EFFECTS OF FARM SIZE, FARMERS' EXPERIENCE AND UTILIZATION OF IMPROVED RUBBER MANAGEMENT PRACTICES ON INCOME FROM RUBBER FARMING IN EDO AND DELTA STATES OF NIGERIA

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ABSTRACT

A study was conducted to evaluate the effects of farm size, farmers' experience and utilization level of improved rubber management practices on income from rubber farming in Edo and Delta states of Nigeria. A total of 130 respondents were randomly selected from the three farm settlements. Data were analyzed using descriptive statistics and multiple regression. The results of a descriptive statistics indicated that 85.38% of respondents were between the age brackets of 51-70years old; All respondents (100%) were male with the majority married (93.78%). They (89.23%) had household size of 5 and above, well experienced (16 to 35years) in farming. All respondents (100%) were aware of improved rubber management practices but above average (54.46%) do not make use of most of them which lead to low income from rubber farming, Michelin estate (55.38%) and middlemen (40.00%) were the major buyers of rubber produce, they sold their produce once a month and no tax payment. Multiple regression analysis indicated that farm size was significantly related with income from rubber farming at 5%.

Keywords: Farm size, Income, Farmers' experience, Management practices, Rubber belt.
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INTRODUCTION

Rubber (*Hevea brasiliensis)* was introduced into Nigeria from Kew gardens, England in 1895 and has become increasingly important since the beginning of the 20th century. *Hevea* belongs to the family *Euphorbiaceae*. Production statistics show that Nigeria has a total of 247,100 hectares of land under rubber cultivation. Of this figure, small scale farmers own 200,100 hectares while the remaining 47,000 hectares are owned by estates (Aigbekaen *et al*., 2000; Delabarre and Serier, 2000).

Faced with the need to improve productivity and production of the agricultural industry, the various Governments in Nigeria initiated many policies and programmes that could lead to improvement in the rubber sub-sector. Some of these programmes include the establishment of Farm Settlement Scheme in Nigeria. Farm settlements were set up and funded by the Federal Government with the settlers employed initially as labour on paid wages but gradually becoming owners of the farms. They use Government facilities to manage the farms and sell all

the produce to a cooperative body set up by the Government (Famoriyo, 1986). Abolagba (1997) noted low income level among farm settlers in Edo and Delta States. This might be as a result of selling in group to cooperative body or other factors. This study therefore examines the effects of farm size, farmers' experience and utilization of improved rubber management practices on income from rubber farming among farm settlers in Edo and Delta states of Nigeria of Nigeria.

The specific objectives are to:

i. describe socio-economic characteristics of rubber farmers;
ii. ascertain the level of utilization of improved rubber management practices;
iii. examine the market access of rubber farmers and
iv. determine the effect of the utilization level of improved rubber management practices on income from rubber farming.

MATERIALS AND METHODS

The Study Area: The study was conducted in farm settlement in Edo State and Delta State. Edo State lies between longitude 05^0 04' North and 06^0 43' East and latitude 05^0 44' North and 07^0 34' North. It is bounded in the north by Kogi State, on the south by Delta State on the west by Ondo State and on the east part by Kogi State and Anambra State. It has ultisol soil with pH range of 4.5 – 5.5 favourable for the production of natural rubber (Aigbekaen *et al*., 2000). Delta State lies between longitude 05^0 00' and 06^0 45' East and latitude 05^0 00' and 06^0 30' North. The average annual rainfall is about 266.7 cm in the coastal areas and 190.5cm in the extreme north. Rainfall is heaviest in July. It has a high temperature, ranging between 29^0C and 44^0C with average of 30^oC. It has ultisol soil with pH range of 4.5 – 5.5 favourable for the production of natural rubber (Aigbekaen *et al*., 2000). Agriculture is the predominant occupation of the people in this state. The major crops produced are rubber and palm produce.

Population and Sample Size Selection: The population of this study consisted of all rubber farmers in three farm settlements namely, Iguoriakhi (Edo State), Mbiri and Utagba–uno (Delta State) who were purposively selected. Due to the enormity of the population size, a simple random sampling technique was used to select 40, 58 and 52 respondents from Iguoriakhi, Mbiri and Utagba-uno farm settlements respectively. The total sample sizes were 150 respondents. One hundred thirty (130) questionnaires was accurately filled and returned. The Iguoriakhi, Mbiri and Utagba-uno farm settlements composed of 125, 182 and 162 farm families respectively (Begho *et al.* 2002).

Data collection: Data were collected with the use of structured questionnaire. Data collected was analyzed using both descriptive and inferential statistics. Descriptive statistics such as percentages and tables were used. Inferential statistics such as multiple regression model was used for the in-depth analysis of the effects of utilization level of improved rubber management practices, farm size and experience on income from rubber farming.

