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# Determinants of Rice Marketable Surplus In Yala Local Government Area of Cross River State, Nigeria

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***Abstract***

*The study examined the determinants of rice marketable surplus in Yala Local Government Area of Cross River State. Random sampling produce was use to select 120 rice farmers and a structured questionnaire was used. The basic objective was to determined factors that affect the quantity of rice supplied to the market after production from the farm. Both socio and economic elements were considered. The simple descriptive statistics and multiple regression analysis were used as the analytical tools. Results show that variables such as quantity of rice for gift, quantity of rice consumed, quantity of rice reserve for seed, quantity reserve for uncertainty, level of education, house-hold size, quantity of rice produced, cost of transportation, and cost of production as well as farmers socio-economic characteristics positively influenced the quantity of rice sold in the area. The study recommended that rice producers in the study area should increase their hectare of rice cultivation as well as apply all the necessary agronomic practices as these will increase the marketable surpluses. Also, Local varieties of rice should be replaced with improved varieties to enhance high yield. Farmers should be encouraged by the government through giving them loans, subsidies and Agro-chemicals like fertilizer and herbicide at affordable prices to reduce cost of production and to increase commercial quantity of rice in the market.*

***Key words:*** *Determinants, Rice marketable surplus, Subsidies, Rice production*.

## Introduction

Rice is one of the most common and important grain consumed in almost every house-hold today in Nigeria. Despite its importance, the marketable surplus has not been able to meet up with the increasing demand as a result of the increasing population. In agriculture as a whole, marketing surplus plays a very vital role in determining the amount of rice produce that are available in the market for sales Garth *et al* (2006).
Bamidele *et al* (2010) reported that due to the contribution of rice to the per capita calorie consumption of Nigerians, the demand for rice has been increasing at a much faster rate than domestic production. It was also reported that the output of local rice was estimated to be three million tones, while the demand amounted to five million tonnes (Rahji and Adewumi, 2008).

As a measure to bridge the gap between supply and demand for rice in Nigeria, the government intervened in the rice sector by increasing import tariffs so that local production could be encouraged (Bamidele *et al,* 2010).
In 2000, Rahji *et al* (2008) reported that out of about 25 million hectares of land cultivated to various food crops, only about 6.37% was cultivated to rice. During this period, the average national yield was 1.47 tonnes per hectare. Generally, the price of rice determines the availability of the marketable surplus in the market. This is because the interest of every farmer is to be able to make sufficient profit from the sales of what they produce, supply and market.
Self sufficiency in rice production and marketing can also be feasible only if there is an improvement in production techniques and also if the rural rice farmers are assisted to reduce the cost of production. The importation of rice into Nigeria from the world market annually is over three hundred million US dollars (Akande, 2002). If this trend continues, the supply of rice would not be able to meet up the increasing demand. The study is of paramount importance as it examines the factors that influence the availability of commercial quantity of rice in Yala Local Government Area of Cross River State.

**Theoretical Framework**
Marketable surplus in the agricultural sector contribute to capital formation in the non-agricultural sector, improvement of standard of living in the sector by making available industrial consumer goods and capital formation in the sector by fetching the requisites of agricultural production ( Awotide and Adejobi, 2004). They also noted that every agricultural commodity is either produced for subsistence (home consumption) or for sale in the market to earn some cash income and thereby meet family requirement which are not satisfied on the farm income.

Marketable surplus is the residual production of agricultural produce left with the producer after meeting his requirements of family consumption, farm needs (seed and feed), kind payments and quantity added to end- of ï year stocks( Awotide and Adejobi, 2004). An average Nigerian farmer cultivates rice using family labour on small fragmented land holdings to produce a little surplus or sell to earn cash income to meet other family needs. The agricultural sector in Nigeria is characterized by subsistence farmers whose output levels are not enough to meet the demand (Alteri and Bisari, 2003). Chinin (1976) noted that marketable surplus is the commercial quantity of rice in the market.

This means that total rice output for a given year (QOUT) can be disposed off in several ways. It can be sold for cash in the free market (QSOLD), bartered for house

consumption item (HOUSKD), used to pay in kind farm household (QCONS), or added to end ï of ï year stocks (æSTOCKS).

There is paucity of information on rice marketing surpluses due to less attention paid to the concept. There is therefore need to provide vital information that will give scholars and the stake holders a better understanding on the actual relationship between the quantities of rice produced and the quantity that actually reach the market for sale. Therefore, the broad objective of this study is to analyze the factors affecting the availability of rice marketing surpluses in Yala Local Government Area. The specific objectives are:

1. to estimate the average quantity of rice produced;
2. determine the quantity of rice sold by farmers;
3. estimate the factors that affect the degree of variation of rice produced and rice sold.

