NIGERIAN AGRICULTURAL JOURNAL
ISSN: 0300-368X
Volume 50 Number 1, April 2019. Pp.22-29
Available online at: http://www.ajol.info/index.php/naj

RISK MANAGEMENT STRATEGIES AMONG SMALLHOLDER ARABLE CROP FARMERS IN IBIONO IBOM LOCAL GOVERNEMET AREA, AKWAIBOM STATE, NIGERIA

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ABSTRACT
The study investigated risk management strategies among smallholder arable crop farmers in Ibiono Ibom Local Government of Akwa Ibom State, Nigeria. Purposive and random sampling techniques were used in selecting 80 respondents used in the study. Primary data collected with the use of well-structured questionnaire were analyzed with both descriptive and inferential statistical tools. The result of the study revealed that majority of the farmers (66%) were males, young and active with mean age of 44 years. About 62% were married, 98.25% of them were literate and on the average had spent 23 years in farming. It was observed that the level of adoption of risk management strategy was low ($\bar{x}$=2.8). The significant variables influencing production were sex ($p < 0.10$), age of the farmer ($p < 0.10$), education ($p < 0.01$), farming experience ($p < 0.10$), income ($p < 0.01$), capital ($p < 0.10$), and the index of risk situations ($p = 0.10$). The result revealed that enterprise diversification ($\bar{x}$=3.3) was widely adopted as the most important management strategy. The result also shows that farmers in the study area placed higher preference on risk- taking behavior as affirmed by 50% of the farmers. The results therefore call for policies aimed at encouraging financial institutions to collaborate with insurance companies to insure agricultural credit facilities in order to indirectly insure crop farms due to inevitable risk involve in food crop farming business. There is need to encourage farmers to insure their farms and products against uncertain events. Banks and financial NGOs as well as government's Poverty Alleviation Fund programme are encouraged to strengthen the provision of credit assistance to food crop farmers to enable them adopt the most efficient practices to increase produce beyond subsistent level. Farmers are encouraged to form cooperatives to help manage marketing related problems

Keywords: Risk, Smallholder, Management strategies and Risk behaviour

Introduction

Investing in Agriculture, like many other economic activities, is exposed to a wide variety of risks ranging from input supply and prices, agricultural yield, post-harvest losses and product prices to the vagaries of nature such as inclement weather conditions, pests and diseases (Alimi and Ayanwale, 2005). Other natural hazards such as floods and fire outbreaks are equally important with regards to their impact on the success or failure of an agricultural enterprise. In order to boost agricultural production considerably, it is imperative to reduce the impact of these risks and uncertainties to the barest acceptable minimum (Alimi and Ayanwale, *2005*). Agricultural production decisions are taken in the environment of risk which affects the production and marketing decisions of the farmer. Farmers make decision every now and then that affect farming operations. Ayinde *et al.* (2008) stated that production decisions are generally made under the environment of risks and uncertainties as yield, product prices, input prices and quantities are usually not known with certainty when investment decisions are being made. Many of the factors that affect the decision cannot be predicted with complete accuracy. Aye and Oji (2007) enumerated these factors to include climate variability, input price variability, technology change, theft, insecurity, incidence of pest and diseases, equipment breakdown, high cost of veterinary services, change in government policy, borrowing money with sudden change in interest rates, scarcity of labour at peak time and change in health and wellbeing of the farmers. All of these changes are examples of the risks and uncertainties that farmers face in managing their farms as a business. These factors make small-scale farmers inadequately equipped against risks and uncertainties (Ayinde *et al.*,

2008). Nigeria being prone to a lot of environmental inconsistencies requires high degree of risk aversion strategy to break the circle of poverty which engulfed over 70% of its population and also to achieve increased food production to meet 3.18% population growth (Alimi and Ayanwale, 2005). Risk which investment economists describe as the variation from expected outcomes due to imperfect knowledge of investor in decision making is inherent in every form of enterprise but is more intensive in input-output relation among agricultural productions (Kuyrah *et al.*, 2006; Odii, 1998). Alimi and Ayanwale (2005) noted that a situation of imperfect knowledge is more common in agribusiness enterprises. The need for the management of risk associated with arable crop production will be better appreciated when it is realized that 70% of the Nigerian population are farmers (Ekong, 2010). These farmers do not have the understanding of risks and risk management skills or approach to manage problems and reduce consequences of risks and uncertainties. These situations therefore justify the need for a thorough assessment of existing risks in arable crop production. Also, an understanding of how the farmers are affected and react to these risks will in due course help in the design of improved risk management approach. The above scenario forms the crux of the study.

