

**ENTERPRISE SHIFT DECISION AMONG NATURAL RUBBER PLANTATION OWNERS IN THE
RAIN FOREST ZONE OF DELTA STATE, NIGERIA (republished)**

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ABSTRACT

*The rapid disappearance of natural rubber plantations in the rain forest zone of Nigeria has worrisome ecological, economic and social implications. It is important to evaluate dynamic land use decision among natural rubber plantation owners in the rain forest zone of Delta State, Nigeria. A total of 84 respondents were randomly selected from the six rubber plantation settlements in Delta state. Primary data were collected with structured questionnaire. Descriptive statistics and logit regression model were used to analyze data. The result indicates that rubber farmers are old and majority of the improved rubber management practices were not utilized. About 76.7% of rubber plantation majority of natural rubber plantation owners express decision to shift from rubber production while 23.3% indicated decision not to shift. Logit model analysis revealed that cost, risk, education and family size had significant effect on dynamic land use decision ($P < 0.05$). Resources are likely to flow out of natural rubber industry. It was recommended that rubber plantation owners should be encouraged to make use of all the improved rubber practices, and the Government should attract youth to rubber farming through appropriate pricing policies. There should be attractive market price and extension advisory services on profitable land use should be encouraged..***KEYWORDS:** *Dynamic land use factors, decision, natural rubber, plantation owners, rain forest*

INTRODUCTION

Agricultural production is driven by changing climatic factors, product prices, changing technology and changing comparative advantage. Agricultural entrepreneurs shift towards alternative agricultural enterprises will be more heterogenous than it has been in the past years. The shift to alternative agricultural enterprises will be more pronounced with the emerging economic and climatic environment that envelops agricultural production. Barriers to entry into alternative agricultural enterprises are severe and some farmers may experience a decline in income after switching due to economic shocks. Academic institutions should have the capacity to investigate some of the problems that are associated with the choice of alternative farm enterprises through research and extension programs. The natural rubber tree (*Hevea brasiliensis*) is a permanent crop that is capable of being exploited for up to 35 years. The seedlings were first introduced into Nigeria in 1903. This gave rise to the

establishment of many private and corporate rubber estates (plantation) in the rain forest belt southern Nigeria. The rubber sub-sector employs a good number of rural population. It is a source of income and very relevant in poverty reduction. However, the rapid growth of oil and gas industry in Nigeria led to the neglect and complete cessation in the planting and replanting of natural rubber (Ogowewo, *et al*, 1987). Rubber plantation owners have switched and will continue to switch as the rubber sub-sector dwindles over time. This has implication for resources drift and extinction of rubber industry and related economic activities. A shift from low to high profit and comparative advantaged enterprises is a rational economic behavior. More profitable agricultural enterprises such as corn, cassava, yam, oil palm and soya beans has attracted entrepreneurial shift from rubber industry in recent times. Many new agricultural commodities posses attributes of income generation and physiological needs. Entrepreneurial shifts are often influenced by the need by producers to

satisfy the demand for attributes and would want to produce agricultural products that posses such attributes. The search by farmers for more profitable agricultural enterprise is never ending. The intensity of the search does vary with the prevailing environment and economic scenarios that envelops agriculture. The current climatic and financial stress in agriculture has generated widespread interest in shift to alternative agricultural enterprises.

Evidence from conferences, debates, workshops and seminars in local and international forum shows that research attention is gradually being directed at a switch in agricultural enterprises and economic implication considering the emergence of climate change and its effects on agriculture. Dynamic land use in this context is the change from one agricultural enterprise to another. Agricultural enterprises shift has implications for a resource drift in the economy. Despite the fact that much attention and effort is being devoted to alternative agriculture, much of the effort is neither sharply focused nor capable of generating a systematic body of knowledge. The massive outpouring of

issues on shift in alternative agriculture ranges from the *anecdotal* to sophisticated research findings (Dabbert and Madden, 1986). For the purpose of this study, four forces which are particularly relevant to entrepreneurial shift in agriculture are adopted as premises with little questioning of their validity. These forces are continued financial stress in agriculture, changes in the pattern of food

consumption, unpredictable shocks from macro economics forces, and acceleration of technological development. Increased consumption of fruits, vegetables, cereal, oil and plant protein sources are assumed to continued. Away-from home eating will expand. More affluent consumers and larger numbers of persons from varied ethnic and cultural backgrounds will expand the demand for new and exotic foods. Medical research and technology will raise the health consciousness of consumer. Consumption of food considered nutritious, low in calories, free of chemical and pharmaceutical substances and low in substances associated with heart and circulatory problems will expand. This will create new demand for agricultural entrepreneurs to satisfy through production.

