Risk Assessment and Management Strategies in Rice Production in Niger state, Nigeria

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ABSTRACT

Rice is an important cereal crop in Nigeria. However, its availability is affected by the risk involved in its production. Hence, farmers use various strategies to mitigate these risks. Therefore, it is on these bases, the study assesses the risks and management strategies in rice production in Niger State, Nigeria. Data were collected from 151 respondents and analyzed using descriptive statistics and multinomial logit regression. The results revealed that, majority (90.7%) of the respondents were males and highly educated (82.1%). The mean age of the respondents was 35years and a mean of 12 years of experience in rice production. The major risk sources that compromise rice production in the study area includes climate variability (WM=4.16), pilfering/theft (WM=3.68) and market failure (WM=3.56). The most effective management strategies adopted by rice farmers to mitigate risks associated with rice production in the study area were diversification into non-farm business (WM=2.72) which ranked 1st, use of agro-chemicals (WM= 2.38) ranked 2nd while the use of crop rotation technique of farming (WM = 2.30) and cooperative marketing (2.30) ranked 3rd respectively. The multinomial logit regression reveals that age, educational level, farming experience, farmers' association, goal of farming, household size, farm output, access to extension and number of extension contacts had significant effect on the management strategies adopted by rice farmers in the study area. Thus, it was recommended that the farmers should adopt the modern risk management strategies such as insurance and integrated farming system.

Keywords*:* Risk, Management strategies, adoption, rice production.

INTRODUCTION

Rice is a staple food in Nigeria and the most widely consumed. According to Imolehin and Wada (2000), half of the human race consumes rice. West Africa has been producing rice for at least 3000 years and Nigeria is the highest consumer and producer of rice within the West African sub-region (Akaeze,2010) as every individual household both the poor and the rich consume a great quantity and its consumption in Nigeria has risen tremendously to about 10% per annum tremendously due to change in consumer preference(Godwin, 2012). Virtually all the agro-ecological zones of Nigeria cultivate rice in both upland and swamp areas depending on the variety (Kano State Agricultural and Rural Development Authority [KNARDA], 2007).

Every business is subjected to risk and agriculture is not an exception. Agricultural risk includes those coming from markets, such as the prices of inputs, outputs and production risks. Production risks are risks that probability can be assigned and can also be insured such as pest and diseases and climatic condition. Risk management is part of the business management of the farm (Organization for Economic Co-operation and Development [OECD], 2009). Farmers are faced with different types of risk but variation in the risk environment and tools available to strategize the risks makes it a must to be involved in risk management education. Risk management in agriculture has become more important unlike before, most especially for mechanized or modern farms which can no longer rely upon family labour, their own land and equity capital. Growth strategies instead are most times used to characterize modern farms that involve hiring paid farm workers, leasing most of the shares of their land and increasing debt to equity ratios (Schaper *et al.*, 2011).

Risk occurs because agriculture is affected by many uncontrollable events that are often related to weather, including excessive or insufficient, rainfall, extreme temperatures, insect pests, and diseases (Jirgi, 2013). In Nigeria, slow rice production and the developing status of the

nation are major reasons why risk-measuring is unpopular and rarely considered. Agricultural business organizations and farmers are more likely to face risks than other business sectors owing to the fact that agricultural products and services are related to natural processes, biological assets, and plant and animal diseases. Agriculture is highly exposed to adverse natural events, such as insect damage or poor weather conditions, which have a negative impact on the production. In the future, climate change may lead to a further increase in the economic costs of major climatic disasters.

Farmers have to develop risk management strategies to cope with those adverse events and sometimes may require government intervention when the risk is beyond their control. Hence, in agriculture it is extremely important to evaluate and manage agricultural risks and to select the best management methods to adopt. The understanding of the information on risks in agricultural production and the knowledge of the management strategies to adopt is key to profitable production. In view of the above, this study was designed to assess the risk and management strategies in rice production in Niger State, Nigeria. The specific objectives are to: describe the socio-economic characteristics of rice farmers in the study area; identify the sources of risks encountered by rice farmers in the area; examine the management strategies adopted by rice farmers to mitigate incidences of risk in rice production; assess the level of effectiveness of the management strategies adopted by rice farmers to mitigate risk and examine the determinants of management strategies employed by rice farmers to mitigate risk.

