

Value Chain and Profitability Analysis of Shea Butter Production in Kwara State, Nigeria

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Abstract: The study assessed the value chain and economic viability of shea butter production in Kwara State, Nigeria. A well-structured questionnaire was used to gather information from 247 participants in the shea butter value chain industry within the State. Descriptive statistics, gross margin analysis, and linear regression were used to analyze the data gathered. The study found out that the shea nut processors and marketers were women (92%), while men (54.7%) were mostly shea nuts collectors. The average age of collectors was 43 and that of the processors and marketers were 46. Findings also revealed that the shea butter value chain is made up of collectors, assemblers, processors and marketers who perform various functions in getting the butter by product from the shea nuts to the consumers. According to the profitability analysis that was carried out, the study discovers that the gathering, processing, and sale of shea nuts in the study area were profitable. The gross margin for 100kg of shea nut collected was ₦7,094 (1USD≈450₦) while that of the processors/marketers for 20kg of shea butter produced was ₦16,200. The major constraint facing shea nuts collectors was the felling of shea trees (82.7%) while that of processors/marketers was the lack of modern processing equipment. It is therefore necessary for government to provide credit facilities and modern processing equipment's for rural women involved in shea butter production to enable them produce in large quantities.

Keywords: Shea butter; Value chain; Gross margin; Shea tree; Kwara state.

INTRODUCTION

In the semi-arid region of Africa, the shea tree (*Vitellaria paradoxa*) grows in untamed agroforestry parklands (Enaberue *et al.*, 2011). The tree grows mainly in Benin Republic, Burkina Faso, Central Africa Republic, Ghana, Mali, Nigeria, Togo and Uganda. The nuts from the shea tree play crucial roles in employment generation and livelihood support to rural dwellers particularly women who are involved in butter extraction from the nuts (Tiamiyu *et al.*, 2014). Every part of the tree has its use. For instance, the leave is used as an ingredient for producing paint and it can also be used as fodder while the fruit is eaten (Lovett & Haq, 2000). The shea tree also produces large amount of sap which serve as a crucial input material for rubber and gum industry. The husk of the shea butter nut has the capacity to remove heavy metal ions from aqueous solutions, for instance from wastewater.

The shea tree can produce fruit for 150 to 200 years after it is about 15 years old (Anon, 2012). The fruits are picked throughout the wet season, particularly in August and October. Collection, selection, washing, drying of the nuts,

and oil extraction are the processing procedures that are involved. Shea nut harvesting occurs during the wet season, and the ripe fruit pulp is a significant dietary supplement. (Hall *et al.*, 1996). Due to the rising demand for the butter made from the shea tree's nuts, the shea tree is regarded as a significant commercial crop. The butter is mostly used to make chocolate instead of cocoa butter. Also, shea butter is in higher demand because cosmetic companies are using it more often as an ingredient in their products. (Prasad and Prasad, 1995).

A value chain is a series of actions taken during the making and product delivery processes (Mejabi, 2012). In order to produce a good or service, all operations must be coordinated, for example, from shea nuts to shea butter. Nigeria is endowed with a variety of cash crops and a wealth of natural resources like Cassava, cashew, shea, cotton, cocoa, oil palm, rubber, etc. (Onwualu, 2012a, 2012b). It has been shown that value addition to the processing of these crops has helped to create employment opportunities. Although, the shea butter has many industrial applications but its production, processing and handling in Nigeria are still not developed.

The shea value chain, which has its end points in multinational food corporations and the local home market, starts with rural women. This is because majority of rural women are the harvesters and processors of shea nuts. Additionally, they sell to a variety of customers in the neighborhood market, including exporters, nut traders, and local butter processors. In Nigeria, there are neither shea butter extraction facilities nor shea butter oil refineries because the processing is done by rural women using conventional techniques. As a result, the value chain for the production of shea butter is underdeveloped and characterized by low technological input. Nigeria as a country is the world's greatest manufacturer of shea nuts, yet its exports to other countries are quite small (Olife, 2013).

The aim of value addition in this study is to ensure increased revenue from shea butter business. Oguntade *et al.*, (2011) substantiated this in a research work carried out on value growth in rice production. They discovered that the amount of value added when paddy rice was processed into basic milled rice was 20%, whereas the amount of value added when basic milled rice was processed into value added rice was 17%, demonstrating that the processors gained more money. However, unlike the rice crop in respect of value addition, not much is known about shea butter value chain. There is also a dearth of information on the determinants of profitability in shea butter value chain in Kwara State, Nigeria and it is one of the states where it is majorly produced and these informed the study, given the relevance of Shea butter value addition. The shea butter value chain (planting, harvesting, processing and marketing) has great potential for job and wealth creation, women empowerment and poverty reduction in shea producing communities. It can also be a solid raw material base for local and international shea-based food, pharmaceutical and cosmetics industries. The value chain can also provide the local shea nut growers and processors with the knowledge and tools they need to compete on the world stage.

