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Analysis of Economy of Natural Rubber and Shea Nuts in Selected Households in Edo and Oyo States, Nigeria

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ABSTRACT

The study examines the contributions of Natural Rubber and Shea Nuts to selected households' income in Edo and Oyo States. The study made use of cross sectional data generated from 150 processors of Shea nuts. Three (3) local Government Areas were selected purposively, five (5) communities each were selected from each of the LGAs, and lastly, ten (10) respondents were selected from the five communities each. The data were analyzed using percentage distribution, regression and profitability analysis. The study revealed that the processors of shea nuts were female dominated (96% female). Majority of the processors (72.7%) havehousehold size of 8 persons. The processors of Shea nuts were of middle age (43 years old) and 70% of them have no formal education, although they have 15 years of experience in processing of Shea nuts (karite). Shea nut contributes 62.37% to their total household income. More than eighty-seven percent (87.3%) of the respondents gathered their shea nuts from the wild, while 12.7% bought theirs from the open markets. The profit margin in Shea nuts processing was #125,701.89 per annum. The study also measured the profitability of natural rubber production and its contribution to some selected household income in southern Nigeria by examining the socio-economic characteristics of respondents and the profitability of latex production. Multistage, purposive and random sampling techniques were employed in the collection of primary data from 150 respondents. Descriptive statistics and production function tools were used to analyze the data collected. Results indicated that respondents were educated (84%), married (76%) with a mean family size of seven people and well experienced with mean farming experience of 19 years. Latex production was a profitable venture with an average variable cost per ha of 54,600.94 with total revenue (T.R.) and gross margin (G.M.) per hectare of 163,594.17 and 107,893.23, respectively. We recommend that: Rubber farmers adopt rubber-based agroforestry systems using early maturing planting materials of shea butter tree as intercrop in order to support ecological diversity and domestication of shea butter tree and overcome scarcity of its nuts which are usually found in the wild; vegetative propagation of shea butter is adopted for the production of early maturing dwarf planting materials of the tree for farmers; strong collaboration with rubber farmers; sensitization and training for promoting and harnessing the profit accruing to shea nuts to rubber farmers in order to Improve rubber farmers' main sources of income through enhancing shea nut processing; Government should formulate policy to encourage rubber farmers in shea nut processing for maximum profitability.

Keywords: *Agroforestry, Households, Income, Livelihoods, Marketers, Natural rubber, Processors, Profitability, Revenue, Shea nuts, Socioeconomics, Vegetative propagation.*

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INTRODUCTION

Rubber, *Hevea brasiliensis* (Willd.Ex A.Jusieu) Muller.Arg, is the main source of natural rubber. It is an economically important perennial crop in Nigeria as it is an important plant not only for world economic strategies but also for the use of mankind (Olaniyan and Oje, 2007; Okullo *et al.*, 2011). Natural Rubber is the fourth most important natural resources after air, water and petroleum. The top ten countries that produced the most natural rubber in 2019 were: Thailand; Indonesia; Vietnam; India; China; Malaysia; Philippines; Guatemala; Cote D' Ivoire; and Myamman. The agronomic challenges of natural rubber including long gestation period necessitate the need for other activities geared towards generating income for rubber farmers during the early stage of rubber cultivation. One such activity is intercropping, which is a useful agroforestry practice of cultivating rubber with high value fruit trees (Anegbeh *et al.*, 2012) such as Shea butter tree (*Vitellaria paradoxa* C.F. Gaertn), bush mango (*Irvingia gabonensis*) (Anegbeh *et al.*, 2003) and African pear (*Dacryodes edulis*) (Anegbeh *et al.*, 2005).

Encouragingly, rubber-based agroforestry systems of RRIN entail growing rubber and prioritised economic food and medicinal plants together (e.g. rubber and shea butter tree). Rubber farmers can expand their planting areas only when prices of rubber are good (Omozusi *et al*., 2024) and profits from tapping are high.