METHODOLOGY

This study was conducted Niger State, Nigeria. The State is located on Latitude 8°22′ to 11°30′ North and Longitude 3°30′ to 7°20′East. It has a total land area of about 76,481km^{2}which represent 8% of the total land area of Nigeria. The mean annual rainfall in the state is 1,350mm with an average temperature of 27^{0}C (Salihu *et al.*, 2017). As at 2006, it has a population of 3.9 million in 2006 and the projected figure of 5.4 million persons in 2016 using growth rate of 3.2 percent (NPC, 2006). The state is divided into three agricultural zones namely; zone I, Zone II and Zone III with Bida, Kuta and Kontagora as their respective headquarters. The major occupation of the people is agriculture with about 85% of the population engaged in farming.

In order to obtain a sample frame for this study, a list of registered rice farmers was obtained from National Fadama Development Project, Fadama III additional Financing Niger State. To obtain the sample size for this study, a multistage sampling technique was adopted. The first stage involved random selection of one LGA from each of the zones. In the second stage, four (4) villages were randomly selected from each of the selected LGA. The third stage involved the use of Yamanne formula to select sample size from the sample frame from the list of registered farmers involved in rice production from the selected villages. Thus, a total of 151 registered rice farmers were randomly selected as respondents for this study. The Yamanne's formula is mathematically expressed as:

$$n = \frac{N}{1+N(e)^2} \qquad (1)$$

Where;
n = samples size,
N = finite populatione = limit of tolerable error (level of precision at 0.05 probability) and l = constant

Both descriptive statistics (such as frequency, percentages and mean) and multinomial logit regression was used to analyze the data for this study. The risk sources encountered by rice farmers was determined using 5-point Likert scale of Very Likely (VL) = 5, Likely (L) = 4, Neutral (N) = 3, Not Likely (NL) = 2, Not Very Likely (NVL) = 1. A mean score of 3 was obtained by adding 5+4+3+2+1 = 15 and dividing it by 5. Thus, mean scores ≥ 3

were categorized as "high risk sources", while, and mean scores < 3 as "low risk sources". The management strategies employed by rice farmers was determined using a 3-point Likert type rating scale of Regularly Used (RLU) = 3, Seldom Used (SU) = 2, Never Used (NU) = 1. A mean score of 2 was obtained by adding 3+2+1 = 6 and dividing it by 3. Thus, mean scores ≥ 2 were categorized as "Regularly used management strategies", while, and mean scores < 2 as "Seldom used management strategies". The level of effectiveness of the management strategies was determined using a 5-point Likert scale of Very Effective (VE) = 5, Effective (E) = 4, Moderately Effective (ME) = 3, Not Effective (NE) = 2, Not Very Effective (NVE) = 1. A mean score of 3 was obtained by adding 5+4+3+2+1 = 15 and dividing it by 5. Thus, mean scores > 3 were categorized as "Effective management strategies", mean scores = 3 as moderately effective management strategies, while mean scores < 3 as "Not effective management strategies".

Model specification

To achieve objective (5), multinomial logistic regression model was used since the dependent variable is nominal with more than two levels. This analytical approach is commonly used in management strategies involving multiple choices that are not ordered (Green, 2003).The model is specified as follows:

$$Yi=BX_1+BX_2+BX_3+BX_4+BX_5+BX_6+BX7+BX_8+BX_9+BX_{10}+BX_{11}+e \quad (2)$$

Where: Yi= Management strategies (Income diversification=1, insurance=2, Mixed cropping=3, Storage facilities = 4, Irrigation=5, Mixed farming=6, Crop rotation=7).X_1= age of the farmer (years);X_2= household size (numbers);X_3= level of education (number of years spent in school); X_4= farming experience (years);X_5= farm output (kg);X_6= farm income (NGN);X_7= access to extension services (yes=1, no=0);X_8= member of farmers association (yes=1, no=0); X_9= farm size (ha); X_{10}= goal of farming (family consumption=1, otherwise=0); X_{11} = involvement in extension events on risk management = (No. of events involved); Bo=intercept; B_1+ B_{11} = coefficients to be estimated; e = error term.

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Respondents Age distribution of the respondents:

The results in Table 1 shows that majority (77.5%) of the respondents were between the age of 21 and 40 years. The mean age of the respondents was 35 years. The implication of the mean age is that the young farmers were at their productive age to manage the risks they encounter in the production of rice. This finding is in line with that of Okoruwa *et al.* (2009) and Ekong (2010) that age bracket of farmers in Nigeria lies between 30-50 years. Moreover, the age of farmers determines his strength and also to some extent his experiences in risk management.

