



TRANSFORMING LOCUST BEAN PROCESSING: A PATH TO PROFIT FOR ELDERLY WOMEN'S MICROBUSINESS IN SOKOTO, NIGERIA.

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ABSTRACT: *This study investigates the value addition potential of African locust beans (*Parkia biglobosa*) in Sokoto Metropolis, Nigeria, emphasizing the socio-economic characteristics of processors, cost-benefit analysis, and strategies for enhancing the value chain. Despite the nutritional and economic significance of locust beans, their market utilization remains constrained by traditional processing methods, inadequate packaging, and a lack of modern branding. Utilizing a multi-stage sampling technique, data was collected from 60 respondents, revealing that the locust bean processing industry is predominantly elderly female-driven, with limited modern educational and high family sizes. The total variable costs for processing were computed at ₦1,6888.49 revenue of ₦2,473 thus realizing a gross margin of ₦873.2. However, upon value addition of grinding and branded packaging, the variable cost rose to ₦7,220, with revenue from packaged Daddawa reaching ₦12,000, resulting in a Gross margin of ₦4,780. This underscores the financial viability of value addition through improved packaging and branding. The study further identifies key constraints including market disorganization and the need for better processing technologies. The findings advocate for strategic interventions to enhance the economic value of locust beans, promoting broader consumer acceptance and contributing to food security and economic development in the region.*

KEYWORDS: Value Addition, Locust bean, Powdered Daddawa, Sokoto metropolis.



INTRODUCTION

Background to the Study

Value addition to agricultural products involves enhancing the economic value and consumer appeal of an agricultural commodity. This process includes various technologies such as processing, preservation, dehydration, drying, fermentation, as well as labeling, packaging, and branding (Babalola, 2012). The concept of value addition is crucial in transforming raw agricultural products into higher-value goods that meet consumer demands, thereby increasing profitability. Value addition, as defined by Adejumo (2008), is the turnover plus income from services over the cost of materials and services purchased. The annual depreciation charge on the remaining value constitutes the net Gross margin.

One agricultural product with significant potential for value addition is the African locust bean (*Parkia biglobosa*). Locust beans are a highly nutritious condiment integral to the traditional diets of various communities across West Africa (Fagbemi, 1989). This legume is especially vital for food security, providing essential nutrients during periods of food scarcity and drought (Kourouma et al., 2011). Beyond its role as a staple food, the African locust bean holds regional and international significance due to its therapeutic properties and its ability to generate income in many African societies.

Processed African locust beans are known by different names across various ethnic groups in Nigeria—"Iru" in Yoruba, "Dawadawa" in Hausa, and "Ogiri" in Igbo (Diawara et al., 2000). These names reflect the cultural diversity and widespread use of locust beans across the country. Recent studies, such as the one by Adetunji et al. (2021), have explored innovative applications of locust beans, revealing that locust bean extract can be used as a natural colorant in food products. The study demonstrated that adding locust bean extract to tomato paste and yogurt not only enhanced their color but also improved their stability, highlighting the versatile applications of this traditional ingredient.

The potential for value addition to locust beans is vast. Processing this staple into various products—such as locust bean powder, sauce, oil, and flour—offers numerous opportunities to enhance its marketability and consumer convenience. Further value can be added through product improvement, such as refining processing techniques to improve flavor and extend shelf life, as well as through modern packaging and branding strategies. In Nigeria, value addition to locust beans not only promises to increase its economic worth but also encourages broader consumption of this nutrient-rich and flavorful ingredient, thereby contributing to both public health and economic development (Adetunji et al. 2021).

The current methods of processing and marketing locust beans fail to fully exploit their potential for value addition through diversification into new products such as locust bean powder, sauce, oil, and flour. This underutilization not only restricts consumer options but also limits the economic benefits that could be derived from the locust bean value chain. Furthermore, the lack of modern packaging, branding, and product improvement strategies has resulted in locust beans being perceived as a low-value, traditional food item rather than a versatile, premium product with significant health benefits.