Macroeconomic forces have increased market risks for agriculture. These higher risks are one incentive to diversify or switch enterprises. The hocks to agriculture from these forces are not expected to subside. Given the prevailing poor situation of rubber sector in Nigeria presently, there is need to carry out study that will gather and analyses various relevant socio economic factors that influence the choice of enterprise decision by rubber

plantation owners in the study area. Household diversification and its cumulative effect on sustainability of livelihood systems also points to the virtual absence of empirical analysis specific to crops and crop related systems. The present study attempts to fill this gap in empirical analysis of dynamic land use decision making in natural rubber livelihood systems in Delta state, Nigeria.

The findings of this study is expected to improve the dynamic land use decision making process in the study area. The study will be a useful guide to agricultural policy makers. The specific objective of the study were to:

- i) examine the direction of dynamic land use by rubber plantation owners in the study area.
- ii) evaluate the factors that underpin dynamic land use decision from rubber production to selected crops (arable or permanent crops) enterprises in the study area.

The following null hypothesis was formulated to guide the study.

Ho: The selected factors do not have joint and individual significant effects on dynamic land use preference of rubber plantation owners in the study area.

MATERIALS AND METHODS

Area of Study, Sampling Techniques and Data Collection Techniques

This study was carried out in Ughelli South Local Government Area of Delta State. The study area has six clans namely, Jeremi, Olomu, Ewu, Effurun-Otor, Okparabe and Arhavwarien The vegetation of the area is rainforest. The major occupation of the people is fishing and farming while others are involved in

petty trading. The area is suitable for livestock and crop production. The crops grown include: rubber, oil palm, cassava, yam, maize and vegetables.

A two-stage sampling techniques was adopted in sample selection. Firstly, the simple random sampling techniques will be adopted in selected six communities. Second stage involved the selection of at least twelve (12) rubber plantation owners. This gave a total of 84 respondents that participated in the survey. Data were collected from both primary and secondary sources. Primary data were collected using structured questionnaire which was personally administered to rubber plantation owners in the study area. The questionnaire contained questions that relate to respondents socio-economic characteristics enterprise choice variable and problems associated with dynamic land use. Secondary data were obtained from newspaper, ADP, annual and updated seminar papers and statistical reports and other relevant publications.

Data Analysis Techniques

The objectives were achieved by analysing collected data with descriptive statistical tools such as mean percentage, standard deviation and frequency distribution table and logit regression model. Direction of dynamic land use was achieved following Train, (2003) specification. The probability that the rubber plantation owners will choose (shift to) was determined by using discrete choice model. The probability that a person chooses a particular alternative is determined by comparing the utility of choosing that alternative to the utility of choosing other alternatives. The choice space includes permanent crops and arable crops.

Model Specification

Determinants of entrepreneurial shift decision were estimated using conditional Logit model with variable that vary over alternative enterprises. This is presented below:

$$P_{jk} = \frac{e^{Z_{ij}}}{\sum_i e^{Z_{ij}}} \dots \dots \dots (1)$$

Where: d_j
 k is the dummy variable that identifies alternatives k .
 $d_{jk} = 1$, if $j=k$(2)
 0, otherwise

P_{ij} = the probability that a rubber plantation owner will choose to shift to permanent crop (j) or annual crop (i) enterprises. Given the information embodied by index, Z_i , C is a constant index.

$$Z_{ij} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \epsilon_i \dots \dots \dots (3)$$

Where x_1, \dots, x_6 are the factors underpinning farmers choice of alternative enterprises. Following Bamire and Ola (2004) specification the Logic model further be specified as:

$$\ln \left(\frac{P_{ij}}{C_i} - P_{ij} \right) = \beta_1 X_1 + \beta_2 X_2 + \dots \dots \dots + \beta_k X_k - \epsilon_{ij} \dots \dots \dots (4)$$

Table 1: Description of Symbols of Variable in Models

Symbols	Description	Measurement
Pij	Probability of shifting from rubber to other crop enterprises (i)	1, if yes O, otherwise
Xi	Expected profit differential $Uni - Unj > 0, j i$ Minimum unit cost of production	1, if expected profit of chosen alternatives is higher O, otherwise
X2	Availability of required inputs Possession of required skills	1, if profit cost of chosen alternatives is lower, O, otherwise.
X3	Existence of market	Very High = 5, High = 4,
X4	Climatic change	Moderate = 2, scarce = 2, very scarce = 1
X5	Constant	
X6	Co-efficient of parameter estimate	1, if yes, O, otherwise
β_0		1, if yes, O, otherwise
β_1		1, if yes, O, otherwise

RESULTS AND DISCUSSION

Dynamic land use by Rubber Plantation Owners

The distribution of dynamic land use direction of rubber plantation is presented in table 2

Table 2: Distribution of Dynamic land use Decision

Decision	Frequency	Percentage
No	20	23.3
Yes	64	76
Total	84	100

(Source: Field Survey 2012)

The result shows that majority 76.7% of rubber plantation owners expressed decision to shift from rubber enterprise to other agricultural enterprises while minority 23.3% indicated decision to remain in rubber production.

