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Profitability analysis of shea nuts supply chain in selected states in Nigeria

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Abstract. The objective of this study was to establish the supply chains of shea nuts and analyse the profitability of shea based enterprises. Data were collected through interview schedules conducted on 262 respondents chosen from the lists of relevant shea value chain actors in four selected shea producing states in Nigeria. Data were analysed using budgeting technique. Results indicated that the gross margins per ton for shea nuts collection and processing were №10,846.15 and №43,500.00, respectively. The shea nuts marketing margin per ton within Nigeria was №7000.00. The export margins for nuts and for butter were №19,500.00 and №34,500 per ton, respectively. The returns per each naira invested in shea-based enterprise range from 0.16 to 0.46. Value addition of shea nuts into butter increases the economic value of shea nuts. It was concluded that business of shea collection, processing and marketing were profitable. It was recommended that credit should be made available to private entrepreneurs to invest on shea-based enterprise in Nigeria. Research into reduction of gestation period of shea tree (*Vitelleria paradoxa*) should be funded.

Keywords: Forest product, export commodity, profitability, shea value chain, Nigeria.

INTRODUCTION

Shea trees *Vitellaria paradoxa is a* perennial crop that is usually found in the wild agro-forestry parklands across the semi-arid region of Africa, where annual rainfall ranges from 600 to 1500 mm (Enaberue et al., 2011). It occurs on an estimated 1,000,000 km² area between western Senegal and northwestern Uganda. Nigeria accounts for 62% of the 600,000 metric tons produce in West Africa. Shea nuts play important socio-economic role in Nigeria in terms of employment and income generation to a significant proportion of rural population especially women who are, directly involved in shea nut collection and butter extraction (Matanmi, et al., 2011).

In Nigeria, direct cultivation of shea tree is not common because of slow initial growth. However, farmers preserved shea trees in the wild forest when cultivating other crops and the shea plantation is restricted to avoid shading of other crops when clearing land for other agricultural activities. The shea nut tree bears fruit when it is about 15 years old, reaching full bearing capacity at 25 years and has a useful fruit bearing life span of 150 to 200 years (Anon, 2012). The fruit is a spherical berry about 3 to 5 cm long. It consists of a thin brown shell enclosing a single, dark-brown, egg-shaped seed embedded in a yellowish-green sweet pulp. Average production is between 15 and 20 kg of fresh fruit/tree, and about one tree in three is productive in each year. On average, 50 kg of fresh nuts give 20 kg of dry kernels which contain 40 to 55% of fat (Anon, 2011).

In the quest to diversify the revenue earning sources from crude oil exports to other sources, investment in value addition of export commodities features prominently in Agricultural Transformation Agenda of the Federal Government of Nigeria. Consequently, shea butter, a product of shea tree, has been on the list of

States	Local Government Areas	Sample size	Percentage
Kebbi	Fakai, Zuru	68	26
Kwara	Kaiama	36	14
Niger	Agaie, Borgu, Gbako, Katcha, Kontagora, Mashiegu	123	47
Оуо	Irepo, Orelope	35	13
Total		262	100

Table 1. Selected Local Government Areas and sample size.

Nigeria export commodities on account of its industrial use in the European Union and United States for separation into stearin for use as "cocoa butter improvers and margarines. The demand for shea butter has increased in recent years as cosmetic and personal care companies in those countries have increased the use of shea butter in their products. The ability of Nigeria government to supply the commodity to these countries depends on the quantity sold out by various collectors and marketers and selling depends on proper marketing conditions (Prasad and Prasad, 1995). Since the motive of engagement in any enterprise is to generate return to invested capital, there is need for information on the economic profitability of venturing into shea value addition enterprise. Some studies have been conducted on shea in Nigeria (Odebiyi et al., 2000; Popoola and Tee, 2001; Peter, 2004; Enaberue et al., 2011; Matanmi et al., 2011; Ademola et al., 2012). To the best of my knowledge, I have not come across literature that actually directed at profitability analysis of shea enterprise along the value chains. The objective of this study therefore is to provide information on the profitability of shea nut collection, processing and marketing.

METHODOLOGY

The study was conducted between March and April 2011 through a survey of shea collectors, processors and traders in four states including: Kebbi, Kwara, Niger and Oyo. Respondents for the study were selected through multistage sampling procedure. The first stage involved selection of the four states from the list of states where shea are found in Nigeria. In the second stage, Local Government Areas (LGAs) were randomly selected from the four states based on probability proportionate to size. The third stage involved random selection of respondents from the villages selected from each LGA, again based on probability proportionate to size. Table 1 presents the selected LGAs and respondents sample size. Data were collected interview schedule through using questionnaires and facilitated discussion. Information related to costs of inputs required in establishing and running the shea-based enterprise was collected. The revenue generated from the sales of products was also collected. A total of 262 respondents provided information used for this study. Data were analysed using budgeting technique. The gross margin estimate was used in evaluating profitability (Eluagu and Nwali, 1999; Tiamiyu et al., 2002; Somda et al., 2003; Abu et al., 2011).