Household size of respondents

The results in Table 1 show that more than half (64%) of the respondents had a household size of between 6-10 members with a mean 8 of people, implying a large household size. The size of household determines the variability in agricultural production and the amount of labour input. This implies that the larger the number of people in the household, the more likely to get family labour. This is in line with the findings of Marenya and Barrett (2007) who found that as the household size increases, the likelihood of expanding cultivated farm land is expected to be high among rural crop farmers.

Formal education of the respondents

The result in Table 1 shows that the majority of the respondents (82.1%) in the study area had formal education in which most of them (47.7%) attended primary and secondary school. The implication is that the respondents are educated enough to know and understand the complexities involved in risk encounter and the management strategies to adopt to mitigate such risks. This agrees with the findings of Nmadu *et*

al. (2012) who found that the level of education contributes much for productivity, adoption of new technology and the combination of different farming techniques.

Years of farming experience

Farming experience is the total number of years an individual spent farming. The result of Table 1 shows the farming experience of the respondents with a mean of 12 years. This implies that the farmers have spent a lot of years farming and are quite experienced in rice production. This is expected to give those technical skills and higher level of familiarity with the risks associated with rice production and knowledge on how to manage them.

Sources of Risks encountered by Rice Farmers

Sources of risk are those means through which farmers are exposed to certain unforeseen negative circumstances which hinder or inhibit their level of rice production in the study area.

A comprehensive list of the risk sources was made and farmers were asked to thick appropriately the source of risk they encounter. The findings in Table 2 indicated that rice farmers in the study area were more exposed to risks associated with climatic and institutional related factors. The most significant climatic factors influencing rice production involves variation in seasonal rainfall and sunshine (WM= 4.16) and Incidences of flood (3.54).This result is not surprising considering that most if not all crop farming operations are seasonal dependent.

Risk Management Strategies Adopted by Farmers

Seasonality dictates planting, harvesting and even storage thus; extremities or deviation in climatic elements could bring about poor harvest. This finding is consistent with the result of Aidoo *et al.* (2014) who reported weather variability among the most significant source of risk faced by farmers in Nigeria. Similarly, lack of institutional security in rural areas in the form of Pilfering/theft (3.68), Market failure (3.56) and Unsuitable credit facilities (3.48) were also reported as risk sources to rice farmers as these factors tends to limit farm income and consequently discourages sustainable production of rice. The situation is more worrisome as farmers also reported to lack extension services (3.46) in their production activities. This result corroborates with the findings of Kwame (2018) who reported that lack of secure institutes for suitable financial, assets and marketing information regulation constitute a major source of risk to rural farmers especially, in profit maximization.

Risk management strategies are those techniques employed by the farmers in order to mitigate the incidence of risks. A list of risk management strategies was made and farmers were asked to thick appropriately the risk management strategies they used. The findings in Table 3 indicated that rice farmers in the study area are more engaged in non-farm businesses activates (WM = 2.72), use of agrochemicals (WM = 2.38), crop rotation (WM = 2.30), cooperative marketing (WM = 2.30) and use of improved seeds (WM = 2.19) as their major risk management strategies. This implies that farmers are more engaged in other business such as owning shops, driving and buying and selling, use pesticides and other similar agrochemicals coupled with improved varieties and have their farm products marketed cooperatively. This finding is in line with the findings of Ben-chendo *et al.* (2015) that majority of the respondent adopted the use of improved seeds and varieties of rice, adopted mixed-cropping and non-farm businesses as a means of reducing risk. The non-significant strategy which is farm insurance (WM = 1.68) implies that the farmers have no idea about insuring their farm. This could be attributed to low level of awareness on agricultural insurance policies in the study area. This is contrary to the assertion made by Ben-chendo *et al.* (2015) that most of the farmers had their farm insured.

Level of Effectiveness of the Risk Management Strategies Adopted by Farmers

A list of risk management strategies was made and farmers were asked to thick appropriately thelevel effectiveness of the risk management strategies they adopted.

The findings in Table 4 indicated that rice farmers in the study area fund that diversification into non-farm business (WM = 4.06), crop rotation (WM = 3.62) and use of improved seeds (WM = 3.58) to be very effective risk management strategies in rice production. Other effective management strategies indicated by the respondents includes the use of agrochemicals and cooperative marketing of their farm products. Irrigation system is also adopted to augment water availability in dry periods of production.