Vitellaria paradoxa is known in English as shea butter treet, while the French call it Karite. In Nigeria, it is called Okwuma in Ibo language; Orioyo in Yoruba, while Hausas call it markade (Odebiyi, 2004). This economic tree grows in the wild and it is found in Edo, Oyo, Niger, Nasarawa, Kebbi, Kwara, Kogi, Adamawa, Benue, Katsina, Plateau, Sokoto, Zamfara, Taraba, Borno States. The tree has dense-clustered leaves spirally arranged at the base of stout twigs (Figure 1). The fruits are 5-8 cm long and 3-4 cm wide, elliptic, green when young (Figure. 1), and yellow-green or yellow berry. Shea butter is sold in the market (Figure 2) for the preparation of baking fat, foodstuffs, margarine, medicine (it protects against sunburn, wound healing, ointment, inflammation, rashes in children, ulcer, and as a rub for rheumatism).

Figure 1: Shea nut tree with fruits

Figure 2: Fully prepared shea butter for the markets

Objectives of the study

The broad objective of this study was to analyze the economy of Natural Rubber and Shea nuts in some selected households in Edo and Oyo States.
The Specific objectives of the study were**:**

1. To analyze the socio-economic characteristics of the respondents in the study areas;
2. To determine the profitability of shea nuts processors and rubber producers in the study areas;
3. To identify the determinants of household income in the study areas;
4. To identify the constraints limiting shea nuts butter processing and natural rubber production in the study area.

MATERIALS AND METHODS

Multi stage, purposive and random sampling procedures were adopted for the study. The study areas are among the major rubber growing belts of Nigeria. Stage one of the study was the purposive selection of Edo and Oyo States, while stage two was the selection of rubber growing local government areas of the States (Uhunmwode, Ovia North East and Ovia South West in Edo State) and shea nut zone of Oyo State (Atisbo, Olorunsogo and Irepo local government areas). The third stage was the random sampling of the five (5) communities each from the local governments and finally the random sampling of ten (10) respondents from each of the communities to give a total number of one-hundred and fifty (150) respondents for the survey.

Data collection instrument and analysis

The data for the analyses were collected from the primary source, through the administration of structured questionnaires, using the multi-stage sampling technique to select 150 respondents from the study. Data were collected on variables, such as the demographic characteristics of the respondents (gender, age, marital status, level of education, family size, experiences and economic variables, including annual income and their expenditure on shea nut production and natural rubber. The response data were analyzed using descriptive statistics

RESULTS

Socio-economics characteristics of respondents

Gender distribution of respondents

Result of the study showed that 96% of the respondents were female while 4% were male (Table 1). The reason adduced to this is that Shea butter processing is culturally

perceived to be a female job and less laborious and a task that women have the strength to undertake. This is in line with the findings of Garba *et al*., (2015) and also corroborating the findings of Cocoa Research Institute of Ghana and processing of Shea nut in consonance with the finding of Kante *et al*., (2009) in the work; Making Extension Efforts More Effective: A Case Study of Malian Shea Butter Producers.

Age distribution of respondents

The result showed that 53% of the respondents were between 41–50 years, while the age bracket of 31 – 40 years accounted for 18.1%. Those within the age bracket of 51 – 60 accounts for 6%. Also 8.7% of the respondents were within the age bracket of 21 – 30 (Table 1).These categories are predominately women activities and results have shown that both young women and old women have also dominated in the business of processing and marketing of shea butter. These findings showed that most of shea butter respondents were within the active labour force with a mean age of 43 years with younger Individuals participated more than older ones. This was supported by Ogungbile *et al*., (2002), who asserted that younger respondents are more likely to adopt an innovation than older respondents because of better education and more exposure to new ideas.

Table 1: Socioeconomic characteristics of respondents

Characteristics	Frequency	Percentage (%)
Sex		
Male	6	4.00
Female	144	96.00
Total	150	100.00
Age (years)		
Below 20	3	2.00
21-30	13	8.70
31-40	28	18.70
41-50	79	52.70
51-60	18	12.00
>60	9	6.00
Total	150	100.00
Educational Level		
No education	105	70.00
Primary school	38	25.30
Secondary school	3	2.00
Higher institution	3	2.00
Total	150	100.00
Marital Status		
Single	5	3.30
Married	122	81.30
Widow/widower	23	15.00
Total	150	100.00
Business Experience		
1-5 yrs	15	10.10
6-10 yrs	29	19.30
11-15 yrs	24	16.00
16-20 yrs	55	36.6
>20 yrs	27	18.10
Total	150	100.0

Educational Level of Respondents

About 70% of the respondents surveyed had no formal education. It was observed that 25% of them had a primary school education, while 2% had a secondary school education. Also, 2% completed their education in higher institution (Table 1). The implication of those that had no formal education in shea butter business is that, it would be difficult for them to adopt modern techniques, innovation or new ideas in their businesses. According to Farinde *et al*., (2005), education influences the adoption of new innovations, ideas and techniques. In business operations, they also revealed that education is positively related to the adoption of innovations.

