

32 ANALYSIS OF DETERMINANTS OF MARKET PARTICIPATION AMONG LOCAL RICE FARMERS IN SELECTED LOCAL GOVERNMENT AREAS OF NIGER STATE, NIGERIA

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Abstract

Improving the welfare of small-scale farmers is hinged on their access to markets and active engagement in the markets. The main objectives of this research were to analyze the determinants of decision to participate and level of market participation as well as the constraints militating against market participation among rice farmers in the study area. Multi-stage sampling technique was used to sample 100 farmers for the study. Cross-sectional data were collected using semi-structured questionnaire to elicit relevant information from the farmers. The analytical techniques involved descriptive statistics and probit and truncated regression models. The findings revealed that age, education, plot devoted to rice cultivation and household size were the major determinants of decision to participate while extension services, market type, gender of the farmer, household size and transportation cost were the major determinants of level (intensity) of market participation. The main constraints to market participation among rice farmers were infrastructural deficit, high cost of transportation, unavailability of farmland and absence of government support for marketing. Based on the findings of this research, it is therefore recommended that government should address the infrastructural deficit in term of existing road rehabilitation and construction of new roads to make market accessible to the rice farmers.

Keywords: *Market, farmers, participation, Rice, Nigeria*

INTRODUCTION

Nigeria is the most populous country in Africa with [70.8 million hectares of agriculture land area](#) and which has rice, maize, cassava, guinea corn, yam, cowpea and millet as the major crops grown (Tsokar, 2021). In 2020, Nigeria's GDP amounted to 152.32 trillion Naira which translates to over 400 billion U.S dollars out of which agriculture contributed about 24.41% of this amount (O'Neill, 2021). Hence, it is a key activity for Nigeria's economy after oil as it provides livelihood for many Nigerians. Recent poverty statistics of the country revealed that 39.1% of Nigerians lived below the international poverty line of \$1.90 per person per day in 2018/19 and that a further 31.9% percent had consumption levels between \$1.90 and \$3.20 per person per day, making them vulnerable to falling into extreme poverty when shocks occur. (World Bank, 2021). The monthly COVID-19 National Longitudinal Phone Survey (NLPS) revealed that, the impact of Covid -19 pandemic coupled with high inflation for key food items has led to increasing food insecurity,

especially for poor households. Given this rise in food insecurity, alongside school closures and displaced health services, the crisis may have negative long-term effects on the households capital formation (World Bank, 2021). Participation of these households in agricultural markets is therefore expected to improve their welfare outcomes (Muricho *et al.*, 2015 and Holloway *et al.*, 2005). This expectation has made governments in most of the developing countries like Nigeria to promote policies aimed at ensuring overall commercialization of smallholder agriculture (Macharia *et al.*, 2014; Muricho *et al.*, 2015). These will increase the ability of smallholder farmers to participate in markets either as output sellers and input buyers. For instance, the recent ban on rice imports coupled with increase in population growth in Nigeria has led to increased demand and consumption of locally produced rice. This presents new and expanding market opportunities for smallholder rice farmers both in Niger State and other parts of the country. Despite the laudable importance of marketing in improving the livelihood of the farmers, participation in agricultural markets has been hampered by infrastructural deficit, poor road network and marketing risks. This has induced high transaction costs thereby reducing market participation by the rice farmers. In line with this assertion, Holloway *et al.* (2005) emphasized that inappropriate policies and misallocation of investment resources could skew the distribution of the benefits and opportunities away from the smallholders who would potentially gain the most from these market opportunities. Lapar *et al.* (2003) also posited that the inability of smallholder producers to take advantage of economies of scale in production and marketing is a significant impediment to market participation. Besides, remoteness from towns and low population density could also be a threat. All these may result to fallout in subsistence rather than market-oriented production systems. It is against these backdrops that this study attempts to add to the existing body of knowledge on the determinants of both decision to market participation and level of market participation among rice farmers as well as the constraints militating against market participation in the study area.

