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Evaluation of the Utilization Level of Improved Rubber Management Practices among Farm Settlers in Edo and Delta States

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ABSTRACT The study was designed to evaluate the utilization level of improved rubber management practices among farm settlers in Edo and Delta States. A total of 150 respondents were randomly selected from the three farm settlements. Analytical tools used included percentages and logit regression model. The results of a descriptive statistics indicated that rubber farmers are old and majority of the improved rubber management practices were not utilized. Logit model analysis revealed that education and family size had significant effect on utilization level of improved rubber management practices at 5%. It was recommended that respondents should be encouraged to make use of all the improved rubber practices, and the Government should attract youth to rubber farming. There should be attractive market price and extension activities should be encouraged through better funding.

INTRODUCTION

Natural 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*. Planted rubber is grown between longitudes 150N and 100S where the climax vegetation is humid with temperatures ranging from 23 to 450C and a well- distributed rainfall of 1800 mm to 2000 mm on a well- drained soil (Aigbekaen et al. 2000). 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).

Improvements have been made in the breeding of high- yielding clones of rubber by the Rubber Research Institute of Nigeria as RRIN adapted (exotic) clones and RRIN developed clones having a latex yield of 900 to 1600 kg per hectare per year of dry rubber and 2000 to 3500 kg per hectare per year respectively (Omokhafe and Nasiru 2004). The Nigerian rubber industry provides employment opportunities and also, serves as a foreign exchange earner for the country (Abolagba et al. 2003).

Cultivation of rubber in Nigeria is limited to the southern rainforest zones with the major producers being Edo and Delta States. However, for some time now, there has been a continuous decline in the production of natural rubber in Nigeria. A number of plantations have been abandoned, matured rubber trees have been left untapped even in large operating estates because of a short supply of rubber tappers, drops in price of the commodity in international market, low quality of rubber itself, disease and pest infestation (Abolagba 1997). The decline in productivity of rubber estates and small holder rubber farms has been attributed to the neglect of smallholder rubber farmers and movement of tappers and other farm labour from rubber plantation estates to more competitive sectors. Abolagba et al. (2003) stated that in Edo State, smallholders have a lion share of abandonment and alarming rate of decrease in the hectares of land planted with rubber trees. While many plantation owners and workers emphasized the

cultivation of more lucrative food crops, others moved to the cities to take up better paying jobs. Many researchers are of the view that the non-adoption of improved farm practices by farmers is one of the major reasons for low productivity in agriculture, and natural rubber production is not an exception. In spite of the problems of the decline in natural rubber production, research in rubber has evolved improved technologies that may stem the decline in rubber production (Ugwa and Abubakar 2006).

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 Schemes in Nigeria. Farm settlements are 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 (Giroh et al. 2006).

A Farm Settlement Scheme involves the relocation of a group of people who lack capital and land resources to go into profitable farming. The farmers who usually are educated and possess enough management drive in making career are also given basic training in the art of cultivation and management of the mandate crops (Famoriyo 1986). The notion of establishment of farm settlement scheme drew its origin from the Israeli Moshavian Project to introduce agricultural techniques in the rural areas (Ojo and Imoudu 2000).

The broad objective of the study is to evaluate utilization level of improved rubber management practices among farm settlers in Edo and Delta States.

The specific objectives are to:

i. analyze the socio-economic characteristics of rubber farmers in the study area;
ii. ascertain the level of utilization of improved rubber management practices;
iii. determine sources of information available to the farmers.

Ho_1: There is no significant effect of farmers' socio-economic characteristics on the utilization level of improved rubber management practices.

MATERIALS AND METHODS

The Study Area

The study was conducted in Iguoriakhi farm settlement in Edo State, Mbiri and Utagba-uno farm settlements in Delta State. Edo State lies between longitude 05° 04' North and 06° 43" East and latitude 05° 44' North and 07° 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 roughly between longitude 05° 00' and 06° 45" East and latitude 05° 00' and 06° 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°C and 44°C with average of 30°C. It has ultisol soil with pH range of 4.5 – 5.5 favourable for the production of natural rubber (Aigbekaen et al. 2000).

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).

Methods of Data Collection

The primary data were collected with the use of structured questionnaire. Information collected includes socio-economic characteristics of the respondents, their level of utilization of improved rubber management practices, sources of information of the rubber farmers in the production of natural rubber.

Methods of Data Analysis

Data collected was analyzed using both descriptive and inferential statistics. Descriptive statistics such as percentages and tables were used for the analysis of specific objectives 1, 2, 3. Inferential statistics such as Logit regression model was used for the in-depth analysis of hypothesis 1.

Model Specification

Logit regression model is a binary choice technique as far as the dependent variable is concerned, which allows for the prediction of effects of the farmers' socio-economic characteristics on the level of utilization of improved rubber management practices (Giroh et al. 2006).
It is mathematically represented as follows:

$Z_1 = a+b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5+b_6x_6+b_7x_7 + U_i$ ……(1)

Z_1 = level of utilization of improved practices (utilized 1, not utilized 0).
a = intercept/constant
X_1 = age (in years)
X_2 = sex (1male, 0 female) dummy variable was used
X_3 = marital status (married, single, divorce, widower)
X_4 = educational status (measured in years spent in school)
X_5 = farm size (in hectares)
X_6 = family size (number of people in household)
X_7 = farming experience (number of years involved in rubber production and sales).
U_i = error term.