## Research Methodology

### Study Area

This research work was conducted in Yala Local Government Area of Cross River State. Yala is located in the Nothern Sanatorial District of Cross River State and it is bounded in the North by Benue State, in the South by Ikom and Obubra Local Government Areas of Cross River State, in the East by Bekwara and Ogoja local Government Areas and in the West by Ebonyi State (Ogonu, 2010). Yala lies within latitude $6^{O}50$ôN and longitude $8^{0}50$ôE of the equator. It has a total land area of 1,739km$^2$ and a population of 210,843 (Ogonu, 2010). The climate is characterized by distinct wet and dry seasons. The temperature is fairly uniform with a mean monthly average of about $27^{0}$C.The major economic activities in the area are agriculture, fishing, mining and trading. The major foods crops produce are rice, yam, cassava, and maize.

### Sampling Techniques

A multi- stage sampling techniques was used; the first stage is the identification of the council wards in Yala Local Government Area. The second stage is the selection of four villages each in each of the council wards. The third stage is the random selection of three rice farmers from each of the four villages. While the fourth stage is the administration of questionnaires to twelve rice farmers in each of the council wards, given a total of 168 rice farmers that was used to generate data for the study.

### Analytical Techniques

Multiple Regression analyses was used to find the relationship between the dependent variable (quantity sold) and the independent variables, of farm size, household size, distance to the processing site, quantity of rice for gift, age of the farmer, level of

education, quantity of rice consumed, cost of transportation, total cost of production, farming experience, quantity reserve for uncertainty, quantity use to settle debts, quantity reserve for seed, sex, distance to the farm and quantity produced. The general expression is given as

$$Y=(X_1,X_2,X_3,X_4é\ X_{16})\ é\ é\ é\ é\ é\ é\ é\ é \quad (1)$$

While, the regression model is specified as

$$Qs=b_o+b_1X_1+b_2X_2+b_3X_3+b_4X_4+b_5X_5+b_6X_6+b_7X_7+b_8X_8+b_9x_9+b_{10}X_{10}+b_{11}X_{11}+ b_{12}X_{12}+b_{13}X_{13}+b_{14}X_{14}+b_{15}X_{15}+b_{16}X_{16}+eé\ é\ é\ é\ é \quad (2)$$

Where:

$Qs$= quantity of rice sold (₦);
$X_1$= size of the farm (ha);
$X_2$= distance to the farm (Km);
$X_3$= distance to the processing site (Km);
$X_4$= quantity of rice for gift;
$X_5$= age of the farmer (years);
$X_6$= quantity of rice use to settle debts;
$X_7$= quantity of rice consumed;
$X_8$= quantity rice reserve for seed;
$X_9$= quantity reserve for uncertainty;
$X_{10}$= sex
$X_{11}$ = educational level (years);
$X_{12}$= household size;
$X_{13}$= farming experience (years);
$X_{14}$= quantity produced (Kg);
$X_{15}$= cost of transportation (₦);
$X_{16}$= cost of production (₦);
$b_o$= intercept;
$b_1$-$b_{16}$= co-efficients and
$e$ = error term.

The above equation was subjected to multiple regression analysis using three functional models such as linear, semi-log, and double log functional forms. The forms of the equation are as follows;

1. Linear:

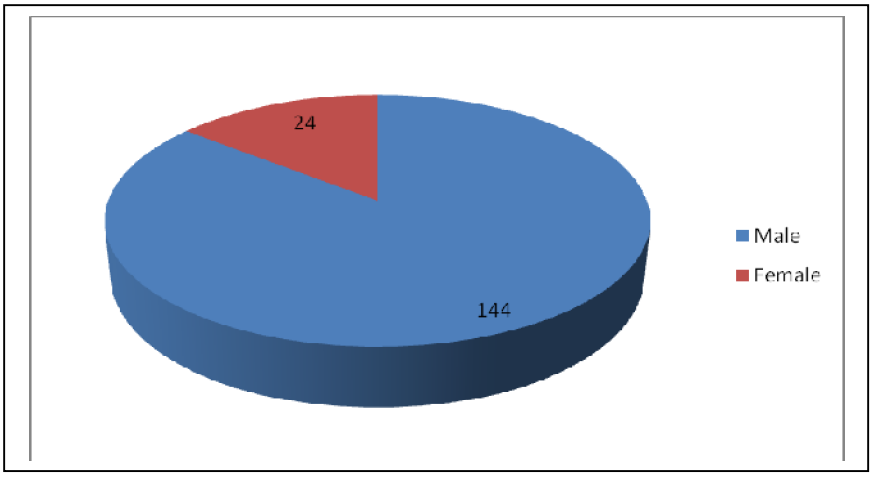
$$Qs=b_o+b_1X_1+b_2X_2+b_3X_3+b_4X_4+b_5X_5+b_6X_6+b_7X_7+b_8X_8+b_9x_9+b_{10}X_{10}+b_{11}X_{11}+$$

