COSTS AND RETURN ANALYSIS IN RUBBER LATEX PRODUCTION IN EDO STATE, NIGERIA

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ABSTRACT

The study examined the costs and return analysis in rubber latex production in Edo Sate, Nigeria. Multi-stage sampling method was adopted to select 96 smallholder rubber framers for the study. The first stage was a purposive sampling of two LGAs and then simple random sampling of 6 villages each from the two LGA. Finally eight rubber farmers were selected using the simple random sampling technique from the 12 villages given a total of 96 selected rubber farmers. Data were collected using questionnaire alongside scheduled interview. Data collected were analysed using descriptive statistics and budgetary analysis. The results of the socioeconomic characteristics shows that the mean age of the farmers was 43 years, mean household size was four persons and mean farming experience was 11 years. Majority (82.3%) of the respondents were male and 86.46% were married, while 92.7 % of the farmers used hired labour while the average farm size was 3.8 hectares The result of the budgetary analysis indicated that rubber production was profitable in the study area with a gross margin and net farm income of ₦162, 000 and ₦149, 408 per/ha respectively. However, the return on investment of 0.71 indicated a low profit level. The major constraints faced by the farmers were high cost of labour, incidence of pests and diseases, inadequate credit facilities, inadequate extension services among others. It was recommended that extension services should be provide to assist the farmers in tackling the problems associated with pests and diseases as well as training of rubber farmers in the area of management practices in rubber plantation.

Keywords: Constraints, Costs and Return, Gross Margin, Rubber latex Production

INTRODUCTION
Agriculture occupies a prominent place in the economy of Nigeria. As at 2014 the sector accounts for about 22.9% of the Gross Domestic Products (GDP) compared with 23.3% in 2013. The fall in agriculture contribution to GDP could be attribute to decrease in production and other related factors (Central Bank of Nigeria, (CNB) 2014). Agricultural produce ranked highest among several non-oil exports product with a share of 36.7%. In the agricultural produce category rubber ranked as one of the lowest with about 2.3% share contribution (CBN, 2014).

According to the Food and Agriculture Organization (FAO) Nigeria natural rubber production was 143, 500 metric tonnes as at 2012. This figure shows a very constant yield for the past three years (FAO, 2013). Rubber as one of the exportable agricultural commodities from Nigeria by the Nigeria Export Council is in high demand in major Asian countries like China and Japan. However, the supply of rubber in Nigeria has not meet the export demand in these countries.

Majority of the rubber producers are smallholder farmers in Edo States scattered across several communities and villages, while the natural rubber functional processing factories are less than 10 in total (Momodu, *et al.,* 2015 in Agbolagba, *et al.,* 2016). The need to encourage smallholder rubber farmers became necessary after a decrease in rubber production in the early 1980s in Nigeria. However, increase in rubber production could not be sustained over time over the years to come. The effect of this is a steady decrease in rubber output which could be attributed to low yield, small farm size, poor knowledge of rubber management, high incidence of diseases and pests amongst others (Agwu, 2006). It is against this backdrop that this study examined the costs and return analysis in rubber latex production in Edo State, as well as to profile the socio-economic characteristics of smallholder rubber farmers and identify the constraints that smallholder rubber farmers encounter in their production activities

MATERIALS AND METHODS

Area of Study: The study was carried in two Local Government Areas (LGAs) of Edo State Nigeria; namely Uhumwonde and Ovia South West LGAs. Edo state has a geographical coordinate of latitude 5^0 44^1 North and 7^034^1 North of the Equator and longitude 5^0 4^1 East and 6^045^1 East of the Greenwich Meridian. The State is classified as a rainforest Zone. The rainy season starts from April till about the end of October. The annual rainfall is between 1750mm and 2100mm with an average rainfall of 1920mm. The temperature is between 22°C and 30°C with an average annual relative humidity of 82% which is very suitable for oil palm production (Ministry of Budget Planning and Development Edo State 2013). Rubber (*Havea brasiliensis*) adopt well to the climatic condition prevalent in Edo State. Rubber is a major tree crop grown in the state and rubber plantation are found in some LGAs of which Uhumwonde and Ovia South West are among the rubber producing areas.