Determinants of Management Strategies Adopted by Rice Farmers

Multinomial log it regression model was used to examine the determinants of management strategies adopted by rice farmers in the study area. The chi^2 is significant at 1%. This implies that the model is fit for the objective. The pseudo R^2 is 20% meaning that 80% of the error is due to some explanatory variables that are beyond explanation. Work by Ojo *et al.* (2013*)* asserted that Rahji and Fakayode (2009) reported pseudo R^2 values of 25% and 31% respectively representing a relatively good-fit for a multinomial logit regression. Hence the pseudo R^2 value of 20% in this study is indicative of good fit and the correctness of the estimated model. The base mean category is non-farm business diversification. This implies that majority of the respondents in the area uses non-farm business most as risk management strategy in rice production. The regression result presented in Table 5 reveals that, there is a significant relationship between the ages of the farmers and the adoption of improved seed and irrigation respectively. This implies that as the farmers add to their age, the rate at which they adopt the use of improved seed to mitigate risk sources also increases. This may be due to farming experience they must have acquired over time about low yield from the use of local seeds. However, age had negative relationship with irrigation practices in mitigating rice production rice as older farmers tend not to adopt irrigation as management strategy. This is due to the fact that irrigation practices require a lot of man-power which older farmers lack. This result was supported by the findings of Aidoo *et al.* (2014) who reported that younger farmers are always willing to try new things than the older ones and will embrace innovations to reduce minimize risks attributed to production and profit maximization.

Equally, Table 5 revealed a significant but negative relationship between the farmers' household size and crop rotation. This implies that as the farmers' household members increases they tend to adopt less of crop rotation as a strategy to mitigating production risks. This is probably due to the increase food demand within the household which reserves less land to circle planting. This result is however contrary to the findings of Kwame (2017) who reported that increase in household size leads to increase in the probability of being risk neutral. Similarly, the table revealed a significant but negative correlation between the educational levels of farmers and the use of improved seed. This implies that the more educated the farmers, the less they adopt improved seed technique. This result is contrary to the appropriate expectation as well as the findings of Ben-Chendo *et al.* (2015) since, education was assumed to be a tool for enlightening rural farmers on the benefit of adopting improved production practices as evident in table 5 where crop rotation, irrigation and cooperative marketing were adopted by the farmers as a means of mitigating risk in rice farming.

Furthermore, table 5 revealed a significant relationship between farming experience and agrochemical, crop rotation, irrigation, cooperative marketing and then a negative correlation with improved seed. This implies that as the farmers get more

experienced in rice farming, there is also probability increase in adopting innovative production techniques to mitigate risks sources associated with weeds, pests, seasonality (dry season) and lack of marketing information. This result is related with the findings of Imolehin and Wada (2000) who reported that farming experience had significant relationship with risk aversion techniques. Furthermore, there is a significant but negative relationship between the rice farmers' output and crop rotation. This implies that as the farmers output from the farm increases, the less they adopt crop rotation as a strategy to mitigate risk. This result is not surprising as the ultimate goal of farmers is to increase output with minimum inputs.

Likewise, access to extension has a significant but negative relationship with crop rotation. This implies that as more farmers gain access to extension services, the probability of adopting crop rotation decreases. Perhaps extension knowledge received enlightened the farmers to be commercial rice producers as such considers other crops to be included in rotation to have less economic value. It could also be that the extension services received focused more on other rice production techniques and less on crop rotation as a farm management strategy is not about the adoption or use of irrigation, insurance and cooperative marketing. Also, Farmers' association had a positive and significant relationship with government intervention. Implying that, belonging to association by the farmers increases their chances of securing Government intervention in form of a project or program that could enhance production and decrease farming risks. This result is in line with the findings of Ben-chendo *et al.* (2015) who reportedthat farmers' association has positive relationship with risk management. There is also a significant relationship between the goal of farming of farmers and the use of improved seed, crop rotation, irrigation, farm income, and cooperative marketing. This implies that farmer' reasons for planting dictates the type of production techniques adopted: where farmers' plants for the market then, improved techniques are often employed to reduce risk and low yield.

CONCLUSION AND RECOMMENDATION

Based on the findings of this study, it was concluded that majority of the respondents were male, married, and within their active age. The respondents encounter climate variability, often use non-farm business as their management strategy and find it most effective in risk management. However, factors such as age of the farmers, educational level, household size, farming experience, farmers' association, farm output, access to extension, number of extensions, and goal of farming have significant impact on the management strategies adopted by rice farmers. Thus, extension personnel should be provided with adequate funds and materials by extension organizations so as to aid effective dissemination of technical information on new or discovered risk management strategies in rice production. Research institutes should be encouraged to research into ways by which the natural phenomena causing decrease in rice yield could be prevented. New risk management strategies in rice production should be made available by researchers to farmers in an affordable rate so as to encourage them to use such strategies**.** Farmers should be trained on the usage of such modern risk management such as insurance, integrated farming and cooperative marketing.