Given the growing global demand for natural, organic, and nutrient-rich foods, there is an urgent need to explore value-adding opportunities for locust beans that can enhance their economic value, extend their market reach, and promote their consumption. Addressing these



challenges is crucial for unlocking the full potential of locust beans, improving the livelihoods of producers, and contributing to food security and economic development in Nigeria.

It is in view of this that this study was undertaken to not only evaluate the value-chain for locust bean in Sokoto Metropolis, but to also investigate ways by which its value addition can be enhance. The specific objectives are to:

1. Describe the socio-economic characteristic of African locust bean processors and marketers in the study area.
2. Calculate the Value addition for African locust bean in the study area.
3. Examine ways by which the Value Chain of African locust bean can be enhanced in the study area.
4. Identify the perceived constraints faced by African locust bean processors and marketers in the study area

LITERATURE REVIEW

Locust bean (*Parkia biglobosa*), primarily processed into *Daddawa* in Nigeria, plays a vital role in the rural economies of West Africa. Traditional processing methods—boiling, fermentation, de-hulling, and drying—are labor-intensive and predominantly performed by elderly women, providing a crucial source of income and food security (Fagbemi, 1989). *Daddawa* is valued for its strong aroma and rich nutrient profile as a flavor enhancer. Although processing techniques vary regionally to reflect local cultural preferences, they largely remain manual, limiting scalability (Adedokun, 2006).

Women, especially elderly ones, dominate the locust bean processing industry in rural parts of Nigeria. The enterprise provides them with income generation opportunities, which are essential for household livelihoods (Ijigbade et al., 2021). Despite their crucial role in this industry, female processors face numerous constraints, such as lack of access to capital, modern technologies, and organized markets (Blessing et al 2020).

Value addition in agriculture involves enhancing a product's worth through activities such as processing, branding, and packaging (Babalola, 2012). For locust bean, this can be achieved by transforming bulk-sold *Daddawa* into branded, packaged goods, which improves shelf life, consumer appeal, and profitability (Adejumo et al. (2013). This approach can create new income streams for women involved in locust bean processing by accessing new domestic and international consumer markets (Waheed, 2017). Research indicates that effective packaging and branding can significantly enhance the perceived quality of agricultural products, making them more appealing to urban consumers and facilitating their entry into formal retail chains, ultimately increasing income for producers (Waheed, 2017).



METHODOLOGY

Study area

Sokoto is a major city located in extreme north-western Nigeria, near the confluence of the Sokoto River and the Rima River. The coordinates for Sokoto are approximately 13°03'44"N latitude and 5°14'02"E longitude. It is the modern-day capital of Sokoto State and was previously the capital of the north-western states and that of the Sokoto Caliphate. The projected population of Sokoto Metropolis in 2023 was approximately 709,000 people (Population Stat, 2024). The Metropolis comprises of Five Local Government Areas either wholly (Sokoto North and Sokoto South) and partly (Dange-Shuni, Kware and Wamakko). Sokoto metropolis, the capital of Sokoto State, Nigeria, is a key area for studying African locust beans (*Parkia biglobosa*) due to its cultural and economic significance. The city has a rich cultural heritage where traditional foods, including locust beans processed into condiments like "Dawadawa," are integral to local cuisine. As an urban center, Sokoto presents opportunities for modernizing locust bean products, appealing to consumers seeking convenience and quality. The agricultural economy of Sokoto State can also benefit from value addition to locust beans, improving livelihoods for local farmers and processors.

Sampling Procedure and Sample Size

Sokoto Metropolis is made up of two urban (Sokoto North and South) and three peri-urban (Bodinga, Dange-Shuni and Wamakko) Local Government Areas. Although the processing of locust bean mostly takes place in the peri-urban areas, the marketing is done mostly by the processors and occurs in both the Urban and Peri-urban areas. Multi-stage sampling procedure was employed for this study. In the first stage, Bodinga and Wamakko LGAs were purposely selected due to the prevalence of locust bean processors in the areas. While kasuwan Dankure and Kofar Gawo markets both in the Sokoto North LGA were also purposely selected as they are the major markets for *Daddawa* in the metropolis. The second stage involved random selection of 60 processors as the sample size for this study.