Data collection and Sampling method: Data for this study were sourced from primary source using questionnaire which was administered to 96 rubber small holder farmers. Multi-stage sampling technique was adopted for this study. The first stage was the purposive selection of two local government areas (Uhunmwonde and Ovia South-west Local Government Areas) of the state where rubber production is predominant. The second stage was the selection of six villages each from each LGA, using the simple random sampling method, this gave a total of 12 villages. Finally, eight farmers from each village were selected using the simple random sampling method from the list of

rubber farmers from the Common Fund for Commodity Department, Rubber Research Institute of Nigeria (CFCD-RRIN), Benin. This gave a total of 96 smallholder rubber farmers (48 each from both local government areas) for the study.

Data Analysis Techniques: Data obtained for the study were analysis using descriptive statistics (such as percentages and mean) and budgetary analysis. Likert scale was also used to measure the constraints that the rubber farmer faced. Budgetary analysis was used to analyze the costs and return in rubber latex production as well as to estimate the profit. The budgetary analysis was presented as:

$$GM = TR - TVC \tag{1}$$

Where:
GM = Gross margin
TR = Total revenue
TVC = Total variable cost

Also, $NI = GM - TFC \tag{2}$

Where:
NR = Net Income
TFC = Total fixed cost
Also, ROI = Return on Investment was computed using the formula:

$$ROI = NI/TC \tag{3}$$

Where:
ROI = Return on investment
$TC = Total\ cost\ (TVC + TFC)$

The fixed costs accrued to rubber production were depreciated using the straight line depreciation method as given by Olukosi and Erhabor (1988). It was stated as:

$$D = \frac{C-S}{N} \tag{4}$$

Where: D= Depreciation
C= Cost of asset
S= Salvage value
N= Number of useful life of the asset

Constraints faced by smallholder rubber farmers: Likert scale was used to measure the various constraints in rubber production. Likert scale is a psychometric scale commonly used in research that employs questionnaire. The scale for this study area is a 5-point scale and employs the ordinary level of measurement. The responses for constraints in broiler production were scored as follows: Very serious =5; Serious = 4; Moderately Serious = 3; Least Serious = 2; Not serious = 1. For a given constraint, the mean was computed by summing the score on each item and then divide by the total number of responses. This method of determining constraints is important because it tells us exactly those constraints that are serious. When the mean is less than 3, it means that peculiar

constraint was not very serious. Those with the mean equal to or greater than 3, indicates that those constraints were very serious and were

RESULTS AND DISCUSSION
Socioeconomic characteristics of smallholder farmers
The results of the socioeconomic characteristics of the smallholder rubber farmers is presented in Table 1. The result shows that majority (82.3%) of the farmers were male. This imply that male were more involved in rubber production in the study area. This results agrees with the finding of Pierre-Andre, Aureaie, Ejolle, Benedicte and Jean-Claude (2010) who reported that majority (90%) of rubber farmers in the South-west region of Cameroon were male. This result was also affirmed by Olaniyi (2010) who reported that majority (92.9%) of rubber farmers in Delta State Nigeria were male. This result show the important role male rubber farmers play in rubber production. The result also revealed that the mean age of the smallholder rubber farmers was 43 years old. This implies that the farmers were in the active age. The fact that rubber production and be a laborious enterprise cannot be over emphasized and require farmers who are in there active age. This result agrees with Olaniyi (2010) and Pierre-Andre *et al.* (2010) who reported similar findings in their studies.