$$_{12}+b_{13}X_{13}+b_{14}X_{14}+b_{15}X_{15}+b_{16}X_{16}+eé\ é\ é\ é\ é\ é\ é\ é\ é\ é\ é\ é\ é\ é\ é\ é\ é\ é\ é\ é\ é\ .(3)$$

2. Semi-log: $Qs = \log b_o + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + b_6 \log X_6 + b_7 \log X_7 + b_8 \log X_8 + b_9 \log x_9 + b_{10} \log X_{10} + b_{11} \log X_{11} + b_{12} \log X_{12} + b_{13} \log X_{13} + b_{14} \log X_{14} + b_{15} \log X_{15} + b_{16} \log X_{16} + e$ é é é é é é é é é .....(4)
3. Double log (Cobb-Douglas): $Qs = \log b_o + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + b_6 \log X_6 + b_7 \log X_7 + b_8 \log X_8 + b_9 \log x_9 + b_{10} \log X_{10} + b_{11} \log X_{11} + b_{12} \log X_{12} + b_{13} \log X_{13} + b_{14} \log X_{14} + b_{15} \log X_{15} + b_{16} \log X_{16} + e$ é é é é é é é ..(5)

## Results and Discussions

This section presents, analyzed and discusses the data generated from the field on socio-economic characteristics of the respondents and the output of the regression results. From table 1 below, the total number of respondents sampled for the study were 168 out of this 85.71% were male ,while the females were represented by 14.29%. This shows that rice cultivation in Yala Local Government Area is not gender exclusive because both male and female cultivated rice. However, the female farmers are fewer in number as compare to their male counterpart. This is so because male have more asses to swamp land and other economic inputs than female in the study area. Also, the rice produced in the household is controlled by men. Women assist their husbands in the cultivation, processing and marketing the products.




Source: Field survey 2011.

**Figure 1: Showing distribution of respondents by sex.**

Figure 1 is a reflection of the sex distribution of the respondent among rice farmers in the study area. From figure 1 above, male rice farmers are 144, while their female counterparts are 24, giving a total of 168 rice farmers was used for the study in the area.
Table 1 also, indicates that 77.4% of the farmers in the area are married, while 22.61% are unmarried. The implication is that rice production in the area is mostly carried out by married men/women. This is likely so because of the requirement needed to cultivate rice in the study area, as most unmarried are young and are in school, or doing other businesses other than farming.