This study is unique because the value chain examination of shea butter will analytically identify the players contribution in the production, processing and supply/advertising of shea butter in the study area. This gives room for characterization of the players and the distribution of goods through the chain (Kaplinsky and Morris, 2001). It is necessary to study shea butter value chain since results will guide policy makers on how to improve shea butter making. The findings of the study will ensure optimum allocation of resources that will improve production efficiency and address the challenges experienced in shea butter production in Nigeria.

Objectives of the Study

The broad objective of the study is to analyze the value chain and profitability of shea butter in southwest, Nigeria. The specific objectives are to:

1. map out stages and activities in shea butter value chain;
2. determine the cost and returns alongside the value chain;
3. examine the factors that influence the profits made by each stakeholder along the value chain;

4. identify and analyze the challenges faced by all participants in the chain.

METHODOLOGY

Study Area

Kwara State is a Nigerian state in the North Central area. It is bordered by the Benin Republic to the west, the Nigerian states of Niger, Kogi, and Ekiti to the north, and the states of Osun, Oyo, and Ogun to the east. The majority of the state is made up of woodland savanna, while there are some forested areas in the south. It is situated between North Latitudes 110 21 and 110 451. It is also located between the Greenwich Meridian's longitudes 20451 and 60401 East. The state's land area is 32,500 km² (3,250,000 hectares), and temperatures often vary from 300°C to 350°C. The study area has two different climatic seasons: the rainy season and wet season (Kwara ADP, 2005). In almost all of the state's local government areas, rainfall favours the growth of the shea nut tree due to its amount (1000-1500mm per year) and duration (8-month period). There are 2,365,353 people living in the state, with 1,193,783 men and 1,171,570 women. (2007 census).

Source of Data and Sampling Method

Primary data were gathered through the administration of well-structured questionnaire. Data were gathered from the actors of shea butter producers which include the collectors, processors and marketers. Information on yields, input requirements, transportation and storage costs were obtained. There are 16 Local Government Areas (LGAs) in Kwara State and they are classified into four agricultural zones, 23 blocks and 184 cells (KWADP, 2005). Multi-stage sampling technique was used for the study. At the initial stage, agricultural zones A and C were purposively selected because Zone A had a large number of shea collectors while Zone C had large number of shea butter producers. Zone A has two Local Government Areas (LGAs) while Zone C has five LGAs. In the second stage, 30% of the wards in each LGA of the two zones were randomly picked and at the final stage, 75 shea nuts collectors and 172 shea butter producers/marketers were randomly selected and this formed a sample size of 247 shea butter value chain actors that was used for the study.

Descriptive statistics

The socio-demographic characteristics of the respondents, the phases and activities in the shea butter value chain, as well as the difficulties faced by each participant in the value chain, were all described using descriptive statistics in the form of tables, frequencies, percentages, and diagrams.

Gross Margin

The earnings realized by players in the shea butter value chain were analyzed using gross margin. Gross profit is defined as revenue less cost of goods sold (CGS) and the gross margin is the ratio of gross profit to revenue (Olaleye *et al.*, 2019). Gross Margin expresses the relationship between gross and cost.

Mathematically;

$$GM = TR - TVC; TC = TVC + TFC; ROI = GM/TVC$$

Where;

GM is the Gross Margin (profitability of catfish farming), TR is the Total Revenue (revenue generated from revenue generated from shea butter business), TVC is Total Variable Cost (transportation, labor, fuel, machine repair among others), TC is Total Cost, TFC is Total Fixed Cost (cost of items used for more than a production cycle). If the gross margin is greater than 1, the business is profitable. If less than 1, the business is unprofitable (Adewuyi *et al.*, 2010).