Table 1: Summary Statistics of Socio economic characteristics of smallholder Rubber farmers

Variables	Smallholder rubber farmers	Mean	Percentage
Gender: Male	79		82.3
Female	17		17.7
Age(years)	13	43	
Marital Status: Single	83		13.5
Married			86.5
Household Size (persons)		4	
Farming Experience		11	
(years)		10	
Years of Schooling	89	3.8	
Farm Size (hectare)	7		92.7
Labour: Hired			7.3
Family		3	
Average year of tapping			

Source: Field Data, 2015

The results also showed that majority (86.5%) of the respondents were male. Also, the average household size was 4 persons. The low household size could be a possible reason for 92.7% of hired labour employed in rubber production as opposed to family labour (7.3%) in the study area. The result presented in Table 1 also shows that the average farming experience of the smallholder rubber farmers was 11 years with a mean schooling years of 10. This results show that the farmers were relatively experience in rubber production and where also education. The number of years spent in schooling alongside the experience of the farmers is an indication that they will be more willing to adopt new innovation and improve on their productivity.

The average farm size of 3.8 hectares from the results presented in Table 1 shows that the farmer had a farm holding of less than five hectares. This implies that the farmers were small scale farmers. This result agrees with the finding of Ogbebor (2013) who reported that majority of the rubber farmers in Nigeria had farm size less than five hectares The important of smallholder farmers in rubber production has become a necessary factor in increasing the declining rubber production in Nigeria in the past decade.

Profitability analysis
The result of the budgetary analysis is presented in Table 2. The result shows that the costs and return obtained per hectare were estimated to determine the profitability of rubber latex production in the study area. The total cost of production per hectare was ₦210,590.00 while the total return per hectare was ₦360,000.00. The cost of tapping the rubber tree accounted for about 49.9% of the total cost of production. The analysis revealed that the gross margin and net income per hectare was ₦162,000.00 and ₦149,408 respectively. The return on investment was 0.71 this implies that for every ₦1 invested, a profit of ₦0.7 was realized. This result indicates that rubber latex production in the area of study was profitable, however the profit level was low thus there is opportunity for improvement in rubber production in the study area with respect to profit maximization. This agrees with the work of Giroh *et al.* (2011) who reported that rubber latex production was a profitable venture.

Table 2: Budgetary analysis of rubber latex per hectare

Items	Quantity	Unit price/kg	Amount (₦)	Percentage
Revenue	**2,000kg**	**180**	**360,000**	
Variable Cost:				
Land clearing			17,500	8.3
Planting			14,000	6.6
Fertilizer			30,000	14.2
Herbicide			4,500	2.1
Fertilizer			7,000	3.3
application			6,000	2.8
Herbicide			14,000	6.6
application			105,000	49.9
Weeding			**198,000**	
Tapping				
Total variable cost				
Fixed Cost:				
Budded stumps			855	0.4
Tapping knife			1,500	0.7
Cup hanger wire			1,350	0.6
Latex cup			4,000	1.9
Sharpening stone			300	0.1
Buckets			750	0.4
Coagulating pan			1,500	0.7
Spout			335	0.2
Safety kits/boot			2,000	0.9
			12,590	
Total Fixed cost			210,590	
Total Cost				
Gross Margin			162,000	
Net Income			149,408	
Return on investment			**0.71**	

Source: Survey Data, 2015.

Production Constraints faced by respondents

The farmers in the study area had multiple responses to rubber production constraints. All the variables considered were regarded as major constraints faced by rubber farmers. With the most to the least serious in the following order presented in Table 3. The constraints were high cost of labour (mean=4.42), pest and disease (mean=4.41), lack of credit facilities (mean=4.30), price instability (mean=4.20), poor plantation management

(mean=4.19), lack of extension services (mean=4.06), Rubber Clone (mean=4.02), lack of improved clone (mean=3.80), Tapping equipment (mean=3.77), wage payment (mean=3.58) and transportation (mean=3.42). This results indicated that despite the profit obtained from rubber production the farmers still encounter several production constraints. This findings agree with Banmeke and Omoregbee (2009) who reported similar constraints to rubber production in Edo and Delta States, Nigeria.