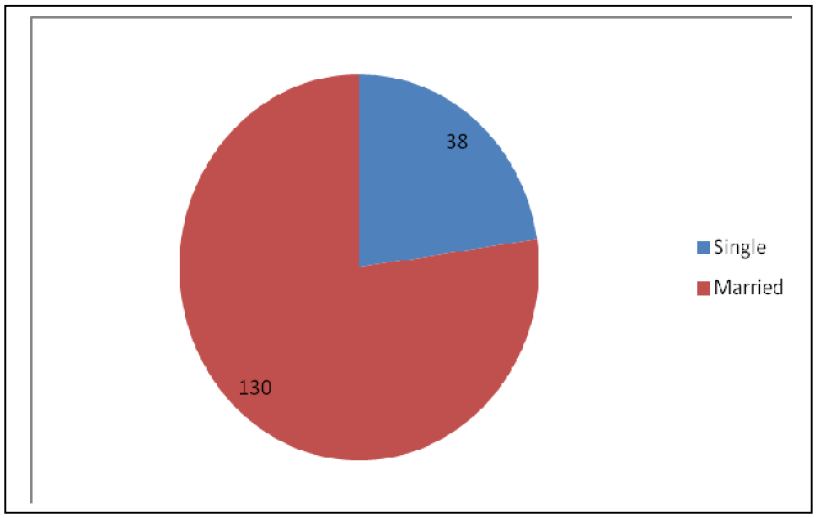



**Figure 2: Distribution of Respondents by Marital Status**

The pie chart in figure 2 above reveals that married men/women has a population of 130, while unmarried made up the remaining 38, giving a total of 168 rice farmers. The pie chart also shows that rice cultivation is mostly carried out by married men/women than those who are single. This is because the amount of labour required cultivation is high and the total cost of production is also high and involves a lot of capital.
Table 1: shows the age grouping of the respondents. It indicates that 44.0% of the respondents fell within 30-39 years. This implies that rice production in the area is predominantly carried out by people within this age bracket in the study area; rice production is done by active and energetic people in their middle ages. However, few old people (8.4%) also cultivate rice in the area as this is represented by the age bracket of 50 years and above. This can be seen in figure 3

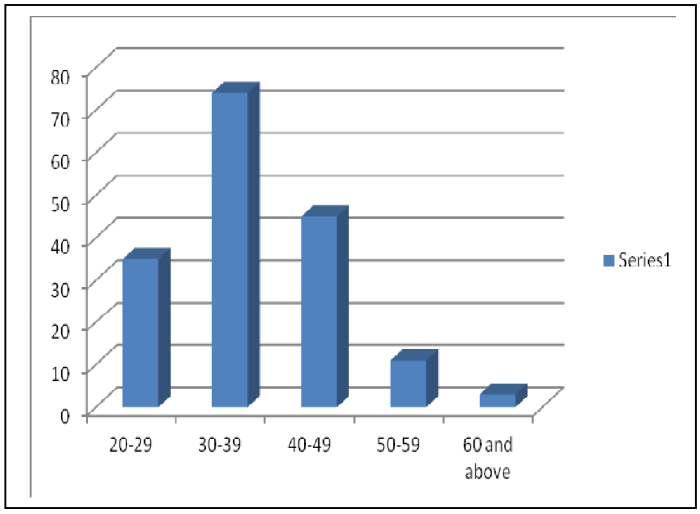



**Figure 3: Distribution of Respondents by Age**

The educational level of respondents in table 1, shows that 20.2% of rice farmers in the area are not educated while about 79.8% had some forms of formal education.

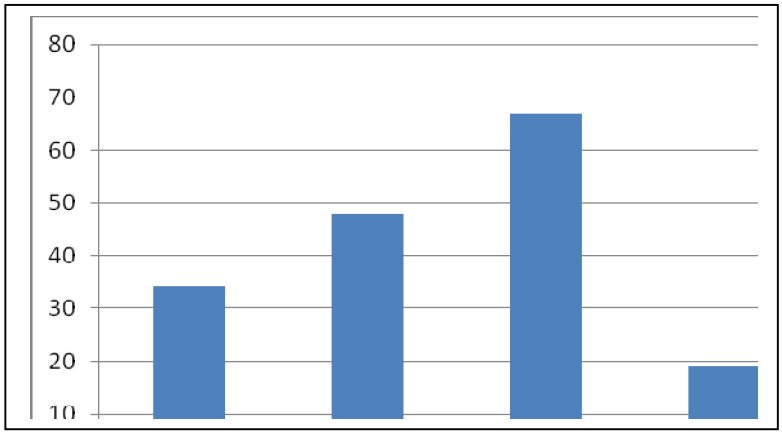
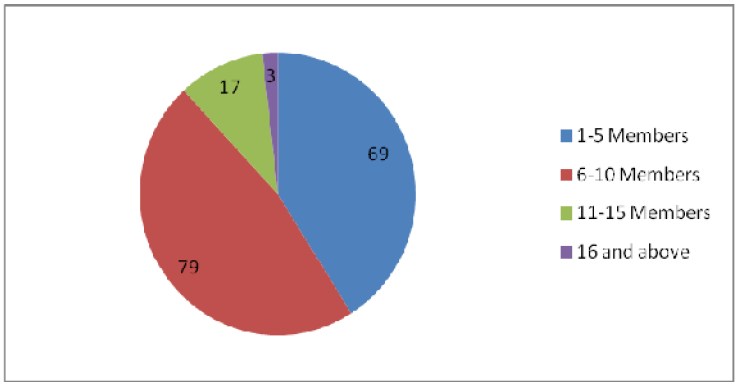



**Figure 4: Distribution of Respondents by Level of Education**

Table 1: below shows that the household size of 6-10 persons had 47.0%, had the highest frequency, which mean that rice cultivation needs average family labour to assist in the venture because it is labour intensive technology that is prevalent in the study area and increase family size guarantee labour availability.




