

DETERMINANTS OF RISK MANAGEMENT STRATEGIES AMONG RICE FARMERS IN EBONYI STATE, NIGERIA

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ABSTRACT

Risk is a likelihood of a negative outcome which is capable of distorting business ideas especially when such risks are poorly managed. This paper specifically examined rice farmers' profile, risk sources, risk management strategies and determinants of choice of risk management strategies. Multistage sampling technique was adopted for sample selection. Data collected were analysed using descriptive statistics and Ordered Probit regression. The results showed mean age of 48.7 years with 19.4 years mean farming experience. Majority (78.33%) of the farmers were males while 60% attained primary level of education. All the respondents indicated Input/output price fluctuation as a major source of risk. It also showed that 96.67% and 71.67% of them identified illness/death and farm theft as other sources of risk. Similarly, improved variety, use of agro-chemicals, use of fertilizer, mixed cropping and cooperative marketing were mostly identified as risk management strategies in the study area. The likelihood ratio statistics as indicated by χ^2 (48.50) were highly significant ($P < 0.0019$) and this also suggested that the model has a strong explanatory power. Gender, age, extension contacts, education and farming experience were major determinants of risk management strategies. It therefore recommended the provision of accessible and affordable formal education in order to enhance farmers' skills and productivity in rice production.

Key Words: Rice, Risk sources, Risk management Strategies, Ordered Probit.

1.0 INTRODUCTION

Over a period of twenty years, Nigeria's economy was dominated by the export of oil until late 2005. The development of the petroleum industry during this period transformed Nigeria from an agricultural based economy to a major oil exporter. According to World Bank report (1993), the share of exports on fuel stood at 96% in 1991. This made Nigeria to be branded a mono-economy contrary to what was obtainable before the oil boom when agriculture contributed over 70% of export. Nigeria was then rated among the world's leading producers of cocoa, groundnuts etc. (Omobowale *et al.*, 2009). However, over time agriculture which contributed immensely to the Nigerian economy remained neglected for crude oil. The Country has moved from being an exporter of agricultural commodities to becoming a huge importer of food including staples like rice and beans. Now, with the dwindling oil prices in the global market and the attendant drop in government revenue, there is an urgent need to diversify Nigeria's economy and to unlock the country's agricultural potentials through massive investments in order to reduce poverty and secure food for its teeming population.

Rice is the most important staple for about half the human race (National Rice Development Strategy (NRDS) (2009). It has been estimated that half the world's population subsists wholly or partially on

rice. In terms of local production, rice grew from 1.8milled rice per hectare in 1995 to 2.21 million tons per hectare in 2009. These notwithstanding, Ojogho and Alufohai, (2010) noted that Nigeria has long been dependent on staple imports to feed its teeming population with a total of \$4.3bn at the end of December 2013. Considering the favourable agro-ecology for rice production in Nigeria, the country has the potential of boosting rice production to the point that the crop becomes Nigeria's number one export crop. The problem remains that rice is mostly cultivated by small scale farmers whose operation resulted in a vicious circle of low agricultural productivity and poor yield. Umeh and Ataborh, 2006 cited in Ben-Chendoet *et al.*, (2015) is of the opinion that low productivity in rice production is also attributable to risk management culture and practices of the rice farmers. .

Agriculture is an inherently risky business. Its biological nature has made economic performance of production very uncertain (Drummond and Goodwin, 2011). These risks factors are not under the control of farmers but they have over the years developed ways of coping and managing them (Food and Agricultural Organization, 2013). Risk disrupts the most crucial decisions of the farming households whose prospects could be to make farming a lifetime business venture. This is one of the reasons which have not allowed investors to benefit from the great

potential in agriculture in the developing countries like Nigeria. But with adequate policy on rice production and risk managements, investors could be attracted into Nigerian agriculture especially when the environment for investment becomes very friendly. To this end, the paper specifically examined the farmers' profile, risk management strategies adopted and determinants of risk management strategies.

