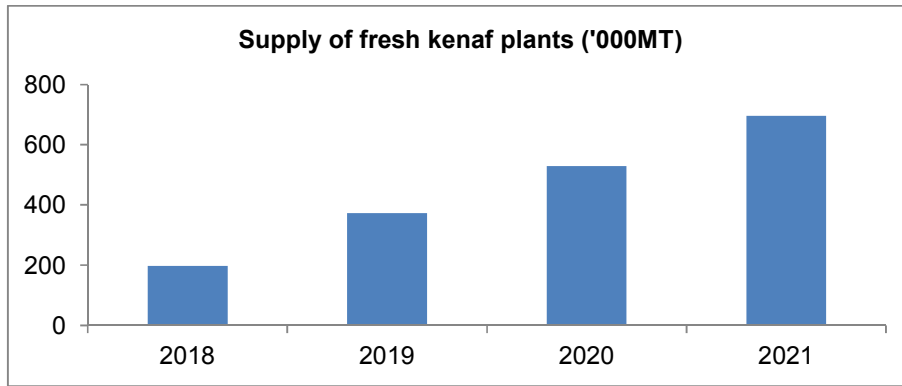


Fig. 2. Annual projected supply of fresh kenaf plants for jute bags production measured in thousands of metric tons

(Source: Adapted from 21)

3.3 Annual Projected Farmland Requirements for Jute Bags Production

Almost 20 tons of kenaf dry matter yield is expected from one hectare [23], hence, the annual projected farmland requirements to support the production of kenaf plants would be 13000, 25000, 35000 and 65000 hectares of farmland in 2018, 2019, 2020 and 2021 respectively. By this, there would be yearly increases in farm lands requirements.

3.4 Annual Projected Number of Jobs in Primary Production

Kenaf has a relatively high labour content requirement of over 320 mandays per hectare. This high requirement translates into almost a quarter of million jobs in primary production alone. From Fig. 4, it is observed that annual

projected number of jobs in primary production (farmers, processors and technicians) would be 121000, 182000, 242000, 317000 and 398000 jobs in 2018, 2019, 2020, 2021 and 2022 respectively.

3.5 Annual Projected Number of Jobs in the Jute Bags Value Chain

Agro-commodity produce bags value chain is relatively labour intensive. It is estimated that for every 100 jobs created in primary production, 10 jobs would be created within the value chain. The value chain includes input supply, service delivery and aggregation of output, processing and marketing. Therefore, Fig. 5 indicates that annual projected number of jobs in the produce bag value chain would be increased in a progressive manner in 2018, 2019, 2020, 2021 and 2022 respectively.

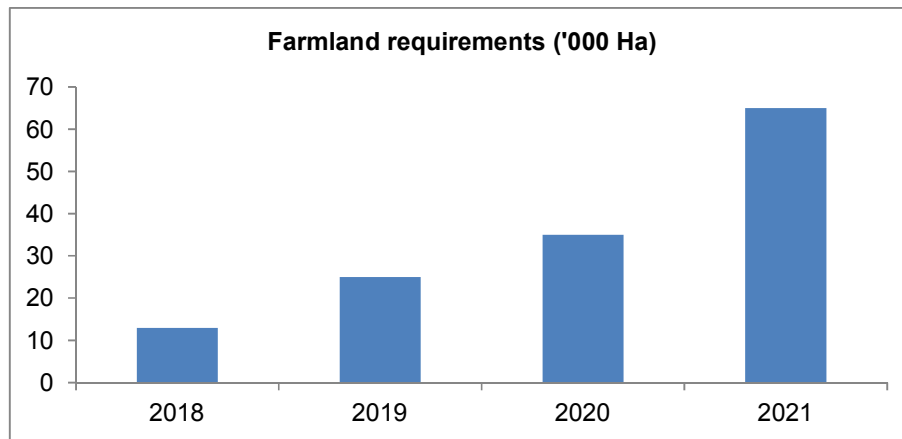


Fig. 3. Annual projected farmland requirements for jute bags production

(Source: Adapted from 21)