Source: Field survey 2011

**Figure 5: Distribution of Household size of the Respondent**

The figure 5 indicates that household size of 6-10 members has 79% from the pie chart, The pie chart shows that those with household sizes of 6-10 members contribute more to rice marketable surplus in the study area.

Table 1 below also, illustrated that 51.79% of the farmers had farming experience of between 16 years and above, 22.02% This implies that rice farming is not only an occupation but a way of life of the people in the study area.

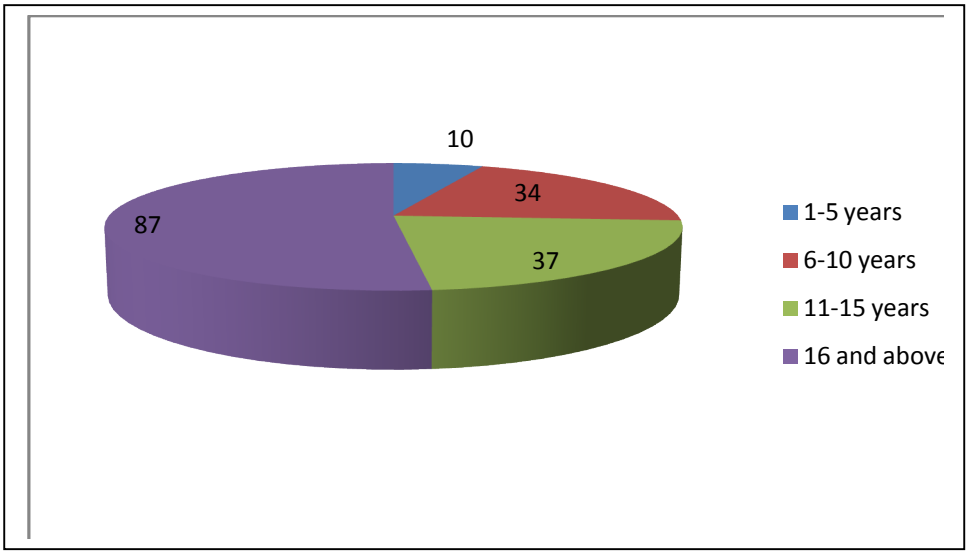



**Figure 6: Distribution of Respondents Farming Experience**

The pie chart in figure 6 above reveals that rice farmers that fall within the bracket of 16 years and above occupies the highest percentage of 87%, they constitute the section of the respondents that contribute more rice to the market.

Table 7: shows the mode of transportation of rice farmers in the area. 54.2% of farmers in the study area transport their produce with a van, while 36.9% of the farmers use motocycle and 8.9% of them use wheel barrow. This implies that majority of rice farmers in the area depend on the use of van to transport their produce to the market.

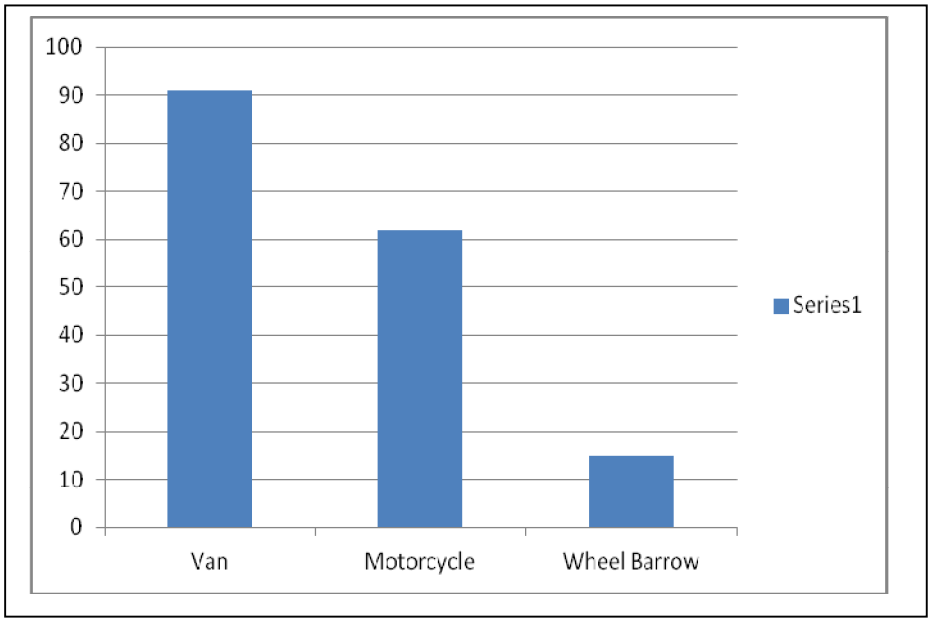
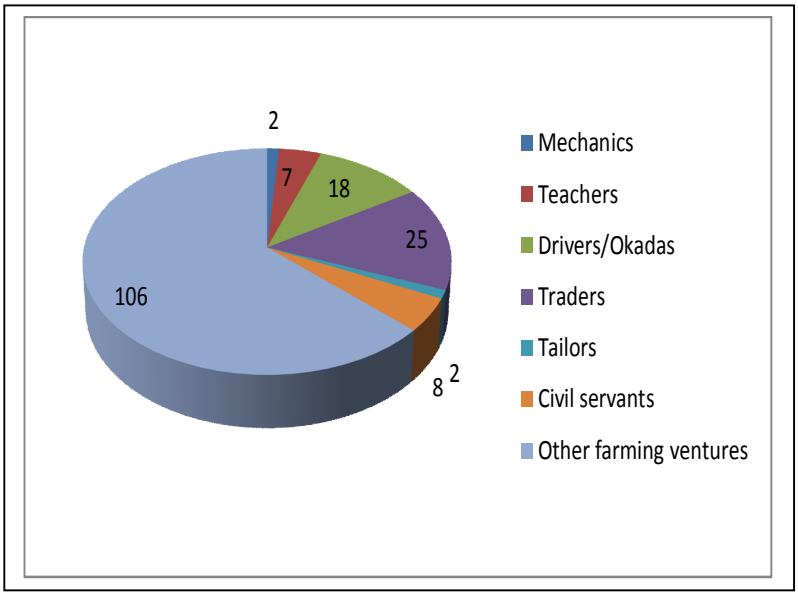