Methods of Data Collection and Analysis

An Interview Schedule was employed to collect the primary Data for this study. Meanwhile, descriptive statistics, the Gross margin Analysis and Value added model (VAM) were used to analyse the data.

Gross Margin Analysis was used to compute the profitability of *Daddawa* processor during the study period and is stated thus:

$$GM = RV - TVC \text{ ----- (1)}$$

Where;

GM = Gross margin

RV = Revenue

TVC = Total Variable Cost



Meanwhile, to demonstrate the efficacy of value addition for *Daddawa* in the study area, 3 kg of Processed *Daddawa* was purchased, air dried, cleaned and blended into powdered form. The powdered *Daddawa* was then packaged in a 24 branded container pieces of 100 grams sizes and sold to the University community at a rate of ₦500 per pack. Therefore, to measure the value addition, a Value added model (VAM) was is stated thus;

VAM

$$VAP = C_{pb} - C_{pu} \text{ ----- (2)}$$

Where:

VAP = Gross margin

C_{pb} = Processor's selling price

C_{pu} = Processor's purchasing price:

RESULTS AND DISCUSSION

Socio-Economic Characteristics of the Respondents

Table 1 detailed the socioeconomic characteristics of the *Daddawa* processors and marketers in the study area.

Table 1: Socio-Economic Characteristics of Actors in Locust Beans Value Addition

Category	Variable	Freq.	%
Age	≤30	9	15
	31-50	24	40
	51-70	26	43.33
	≥70	1	1.67
	Total	60	100
Sex	Mean	50	
	Female	60	100
	Male	0	0
Total	60	100	
Marital Status	Single	7	11.67
	Married	44	73.33
	Divorced / Widowed	9	15
Total	60	100	
Household Sizes	1-5	8	13.33
	6-10	42	70



	11-15	10	16.67
	Total	60	100
	Mean	7	
Educational Levels	Quranic.	42	70
	Primary	15	25
	Secondary	3	5
	Tertiary	0	0
	Total	60	100
Business Experience	1-15	31	51.66
	16-20	9	15
	21-25	3	5
	26-30	16	26.67
	30 -35	1	1.67
	Total	60	100
	Mean	27	
Source of Capital	Personal savings	43	71.67
	Family/friend	17	28.33
	Credit	0	0
	Total	60	100

Source: *Field Survey, 2024*

The demographic and socio-economic profile of locust bean business participants highlights several key trends. The majority (43.33%) of individuals involved are aged between 51 and 70 years, with an average age of 50, indicating that this is predominantly an older demographic. The business is entirely female-driven, with 100% of participants being women, underscoring its significance as a female-dominated enterprise. Most participants (73.33%) are married, and large households (6-10 members) are common, with an average household size of 7, suggesting that family labor plays a crucial role in their operations. These findings are in line with that of Ijigbade *et al* (2021) who noted that locust bean processors are mostly female, married and above 50 years of age.

Educationally, the majority (70%) have Quranic education as their highest qualification, while a smaller percentage have primary (25%) or secondary (5%) education, which may limit their ability to access and adopt new technologies or business practices. Business experience is varied, with 51.66% having 1-15 years of experience, but a significant portion (26.67%) has over 26 years of experience, indicating a mix of seasoned and relatively new participants. which signifies deep traditional knowledge. The reliance on personal savings as the primary source of capital (71.67%) points to limited access to formal credit, which could constrain business growth and the ability to invest in improvements. Overall, the data reflects a traditional, experienced, but financially constrained and educationally limited group of elderly female entrepreneurs in the locust bean industry in Sokoto metropolis. Similar findings were also reported by Adejumo *et al.* (2016).



Cost and Return to Locust Bean Value Chain Actors in the Study Area

Table 2 presents the average cost and returns per production cycle to locust beans processors during the study period.