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Table 1: Socio-economic characteristics of respondents in the study area (n=151)

Variable	Frequency	Percentage	Mean
Age			
below 20 years	4	2.6	35
21- 40 years	117	77.5	
41- 60 years	29	19.2	
61and above years	1	0.7	
Household size			
5 and below	56	37.1	8
6 – 10	64	42.4	
11 – 15	23	15.2	
15 and above	8	5.3	
Formal education			
No	27	17.9	
Yes	124	82.1	
Farming experience			
5 and below years	29	19.2	12.3
6-10 years	53	35.1	
11-15 years	35	23.2	
16-20 years	17	11.3	
21 and above years	17	11.3	

Source: Field Survey, 2019

Table 2: Sources of risks encountered by rice farmersin the study area

Risk sources	VL (%)	L (%)	N (%)	NL (%)	NVL (%)	WM	Rank
Climate variability	81(53.6)	30(19.9)	23(15.2)	11(17.3)	0(0)	4.16*	1st
Market failure	11(7.3)	88(58.3)	27(17.9)	25(16.6)	0(0)	3.56*	3rd
Soil degradation	35(23.2)	19(12.6)	58(38.4)	34(22.5)	5(3.3)	3.30*	8th
Unsuitable credit facilities	37(24.5)	41(27.2)	39(25.8)	25(16.6)	9(6.0)	3.48*	5th
Insufficient hand labour	34(22.5)	31(20.5)	41(27.2)	29(19.2)	16(10.6)	3.25*	9th
Lack of machineries	41(27.2)	27(17.9)	41(27.2)	33(21.9)	9(6.0)	3.38*	7th
Poor extension service	37(24.5)	41(27.2)	39(25.8)	22(14.6)	12(7.9)	3.46*	6th
Land acquisition problems	20(13.2)	28(18.5)	40(26.5)	41(27.2)	22(14.6)	2.89	11th
Bush burning	22(14.6)	26(17.2)	39(25.8)	41(27.2)	23(15.2)	2.89	11th
Incidences of drought	18(11.9)	31(20.5)	23(15.8)	42(27.8)	37(24.5)	2.62	13th
Incidences of flood	53(35.1)	28(18.5)	27(17.9)	34(22.5)	9(6.0)	3.54*	4th
Pilfering/theft	52(34.4)	36(23.8)	34(22.5)	2013.2)	9(6.0)	3.68*	2nd
Breakout of pests	43(28.5)	43(28.5)	35(23.2)	20(13.2)	10(6.6)	2.59	14th
Unviable seed	29(19.2)	35(23.2)	33(21.9)	280(18.5)	26(17.2)	3.04*	10th

Source: Field survey, 2019.

Key: VL=very likely, L=likely, N=not likely, NL=not likely, NVL= not very likely, WM=Weighted Mean, *= Significant, Decision rule: $\bar{X} \geq 3$= Likely and $\bar{X} < 3$ = Not likely

Table 3: Risk management strategies adopted by farmers

Risk management strategies	RU (%)	SU (%)	NU (%)	WM	Rank
Technical method					
Use of agro chemical	66(43.7)	76(50.3)	9(6.0)	2.38*	2nd
Improved seed	66(43.7)	48(31.8)	37(24.5)	2.19*	5th
Crop rotation	71(47.0)	54(35.8)	26(17.2)	2.30*	3rd
Irrigation	54(35.8)	59(39.1)	38(25.2)	2.11*	6th
Diversification					
Non-farm business	116(76.8)	27(17.9)	8(5.3)	2.72*	1st
Others					
Farm insurance	30(19.9)	42(27.8)	79(52.3)	1.68	8th
Cooperative marketing	71(47.0)	54(35.8)	26(17.2)	2.30*	3rd
Government intervention	27(17.9)	66(43.7)	58(38.4)	1.79	7th

Source: Field survey, 2019.
Key: RU=regularly used, SU=seldom used, NU=not used, WM=Weighted Mean, *= Significant, Decision rule: $\bar{X} \geq 2$=Regularly used and $\bar{X} < 2$ = Seldom used.