**Figure 7: Distribution of mode of Transportation of the Respondents**

**Off-Farm Activities:** Table 1 and Fig. 8 shows that rice farmers in the area are engage in other forms of activities aside from cultivating rice. From the pie chart, rice farmers are also involved in off farm activities such as driving motorbike, trading, civil service, tailoring, teaching and mechanics.

**Determinants of Rice Marketable Surpluses**

Ordinary Least Squares regression model was used to identify the factors affecting the volume of rice sold to the market by rice farmers in the area. From the regression analysis of the three functional forms, viz: the linear, double and semi-logarithmic model that were fitted to estimate the variables, the linear model was chosen as the lead equation (LE), to discuss the result base on the a priori expectation, the economic theory , statistical and the econometric conditions. This is so because in this model, the co-efficient of all the variables estimated carried the expected positive signs expect farm size, distance to the farm, distance to the processing site, age of the farmer, quantity of rice use to settle debt and farming experience.




Source: Field survey 2011

**Figure 8: Distribution of off-farm Activities of rice farmers**

This shown in the table 2 below, the result of the analysis presented in table 2 shows that farm size ($X_1$) is negatively associated with rice marketable surplus and significant at 10% level, meaning that increase in farm size donôt correspond to increase in output thereby affecting the commercial quantity of rice supply to the market. However, the result is at variance with economic a priori expectation, which predictably should have a direct relationship. The reason for the inverse relationship of farm size and output in the study area could be the technology being used. Farmers in the study area may only engage in acquiring larger farm lands but failed to apply the required agronomic practices.

Distance to the farm ($X_2$) has the expected negative sign and not significant at 10% level of significant. This finding reveals that distance to the farm ($X_2$) has an inverse relationship with rice marketable surplus. This is however in agreement with the findings of Awotide and Adejobi (2004) who noted that more rice would be sold the closer the market and ADP office.

Distance to the processing site ($X_3$) also have a negative sign and not significant. This implies that distance to the processing site has no influence on the quantity of rice sold. This is because most rice producers in the area convey their produce via van and other means of transportation to processing site for processing irrespective of the distance.

Quantity of rice for gift ($X_4$) has a negative co-efficient and significant even at 10% level. This shows that the quantity of rice being given as gift ($X_4$) had negative relationship with rice marketable surplus. This implies that the higher the quantity of rice given out as gift the lower the quantity of rice available to the market for sale.

Age of the farmer ($X_5$) has a negative sign and significant at 5% level. This suggests that rice production in the area declined with age of the farmer. This agreed with the findings of Chinaka *et al* (1995), which state that age affects the output of yam. This can happen if the majority of the people engage in the farming area are predominantly between the children and old people rather than in their active ages.