Multiple Regression Analysis

It was applied to determine the statistical relationship between the expenses incurred and the profits made by the marketers and producers of shea butter. The assumption that the data obtained satisfied the requirement of the multiple regression model was the basis for the usage of OLS. The implicit presentation of the general functional form described by

$$Y = F(X_1, X_2, X_3, X_4, X_5, \dots, X_{10} + U)$$

Here,

Y = Gross margin i.e TR - TVC

X1 = Cost of shea nuts (in naira)

X2 = Cost of equipment (in naira)

X3 = Labor cost (in naira)

X4 = Storage cost (in naira)

X5 = Transportation cost (in naira)

X6 = Education (years)

X7 = Years of experience

X8 = Access to market information (Yes – 1, Otherwise -0)

X9 = Access to credit (Yes – 1, otherwise – 0)

X10 = Household size (number)

U = error term

RESULTS AND DISCUSSION

Socio-demographic Characteristics of the Respondents

Table 1 reveals that most (54.7%) of the shea nut collectors were male while female dominate processing of shea nuts and marketing of shea butter. This suggests that females were more engaged in the Shea butter value chain. This is in tandem with the findings of the study carried out by Abubakar and Baba, (2020) & Adagba, (2014) which showed that women participated more actively in the shea butter business compared to men. This was as a result of the overlapping of shea collection season with the main cultivation season which keeps most adult male farmers engaged in other main farming activities. The age distribution of the actors across the value chain shows that the majority were between the age bracket of 41-50 with average age of 43 for shea collectors and 46 for processors and marketers of shea butter. This indicates that majority of the sampled respondents were still in their economically active and productive years. This also corroborates the findings of Senchi and Yakubu (2014) & Garba *et al.* (2015)

which showed that most of shea butter producers were within the economic active age and that younger individual participated more than older individuals. The majority (80%) of the shea nuts collectors were married while about 85% of the processors and marketers were married. This indicates that there is the accessibility of family manpower which reduces production costs. This corroborates with the result of a study by Abubakar and Baba, (2020) which shows that all respondents across the shea butter value chain were married.

Shea nut collectors' mean household size was four while the processors and marketers had an average household size of 5. The majority (69.3%) of the shea nut collectors did not have formal education while 69.7% of the processors and marketers lack formal education. This result corroborates the finding of Oluwalana and Sowunmi, (2017) in the work carried out on empirical evidence and analysis of shea butter production in which about 78.5% of the respondents have not acquired a formal training or education. This implies that actors in shea butter value chain were mostly illiterates. This may be as a result of the fact that activities required in producing shea butter do not required so much calculations and management skills and most uneducated people can get involved in the production. Most (56.5%) of the processors and marketers had the range of 11 and 15 years of experience of producing and marketing shea butter. This result is somewhat similar to that of Tanko, (2017) on profit efficiency and constraint analysis of the shea butter industry in northern Nigeria in which most of the respondents had experiences of between 11 – 20 years.

Table 1. Socio-economic Characteristics of Actors in the Shea butter Value Chain

Variables	Collectors (N=75) (%)	Processors & Marketers (N = 172) (%)
Gender		
Male	41 (54.7)	14 (8.1)
Female	34 (45.3)	158 (91.9)
Religion		
Islam	69 (92)	157 (91.3)
Christianity	6 (8)	15 (8.7)
Age		
≤30	4 (5.3)	9 (5.2)
31-40	28 (37.3)	65 (37.7)
41-50	35 (46.7)	79 (45.9)
51-60	6 (8)	12 (6.9)
≥60	2 (2.7)	7 (4.3)
Mean	43	46
Marital Status		
Single	9 (12)	12 (7.0)
Married	60 (80)	145 (84.4)
Widow	5 (6.7)	14 (8.1)
Divorced	1 (1.3)	1 (0.5)
Household Size		
1-4	21 (28)	41 (23.8)
5-8	36 (48)	75 (43.6)
9-12	11 (14.7)	39 (22.7)

>12	7 (9.3)	17 (9.9)
Mean	4	5
Education		
None	52 (69.3)	120 (69.7)
Primary	7 (9.3)	27 (15.6)
Secondary	11 (14.7)	15 (8.7)
OND	5 (6.7)	8 (4.6)
BSc/HND	0 (0)	2 (1.1)
Years of Experience		
≤5	6 (8)	18 (10.5)
6-10	11 (14.7)	30 (17.4)
11-15	49 (65.3)	97 (56.4)
11-15	9 (12)	27 (15.7)
≥15	75 (100)	172 (100)

Source: Field Survey, 2021

Stages and Actors involved in the Shea Butter Value Chain

Figure 1 shows the result of the analysis of the shea butter value chain mapping. The analysis shows that the stages involved in shea butter production include collection of shea nuts, assembling, processing and butter bye product collection. The farmers are mostly involved in collecting the shea nuts as the shea trees are found near farmlands and in the wild. The collectors supply the shea nuts harvested to the assemblers who carry out activities such as sorting, grading and bagging. The assemblers then supply the shea nuts to industrial assemblers, local consumers and exporters. They mainly sell the bagged shea nuts to local processors who carry out activities such as cracking, milling, cooking, milling, decantation and solidification after which the butter bye product is produced. The processors then supply the local consumers and industries. The local consumers make use of the shea butter as body cream, hair cream, cooking oil and medicine. They also supply the wholesalers and retailers who also supply to some consumers.