2.0 MATERIALS AND METHODS

The study was carried out in Ebonyi State, Nigeria. A multistage sampling technique was adopted for the study. First, 3 Local Government Areas (Izzi, Ikwo and Ohazara-South LGAs) were purposively selected based on the prevalence of rice farmers in the area. The three LGAs have a total of 30 communities. In the second stage, a proportionate sampling was used to select 12 communities. The proportionate selection was based on 40% of the total communities in the selected LGAs. In stage three, a proportionate selection of 44 villages out of a total of 110 villages was performed. List of registered rice farmers in the selected villages was compiled with the help of resident extension agents. The list which was made up of 205 registered rice farmers formed the sampling frame from which the final sample was drawn. In the Final stage, 82 rice farmers which constitute 40% of the entire registered farmers were randomly selected. A total of 82 questionnaires were distributed but only 60 of them were valid.

Following Greydanuset al., (2013); Mohammad&Clem (2006) Ordered Probit was adopted. Each farmer is assumed to have adopted a certain number of risk management strategies based on the maximization of an underlying utility function. The reduced form of the unobserved Ordinal Probit model is shown as follows:

$$Y_i^* = X_i B + e_i, e_i \sim N(0, 1), i=1, \dots, N \dots (1)$$

Where Y_i is the observed ordinal variable which takes on values 1 through 3. Thresholds partition the real line into a series of regions corresponding to the various ordinal categories. Farmers in the low category adopted fewer risk management strategies while farmers in medium and high categories adopted more and highest number of risk management strategies respectively

X_1 = Gender (Dummy: 1 for male, 0 if otherwise), X_2 = Marital Status (Dummy: 1 for married, 0 for otherwise), X_3 = Household Size (Number), X_4 = Education (Number), X_5 = Age of Household Head (Years), X_6 = Extension Contact (1 for access, 0 if otherwise), X_7 = Farm Experience (Number). The economic *a priori* expectation is stated mathematically as shown: $X_1, X_2, X_4, X_6, X_7 > 0$; $X_3, X_5 < 0$

3.0 RESULTS AND DISCUSSION

3.1 Socio-economic Characteristics of the Respondents

The socioeconomic characteristics examined are presented below on Table 1.

Table 1: Distribution of Rice Farmers by Socio-economic Characteristics

| Socio-economic Characteristics Farmers' N = 60 | | | | | |
|--|-----------|------------|--------------------------------------|-----------|------------|
| Variables | Frequency | Percentage | Variables | Frequency | Percentage |
| a) Age (Years) | | | d) Education (Level) | | |
| 21 – 30 | 3 | 5.00 | Primary | 36 | 60.00 |
| 31 – 40 | 15 | 25.00 | Secondary | 16 | 26.70 |
| 41 – 50 | 17 | 28.33 | Tertiary | 8 | 13.30 |
| 51 - 60 | 16 | 26.67 | e) Farming Experience (Years) | | |
| 61 – 70 | 8 | 13.33 | 1-5 | 15 | 25.00 |
| 71 - 80 | 1 | 1.67 | 6-10 | 4 | 6.70 |
| b) Gender | | | 11-15 | 19 | 31.70 |
| Male | 47 | 78.33 | 16-20 | 20 | 33.30 |
| Female | 13 | 21.67 | 21-25 | 2 | 3.30 |
| c) Household size (No. of Persons) | | | f) Extension Contact | | |
| 1-4 | 3 | 5.00 | Yes | 41 | 68.30 |
| 5-8 | 32 | 53.33 | No | 19 | 31.70 |
| 9-12 | 22 | 36.67 | g) Marital Status | | |
| 13-16 | 3 | 5.00 | Single | 10 | 16.67 |
| | | | Married | 50 | 83.33 |

Source: Field Survey Data, 2017

Table 1 showed a mean age of 48.7 years. This is an indication that the farmers are within their productive age and can make reasonable decision regarding risk management strategies. This conforms to the findings of Ben-Chendoet *al.* (2016), who reported that majority of paddy rice farmers in Kaduna State were within the age category of 40–49 years. Majority (78.33%) of the farmers were males, and 83.33% were married. A family is an interaction forum of the society and so with this number of married farmers; it becomes easy to pass across information on risk management. With mean household size of 8 persons, it could be adduced that large household size helps to provide unpaid labour during peak period. This assertion supports the findings of

Oluyole (2013) that large household size has a great implication on family labour supply. Majority of the farmers (60%) attained only the primary level of education and the mean farming experience was 19.4 years. These statistics are pointers to the fact that most of these farmers have spent a greater part of their lives in the farm. While in the farm, they could not have been privileged to attend high levels of formal education, hence, they concentrated on farming for their family up-keep.