Quantity of rice use to settle debt ($X_6$) also has an inverse relationship and significant at 5% level. This implies that the quantity of rice used to settle debt affect the marketable surplus. The quantity of rice consumed ($X_7$), as expected had a positive relationship with the amount of rice supply to the market in the study area, it is significant at 10% level. This is in a variance with the a priori expectation which might be due to the family size of the rice farmers.

The economic implication should have been that the higher the house-hold size, the higher the amount of rice consumed and the lower the marketable surplus.

Quantity of rice reserve for seed ($X_8$) has a positive relationship with the quantity of rice sold to the market. One possible explanation for this is that most of the rice farmers in the study area get their planting materials (seed) from their past harvest. This suggests that large amount of the farmers harvest is being used as seed for planting rather purchasing seeds.

Quantity reserve for uncertainty ($X_9$) is significant at 5% level and has a positive sign which indicates that the amount of rice produced is being affected by the quantity of rice reserve by the farmers in the area. This finding is consistent with the result of Chinin, (1976) who noted that total rice output for a given year can be disposed off in several ways. It can be sold, consumed, reserve for future use or added to end-of-year stocks.

Level of education ($X_{11}$) has a positive relationship with the quantity of rice sold to the market. The study revealed that farmers with higher level of education produced and sold more rice than those with low level of education.

House-hold size ($X_{12}$) has a positive sign and it is statistically significant at 10% level. This shows that house-hold size influence the output of rice. This finding is in consonance with the work of Awotide and Adejobi (2004), who noted that family size positively influence rice output remarkably in Ebonyi State. This reveals that the size of house-hold determine the output of rice produced and the quantity sold. Family labour could also be used to supplement hired labour to reduce the cost of production.

Farming experience ($X_{13}$) is negatively associated with the quantity of rice sold and it is significant at 10% level. This suggests that farmers with less experience in rice farming sold more rice to the market. This is because most of the farmers in the area still use crude method of cultivating rice rather than adopting new technique.

Quantity of rice produced ($X_{14}$) as expected, has the positive sign and significant at 1% level. The positive relationship is in accordance with the apriori expectation that if more of rice is produced the marketable surplus will be increased. Another possible explanation for this is that most rice farmer are small-scale farmers so more output will be released for sale to recover the money incurred on variable input as soon as possible. The finding is consistent with the result of Awotide and Adejobi (2004), who noted that the more the rice output the more the marketable surplus.

Cost of transportation ($X_{15}$) also has a positive sign but not significant even at 10% level. This indicates that cost of transportation do not influence marketable surplus. Despite cost of transportation, producers will still sell the desired quantity of rice, because at short-run period reasonably adjustment cannot be achieved.

Cost of production ($X_{16}$) has the expected positive sign. This indicates that it influences the output of rice and the marketable surplus. This also means that farmers will tend to sell more of the rice produced to cover the cost of production.

## Conclusion

The study concludes that variables such as quantity of rice for gift, quantity of rice consumed, quantity of rice reserve for seed, quantity reserve for uncertainty, level of education, house-hold size, quantity of rice produced, cost of transportation, and cost of production as well as farmers socio-economic characteristics positively influence the quantity of rice sold in the area.

However, variables such as farm size, distance to the farm, distance to the processing site, age of the farmer, quantity of rice use to settle debt and farming experience have an inverse relationship against the marketable surplus

**Recommendations**

Based on the findings of the present study the following recommendations are made;

- Rice producers in the study area should increase their hectare of rice cultivation as well as apply all the necessary agronomic practices as these will increase the marketable surpluses.
- Local varieties of rice should be replaced with improved varieties to enhance high yield.
- Farmers should be encouraged by the government through giving them loans, subsidies and Agro-chemicals like fertilizer and herbicide at affordable prices to reduce cost of production and increase commercial quantity

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**Table 1: SOCIO-ECONOMIC VARIABLES OF RESPONDENTS**

**Gender Characteristics of the respondents by male and female**

| **Variable** | **Frequency** | **Percentage (%)** |
|---|---|---|
| Male | 144 | 84.71% |
| Female | 24 | 14.29% |
| Total | 168 | 100 |
| **Marital status of respondents** | | |
| **Variable** | **Frequency** | **Percentage (%)** |
| Single | 38 | 22.61 |
| Married | 130 | 77.38 |
| Total | 168 | 100 |

**Distribution of Respondents by Age**

| **Age group (Years)** | **Frequency** | **Percentage (%)** |
|---|---|---|
| 20-29 | 35 | 20.8 |
| 30-39 | 74 | 44.0 |
| 40-49 | 45 | 26.8 |
| 50-59 | 11 | 6.6 |
| 60 and above | 3 | 1.8 |
| Total | 168 | 100 |