Profitability of Shea Nuts Collection in the Study Area

The table below presents the gross margin for 200kg of shea nuts collected in the study area. According to the result, the total cost incurred by the collectors was ₦8,070 and revenue of ₦15,164 was realized. The gross margin for 100kg of shea nuts collected is ₦7,094. The return on investment showed that the amount realized for every one naira invested in collecting shea nut was ₦0.87. The result of the gross margin implies that there is value addition as the shea collectors gather the nuts and transport them to the assemblers and processing units.

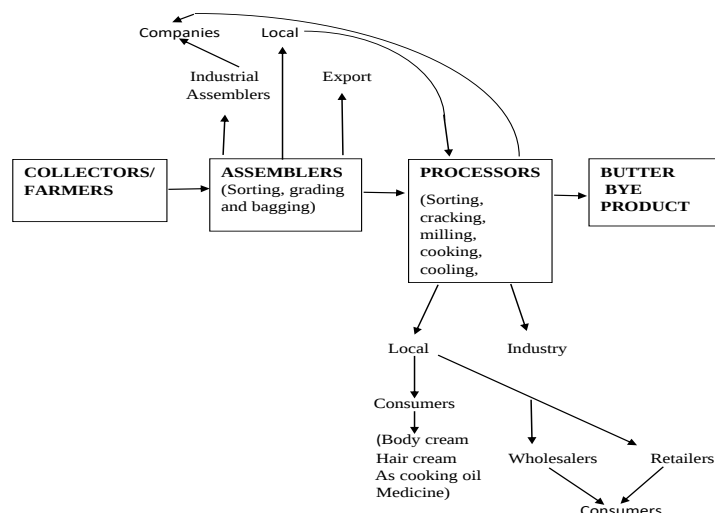


Figure 1. Mapping of the stages, activities and actors in Shea Butter Value Chain

Table 2. Average Profitability Analysis of Shea Nuts collection in the Study Area.

Items	Cost Value for 100kg of shea nuts collected (₦)
Labor cost	6,250
Transportation Cost	570
Sack Cost	400
Commission agent	850
TVC	8,070
Returns	
Revenue	15,164
Gross Margin	7,094
ROI	0.87

Source: Field Survey, 2021. (1USD≈450₦)

Profitability Analysis of Shea Butter Production and Marketing in Kwara State

According to the table above, the gross margin for processing 20 kilograms of shea butter was 16200 naira, and the rate of investment showed that for every naira invested in the manufacturing of shea butter, almost 54 naira were realized. It is clear that shea butter production is profitable, and the profit increases with production volume. The table shows that, after the cost of nuts, labor is the most expensive component in the manufacturing of shea butter in the research region. This is not surprising considering that labor is the primary source of manpower in rural Nigeria due to a lack of modern machinery.

Table 3. Average Profitability Analysis of Shea Butter production and Marketing in the Study Area.

Items	Total Cost for 20kg of shea butter (₦)
Variable Cost	
Labor cost	8220
Transportation cost	1150
Cost of fuel for grinding machine	950
Cost of firewood	450
Grinding cost	2000
Machine repair	1350
Cost of shea nuts	11,550
Packaging cost	4290
Total Variable Cost (TVC)	29940
Fixed Cost (Depreciated)	
Cost of pots	182.54
Cost of presser	13.61
Cost of basin	74.25
Cost of drum	7.24
Cost of sievers	5.18
Cost of mortar and pestle	143.80
Total Fixed Cost (TFC)	426.62
Total Cost (TC)	30,366.62
Revenue	46,140
Gross Margin	16,200
ROI	0.54

Source: Calculation from Field Survey, 2021. (1USD≈450₦)

Determinants of the Profitability of Shea Butter Production and Marketing in Kwara state, Nigeria