Table 3: Production Constraints faced by Rubber farmers

Items	Strongly agreed (%)	Agreed (%)	Uncertain (%)	Disagreed (%)	Strongly disagreed (%)	Mean value	Rank
High cost of labour	45.8	50	0.2	-	-	4.41	1
Incidence of Pests and diseases	57.3	31.3	7.3	3.1	1	4.40	2
Inadequate credit Facilities	51.0	33.3	10.4	4.2	1	4.29	3
Price instability	28.1	63.5	8.3	-	-	4.19	4
Poor Plantation management	38.5	44.8	13.5	3.1	-	4.18	5
Inadequate extension services	44.8	28.1	19.8	3.1	4.2	4.06	6
High cost of Rubber clone	40.6	32.3	15.6	11.5	-	4.02	7
Inadequate Improve Clone	33.5	25	29.2	125	-	3.79	8
High cost of Tapping equipment	30.2	24	38.5	7.3	-	3.77	9
High cost of Transportation	12.5	42.7	19.8	25	-	3.42	10

Source: Survey Data, 2015.

CONCLUSION
Results from the study show that rubber production was profitable in the study area, however this profit was on the low side. The is need to encourage rubber farmers in production through extension service delivery as well as provision of credit facilities so as to help tackle some of the constraints faced by the farmers. Also, the CFCD-IRRN

should assist more in providing services that will help train smallholder rubber farmers in plantation management practices as this will go a long way to improve on the productivity and profitability. Also, attractive price for rubber latex and creation of effective and efficient marketing outlets for both domestic and international trade in rubber latex should be ensured. Rubber farmers should be encouraged to form cooperative to enable them pool resources together and access production credits from commercial and agricultural banks. This will to allow them procurement inputs which individually will be too expensive for production

REFERENCES

Agbolagba, F. O., Agbolagba, O.O., Esekhade, T.A., Agbonkpolor, B. N., Osazuwa, E. S., Umar, H.Y and Musa, E. (2016) Decline in Activities in Nigeria Rubber Industry: A Case Study for Government Intervention. *Research Journal of Agriculture and Food Science* 4(10): 294-299.

Agwu, A. E. (2006). Enhancing Rubber (*Heven brasiliensis*) Production through Extension Service Delivery in South West Agricultural Zone of Nigeria. *Journal of Agriculture, Food, Environment and Extension* 5(2): 7-16

Banmeke, T.O.A. and Omorogbee, F. E (2009). Farmers' Perception of the Factors Militating against Rubber Production in Edo and Delta State, Nigeria. *International Journal of Agricultural Economics and Rural Development* 2(2): 33-39

Central Bank of Nigeria (2014). *Annual Report* 2014. Pp 1- 198

Ministry of Budget Planning and Development Edo State (2013). Edo State Statistical Year Book

Food and Agriculture Organization (2013). *FAO Statistical Yearbook* 2013

Giroh, D. Y., Moses, J. D. and Yustus F.S. (2011). Technical efficiency and costs of production among small holder Rubber farmers in Edo State, Nigeria. *World Rural Observations* 3(3): 22-27

Ogbebor, O.O. (2013). The sustainability of agriculture in Nigeria using Rubber as a case study. Unpublished Thesis in the Department of Technology East Tennessee State University pp 1-80

Olaniyi, O. J. (2010). Factors Influencing Adoption of Rubber-based Techniques among Small-holder Farmers in Delta State, Nigeria. *Journal of Food Agriculture and Environment,* 8(2): 391-394

Olukosi, J.0. and Erhabor, P.O (1988). *Introduction to Farm Management Economics Principles and Application.* Agitab Publishers Ltd. Samaru-Zaria pp 12-18

Pierre-Andre, O. N., Aurelle, N. N., Ejolie, E. E., Beneditre, C. and Jean-Claude B. (2010). Assessment of Training needs of Rubber Framers in the South West Region of Cameroon. *African Journal of Agricultural Research* 5(17): 2326-2331