**Distribution of Respondents by Level of Education**

| **Level of Education** | **Frequency** | **Percentage (%)** |
|---|---|---|
| Never attended school | 34 | 20.2 |
| Primary school | 48 | 28.6 |
| Secondary school | 67 | 39.9 |
| Tertiary Institution | 19 | 11.3 |
| Total | 168 | 100 |
| Level of Education | Frequency | Percentage (%) |
| Never attended school | 34 | 20.2 |
| Primary school | 48 | 28.6 |
| Secondary school | 67 | 39.9 |
| Tertiary Institution | 19 | 11.3 |
| Total | 168 | 100 |

**Distribution of Household size of the Respondents**

| **Household size** | **Frequency** | **Percentage (%)** |
|---|---|---|
| 1-5 | 69 | 41.1 |
| 6-10 | 79 | 47.0 |
| 11-15 | 17 | 10.1 |
| 16 and above | 3 | 1.8 |
| Total | 168 | 100 |
| Farming experience (Years) | Frequency | Percentage (%) |
| 1-5 years | 10 | 5.95 |
| 6-10 years | 34 | 20.24 |
| 11-15 years | 37 | 22.02 |
| 16 and above | 87 | 51.79 |
| Total | 168 | 100 |
| **Mode of Transportation** | **Frequency** | **Percentage (%)** |
| Van | 91 | 54.2 |
| Motorcycle | 62 | 36.9 |
| Wheel Barrow | 15 | 8.9 |
| Total | 168 | 100 |

**Table 2: Distribution of off-farm Activities of rice farmers**

| Variable | Frequency | Percentage (%) |
|---|---|---|
| Mechanics | 2 | 1.19 |
| Teachers | 7 | 4.17 |
| Drivers/Okadas | 18 | 10.71 |
| Traders | 25 | 14.88 |
| Tailors | 2 | 1.19 |
| Civil servants | 8 | 4.76 |
| Other farming Ventures | 106 | 63.10 |
| Total | 168 | 100 |

**Table 3: Regression results for the determination of rice marketable surplus**

| Variable | Description of Variable | Co-efficient | Standard Error | t-Statistic | Probability |
|---|---|---|---|---|---|
| Constant | | 6.054017 | 3.892599 | 1.555264 | 0.1220 |
| $X_1$ | Farm Size (ha) | -1.248024 | 0.662036 | -1.885131* | 0.0614*** |
| $X_2$ | Distance to the farm (Km) | -0.022793 | 0.169583 | -0.134405* | 0.8933 |
| $X_3$ | Distance to processing site (Km) | -7.35E-05 | 0.289699 | -0.000254* | 0.9998 |
| $X_4$ | Quantity of rice for gift | - 0.034355 | 0.436654 | 0.078678* | 0.9374 |
| $X_5$ | Age of the farmer (Years) | -0.101605 | 0.097302 | -1.044224* | 0.2981 |
| $X_6$ | Quantity use to settle debt | -0.307134 | 0.347252 | -0.884469** | 0.3779 |
| $X_7$ | Quantity consumed | 0.534168 | 0.310391 | 1.720953* | 0.0873*** |
| $X_8$ | Quantity reserve for seed | 0.219675 | 0.822018 | 0.267239* | 0.7897 |
| $X_9$ | Quantity reserve for uncertainty | 0.680457 | 0.234918 | 2.896571*** | 0.0043* |
| $X_{10}$ | Sex | 2.479219 | 1.623015 | 1.527539** | 0.1288*** |
| $X_{11}$ | Educational level (Years) | 0.111594 | 0.107667 | 1.036471** | 0.3017 |
| $X_{12}$ | House hold size | 0.454656 | 0.165373 | 2.749270*** | 0.0067* |
| $X_{13}$ | Farming experience | -0.169091 | 0.091628 | -1.845407** | 0.0670*** |
| $X_{14}$ | Quantity produced | 0.455598 | 0.096145 | 4.738670** | 0.0000* |
| $X_{15}$ | Cost of transportation | 1.48E-06 | 0.000672 | 0.002201* | 0.9982 |
| $X_{16}$ | Total Cost of Production | 7.13E-05 | 0.000501 | 0.142336* | 0.8870 |

Source: Output from regression analysis.

R Squared ($R^2$)=0.59 Adj. $R^2$=0.53 F-value 8.765***

*Significant at 1% level **Significant at 5% level ***Significant at 10% level