METHODOLOGY

Area of Study

This study was carried out in Niger State, Nigeria. The State is situated at latitude 8°22'N and 11°30'N and longitude and 70°20'E. The State has the largest land mass of 74,244 square kilometres or about 8% of the total land mass in Nigeria It has a total of 25 LGAs. Its population is 3,954,772, comprising 2,004,350 males and 1,950,422 females (Federal Republic of Nigeria (FRN), 2009) which was projected to 5,556,200 (United Nations Population Fund (UNFPA), 2016). The State is divided into three agricultural Zones. It has a seasonal variation from wet to dry season wherein the wet season falls within April to October while the dry season falls within November-March. The average temperature and annual rain fall distribution are 27°C and 1000mm-1500mm annually.

Sampling Technique and Sampling Size

A multi-stage sampling procedure was used to select respondents for this study. In the first stage, 2 LGAs were randomly selected for the study. The second stage entailed random selection of 2 town/villages from each of the selected LGAs while in the third stage, 25 farmers were selected from each of the 2 randomly selected town/villages which gave a total sample size of 100

Method of Data collection

Primary data were collected using semi-structured questionnaire and interview schedules. Information on level of participation in rice marketing and constraints were collected.

Analytical Techniques

Analysis of the level of market participation was achieved using the Double Hurdle model following the work of Abu (2013) and Mignouna *et al.* (2016). The DH model is a parametric generalisation of Tobit model in which two separate stochastic processes determine the decision to participate and level of participation. The decision to participate or not to participate in marketing usually precedes the level of participation though empirical evidence has proved that it can either be done simultaneously or independently or sequentially. But for the purpose of this study, the latter will be assumed. The model is based on an assumption that these two separate hurdles or stages must occur before a positive level of market participation is observed. The DH model is estimated by the Probit and the Truncated regression models respectively. In the first stage of the analysis,

$$y_t = 1 \quad \text{If } > 0$$

$$y_t = 0 \quad \text{If } < 0$$

$$y_i^* = X_i^1 \alpha + \varepsilon_i$$

Where,

y_i^* = Latent participation variable that takes on the value of 1

X_i = Vector of household characteristics

α = Vector of parameter

In the second stage, the level of participation is represented thus,

$$t_i = t_i^* > 0; y_i^* > 0$$

$t_i = 0$ otherwise

$$t_i^* = Z_i^1 \beta + u_i$$

Where,

t_i = Observed response on the quantity of rice to be conveyed to the market

Z_i = Vector of household characteristics

β = Vector of parameter

The Probit model was used to determine the probability of participation in the market. The procedure for analyzing the Probit model start with identifying the dependent variable, which is a dummy and can assume only two values (either 0 or 1). The Probit model is specified thus:

$$P_{(sy-1)} = f(z_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z_i} \frac{e^{-u^2}}{2} du$$

Where the unobservable z_i is a linear combination of the observable explanatory variables. The model explanatory variables are specified thus;

Y = Decision to participation or not to participate (Participation = 1; 0 otherwise)

X₁ = Age of farmer (Years)

X₂ = Family size of farmer (No.)

X₃ = Level of education (Years of schooling)

X₄ = Farmer' years of experience in marketing (Years)

X₅ = Distance to market (Km)

X₆ = Plot devoted to rice cultivation (Ha)

X₇ = Access to credit facilities (₦)

X₈ = Membership of social group (Member = 1; 0 otherwise)

X₉ = Type of labour (Family labour = 1; 0 otherwise)

X₁₀ = Ownership of means of transportation (Yes =1; 0 otherwise)

X₁₁ = Transportation cost (₦)

The second hurdle is the level of participation and is explicitly expressed thus:

Y = Level of participation (Quantity of rice sold in kg)

X₁ = Waiting time before sale of rice is made at the market (Hours)

X₂ = Transport fare of 100kg of rice from farm to market (Naira)

X₃ = Age of farmer (Years)

X₄ = Gender of farmer (Male = 1; 0 otherwise)

X₅ = Marital Status of farmer (Married = 1; 0 otherwise)

X₆ = Family size of farmer (No.)