Table 2 Average Cost and Return to locust bean processors

	Items	Qty. (kg)	Rates (₦)	Amount (₦)	%
A	Variable cost				
	Unprocessed locust bean	7.5	113.33	850	53.12
	Energy			400	24.99
	Inputted Family Labour			300	18.76
	Storage			45.33	1.42
	Transportation			83.33	2.62
	Packaging			9.33	0.29
	Total variable cost			1688.49	100
B	Revenue				
	Average quantity sold	3.06	808.4	2,473.70	
C	Gross margin (VA) REV-TVC			873.2	

Source: *Computed from Field Survey Data, 2024*

Given that the labor component in the analysis is provided by family members, the financial dynamics of locust bean processing reflect both direct costs and implicit, non-monetary contributions. The total variable cost is ₦1,688.49, with the purchase of unprocessed locust beans being the most significant expense, making up 53.12% of the total cost. Similar findings were reported by Shuaibu (2021) who noted that the cost of raw materials can be as high as 62% of the variable cost in female micro processing businesses. Energy costs are also notable at 24.99%. The labor cost, which accounts for 18.76% of the total, is technically a non-cash cost since it involves family labor. This indicates that the processing operation relies heavily on household participation, reducing the need for hired labor and keeping cash expenses lower. Similar results were reported by Adedokun, (2006) who reported that the processing of Parkia bean seed is traditionally carried out by families using basic utensils.

The revenue generated from selling an average of 3.06 kg of processed locust beans is ₦2,473.70, resulting in a Gross margin of ₦873.20. The fact that family labor is used means that more of the revenue contributes directly to household income, rather than being spent on external labor costs. This dynamic suggests that while the operation is profitable, it is heavily dependent on the availability of family labor. To enhance profitability, strategies could include improving processing efficiency or scaling up production if additional labor resources are available. The reliance on family labor also underscores the importance of household involvement in sustaining the business (Babalola 2012; Ijigbade *et al*, 2021).



Ways of Enhancing the Value-Addition for Locust Bean Product in the Study Area

Table 4 shows the results of the Value added model of a test production of packaged powdered locust bean during the study period.

Table 4 Cost and Return from the value addition

Items	Units	Qty.	Rates (₦)	Cost (₦)	%
A Variable costs					
<i>Daddawa</i>	kg	3	800	2,400	33.24
Plastic Packs	pieces	24	100	2,400	33.24
Branding	pieces	24	80	1,920	26.59
Processing (cleaning, grinding and blending)				500	6.93
Total variable cost				7,220	100.00
B Revenue					
Packaged <i>Daddawa</i> powder in 100 gm. sizes	packs	24	500	12,000	
C Value Added (B-A)				4,780	

Source: Computed from Field Survey Data, 2024.

The decision to add value to *Daddawa* through grinding and packaging has resulted in a significant transformation of the product's profitability. The total variable cost for this enhanced processing is ₦7,220, with the main costs evenly distributed between the raw processed *Daddawa* (33.24%), plastic packaging (33.24%), and branding (26.59%). The inclusion of processing costs (cleaning, grinding, and blending) is relatively minor at 6.93%, indicating that the value addition primarily lies in packaging and branding rather than in the processing itself.

On the revenue side, selling the packaged *Daddawa* in 100-gram sizes at ₦500 per pack generates total revenue of ₦12,000. This leads to a substantial Gross margin of ₦4,780, highlighting the financial benefits of moving up the value chain. By transitioning from selling bulk *Daddawa* to a more refined, branded product, the Gross margin nearly doubles the input costs, indicating a strong return on investment.

This analysis shows that value addition through packaging and branding not only covers the costs but also significantly enhances profitability. It underscores the potential of marketing and presentation in increasing the market value of traditional products. This strategy could be particularly effective in attracting a broader customer base and commanding higher prices, further increasing the economic viability of *Daddawa* production. Waheed and Joseph (2017) as well as Blessing et al. (2020) observed that, value addition to farm produce particularly food products could create more economic opportunities and thereby generate more economic returns for microbusinesses in the food industry.



Figure 1: Showing the packaged value-added Daddawa produced by the Authours.

Perceived Constraint facing locust bean processors and marketers in the study area

Various constraints were faced by the respondents during the study period. Figure 1 shows these constraints in order of magnitude as perceived by the respondents.