3.2 Sources of Risk

The sources of risk as indicated by the farmers are presented on Table 2 below.

Table 2: Sources of Risk in Rice Production

| Type of Risk | Frequency* | Percentage | Type of Risk | Frequency* | Percentage |
|--------------------------------|------------|------------|--------------------------|------------|------------|
| a) Production Risk | | | c) Social Risk | | |
| Pests and diseases | 33 | 55.00 | Poor infrastructure | 41 | 68.33 |
| Flood | 47 | 78.33 | Farm theft | 43 | 71.67 |
| Drought | 47 | 78.33 | Ageing | 21 | 35.00 |
| b) Market Risk | | | d) Financial Risk | | |
| Input/output price fluctuation | 60 | 100.00 | Illness/ death | 58 | 96.67 |
| Preference for foreign rice | 37 | 61.67 | High interest rate | 47 | 78.33 |
| | | | Low access to credit | 51 | 83.33 |

*Source: Field Survey Data, 2017 *Multiple responses were recorded*

Technical, market, social and financial risks were the major sources of risk identified by farmers; with social risk and technical risk having the highest responses (163 and 127 respectively). Within the social risk, illness/death (96.67%) and farm theft (71.67%) were the biggest challenges faced by the farmers. The result on illness/death could be linked to the drudgery that is inherent in farming in the rural areas of Nigeria. Flood and drought, which are climatic variables, had 47 responses each in the technical risk category. These findings are consistent with Ben-Chendoet *al.*, (2016) who found that most

farmers highlighted the technical risk consisting of pest/diseases among others as the major source of risk in paddy production. Climate change has been severally identified as a major affecting the production and productivity of farmers. The farmers could lose their entire crop to these two production challenges.

3.3 Risk Management Strategies

Risk management strategies by rice farmers in the study area are presented on table 3

Table 3: Risk Management Strategies Adopted by the Rice Farmers

| Risk management strategies | Frequency* | Percentage | Risk management strategies | Frequency* | Percentage |
|----------------------------|------------|------------|----------------------------|------------|------------|
| Use of improved variety | 60 | 100.00 | Cooperate marketing | 52 | 86.67 |
| Use of agro-chemicals | 60 | 100.00 | input/output storage | 37 | 61.67 |
| Use of fertilizer | 60 | 100.00 | Farm Insurance | 17 | 28.33 |
| Mixed cropping | 60 | 100.00 | Forward Contracting | 24 | 60.00 |
| Non-farm business | 21 | 35.00 | | | |

*Source: Field Survey Data, 2017 *Multiple responses were recorded*

From the result, while all the respondents identified use of improved/resistant variety, use of agro-chemicals, use of fertilizer and mixed cropping as major risk management strategies, a considerable proportion (86.67%) of them indicated cooperative marketing as risk management strategies.

3.4 Determinants of Risk Management Strategies

Table 4 below presented the estimated marginal effects from the Ordered Probit Model.