Model Specification: The stepwise multiple regression analysis was used to determine the effects of rubber farmers' utilization level of improved rubber management practices, farm size and experience on income of rubber farmers. This was used to help determined the

individual contribution of the independent variables. It is mathematically represented as follows:

$$Y=b_o+b_1x_1+b_2x_2+b_3x_3+u_i \qquad (1)$$

Y = income from rubber farming (in naira)
b_o = intercept/constant
x_1 = utilization level (dummy variable; 1 utilized, otherwise 0)
x_2 = farm size (in hectares)
X_3 = farming experience (number of years involved in rubber production and sales)
u_i = error term.

RESULTS AND DISCUSSION

Socio- Economic Characteristics of Rubber Farmers: Majority of rubber farmers (85.38%) were within the age brackets of 51-70 years implying that the farmers are old. This result agrees with the views of Abolagba *et al.* (2003), who noted that rubber farmers consisted mainly of the aged category. The preponderance of older people in rubber farming profession means that adoption of innovation may be difficult. Labour output of the old farmers might be low due to their declining productivity. All the rubber farmers (100%) were male and majority of them (93.78%) were married. The predominance of married individuals in rubber production was reported by Olaniyi (2010), who pointed out that getting married is highly cherished among rubber farmers, not only because of the need for procreation but also because in some areas the women form a vital source of unpaid farm labour.

Land allocation in the farm settlements tends to favour men due to the culture of the people. This is in consistent with Swanker (1998) who reported that non-involvement of women in agricultural activities is not as a result of managerial and technical in-efficiency but based on socio-cultural factors. Farm size distribution of respondents revealed that rubber production is predominantly small scale, because respondents cultivated between 1 and 8 hectares, which is within the range of small-scale production. This finding agrees with the work of Delabarre and Serier (2000) who reported that rubber cultivation in Nigeria is mainly by small-scale farmers. Adoption of an innovation may be affected by small hectares and might be a disincentive in the acquisition of credit facilities from commercial banks.

Majority of the respondents (89.23%) had family size ranging from 5 and above. The large family size could be a valuable source of labour for rubber production and other agricultural and non-agricultural activities. About 50.8% of the respondents had 16-35 years of experiences in rubber farming while 42.30% had between five to fifteen years of experience in rubber farming. This result revealed that rubber farmers in the study areas had long years of experience in rubber production. This result agrees with Abolagba *et al.* (2003) who observed that most of the rubber farmers have the benefit of long years of accumulated experience in rubber farming.

The educational level of respondents revealed that farmers with primary school education were the majority (75.38%) while 17.69% had secondary school education. The findings also indicated that most of the

respondents were literate; at least they can read and write as they had primary education, and this can make them favourably disposed to improved technologies since education enhances the capacity of individuals to understand and work with new ideas. .

Table 1: Socio-Economic Characteristics of Rubber Farmers (N=130)

Socio-Economic Characteristics	Percentage
Age (Years)	
21 - 30	3. 85
31 – 40	3. 46
41 – 50	3. 46
51 – 60	56.15
61 – 70	29.23
> 70	3. 85
Sex	
Male	100.00
Female	0.00
Marital Status	
Married	93.85
Single	4.62
Widower	1.52
Farm size (ha)	
1 – 2	79.23
3 – 5	15.38
5 – 6	3.08
7 – 8	2.31
Household size (persons)	
1 – 2	5.38
3 – 4	5.38
5 – 6	16.92
7 – 8	31.54
9 & above	40.77
Experience (years)	
2 – 4	3.85
5 – 15	42.30
16 – 25	28.46
26 – 35	22.31
36 - 45	3.08
Education	
Primary school	75.38
Secondary School	17.69
NCE	6.15
University	0.77

Source: Field Survey (2012).

Table 2 shows that all the respondents were aware of improved rubber management practices. This may be due to the existence of strong cooperative societies and eventually all respondents belonged to these cooperative societies in the study area where the news are easily spread by either RRIN extension agents, Michelin extension agents and TCU/ADP extension agents. About 58.46% of the respondents utilized the improved rubber management practices. This is not a surprise as farmers in the study area were educated thereby making utilization of the improved practices easier for them. Majority of the respondents (93.08%) used budded stumps as their sources of planting material. This is in agreement with Schroth *et al.* (2004) who reported that a basic component of any crop production enterprise is the planting material. Most (88.46%) of the respondents practiced intercropping by planting rubber and pineapple, cassava, pepper, okra, coco-yam, and maize in their rubber plantation farms. Multiple cropping in the vast interior of young rubber plantation holds the key to attracting small holders to rubber farming due to its (rubber) long gestation period. This agrees with the views of Esekhade *et al*. (1996) who noted that intercropping rubber with arable crops has been found to be economically viable, in that the farmers obtain revenue from the sales of the crops while waiting for the maturity of the trees before the commencement of tapping. About 40.7% of the respondents practice recommended land spacing. Esekhade *et al.* (1996) is of the view that recommended land spacing which gives about 450 plants per hectare help in the introduction of intercropping with arable crops before canopy closure ensure effective utilization of the avenues and labour for maintenance. Only few (24. 62%) of the respondents practices fertilizer application in their rubber farm. Majority does not use fertilizer because of the unavailability of fertilizer and capital to purchase it, resulting in low yield.