Marital status of respondents

On marital status, majority of the respondents were married accounting for 81.1% of the population. Consequently 3.3% of them were singles, while 15.5% of the respondents were widows/widowers (Table 1). This means that married individuals are more committed to their responsibilities and work very hard to earn their living. This agrees with Olarinde *et al*., (2008) who reported that one of the most important factors that determined efficiency of a business is the marital status of an individual. This is because married people worked hard in order to meet up with the demand of the family members.

Respondents' years of experience in shea butter business

The results indicate that some of the respondents (21.5%) had experience of 20 years in the shea butter business, while 0.7% of the respondents had 35 years and above in the business (Table 1). The result also indicates that only 2% of the respondents had one year experience in the business. The mean business years of experience was found to be 15 years. Years of experience in agricultural production help in determining the accuracy in decision making and in allocation of scarce resources wisely. Oluwatayo *et al.,* (2008) reported that farmers with more experience would be more efficient, have better understanding of the environment and market situations.

Household size of respondents

Table 2 shows the household size distribution. The result indicates that majority of the respondents (72.7%) had a household size of 6 - 10 members, while 17.3% of them had a household size of 1 - 5. The large household size may also justify the use of family labour in the shea nut processing business.

With respect to labour, these findings could mean that there was readily available family labour thereby reducing the cost of hired labour in their business. Other studies have indicated that larger family sizes are expected to enable farmers to take up labour intensive activities (Anley *and Haile-Gabriel,* 2007).

Respondents' Sources of Shea Nuts

Table 2 shows the sources of shea nuts. The result indicates that majority of respondents (87.3%) get their nuts from the wild, while a minority (12.7%) purchase theirs from the open market. This, however, implies an irregular supply in shea nuts. This is also in line with the findings of Senchi *et al*. (2014).

Table 2: Household size, Sources of Shea nuts and Labour

Characteristics	Frequency	Percentage (%)
Household size		
1-5	26	17.30
6-10	109	72.70
>10	15	10.00
Total	150	100.00
Source of shea nuts		
Open market	19	12.70
Wild	131	87.30
Total	150	100.00
Labour in Man/day		
≤ 5	35	28.10
6-10	79	63.60
11-20	8	6.40
>20	2	1.60
Total	124	100
No response	26	
Gathering period (days)		
≤ 10	2	1.52
11-20	14	10.61
>20	116	87.87
Total	132	100.00
No response	18	
Processing period (days)		
2	42	28.38
3	65	43.92
4	33	22.30
5	5	3.38
>6	3	2.02
Total	148	100.00
No response	2	
Equipment Used		
Traditional	149	100.00
Modern	0	0
Total	149	100.00
No response	1	

Source: Field survey, 2014.

Respondents' Labour Requirement in Man/Day

Table 2 shows the labour requirements (man/days) for shea nut processing. The result indicates that 29.8% of the respondents are of the view that shea nut processing is a 10 man/day job. This finding indicates the labour intensive nature of shea nut processing in the study area, suggesting the need for mechanization.

Respondents' duration for gathering shea nuts

Table 2 shows the duration for gathering the nuts from the wild. The result indicates that majority of the respondents (61.4%) took 60 days to gather an average of 300kg of shea nuts from the wild. These findings are also in line with the work of Agyente *et al*., (2010).

Processing Period of Respondents

Table 2 shows the processing period of shea nuts in days. The findings reveal that some of the respondents (43.9%) spent 3 days in processing the nuts into butter, while 28.4% of them took 2 days to process them. Also, 22.3% of them spent 4 days to process them.

Equipment used by respondents

The results show that majority of the respondents (99.3%) used traditional equipment to process the shea nuts. This implies that the cost of purchasing the modern equipment may be too high for them to afford or their level of illiteracy, which was high, contributed to their unawareness of the availability of modern equipment for the processing. Lack of available information (Läpple and van Rensburg, 2011), and lack of capacity to access information were some of the barriers towards obtaining the required information resulting to slow pace of adoption.