Choice of Enterprise Other than Rubber Production

Table 3 shows the distribution of decision to invest in alternative agricultural enterprises other than rubber production in the study area.

Table 3: Distribution of Direction of Enterprise Choice by Rubber Plantation Owners.

S/No	Alternative Agricultural Enterprise	Frequency	Percentage
1.	Permanent Crops	27	32.1
2.	Annual Crops	57	67.9
	Total	84	100

(Source: Field Survey 2012)

The result shows that majority (67.9%) rubber plantation owners surveyed expressed decision to shift to annual crop enterprises while 32.1% shifted to permanent crop enterprises other than rubber production. This result implies that former rubber plantation owners are dissatisfied with natural rubber production in the study area. This goes a long way to show that natural rubber industry presently lacks the utility that motivates investors to invest in it. Former rubber plantation owners demonstrate economic behaviour. This result can be attributed to the fact that annual crop production yields quick monetary benefits than permanent crop in the study area.

Furthermore, the food security situation in the area requires annual (food) crop production. Farm households in study would rather prefer to produce annual crops to sustain their families. This could be possible reason while few households shifted to permanent crop production, particularly oil palm enterprise that will yield higher monetary benefits, but in the long run. Many households would not be patient enough for such returns in the long run. Besides, small scale crop production does not require large expanse of land unlike permanent

crop enterprises. Over the years, inherited natural rubber plantation has been fragmented among the siblings, such that the portion inherited has become too small for large scale permanent crop production. As a result, annual crops (food crops) production becomes a better choice among former rubber plantation owners in the study area.

Socio Economic Factors Underpinning Dynamic land use Decision

Table 4. shows the result of logistic regression of the effect of farmer's socio-economic characteristics on dynamic land use decision among rubber plantation owners. The result of logistic regression showed that among the socio-economic characteristics regressed on dynamic land use decision, the effects of family size ($W = 0.000$) 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 dynamic land

use influence. This implies that as the family size of increase the likelihood to shift to other crops production practices increase. Respondent's level of education (X6) also had a positive effect on enterprise decision to shift among rubber plantation owners. 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 he will likely shift to other enterprise that use more of his new knowledge of improved management for increased production, and the 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 and decision to shift. The null hypothesis was rejected. There is significant effect of farmer's socio-economic characteristic on dynamic land use decision among rubber plantation owners.

Table 4.: Logit regression of the effect of farmers' socio-economic characteristics on shift of investment preference among rubber plantation owners

Variable	Estimated parameters	Standard errors	Wald stat.	Significance
Exporf	3.1932	1.6323	3.827	0.050*
Cost	-4.0658	1.4610	7.744	0.005*
AVL	0.0542	0.4911	0.012	0.912
RSKL	-3.9647	1.2878	9.378	0.002*
MKT	1.1877	1.4775	0.646	0.421
CLM	-0.6389	1.3122	0.237	0.626
Constant	6.5315	2.5134	6.753	0.009*

Sig* is significant at $P < 0.05$

$R^2 = 0.824$

From the table 4.4 above there is strong correlation between the factors included (existence of market for the product other than rubber, cost of production, Availability of required input, risk level in natural rubber production, market for the product and climate change). In the model and farmers decision to shift from rubber plantation production to other crop production correlation of determination of 0.824 means that 82.4% change in decision to shift is accounted by variation in the included factors. With this strong correlation we reject the null hypothesis 2 and accepted the alternative hypothesis which state that the selected factors do have individual significant effect on dynamic land use preference of rubber plantation owner in the study area. Expected profit

differential, Cost, and Risk are statistically significant at $P \leq 0.05$. Expected profit differential showed positive relationship with decision to shift enterprise while Cost and Risk have negative relationship to shift.

CONCLUSION

The focus of this study has been an analysis of dynamic land use decision among rubber plantation

owners in Delta State. Based on results of the study, it was concluded that the rubber plantation owners were aware of the poor production status of natural rubber production. The study demonstrated strong correlation between expected profits from alternative agriculture and the decision to shift from natural rubber production, cost of production (COST) and risk level in natural rubber production (Risk). While existence of market for the new enterprise product (MKT) and climate change (CLM) are not significant reasons for rubber plantation owner's decision to shift to other enterprise other than rubber. Rubber plantation owner's shifted mainly to food crop production, possibly for food security reason and the aging of the rubber trees.

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

1. 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.
2. Information should be given priority attention since this 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.

3. Efforts should be made to make natural rubber production attractive to the households such as the 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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