Table 4 Level of effectiveness of the risk management strategies adopted by the rice farmers

Risk management strategies	VE (%)	E (%)	ME (%)	NE (%)	NVE (%)	WM	Rank
Technical method							
Use of agrochemicals	39(25.8)	42(27.8)	27(17.9)	26(17.2)	17(11.3)	3.40*	4th
Improved seed	25(16.6)	73(48.3)	22(14.6)	27(17.9)	4(2.6)	3.58*	3rd
Crop rotation	48(31.8)	31(20.5)	44(29.1)	23(15.2)	5(3.3)	3.62*	2nd
Irrigation	32(21.2)	34(22.5)	34(22.5)	29(19.2)	22(14.6)	3.17*	6th
Diversification							
Non-farm business	85(56.3)	24(15.9)	9(6.0)	28(18.5)	5(3.3)	4.03*	1st
Others							
Farm insurance	18(11.9)	12(7.9)	26(17.2)	43(28.5)	52(34.4)	2.34	8th
Cooperative marketing	25(16.6)	48(31.8)	34(22.5)	31(20.5)	13(8.6)	3.27*	5th
Government intervention	18(11.9)	21(13.9)	43(28.5)	46(30.5)	23(15.2)	2.77	7th

Source: Field survey, 2019.
Key: VE=very effective, E=effective, ME=moderately effective, NE=not effective, NVE= not very effective, WM=Weighted Mean, *= Significant, Decision rule: $\bar{X} > 3$= very effective, $\bar{X} = 3$= moderately effective and $\bar{X} < 3$ = Not effective.

Table 5: Result of multinomial logit for the determinants of management strategies

Independent variables	Agrochemical	Improved seed	Crop rotation	Government intervention	Irrigation	Farm insurance	Cooperative marketing
	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient	Coefficient
	(p>|z|)	(p>|z|)	(p>|z|)	(p>|z|)	(p>|z|)	(p>|z|)	(p>|z|)
Age	-0.0422792	0.0043379	-0.0347537	-0.0721646	-0.0619107	-0.0410271	-0.0336982
	(0.196)	(0.038)**	(0.169)	(0.160)	(0.056)*	(0.262)	(0.182)
Household size	0.0229712	0.0045383	-0.1574165	0.0769214	0.0113803	0.0624143	-0.0345115
	(0.720)	(0.297)	(0.020)**	(0.424)	(0.851)	(0.497)	(0.571)
Years spent in school	0.0435609	-0.009516	0.1127325	-0.0354913	0.157509	0.0927387	0.1202209
	(0.560)	(0.055)*	(0.060)*	(0.710)	(0.026)**	(0.247)	(0.051)**
Farming experience	0.2343467	-0.022459	0.247716	0.2352224	0.2150206	0.1986737	0.2048647
	(0.081)*	(0.038)**	(0.043)**	(0.110)	(0.090)*	(0.166)	(0.093)*
Farm output	-5.61e07	2.01e-07	-4.14e06	-4.31e-07	-1.64e-06	-8.09e-08	-1.89e-06
	(0.771)	(0.164)	(0.031)**	(0.848)	(0.386)	(0.971)	(0.298)
Farm income	7.09e07	1.04e-07	-1.80e06	2.34e-06	1.02e-06	-1.50e-06	-1.78e-06
	(0.465)	(0.256)	(0.209)	(0.449)	(0.273)	(0.473)	(0.218)
Access to extension	0.3297323	0.0600335	-2.433976	1.380487	-0.2803422	0.1806199	-0.2644923
	(0.703)	(0.330)	(0.010)***	(0.143)	(0.739)	(0.839)	(0.732)
Farmer's association	-0.3550776	-0.0835837	0.9826766	2.477186	1.232826	1.145581	0.4687298
	(0.686)	(0.125)	(0.131)	(0.055)*	(0.106)	(0.197)	(0.480)
Farm size	0.3799022	-0.0205065	0.0817687	0.3641801	0.1858502	0.0181294	0.2469471
	(0.356)	(0.506)	(0.819)	(0.414)	(0.636)	(0.967)	(0.497)
Goal of farming	0.383338	-0.0149292	0.2025735	0.0447347	0.1816902	0.2688846	0.1427278
	(0.693)	(0.031)**	(0.013)***	(0.642)	(0.037)**	(0.005)***	(0.082)*
Number	151						
Base category	Non-farm business						
LR chi2(66)	107.99						
Prob > chi2	0.0009***						
Pseudo R2	0.1959						

Source: Field survey, 2019.
Note: ***= Significant at (1%), **= Significant at (5%), *= Significant at (10%)