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Research Paper

Factors Influencing Adoption of Rubber based Technologies among Smallholding Rubber Farmers in Edo State, Nigeria

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The study investigated the factors influencing adoption of rubber based technologies among. Smallholding rubber farmers in Edo state, Nigeria. The objectives were to ascertain the socio-economic characteristics of rubber farmers, determine their level of awareness and the factors influencing adoption of improved rubber technologies in Edo state. The purposive sampling technique was used to select five rubber growing Local Government Areas in the State. Random Sampling technique was employed to select four communities each making a total of twenty (20) communities. Multiple stage random sampling technique was used to select 12 famers each from the communities, making a total of 240 farmers. Data were analysed using frequency distribution, percentage, multiple regression, and Z- test. The result on multiple regression analysis showed that income, technology awareness and contact with extension agents had significant influence on adoption. The study recommends the need for government to support rubber farmers through the sale of farm inputs to farmers directly at subsidized rates and on time so as to enhance farmers' agricultural productivity. Also, promotion of rubber farmers' income sources such as off-farm employment and livestock production should be encouraged so as to increase farmers income to finance the purchase of farm inputs. Frequency of contact between extension staff and farmers should be strengthened as to enhance adoption of rubber production technologies in the study area.

Key words: Adoption, smallholding, rubber technologies

INTRODUCTION

In Nigeria and most developing countries, about 75% of the population live in rural areas and depend mainly on agriculture for their livelihood (Onuk et al., 2010). This sector is the largest employer of labour in Nigeria and serves as source of income for majority of the population as well as major sources of raw materials to the nation's industrial sector (Mesike, 2006).

Nigeria's agriculture performed reasonably well in the 1950's and 1960's and the export sector of agriculture accounted for 60-70% of total exports (Agwu et al., (2010). Between 1957 and 1960, Nigeria was the biggest producer of natural rubber in Africa and ranked sixth in the world contributing about 3% of the global output (Pursegove, 1968). However, the discovery of crude oil in the early 70's caused a sharp diversion of government attention from agriculture to oil, due to the huge amount of revenue generated by crude oil exploration and exportation (Ewuziem et al., 2010). Thus the agricultural sector which had hither to be the back bone of the economy became characterized by declining productivity

(Tanko and Opara, 2010). This led to a rapid decline in government revenue from agriculture. Umar *et al*, (2011) reported that the rubber plantation size decreased from 243,479 ha in1960 to 154,000 ha in 2010 indicating about 36.8% in reduction.

Due to policy change and the low contribution of the agricultural sector to the country's GDP as well as the sporadic rise in poverty, the Federal Government of Nigeria came up with some policy measures to boost the agricultural sector. One of such policy measures introduced was the Presidential Initiative Programme on production and utilization of rubber (PIR) in 2006. The overall objective of the PIR was to increase both local production and utilisation of natural rubber , generate rural employment, increase farmers income and standard of living as well as ensure food security. Rubber production technologies such as improved rubber clones and intercrop under immature phase of rubber, rubber quality improvement practices, use of fertilizer, fire tracing techniques etc. has been promoted in Edo state Nigeria. RRIN through its research efforts have developed improved clones of rubber (NIG 800 series) having potential yield of 3000-3500 kg dry rubber /ha/yr among others and these technologies have since been released to farmers. Despite these innovations, the level of adoption by the rubber farmers is still very low. The specific objective of the paper is to ascertain the socio-economic characteristics of small scale rubber farmers, determine the level of awareness of improved rubber technologies by these farmers and to determine the factors affecting adoption of improved rubber technologies.

METHODOLOGY

This study was conducted in Edo State, Nigeria. Edo State lies between Latitudes 5° 44´´ and 7° 34´´ N of the equator and between Longitudes 5° 04´´ and 6°43´´ E of the Greenwich Meridian. The people of the State are mostly farmers rearing fish, livestock and varieties of crops such as cassava, rice, yam, plantain, pineapple and tree crops such as rubber, oil palm and cocoa.

Sampling and sample size

The study population consists of rubber farmers in Edo State. Purposive sampling technique was used to select five rubber growing Local Government Areas each in Edo State namely Uhunmwode, Ikpoba Okha, Ovia South West, Ovia North East and Orhionmwon, Four communities were randomly selected from each Local Government Area making a total of twenty communities. Multi-stage random sampling technique was used to select twelve (12) famers each from the communities, thus making a total sample size of 240 respondents.

Data collection

Both primary and secondary sources were used for the study. Primary data was obtained through a pre tested and validated structured questionnaire while Secondary sources were through Journals, textbooks and other relevant published materials.

Methods of data analysis

Descriptive statistics such as frequency, percentage, multiple regression, and Z- test was used.
The multiple regression model used is specified as follows:

$$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \mu b \quad \text{.....(1)}$$

Where:

Y = Adoption index (Number of innovations adopted) by the ith farmer divided by the total number of available technologies.