X₇ = Level of education (Years of schooling)

X₈ = Farmer's marketing experience (Years)

X₉ = Membership of social group (Member = 1; 0 otherwise)

X₁₀ = Total annual income of household (₦)

X₁₁ = Access to market information (Access =1; 0 otherwise)

X₁₂ = Market type (Local =1; 0 otherwise)

X₁₃ = Ownership of means of transportation (Yes =1; 0 otherwise)

X₁₄ = Access to credit facilities (₦)

X₁₅ = Extension services (No.)

X₁₆ = Farm size (Ha)

RESULTS AND DISCUSSION

Factors Affecting the Decision to Participation

The result of the Probit regression used in the determination of the factors affecting the decision to participate was as shown in Table 1. The log likelihood result indicated how quickly the model converged while the likelihood ratio chi-square of 40.23 showed that the whole model was statistically significant at $P > 0.01$. The result further revealed that some of the exogenous variables were positive and statistically significant at different probability levels that is, age at $P > 0.05$, level of education at $P > 0.10$ and plot devoted to rice cultivation at $P > 0.10$. Household size, however was negative but significant at $P > 0.01$. However, since probit is a probability model, it will be better to interpret the result using the marginal effect and elasticity as shown in Table 2.

Table 1: Determinants of decision for market participation among rice farmers in the study area

Variables	Coefficient	Z values	P > t
Age	0.0554	2.23**	0.026
Household size	-0.1400	-3.08***	0.002
Level of education	0.0726	1.93*	0.054
Years in farming	0.0258	1.03	0.305
Distance to market	-0.0405	-0.79	0.430
Plot devoted to rice	0.5111	1.91*	0.056
Access to credit	-0.6716	-1.23	0.218
Farmers association	-0.3691	-0.92	0.356
Type of labour	0.5412	1.26	0.208
Ownership of means transportation	0.8682	1.24	0.213
Transportation fare	-0.0003	-1.16	0.245
Constant	-2.7151	-1.80*	0.072

LR $\chi^2 = 40.23$, Prob > $\chi^2 = 0.000$, Pseudo $R^2 = 0.3471$, ***significant at 1%, **significant at 5%, *significant at 10 %

Marginal effect and partial/quasi elasticity: Analysis of marginal effect and partial elasticity was carried out on the significant variables of determinants of decision for market participation among rice farmers in the study area (Table 2). The result of the marginal effect showed that one percent increase in age, level of education and plot devoted to rice production led to 0.0096, 0.0138 and 0.1061 percent increase in the probability of the rice farmer's participation in the market. Conversely, one percent increase in household size of farmers led to 0.0324 decrease in the probability of the rice farmers' participation in the market. The result of the partial elasticity of the significant variables revealed that age, level of education and plot devoted farm size were inelastic, *that is*, a one percent unit change in any of these explanatory variables led to a less than proportionate change in the probability of rice farmers' participation in the market. On the contrary, the partial elasticity of household size was elastic, *that is*, a one percent unit change in household size led to a more than proportionate change in the probability of rice farmers' participation in the market.

Table 2: Marginal effects and quasi elasticity

Variables	Marginal effect	Elasticity
Age	0.0096	0.8630
Household size	-0.0324	-1.0008
Level of education	0.0138	0.1670
Plot devoted to rice production	0.1061	0.5232