RESULTS AND DISSCUSION

Socio-economic Characteristics of Rubber Farmers

Table 1 revealed that majority of the respondents (85.38%) who were actively involved in rubber farming 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. Farm supervision may be come difficult with attendant reduction of hectares of rubber production. The region lies within the oil belt with scare labour resources, with young and energetic youths seeking for jobs in the oil and gas companies in the area.

Table1: 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
Family Size (persons)	
1 – 2	5.38
3 – 4	5.38
5 – 6	16.92
7 – 8	31.54
9 and 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 2008

All the rubber farmers (100%) were male and majority of them (93.78%) were married. Land allocation in the farm settlements tends to favour men due to the culture of the people. This is in agreement 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 at very small scale. This is because respondents cultivated between 1 and 8 hectares, 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.

Many (50.77%) of the respondents had 16-35 years of experiences in rubber farming while 42.30% had between five to fifteen year of experience in rubber farming and only 3.85% had two to four 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 benefits of long years of accumulated experience in rubber farming. Evidence from the view of Giroh et al. (2007) also show that most of the rubber farmers have perfected their production methods with years of farming experience, any improved practices contrary to those known practices are viewed with suspicion and may never be taken seriously. This resistance to change can be heightened if there is any reported failure regarding to improved practice being promoted.

Respondents were all educated and acquired first school-leaving certificate. Extension experts are of the view that education is a catalyst in the adoption processes. This implies that with the preponderance of the educated farmers, adoption may be easier as farmers are likely to read with ease and understand technologies easily. The process of farmers' transformation is made easier when farmers are educated and are likely to take more decisions in the management of farm enterprises. This finding is agrees with the work of (van den Ban and Hawkins 1996) who reported that there is positive correlation between education and adoption of innovation, and that, an educated mind is able to accept positive change.

Utilization Level of Improved Rubber Management Practices

Table 2 shows the utilization level of improved rubber management practices of the farmers. From the table all (100.00%) of the respondents were aware of improved rubber management practices. This may be due to the existence of strong co-operative 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 Tree Crop Unit / Agricultural Development Programme extension agents.

Table 2: Utilization level of improved rubber management practices by the respondents

Utilization of improved management practice	**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 2008

About 58.46% of the respondents utilized the improved rubber management practices. This is not a surprise as farmers in the study area were

Education, thereby, made 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. Evidence from Spore (2007) showed that small and medium scale farmers need more productive varieties (budded stumps) that are adapted to community conditions.

Most (88.46) of the respondents practiced intercropping by planting rubber and pineapple, cassava, pepper, okra, coca-yam, and maize. Multiple cropping in the vast interior of young rubber plantation holds the key to attracting small holders to rubber farming due to its 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) are 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 a few of the respondents (24.62%) practiced fertilizer application in their rubber farms. Majority does not practice fertilizer application because of the unavailability of fertilizer and capital to purchase it, resulting in their low yield.

About 31.54% make use of trained taper to get 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 from the wound and dries to yield a rubbery film called latex. They 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 allowed to tap. But reverse is the case as the majority of respondents in the study area do not make use of trained tappers as a result of inadequate labour which results in slaughter tapping which damage the cambium cells of rubber tree resulting in low yield per hectare and eventual death of the trees. Abolagba (1997) observed that the non-regular maintenance of plantations and slaughter tapping which damage the cambium cells of rubber trees resulting in low yield per hectare and eventual death of the trees, is as result of slaughter tapping, inadequate labour and lack of trained tappers. Few of the respondents (22.31%), practice 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 pits instead of the use of raised platform/cemented surfaces. The respondents in the study areas believe that their indigenous knowledge is still very much reliable and costs less in term of storing coagulant before sales. 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 (Aigbekaen et al. 2000; Uraih et al. 2006).

Only few (15.39%) of the respondents made use of chemicals (for example, pesticide) in their plant-ation. Chemicals (for example, pesticide) are very im-portant in plantation establishment. Most of the farmers complained of termite and ant infestation 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 that is, replacing the dead planting materials. Majority do not practice supply 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 use of fire trace to avoid plantation burning. Majority (58.46% and 61.54%) of the respondents do not practice

thinning and fire tracing respectively as a result of inadequate labour and rubber farming is labour intensive which 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 (1997) who reported that high labour demand and low availability of labour are some of the problems faced by small holders that lead to low production of rubber in Nigeria.