β_o = constant

$\beta_1 - \beta_7$ = regression co-efficients

X_1 = Age of farmer (in years)

X_2 = Years of rubber production experience

X_3 = Rubber farm size in hectares

X_4 = Family size (Number of people in household)

X_5 = Income (in Naira)

X_6 = Technology awareness (number of technologies aware of)

X_7 = Extension contact (1 contacted, otherwise zero).

RESULTS AND DISCUSSION

Socio-economic characteristics of rubber farmers

Table 1 revealed that all the respondents (100%) were males. It is possible that the tedious activities associated with the cultivation of the crop may be responsible for the dominance of males in the rubber enterprise. Majority of the respondents (86.30%) who were actively involved in rubber farming were between 51-70 years implying that rubber farmers in the study area were old.

The table also showed that 89% of the respondents were married, 27% had secondary education while about 43% had completed primary education and 15% had tertiary education but 15% had no formal education. Literacy level is very important for adoption of new technology. From the study, majority of the respondents (58.1%) had primary or no formal education. Also, 19.2% had a household size if four, 56.7% had a size of 5-8, and

Table 1. Distribution of farmers' by socio- economic characteristics.

Socio economic characteristics	Frequency n = 240	percentage
Age (years)		
21-30	2	8
31- 40	8	3.5
41-50	12	5
51-60	174	72.5
61-70	33	13.8
> 70	27	11
Sex		
Male	240	100
Female	0	0
Marital status		
Married	214	89.2
Single	14	5.8
Widowed	8	3.3
Divorced	4	1.7
Household size		
1-4	46	19.2
5-8	136	56.7
9-12	44	18.3
> 12	14	5.8
Educational qualifications		
No formal education	35	14.6
Completed primary school	104	43.3
Completed Vocational/technical school/WASC	65	27.1
Tertiary education (OND, NCE, HND, B.SC, B.A	36	15
Primary occupation		
Farming	232	96.7
Fishing	8	3.3
Farming experience (years)		
< 10years	72	30
11-20	92	38.3
21-30	33	13.8
31-40	33	13.8
> 40	10	4.2
Farm size (Hectares)		
<2 Hectares	106	44.2
2.1 - 4.0	112	46.7
> 4.0	22	9.2

Source: Field Survey, 2012.

18.3% had a household size of 9-12persons.

Respondents' level of awareness of improved rubber technologies

The result on (Table 2) revealed that majority of the respondents were aware of intercropping rubber with arable crops (91.7%), pest/disease control techniques (88.3%), tapping techniques (86.7%), and integrated farming under matured rubber plantation (83.3%), including recommended spacing of 3.34 x 6.7m (82.5%), and improved rubber clones (73.8%). Slightly above half the respondents were aware of rubber quality improvement practices- cleaning of latex cups and coagula pan before tapping (59.6%), use of fertilizer (57.5%) and use of fire tracing (46.3%). The result suggests that the farmers' level of awareness of rubber production technologies was high suggesting an effective information dissemination of the technologies in the study area. The average number of technologies respondents were aware of is 7 out of the 9 recommended technologies. It should be noted that awareness is the first stage in technology adoption.

Sources of information on improved rubber technologies

The result showed that the respondents ranked Michelin (27.9%) as their most important source of information on improved rubber technologies. This was followed by the

Table 2. Rubber technologies awareness by respondents.

Technologies	Frequency	Percentage
Intercropping under rubber	220	91.7
Pests /disease control techniques	212	88.3
Improved tapping techniques	208	86.7
Integrated farming systems	200	83.3
Recommended spacing (3.34 x 6.7)	198	82.5
Improved rubber clones	177	73.8
Cleaning of latex cup and pan before tapping	143	59.6
Use of fertilizers	138	57.5
Use of fire tracing technique	111	46.3

Source: Field Survey, 2012.

Table 3. Information Sources of Respondents.

Information Sources	Frequency	Percentage
Michelin	67	27.9
MANR	57	23.8
ADPs	55	22.9
RRIN	52	21.7
Family/friends	35	14.6
Radio / TV	30	12.5
TCU	5	2.1

Source: Field Survey, 2012.

Table 4. Respondents contact with extension agents.

Contact status	Edo	
	Freq	%
No contact	210	87.5
Quarterly	30	12.5
Total	240	100.0

Source: Field Survey, 2012.

Ministry of Agriculture and Natural Resources (23.8%), ADP extension agents (22.9%) and Rubber Research Institute of Nigeria (21.7%). Family/friends (14.6%) and radio/TV (12.5%) media constituted less important sources of information (Table 3).

Respondents contact with extension agents

Table 4 showed that majority (87.5%) of the respondents had no contact with extension agents while 12.5% had quarterly contact with the agents. The findings suggest that rubber farmers' level of contact with extension workers was very low. Even for those with some level of contact, personal interview revealed that such contact was very inconsistent. Such low contact may likely limit the farmer's adoption of improved rubber technologies.