The gross margin is expressed mathematically as: GM = GR - TVC,

where GM is gross margin, GR is the gross sale revenue and TVC is the total variable cost (the costs of all variable inputs) involved.

An enterprise is considered profitable if the gross margin is positive. This implies that GR is greater than TVC. A negative GM value implies economic loss, a situation when TVC is greater than GR. The higher the positive gross margin the higher the level of profitability and vice versa.

RESULTS AND DISCUSSION

Shea collection practices adopted by the respondents

In the study area, the shea fruit is generally allowed to fall to the ground naturally when it is ripe, and is then collected. Ninety eight percent of the respondents adopted picking methods while only 2 percent of respondents pluck the fruits from the tree. Sample respondents pick an average of 1.3 tons of Shea nuts per season. According to responses from the sample pickers about one bag (100 kg) of shea nuts can be picked from a tree in a season. The nuts are generally oval in shape. Round shape is not common in the study area. 75 percent of the nuts observed were light brown in colour before shelling; dark brown and black colours are not common. 81 percent of respondents wash their nuts before shelling. After washing the nuts are generally boiled with water in large metal pot for about two hours. The boiled nuts are sun dried by spreading on concrete floor or polythene mat. Six percent of the respondents however, used oven to dry their nuts. Nuts are pounded using mortal to remove husks. Sorting and cracking are manually carried out. Two percent of respondents used mechanical device for sorting while five percent also cracked their nuts mechanically. The clean kernels are packed inside polypropylene bags and stored in the

Table 2. Enterprise budget for shea nut collection.

Budget items	Quantity	Cost value (N)
Sales of Nuts	1.3 tons	45500
Labour	54 man-days	27000
Picking materials	13 bags	1 300
Transportation		2 600
Total variable cost		30900
Gross margin		14 100
Opportunity cost of capital (15% for six months)		2 317
Total cost of production		33217
Net income		12 283

Source: Estimated from survey data, 2011.

Table 3. Enterprise budget for shea nut processing enterprise.

Budget items	Quantity	Cost value (₩)
Sales of butter	1 ton	200 000
Shea nuts	3.5 ton	122 500
Labour	40 md	20000
Other variable costs		14 000
Total variable cost	1 ton	156 500
Gross margin		43 500
Opportunity cost of capital (15% for six months)		11 737
Total cost of production		168 237
Net income		31 762

Source: Estimated from survey data, 2011.

house before selling to the buyer.

Table 2 presents the enterprise budget for shea nut collection enterprise per season. The gross margin per season was ₦14,100.00 and the net income was ₦12,283. An average of 13 bags (1.3 tons) is picked per person per season. This implies that the gross margin and net income per ton of shea collected are ₦10846.15 and ₦9448.46, respectively. The gross margin per variable costs, representing the returns per each invested Naira was 0.46. This result implies that shea collection is a profitable enterprise.

Shea butter processing practices adopted by the respondents

Shea nut is processed into butter using traditional manual process. Kernels are crushed by pounding with mortals or grinding with stone. The dried kernels are roasted or fried in a large iron pots over open fire. The resulting dried shea kernels are usually milled into paste by commercial milling operators. Water is added to the paste and kneaded by hand-beaten for about one hour until fats form emulsion. A larger proportion of respondents changed cold water more than three times while hot water is generally changed once while kneading. The paste is washed and removed into a boiling pot and heated. The extracted liquid is stirred and left to cool into a smooth cream. The average processing yield rate range was 30%. To produce one ton of butter, 3.5 tons of nuts are required. The creamy butter is packaged by pouring into a metal or plastic container or calabash. 79 percent of the respondents usually pour it into metal containers while 21% used plastic containers or calabash.

Table 3 presents the enterprise budget for shea nut processing. The gross margin per ton was \$43,500.00 and the net income was \$31,737.00. The gross margin per variable costs, representing the returns per each invested Naira was 0.28. This result implies that shea processing is a profitable enterprise.

Shea nut marketing pattern and supply

Shea nuts marketing systems function in a framework of a free-market. There were no restrictions for any economic agent to operate in this sub-sector. Both men

Indicators	Mean
Quantity purchased (ton)	1
Price/ton (N)	35 000
Purchase cost (N/season)	35 000
Transport cost (N)	2000
Fees	1000
Sales value (N/ton)	45000
Gross margin (N/ton)	7 000

 Table 4. Partial budget of shea marketing in the study area.