Table 4 shows the result of linear regression that was used to survey the determinants of profitability in shea butter processing and marketing in Kwara State. The R^2 value which is 0.7254 implies that 72.5% of the variation in the profit was due to the limited independent variable. The variables estimated were cost of shea nuts, equipment cost, labor cost, storage cost, transportation cost, education, years of experience, access to market information, access to credit and household size. The dependent variable was the gross margin. The result shows that the cost of shea nuts and equipment used in shea butter production was negatively significant at 1%. This implies that as the cost of shea nuts and equipment increases, the income generated by shea butter producers reduces. This result is in agreement with that obtained from a study by Tanko, 2017 carried out in Ghana in which nut price was negative and significant at 1%. Labor cost is negatively significant at 5% and this shows that there is an inverse relationship between labor cost and income generated from shea butter production. This means that as the labor cost increases the income generated decreases. Any action directed at reducing the labor cost will have a positive impact on gross revenue. Education was positive and significant at 5%. This means that an additional year of formal education acquired will result in increased income for shea butter producers. This finding is in

conformity with that from the work of Tanko, (2017) on profit efficiency and constraint analysis of shea butter industry in the northern region of Ghana. Moreover, access to credit was also positive and significant at 5%, meaning that shea butter producers having access to credit will benefit from increased income.

Table 4. Linear Regression Showing the Determinants of Profitability in Shea Butter Production and Marketing in the Study Area.

Variables	Coefficients	Std. error	t-stat
Cost of shea nuts	-11.4062***	3.0758	3.71
Equipment cost	-4.1208***	1.1521	3.57
Labor cost	-2.4567**	0.9859	2.49
Storage cost	-0.2410	0.2874	0.84
Transportation cost	-0.7242	0.8025	0.90
Education	0.1928**	0.0822	2.35
Years of experience	0.1029	0.0798	1.29
Access to market information	1.1002	1.3712	0.80
Access to credit	2.2041**	1.0045	2.19
Household size	1.4724	1.6542	0.89
Constant	4.3212	1.9685	2.20

Source: Field Survey, 2021

*Significant at 10%, ** significant at 5%, *** significant at 1%. $R^2 = 0.7254$, F value = 62.51 significant at 1%

Constraints Faced by Shea Nuts Collectors in the Study Area

The limitations faced by shea nuts collectors are presented in Table 5 below. The major limitations were falling of shea trees (82.7%), cost of transporting shea nuts (77.3%), poor storage facilities (74.6%), expensive labor (68.0%) and crude implements for nut picking (56.0). The falling of shea trees was ranked number one factor militating against shea nuts collection in the study area. This means the collectors will be limited to smaller quantities of a reduction in the quantity of nuts which will, in turn, adversely their income. This finding corroborates that of Carrette *et al.*, (2009) who found out that the most threatening factor affecting regeneration of shea trees is the felling of the trees. The cost of transporting shea nuts was also ranked as one of the major constraints which may affect the profit realized when poor storage facilities could result in wastage and selling of the nuts at a low price. The table also showed that labor costs were seen as a major obstacle for shea collectors and may also be to blame for the poor returns that shea collectors receive.

Table 6. Constraints Faced by Shea Butter Processors and Marketers in the Study Area.

Variables	Frequency	Rank
Lack of Improved Processing Equipment	159 (92.4)	1 st
Poor quality of Shea nuts	153 (88.9)	2 nd
Price instability	149 (86.6)	3 rd
Poor Storage facilities	135 (78.4)	4 th
Unavailability of Credit	131 (76.4)	5 th
High cost of labor	111 (64.5)	6 th
High cost of Input	96 (55.8)	7 th
Loss of output during processing	82 (47.7)	8 th
Distance to market	76 (44.1)	9 th
High cost of transportation	69 (40.1)	10 th

Source: Field Survey, 2021

CONCLUSION

The shea butter value chain consists of actors such as collectors who collect the nuts from the shea tree, assemblers who sort and grade the nuts collected and the processors who process the nuts to produce the shea butter. The majority of the processors producing shea butter were also involved in marketing the product to wholesalers, retailers and sometimes directly to the consumers. It was discovered that the majority of the shea nut collectors are males while most of the shea butter producers in the study area are females. Shea butter value chain activities are profitable but the processors/marketers had higher profit than collectors because of the value added to get the product to the final consumers. The determinants of profitability among the shea butter processors were cost of shea nuts, equipment, labor, education and access to credit. The major constraints faced by shea collectors were the felling of shea trees, high cost of transporting shea nuts and poor storage facilities while that of processors/marketers were lack of improved processing equipment, poor quality of shea nuts and price instability.

Based on the findings from this study, government needs to make provisions for credit facilities in order to make shea butter value chain actors more productive. This will further help boost their capacity to produce in large quantities for local consumption and for export purposes. There is need for extension officers to train rural women on new method of shea butter production to increase the revenue generated from the business. Government should also assist in providing modern machineries for processing and improved storage facilities to empower women in rural communities where shea butter is produced in large quantities as this will make shea butter business more lucrative and competitive in international market.

Conflict of Interest

The authors declared there were no conflicts of interest.

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