Table IV: Marginal Effects of Ordered Probit Risk Management Strategies Model

| Explanatory variable | Low level | Middle Level | High Level |
|-----------------------|---------------------|---------------------|--------------------|
| Gender | .7150715 (5.96)* | .0963577 (2.35)** | -.5108511 (-3.25)* |
| Marital status | -.0692028 (-0.45) | -.0521517 (-2.10)** | .0907204 (0.45) |
| Household size | -.0061719 (-0.15) | -.0901191 (-6.99)* | .008091 (0.15) |
| Education | -.0052692 (-0.38) | -.0016384 (-0.37) | .0069075 (3.80)* |
| Age | .0064108 (1.98)*** | .0019933 (0.95) | -.0084042 (-4.38)* |
| Extension contact | -.0204062 (-2.04)** | -.006345 (-2.02)** | .0627512 (4.77)* |
| Farm experience | -.0050515 (-3.67)* | -.0015707 (-0.65) | .0099222 (2.72)* |
| Log likelihood | -159.721448 | | |
| LR chi2 | 48.50 | | |
| Prob>chi2 | 0.001927 | | |
| Pseudo R ² | 0.5205 | | |
| Number of obs. | 60 | | |

Source: Field Survey Data, 2017

Notes: *, **, *** = significant at 1%, 5%, and 10% significant level, respectively. Figures in parentheses = z-values

The likelihood ratio statistics as indicated by χ^2 (48.50) are highly significant at $p < 0.0019$. This suggests that the model has a strong explanatory power. Based on the results, the observed factors that were significantly related to the choice of risk management strategies in the low class were gender (at 1%), age (at 5%) and extension contact (at 5%) and farming experience (at 1%). From the result, a male rice farmer in low level had the probability of moving to the next level by 0.715 more than female rice farmers. Similarly, for one unit increase in age and farming experience, the probability of moving to the next level was expected to increase by 0.64% for age and decrease by 0.5% for farming experience.

Also, the rice farmers on the low level class that had more access to extension services had the probability of moving to the next level by 0.2 higher than those with less access to extension services. As expected, at this level, the results on gender and household size are consistent with a priori expectation while for farming experience, the sign negated a priori expectation, though it supports findings by Osujiet *al.*, (2017) who reports farmers with low experience generally lack some farming skills and consequently need to resort to risk management strategies more than those with more farming experience.

The choice in the middle class were negatively and significantly related to gender and marital status at 5% levels of significance and positively and significantly related to extension contacts at 5% and household size at 1%. The result of the relationship between household size and level of choice of risk management strategies was negative and this is consistent with findings of Osujiet *al.*, (2017). Following his argument more people in the family means more people to feed and less money to move to the higher level of choice of risk management strategies. For a male rice farmer in the middle class, the probability of moving to a higher class was 0.096 less than his female counter part. For rice farmers who are married in the middle class, the probability

of moving to a higher class was expected to decrease by 0.052. For a unit increase in the number of extension contact and number of household size in the middle class, the probability of moving to the next level were expected to decrease by 0.63% and 9% respectively.

The choice of risk management strategies in the high class were negatively and significantly related to gender and age at 1% level of significance and positively and significantly related to education and farming experience at 1%. These results are consistent with the signs of their coefficients except for gender and household size. Against a priori expectation, household size had a positive and significant relationship with risk management strategies however this is in line with the findings of Seyi and Tosin (2015). For male rice farmers, the probability of moving to a higher class was expected to be smaller by 0.09 than their female counter part. Also for a unit increase in the number of extension contact, farming experience and years spent in school, the probability of moving to the next level was expected to increase by 6.2%, 0.9% and 0.7% respectively. The more experienced a farmer is the more exposed he is to different risk management strategies. Similarly, for a unit increase in age, the probability of moving to a higher level was expected to decrease by 0.0084. The result on number of years spent in school is in line with the result from Torkamani and Ezatabadi, (2001), who found a positive relationship between adoptions of risk management strategies with education. The inverse relationship between age and choice of risk management strategies is similar to findings by Ghorbani and Jafari (2009) who concluded that the age of the farmer had a significant negative effect on risk management. Also, farming experience was found to increase the likelihood of moving to a new level of risk management strategies.

4.0 CONCLUSION AND RECOMMENDATIONS

Sources of risk were identified as well as the corresponding risk management strategies. The paper concluded that being educated and experienced would avail farmers the opportunity of choosing the most effective risk management strategies in the study area. It therefore recommended the provision of affordable formal and non-formal education to rice farmers. Adequate extension services should be made available in order to enhance farmers' skills in risk management.

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