Butter processing contribution to total income

The result from the shea butter processing contribution to total income revealed that the revenue obtained from the processing shea nut accounted for 62.37% (#78,397.54) while other income obtained outside shea nut processing like trading, tailoring, yam flour processing, charcoal making, garri and fish processing was 37.63% (47,304.35). All these increased the total income to #125,701.89 (Figure. 3). The result revealed that the revenue earned from the shea butter processing and other income annually increased the income of the producers than buying and selling for other producers to process and sell. This is in line with the work of Schreckenberg (2004).

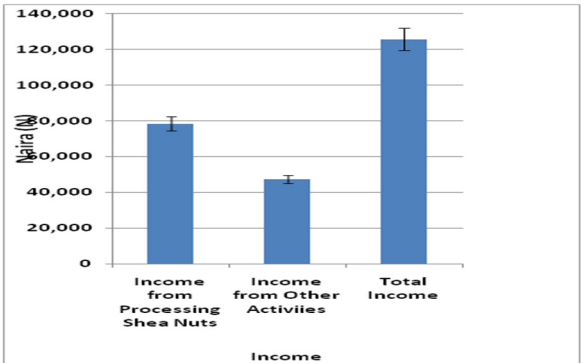

Fig 3. Contributions of Shea Nuts Processing to Household income of farmers in Edo and Delta States

DISCUSSION

The profitability analysis of shea nut and its contribution to household income indicated that shea butter tree in a

rubber-based agroforestry system is profitable and desirable. The purchasing cost of production had a mean of #30,415.33. Transport cost had mean of #838.27, and mean cost of labourwas #1,300.11, which amounted to mean total cost of #32,553.71. The profit earned from the shea nut processing in Oyo State had the mean value of #45,843.83. As an indigenous fruit tree in Nigeria and the tropics (Akinnifesi *et al*., (2008), shea nut processing income earned could help in improving individual household income. Due to the long gestation period of rubber (7 to 8 years), it is imperative that rubber farmers be encouraged to engage in other income generating activities. Integration of economic trees (high value fruit and medicinal trees) like shea butter trees in rubber-based agroforestry systems is desirable. While it is understandable that shea butter tree has a long gestation period of about 20 years and might be discouraging farmers, development of quality planting material is the key and the basic factor for agroforestry systems. Notwithstanding the long gestation period of shea butter tree, there is, nonetheless, opportunity to use vegetative propagation to produce early-maturing planting materials in line with the current economic realities in Nigeria. Therefore, to be viable, planting materials of such economic trees should be developed using vegetative propagation techniques, as used by Anegbeh *et al*., (2006) for *Allanblackia florinunda*, in order to produce early maturing materials for rubber farmers since about 90 percent of total global supply of rubber is fulfilled by small scale farmers.

Conclusion

The analysis showed that shea nut processing in the study area contributes significantly to the household income (62.37%). The linear production function gave the best – fit equation on the basis of econometric criteria for the choice of the lead equation. The coefficient of multiple regressions (R^2) was 0.882 implying that about 88.2% of the variations in the output of shea nut processing were explained by the included explanatory variables, viz other farm income, income from shea nut and butter,shea nut business experience and household size. Results from the studies have reinforced expectations that agroforestry systems would improve farmers' income (i.e. profitability of the systems). The profitability of integrating shea butter tree with rubber in a rubber-based agroforestry system (much-loved agroforestry system) requires concerted efforts to be fast-tracked to ensure sustainable, timely, and trusted agroforestry systems for poverty reduction (Moore, 2008).

RECOMMENDATIONS

1. Rubber farmers should adopt rubber-based agroforestry systems by planting shea butter trees at the peripheral or borders of the farm in order to support ecological diversity and domestication of shea butter tree and overcome scarcity of its nuts that are usually found in the wild.
2. We strongly recommend that agroforestry farmers use best practices such as vegetatively propagated materials of shea butter tree for the production of early maturing planting materials of the tree for integration with rubber to improve the income of rubber farmers
3. Promoting shea nut business and harnessing the profit accruing to rubber farmers through strong collaboration with rubber farmers, sensitization and training.
4. Increasing technical supports to small rubber farmers in order to improve rubber farmers' main sources of income through shea nut processing enhancement.
5. Government should formulate and issue policies to stimulate and encourage rubber farmers in shea nut processing for maximum profitability.

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