Sources of Information on Rubber Production

Table 3 indicated that majority (70.00%) of the respondents obtain information from cooperative societies and about 45.38% obtain their information from family/friends while 35- 38 % of the respondents obtain their information from RRIN extension agents. This may be as a result of the respondents having strong cooperative societies so it was easier for extension agents to pass information to the group. Majority (69.23%) of the respondents were visited one to two times last season, 20.77% were visited three to four times last season and 10.00% were visited five times and above. This further explain why majority (60.00%) of the respondents indicated that extension agents in the study areas were inadequate. This agrees with the view of Arokoyo (1998) who reported that for adequacy of extension workers, there should be an average of 500 farmers to one-extension personnel, but there are instances where the ratio of extension workers to farmers is 1:3,000 or 1: 2,700.

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.

Majority (64. 62%) of the respondents obtained their planting material from Michelin estate at the rate of ₦140.00 and the clone is GTI. While only (35.38%) of the respondents get their planting material from RRIN at the rate of ₦5.00 and the clone is NIG 800. The price was subsidized as a result of presidential initiative on rubber production, formerly the price used to be ₦120.00. Respondents still preferred to get their planting material from Michelin as a result of their follow up if compare to the distance they will cover before getting to RRIN site. Though NIG 800, which is among clones, developed by RRIN and was reported as one of the best in the world but respondents in the study area don't bother much on this as a result of poor follow up by Rubber Research Institute of Nigeria.

Table 3: Analysis of information sources on rubber production

Item	**Percentage*
Sources of Information	
Radio and print media	0.77
Family/Friends	45.38
RRIN Extension Agents	35.38
TCU/ADP	16.15
Cooperative societies	70.00
Michelin Agents	5.38
Extension Contact	
Had contact with extension agents	89.21
Did not have contact with extension agents	10.79
Number of Times Visited by Extension Agents Last Season	
1 – 2	69.23
3 – 4	20.77
5 and above	10.00
Adequacy of Extension Agents	
They are adequate	40.00
They are not adequate	60.00
Sources of Planting Materials	
RRIN	35.38
Michelin Rubber Estate	64.62
Amount Paid Per Budded Stumps (₦)	
5.00 (RRIN)	35.38
140.00 (Michelin)	64.62

*Multiple responses recorded
Source: Field survey 2008

Hypothesis Testing

Table 4 the result of logistic regression showed that among the socio-economic characteristics regressed on level of improved rubber management practices utilized, the effects of family size (W =.000) and education (W = 0.11) were statistically significant at $p<0.05$ in explaining the variability in the level of improved rubber management practices utilized. Family size of the respondent (X3) has positive effect on the level of utilization. This implies that as the family size

of a respondent enlarges, his/her desire and capacity to utilize improved rubber management practices increase. Respondents level of education (X6) also had a positive effect on the level of utilization. There is no doubt that utilization of improved management practices is considered as an appropriate strategy for increased production. Therefore, as the level of education of a farmer increases, there are great chances that utilization of improved management for increased production/output of rubber will increase. This result is in line with the studies of van den Ban and Hawkins (1996), who reported that there is positive correlation between education and adoption of innovations. The null hypothesis was rejected. There is significant effect of farmers socio-economic characteristic on level of utilization of improved rubber management practices.

Table 4: Logit regression of the effect of farmers' socio-economic characteristics on utilization level of improved rubber management practices

Variables	*Estimated parameters (β)*	*Standard errors*	*R. Values*	*Wald (W) significance*
Age	.022	.026	1.022	.724
Family size	.001	.082	1.001	.000*
Farm size	.047	.159	1.048	.088
Experience	-.020	.025	.980	.101
Education	.024	.074	1.024	.011*
Marital status	.038	.357	1.039	.252

Constant = - .820
W* is significant at P < 0.05
Cox and Snell R2 = 0.08
Nagelkerke R2 = .011

CONCLUSION

The focus of this study has been an evaluation of the utilization level of improved rubber management practices among farm settlers in Edo and Delta States. Based on results of the analysis, it has been concluded that the people involved in rubber production were mostly within the ages of 51 and 70 years, well experienced in rubber faming and mostly holders of first school leaving certificate. The study revealed that all the respondents were aware of the improved rubber management practices.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made:

a. Rubber farmers should be encouraged to make use of all the improved rubber management practices to achieve the desired result of boosting rubber production in the region.
b. Extension activities should be encouraged through funding by Government and non-governmental organizations to effectively disseminate production information to farmers. This will accelerate the level of utilization of improved rubber management practices among rubber farmers.
c. Information should be given priority attention since these will promote the level of utilization of improved rubber management practices in the study area. The preparation and publication of manual covering all aspects of improved rubber management practices should be encouraged. There is also the need for frequent workshop for representatives from the public and the private sector dealing with natural rubber production.
d. There is need for financial institution to de-emphasise 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 in the study area.
e. Barriers to utilization level of improved rubber management practices, for example, inadequate capital, pest/disease attacks, low yield, high cost and scarcity of labour, low market price, high cost and scarcity of chemical (pesticide), poor storage facilities, inadequate and timely information and poor infrastructural facilities, should be adequately taken care of by the Government. That is, by providing loans to the farmers, make chemicals available at avoidable prices and provide good infrastructural facilities, which will lead to increase in farmers' income level, and improve the standard of living.

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