About 31.54% make use of trained taper to get the latex. This agrees with the view of Aigbekaen and Alika (1984) who reported that when the bark of the rubber tree is partially cut through, a milky liquid exudes form the wound and dries to yield a rubbery film called latex. They however cautioned that care must be taken in the process of cutting the bark of rubber tree so that the cambium cells will not be tempered with and that is why tappers must be well trained before being allowed to tap. But the reverse is the case as majority of the respondents in the study area does not make use of trained tappers as a result of inadequate labour which result to slaughter tapping which damage the cambium cells of rubber tree, resulting to low yield per hectare and eventual death of the trees. Abolagba (1997) observed that the non-regular maintenance of plantations and slaughter tapping as a result of inadequate labour and lack of trained tappers that make the untrained labour to damage the cambium cells of rubber trees results in low yield per hectare and eventual death of the trees. Few (22.31%) of the respondents practiced cleaning of latex cup before tapping. It is imperative that latex from tree obtained by means of tapping, collection and bulking of coagula as well as materials used for such operations are hygienically free from contamination as enunciated by Giroh *et al.* (2006). Majority did not practice

cleaning of latex cup before tapping because they are not involved in latex production but coagulant production.

Majority (79.23%) of the respondents dug pit instead of the use of raised platform/cemented surfaces for storing coagula. The respondents in the study areas believe that their indigenous knowledge is still very much reliable and cost less in term of storing coagulant before sales. About 42.3% of the respondent's practices clearing of plantation before commencement of tapping and 44.54% of the respondents practice cleaning of coagulating pans before tapping. The implication of this is the low quality of rubber product, which leads to low price. This is in agreement with the views of Nakayama (1991) who noted that impurities such as leaves, sticks and tree barks have been recovered from latex/coagulant due to carelessness or unacceptable practices by farmers. There are reported cases where farmers deliberately add foreign particles in form of stones, sand or wood to their product, all in their bid to earn higher income since the coagulant from their plantation are sold according to weight as enunciated by (Uraih *et al.,* 2006; Aigbekaen *et al.*, 2000).

Only few (15.39%) of the respondents made use of chemical (e.g. pesticide) in their plantation. Pesticide is very important in plantation establishment. Most of the farmers complained of termite and ant infestations in their plantations, but they do not have chemicals to treat them and the result is the death of the rubber trees and low yield. Only 36.92% of the respondents practiced supplying, which is the replacement of the dead planting materials. Majority does not practice supplying because of labour and cost of buying another budded stumps and the result is low yield.

About 41.54% of the respondents practiced thinning to avoid competition and few (38.46%) of the respondents practiced the use of fire trace to avoid plantation burning. Majority of the respondents do not practice thinning (58.46%) and fire tracing (61.54%) as a result of inadequate labour and labour intensiveness of rubber farming. Rubber trees when attacked by fire could lead to complete death of the trees and the result is low yield. This agrees with the view of Abolagba *et al.* (2003) who reported that high labour demand and low availability of labour are some of the problems faced by small holders, which lead to low production of rubber in Nigeria. Majority of the respondents (61. 54%) planted GT1 clone, whereas, 26.15% planted NIG 800 clone, 10.77% planted RRIM 600 clones, 0.77% planted PB5/63 clone and 0.77% planted RRIM 628 clone in their plantation respectively. This was as a result of the unique traits each clone possessed. Omokhafe and Nasiru (2004) reported that NIG 800 has ability to withstand wind damage and resistance to diseases. On the other hand, fewer auxiliary branches appeared on the susceptible clone PB5/63 but they grew longer. Moreover, as some of these traits proved to be similar for use as early prediction traits, RRIM 600 is reported to maintain relatively higher growth during their immature stage phase and more resistance to diseases.