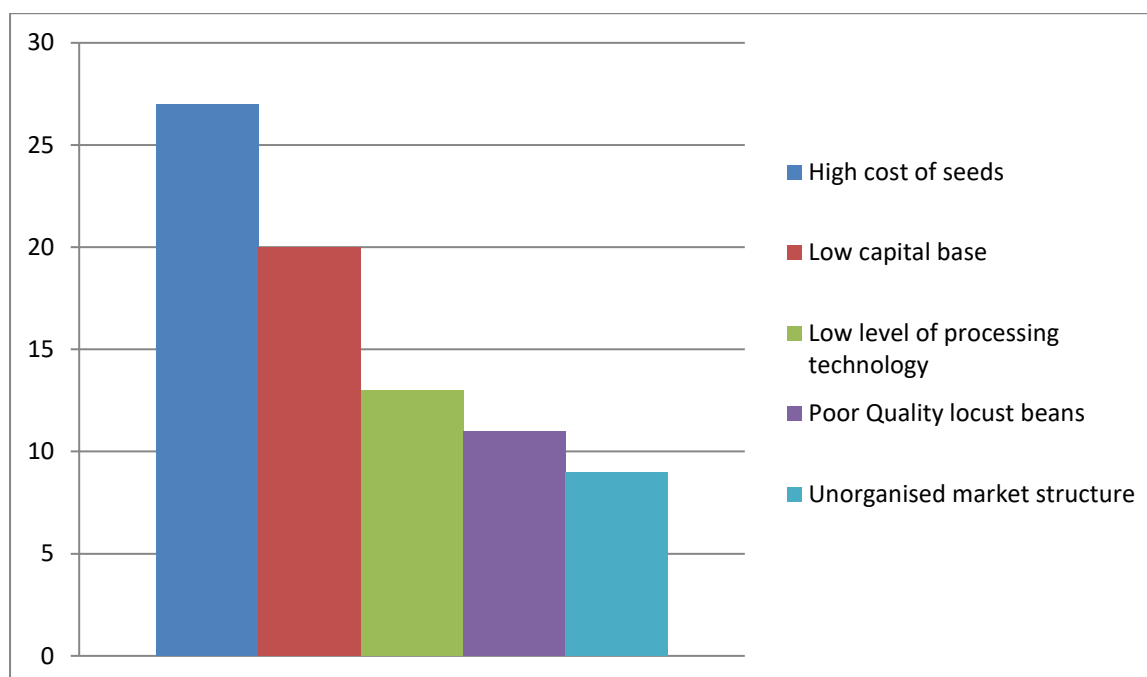


Figure 1: Showing the constraints faced by the respondents.

The analysis of constraints faced by *Daddawa* producers reveals that the high cost of seeds is the most significant challenge, affecting 45% of respondents. This is followed by a low capital base (33%), which limits investment in production and technology. The reliance on traditional, less efficient processing methods is another barrier, cited by 22%, while 18% of producers struggle with poor-quality locust beans, impacting the final product. Lastly, an unorganized market structure, affecting 15%, hinders effective distribution and fair pricing. These challenges highlight the need for improved financial support, better processing technologies, and a more organized market system. Similar constraints were also reported by Adejumo et al. (2013) and Ijigbade et al. (2021).

CONCLUSION, RECOMMENDATION AND SUMMARY

This study highlights the significant potential for value addition to African locust beans (*Parkia biglobosa*) in Sokoto Metropolis. It emphasizes that modernizing processing, packaging, and marketing strategies can greatly enhance profitability and market appeal. Transitioning to packaged products could nearly double the gross margin, showcasing the economic viability of these innovations.

To enhance value addition, the study recommends several strategic interventions:

1. The Government should assist the *Daddawa* processors to Invest in modern processing technologies to improve efficiency and product quality.
2. Governmental and Non-Governmental Organisations should provide financial support mechanisms like microloans or grants to help processors invest in better equipment.



3. Governmental and Non-Governmental Organisations should help Implement training programs on branding and marketing to elevate product perception.
4. Governmental and Non-Governmental Organisations should foster collaboration among processors, marketers, and agricultural extension services to enhance market organization.

By adopting these recommendations, stakeholders can unlock the full potential of locust beans, leading to improved livelihoods and economic growth in the region.

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