Source: Estimated from survey data.

and women participated in shea nuts marketing. Local trading is dominated by female, while men are more dominant in assemblage, transportation and export of shea nuts. Shea nuts are sold throughout the year either to processors, or to local traders. A larger proportion of shea collectors sell their produce within the first three months after harvest. In general, shea nuts were sold at the local market place closest to farm gate. Means of transportation of shea to the market were generally by motorcycle or bicycle (50%), 27% of respondents transport on foot while 23% used vehicle. This implies that good road is necessary for effective marketing of shea nuts. The delivery distances vary from 100 m to 54 km, with an average of 36 km. Transport cost ranges from ₩50 to 100 per bag from the household gate to the market place. Pricing for produce at the farm gate is based on bargaining, and varies from one market place to another. Prices of shea nuts are set according to the season of the year. This ranges from ₩2500 per 100 kg bag during raining season (July to September) to ₩5,000 per 100 kg bag during dry season (February to May). The average price per bag (100 kg) per season in the study area was ₦3,500.

Shea nuts marketing structure and conduct

Three structures of shea marketing were identified during the survey. First, shea collectors supply directly to sellers. Secondly, shea assemblers procure the products from collectors and supply the sellers. The third structure is a combination of the two. Irrespective of the structure, shea marketing is based on a certain confidence between the suppliers (collector, assembler or both) and the sellers (retailers). Shea is procured from various locations and assembled in the local market for further processing into exportable products. According to the categories of shea suppliers, different locations of shea supply were identified. The results indicate that most shea sellers relied on suppliers located outside their locations. Shea nut is processed and packaged in these locations. The final packaged products are transported to Lagos or border towns of Benin Republic. Most of shea traders especially those from Kebbi, Kwara and Niger sell in Benin. The reason is mainly due to higher cost of transportation involved in transferring the product to Lagos port. Also the price in Benin is relatively higher than Lagos price due to international recognition of Benin for high quality shea nut. The shea nuts from Nigeria are usually further processed in Benin before export to either UK or USA. It was reported that most of the shea sold at Benin border were not in the official list of Nigeria shea export.

Economic performance of shea marketing systems

Table 4 presents partial budget for shea marketing in the study area. Traders' margin was ₦7000 per ton. The return per naira invested in shea marketing was 0.18, indicating slightly cost effectiveness.

Export margin of shea nuts and butter

Both shea nuts and butter enter international market. The export margin of shea nuts and butter is presented in Table 5. Export margin for the shea nut is \$19,500/ton. The return to variable cost was 0.35, indicating that the she nut export enterprise is cost effective. Similarly for the shea butter, the result showed an export margin of \$34,500/ton. The return to variable cost was 0.16. The result implies that export marketing of shea nuts and butter is profitable and cost effective.

CONCLUSION

In summary, the business of shea production, processing and marketing is profitable in Nigeria. Bulk of shea nut produced is sold. A little proportion is processed into butter. The butter produced locally is generally for local

	Unit	Shea nuts	Shea butter
Budget items		Cost/return (₩)	Cost/return (₩)
Shea products	1 ton	35 000	200000
Processing	1 ton	2 000	2 000
Packaging	10 bags	1 000	1 000
transportation	1 ton	6 500	6500
tax/other charges	1 ton	2 000	2 000
Forwarding	1 ton	3 000	3 000
Inspection	1 ton	1 000	1 000
Documentation	1 ton	3 500	3500
Port charges/levy	1 ton	1 500	1500
Total	1 ton	55500	220500
Fob price	1 ton	75 000*	255 000*
Export margin	1 ton	19 500	34 500

Table 5. Shea export costs structure and margin in the study area.

* Exchange rate of US\$1= ₩150.

consumption. Only a fraction is collected by local buying agents and enters the larger domestic and international markets. The shea collectors and processors lack basic infrastructures like boreholes, sorting, cracking and milling machines for shea butter production. In addition, majority of the artisanal processors of shea butter lack the capacity to buy a large quantity of shea nuts at harvest time. This creates room for the illegal border trade to flourish. The bulk of shea nuts are exported through illegal border trading. Consequently, the government's quest to diversify the country's revenue earning sources from crude oil exports would be realised if it is able to control smuggling of shea butter across Nigeria's borders.

In order to motivate entrepreneur to engage in shea nut enterprises, it is recommended that: credit facilities should be provided to entrepreneurs that is interested in investing on shea-based enterprise. Effort should be made to discourage illegal border trading by sensitising our producers on the alternative avenue to dispose their products legally. Processors should be trained on how to produce shea butter that will be acceptable in the international market. Research aiming at reducing the gestation period of shea tree should be funded. Awareness campaign on tree planting should be extended to shea tree planting to conserve this valuable agroforestry product.

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