Market Access of the Respondents: About 55.38% of the respondents sold their products to Michelin estate and 40.00% of the respondents sold their products to middlemen. These results indicated that the Michelin estate

provided the budded stumps and other services to the respondents and in return buy the products from them. While the middlemen dealt directly with the local producers or farmers and also have strong association that prevents others from dealing directly with the rural farmers. Majority (73.85%) of the respondents had no market close to their plantation. Almost all (95.38%) the respondents sold their products once a month, since they produce in a small quantity. Most (95.38%) of the respondents sold their products without paying any tax. About 56.15% of the respondents obtained information about current prices of rubber product from friends/family and about 50.00% of the respondents obtained their information from cooperative societies. The result implies that most of the respondents obtained their marketing information from informal sources such as friends/family and cooperative societies. Information from these sources may not be very reliable due to distortion and as a result, the farmers may still not have access to accurate market information, which may enable them to increase their income from rubber farming. .

Table 2:Utilization of Improved Management Practices by the respondents

Utilization of Improved Management Practices		* Percentage
Awareness		
Aware of the improved management practices		100.00
Not aware of the improved management practices		0.00
Level of Utilization		
1.	Use of budded stumps	93.08
2.	Intercropping	88.46
3.	Recommended land spacing (450 plant/ha)	40.77
4.	Fertilizer application (N P K 15, 15, 15; Urea)	24.62
5.	Use of trained tappers	31.54
6.	Cleaning of latex cups before tapping	22.31
7.	Cleaning of coagulating pans before tapping	44.54
8.	Use of raised platform/cemented surfaces	20.78
9.	Clearing of plantation before commencement of tapping	42.31
10.	Use of chemical e.g. pesticide	15.39
11.	Use of ammonia to preserve rubber latex	5.38
12.	Thinning	41.51
13.	Supplying	36.92
14.	Use of fire trace	38.46
	Types of clones planted	
	NIG 800	26.15
	RRIM 600	10.77
	GT1	61.54
	PB5/63	0.77
	RRIM 628	0.77

Multiple responses recorded. Source: Field Survey (2012).

Table 3: Market access by the respondents.

Market Access	*Percentage
Marketing of latex/lumps	
Michelin estate	55.38
Middlemen	40.00
Rubber not matured	4.62
Closeness of market to plantation	
Michelin (Iguoriakhi farm settlement)	26.15
No market	73.85
How frequent do you sell rubber latex/lumps	
Once in a month	95.38
Rubber not matured	4.62
How much do you pay as tax?	
No tax payment	95.38
Rubber not mature	4.62
Information about current price of latex/lumps	
Radio/Television	0.70
Newspapers	1.50
Cooperative Societies	47.70
Friends/Family	50.10
Any cooperatives formed in the market	
Yes, there is cooperative societies formed in the market	26.92
No market, no cooperative societies formed	73.08
Benefits derived as a member	
Sell as a group	24.62
Agreed on price	20.77
Product attract more prices	7.69

* Multiple responses recorded. *Source: Field Survey, 2012.*

Table 4: Multiple regression analysis showing the effects of utilization, farm size and experience on income from rubber farming

Variables	Coefficient of determination (r^2)	Unstandardized coefficient (β)	Standardized coefficient (β)	t-value
Constant	-	49813.330	-	3.027
Utilization	0.000225	1544.293	0.012	-0.142
Farm size	0.166	17751.999	0.410	4.899*
Experience	0.0023	-379.844	-0.55	-0.660

*Significant at $p < 0.05$; $R^2 = 0.170$; Adjusted $R^2 = 0.149$; F-value = 8.118

Significant relationships exist between farm size and income from rubber farming. Farm size is significantly and positively related to the income while the effects of utilization and experience were not significant, but weak and negatively correlated. It is only farm size that can be used to predict the farmers' income. This implies that size of rubber farm determine the

income of the farmers all things being equal (*Ceteris paribus*). .

CONCLUSIONS AND RECOMMENDATIONS

- Majority of people involved in rubber production were old, males, married with small-scale farm sizes, with very low income, though well experienced in rubber faming and aware of improved rubber management practices like intercropping and use of budded stumps as planting materials which were practiced.
- Farm size has a significantly positive relationship with income of rubber farmers, and can be used to predict the farmers' income.
- The effects of experience and utilization of improved rubber management practices were not significant, but were weak and negatively correlated with income of rubber farmers.
- Rubber farmers should be encouraged to venture into large scale production of rubber by providing good market, better price of rubber and also discourage the activities of middlemen in order to increase rubber production in the study area and hence boost their income.
- Government should attract the youth into rubber production by making available modern production resources at a subsidies rate and attractive market opportunities for rubber farmers.
- There is need for financial institution to de-emphasis collateral conditionality attached to credit facility so that rubber farmers may be able to avail themselves of the opportunity of credit in order to boost rubber production that will increase their income in the study areas.

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