Determinants of Farmers' Level of Market Participation

Table 3 showed the result of level of market participation using ordinary regression analysis. The linear regression result showed that the F-ratio with the value of 2.15 showed that the whole model was significant at $P > 0.05$ probability level. The R^2 showed that 29% variation in level of market participation was explained by the included explanatory variables. The non-inclusion of relevant explanatory variables in the model might be the reason for the low R^2 . Findings revealed that six variables were significant at various probability levels. Extension services and market type were positive and significant at $P > 0.01$, gender of the farmer and household size at $P > 0.05$ while transportation fare was significant at $P > 0.1$. However, market information was negative but significant at $P > 0.1$ which implied that access to market information led to reduction in market participation. This is however contrary to *a priori* expectation but this could occur when farmers could not access current, relevant, reliable and accurate market information at the right time. All market participants involved in product creation, as well as the purchasing and selling of items, including rice, requires market knowledge on a regular basis. This is especially true in the case of agricultural products, as their prices fluctuate more than those of other industries. So, decision making process is hampered when market information is not easily accessed by the farmers. The finding is at variance with that of Macharias *et al.*, 2014 who reported that waiting time before receiving payment, market information and age of household head had negative influence on smallholder maize market participation. The finding however agrees with the report of Gani and Adeoti (2011) that market information, distance, output size, extension visit, cooperative membership, family size and education were the main determinants of intensity of market participation.

Table 3: Determinants of level of market participation among rice farmers in the study area

Robust Variables	Coefficient	t-value	P > t
Waiting time	-18.881	-1.53	0.130
Transportation fare	0.0396	1.92*	0.059
Age	-0.6475	-0.51	0.613
Gender	84.0263	2.30**	0.024
Marital Status	8.5579	0.24	0.813
Household size	9.2531	2.50**	0.014
Education	-11.5528	-1.05	0.298
Farer's experience in marketing	-1.4958	-0.73	0.465
Inclusion in social group	22.4536	0.48	0.632
Total annual income	-.0003	-1.26	0.211
Market information	-66.6639	-1.87*	0.064
Market type	131.1877	3.60***	0.001
Ownership of means of transportation	-1.3857	-0.04	0.969
Access to credit	-44.7610	-1.022	0.311
Extension services	171.0786	3.25***	0.002
Farm size	98.2473	1.16	0.248
Constant	8935.1480	67.11***	0.000

F-Ratio = 2.15; R² = 0.2932, * significant at 10%, **significant at 5%, ***significant at 1%

Constraints to market participation

Table 4 showed the constraints affecting market participation in the study area. The result revealed that the major constraints faced by the respondents were lack of infrastructure, high cost of transportation, unavailability of farmland and absence of government support for marketing which ranked 1st, 2nd, 3rd and 4th, respectively. The least of the constraints included high cost of land for rice cultivation rentage, inadequate investment capital and large family size which ranked 8th, 9th and 10th, respectively. The finding is at variance with the findings of Omiti *et al.* (2009) who reported that distance from farm to point of sale was a major constraint to the intensity of market participation.

Table 4: Distribution of respondents according to constraints to market participation

Constraints	Frequency	Percentage	Rank
Lack of infrastructure	72	72	1 st
high cost of transportation	69	69	2 nd
Unavailability of farmland	58	58	3 rd
Absence of government support to improve marketing	52	52	4 th
High cost of labour	50	50	5 th
Unavailability of market	39	39	6 th
Unavailability of improved rice varieties	37	37	7 th
High cost of renting land	36	36	8 th
Inadequate capital to invest	33	33	9 th
Large family expenditure	14	14	10 th

Source: Feild survey, 2018

Conclusion and Recommendations

Based on the findings of this research, it can be concluded that age, education, plot devoted to rice cultivation and household size were the major determinants of decision to participate while extension services, market type, gender of the farmer, household size and transportation cost were the major determinants of level (intensity) of market participation. The main constraints to market participation among rice farmers were infrastructural deficit, high cost of transportation, unavailability of farmland and absence of government support for marketing. It is therefore recommended that government should address the infrastructural deficit in term of existing road rehabilitation and construction of new roads to make market accessible to the rice farmers. Farmers should form cooperative marketing to ease the burden of transportation cost and increase their intensity of participation in the market.

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