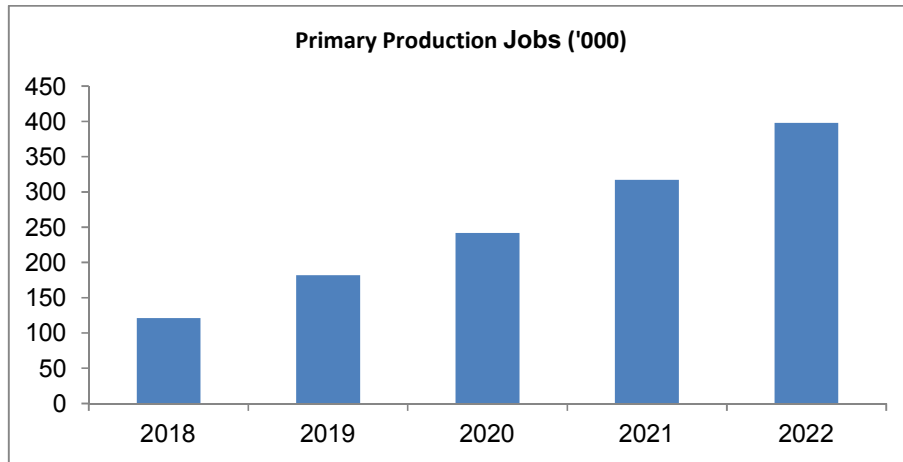


Fig. 4. Annual projected number of jobs in primary production ('000)
(Source: Adapted from 21)

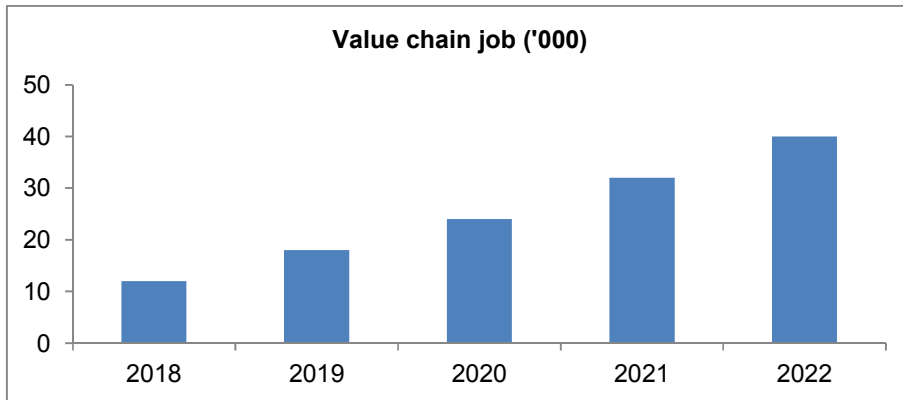


Fig. 5. Annual projected number of jobs in the jute bags value chain
(Source: Adapted from 21)

4. CONCLUSION AND RECOMMENDATIONS

Developing competitive agro-industries such as bio-degradable packaging bags industry, pulp and paper industry, bio-composites industry and bio-absorbents industry is crucial for the purpose of generating employment and income opportunities. These agro-industries have the potential to provide employments for the rural population not in terms of kenaf production only, but also in off-farm activities such as processing, packaging, handling, transporting and marketing of different products from kenaf along its value-chain. There are clear indications from above that, the development of value additions for kenaf in Nigeria are having significant impact on economic development and diversification of the nation and poverty reduction among the masses.

The full potential of the development of value additions for kenaf basically as an engine for economic diversification must be realized in Nigeria.

Adding value to kenaf is the process of changing or transforming it from its original state (plant biomass) to a more valuable state. This article identifies the value-added products that will support the necessary investment in research, processing and marketing of kenaf sector. Kenaf value addition will economically add value to kenaf by changing its current place, time, and from one set of characteristics to other characteristics that are more preferred in market or consumers. This article seeks to create a new generation of kenaf value addition, oriented towards commercial production and industrial uses, and to link them up to reliable demand

either as raw materials or final marketable products. The overarching strategy of the kenaf value addition is to turn the kenaf sector in Nigeria into a major player in local and international biodegradable packaging materials, pulp and paper, bio-composites and bio-absorbents industries by adopting improved production and processing technologies and organizing farmers and industrialists into efficient value-added chains.

The overall desire is to improve the depth and breadth of economic values currently being provided to kenaf, enabling its production and industrial uses to be commercially sustainable. The availability of new and better products from kenaf should enhance the profitability of the whole kenaf value chain. Commercially sustainable value added products will typically involve specialization on the part of the kenaf producers, processors, service deliverer and marketers. It is evident that as a promising industrial crop, kenaf value addition should draw more attention from the government and private entrepreneurs in combining the national policies on agricultural rebirth and industrial growth for kenaf value chains development as panacea for economic diversification.

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COMPETING INTERESTS

Author has declared that no competing interests exist.

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