Result of multiple regression and Z-test analysis

Multiple regression analysis was carried out to determine the relationship between farmers' socio-economic characteristics and adoption of rubber technologies. The results revealed that the independent variables that had significant influence on respondent adoption of improved rubber technologies were income, technology awareness and contact with extension agents. This implies that respondents who had contact with extension workers adopted more rubber technologies than those with no contact. Farmers contact with extension agents and adoption of improved farm technologies. Income of respondents' had a positive effect on their adoption of rubber technologies. Farmers with higher income adopted more farm technologies than those with lower income. Having capital enhances farmers' ability to purchase improved inputs. Also, the more farmers are aware of improved technologies, the more they are likely to adopt such technologies. However, age, household size, education. Years of rubber farming and farm size showed no effect on adoption. The empirical result showing the null hypothesis that socio-economic characteristics of farmers do not influence rubber based technologies is rejected.

Z–test static was used to test the difference in technology adoption between respondents who had

Table 5. Determinants of adoption of rubber technologies (Multiple Regressions)

Independent variables	Coefficient (b)	T value
Constant	1.404	1.161
Age	-0.086	-0.512
Household size	0.154	0.901
Education	0.011	0.086
Years of rubber farming	0.087	1.338
Farm size	0.097	0.602
Extension contact	0.872*	2.224
Income	0.081*	4.237
Technology awareness	0.471*	3.925

Adjusted R square value = 0. 561; F = 5.32 (p<0.050); (critical t (5%)=1.96)
*Significant at the 5% level.
Source: Computed from Field Survey Data, 2012

Table 6. Effect of extension contact on respondents' adoption of rubber technologies (z - test).

Extension contact	N	Adoption (mean)	Z value	Remark
Quarterly	30	4	2.86*	Significant
No contact	210	3		

*Significant at 5% (z tab = 1.96)
Source: Field Survey, 2012

contact with extension agents and those without contact (Tables 5 and 6). The result revealed that the average adoption between both groups was 3 and 4 for those without and those with contact with extension agents respectively. The findings suggest that contact with extension agents contributed positively to farmers' adoption of rubber technologies. The result aligns with the assertion of Eze *et al.* (2006) and Onu (2006), that when the extension service maintains contact with farmers, it helps the latter to understand better the use of the technologies being recommended because increased farmers interaction with extension personnel in the form of multiple visits by extension agents and technical support to farmers greatly increases farmers knowledge of available technologies and their potential benefits and reduce their uncertainty in decision making, hence acting as a trigger mechanism for intensive adoption. The null hypothesis is therefore rejected in favour of the alternate hypothesis.

Conclusion

The study showed that although the farmers were highly aware of improved recommended rubber technologies, their level of adoption was quite low. However, some of the factors found to influence farmers' adoption include extension contact and technology awareness. There is therefore the need for government to support rubber farmers through the sale of farm inputs to farmers directly at subsidized rates and on time so as to enhance farmers' agricultural productivity. Also, promotion of rubber farmers' income sources such as off-farm employment and livestock production should be encouraged so as to increase farmers' income to finance the purchase of farm inputs. Agricultural extension workers should intensify their efforts in reaching rubber farmers and the frequency of contact between extension staff and farmers should be strengthened as to enhance adoption of rubber production technologies in the study area.

AUTHORS' DECLARATION

We declare that this study is an original research by our research team and we agree to publish it in the journal.

REFERENCES

Agwu NM, Nwachukwu IN, Agwu IV (2010). Analysis of Export Performance of Pineapple from Nigeria, 1990-2006. The Nigerian Agricultural Journal 41(1): 144-149.

Ewuziem JE, Onyenobi VO, Ironkwe AG (2010). Technical Efficiency of Pig Farmers in Imo State, Nigeria, A Translog Stochastic Frontier Production Function Approach. The Nigerian Agricultural Journal, Vol. 41(1) 137-140.

Eze CC, Ibekwe UC, Peter O, Nwajiuba CU (2006). Determinants of adoption of improved cassava production technologies among farmers in Enugu State of Nigeria. *Global Approaches to Extension Practice*. 2(1): 37 –44.

Mesike CS (2006). An explorative analysis of factors determining rubber export from Nigeria. Natural Rubber Research.(19)1:Pp9-15

Onu DO (2006). Socio-Economic Factors Influencing Farmers Adoption of Alley Farming Technology under Intensified Agriculture in Imo State, Nigeria. The Philippine Agricultural Scientist. 89(2): 45-52.

Onuk EG, Bello M, Patrick O, Ibrahim H (2010). Socio- economic factors influencing the adoption of *Strigahermontica* tolerant maize varieties among farmers in Panda Development Area of Karu Local Government Area, Nasarawa State. The Nigerian Agricultural Journal 41(1): 42 – 48.

Pursegove JW (1968). Tropical Crops: Dicotyedons. Longman London.

Tanko I, Opara C (2010). Measurement of the Technical Efficiency in Maize Production in Bosso Local Government Area, Niger State. Nigeria. Proceedings of the Annual Conference of Agricultural Society of Nigeria. Pp.25-28.

Umar HY, Giroh DY, Agbonkpolor NB and Mesike CS (2011). An Overview of World Natural Rubber Production and Consumption: An Implication for Economic Empowerment and Poverty Alleviation in Nigeria. J.Hum.Ecol.33 (1):53-59.