Methodology

The study was conducted in Ibiono Ibom Local Government Area of Akwa Ibom State. Ibiono Ibom Local Government Area is bounded by Cross River State and Itu local government area. Ibiono Ibom Local Government Area consists of nine (9) clans and covers a total land surface of 2761.76sq kilometers with a total population of 385,145 people (NPC 2006). A two-stage sampling procedure was used to purposively select 20 farmers each from 4 clans out of the nine (9) clans that made up Ibiono Ibom Local Government Area to give a total sample size of 80 respondents. The area is predominantly rural with agriculture as their major occupation. Primary data used in this study were obtained from 80 smallholder arable crop farmers selected randomly. Data collection was by personal interview and the use of the structured questionnaire to elicit the required information for the study. Descriptive statistical tools were used to analyze the socioeconomic characteristics and risk attitudes of the respondents, while the risks approaches adopted were analysed using mean decision of five (5) point likert rating scale. Ordinary Least Square regression was used to analyze the effect of risks on arable crop production. The OLS model used is specified in the implicit form as:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13})$

Where: Y = arable crop output (annual sales, Naira),

X_1 = Sex (male=1 and female=0),
X_2 = Age (years)
X_3 = Educational attainment (years),
X_4 = Primary Occupation (Farming = 1, otherwise =0),
X_5 = Farming Experience (years)
X_6 = Household size
X_7 = Annual income (Naira)
X_8 = Membership to cooperatives (member= 1, non-member 0),
X_9 = Farm size (ha),
X_{10} = Labour cost (N)
X_{11} = Cost of planting materials (N)
X_{12} = Capital (N)
X_{13} = Number of Risk encountered (ratio of number of risks encountered by the ith farmer to total risks recorded in the study area).

Results and Discussion

Socio-Economic Characteristics of Smallholder Arable Crop Farmers in Ibiona Ibom Local Government Area of Akwa Ibom State

The socioeconomic characteristics of the respondents are shown in Table 1. Table 1 showed that 66% of the respondents in the study area were males while 54 % were were females. This shows that male farmers dominated the farming system in the study area. This is in consonance with the report from FAO (2001) that women were more involved in off-farm activities than men, especially transportation of farm produce, processing of farm produce, feeding of family members and reproductive functions. The result also shows that 10% of the farmers were within the age of 21 – 30 years while 50%, 25% and 13% were within the age range of 31-40, 41-50 and 51-60 years respectively. Only 3% were within the age of 61 – 70 years. This implies that farmers in the study area were at their youthful age, more energetic and flexible to cope with risks and uncertainties that characterize farming. They were also more likely to adopt new improved technologies. As noted by Iheke and Igbeina (2015) and Iheke and Nwaru (2014), the risk bearing abilities and innovativeness of a farmer, his mental capacity to cope with the daily challenges and demands of farm production activities and his ability to do manual work decrease with increasing age. However, 62% of the farmers were married, while 35% of them were single. About 3% and 1% were widowed and divorced respectively. The result implies that majority of the farm households were stable. The results also showed that 16.25% attai/ned primary level of education, while, 56.25% and 26.25% attained secondary and tertiary education respectively and 1.25% with no formal education. Majority (98.75%) of the farmers in the study area were literate with formal educational levels ranging from primary school to tertiary education. Literacy (ability to read and write) would enable the farmers access and process

information on risk management strategies available. Results further showed that the mean farming experience was 23 years, implying that the farmers had long years of farming experience and this has some positive implications on their productivity. Also, the mean household size was 6 persons per household. The family size constitutes a major source of labour available in farming activities. It has been shown that decisions are made by the farm family, since the various farming operations are carried out by the members of the family. The mean income from the enterprise was N203, 778.8. Nwibo and Okorie (2013) noted that income level of an individual plays a great role in shaping the type of enterprise to venture into. This finding is justified on the ground that supply of inputs; labour and day to day running of the farm business is capital intensive and as such requires steady flow of income for business sustainability. Also, 61.2% were members of farmers' cooperative societies. Onyenweaku and Ohajianya (2005) noted that members of cooperative societies have enhanced ability to adopt innovations than non-members.

Severity of Risk Situations in Ibiono Ibom L.G.A of Akwa Ibom State

The distribution of respondents according to severity of risk situations is shown in Table 2. The result showed that the severe risks were disease outbreak, pest attack, price fluctuation, market, high cost of inputs, death of the farmer, theft and burglary, fire outbreak, and power failure. Effiong *et al* (2014) reported that power failure, disease outbreak, climate (weather) and price fluctuation are the most severe risk factors (with mean score ≥ 3). As noted by Briner and Finger (2012), risks directly affect farmers' incomes and can be a threat to the future of their farms. In the future, risks in agricultural production are expected to increase due to climate change and increasing volatility in agricultural markets (Meuwissen et al., 2003; Sckokai and Moro, 2005; Howden et al., 2007).

Risk Management Practices/ Copping Strategies Adopted By the Farmers in the Study Area

Farm households have developed various mechanisms for coping with risk. Most of these mechanisms offer short-term protection. Smallholder farmers in the study area managed risk by implementing practices that would reduce their exposure to risk. Various risk management practices were identified by the farmers; and further investigation was done to find out those adopted by the farmers. The various coping/management strategies are presented in Table 3. In ascertaining the management/coping strategies adopted by farmers in the study area, a 5.0 likert rating scale on the different strategies with reference mean of 3.0 was employed. The result revealed a grand mean score of 2.8 indicating a general low adoption of risks management/coping strategies. The result revealed that enterprise diversification ($\bar{x}$ =3.3) was widely adopted. This implies that the farmers tend not to rely solely on production, they still engage in other enterprises to make up for the loss in risk situations. Marketing strategies ($\bar{x}$ =3.9) was also adopted by farmers in the study area. Farmers tend to increase their price and/or adjust their marketing strategies during risk situations. Production strategies ($\bar{x}$ =4.1) was also widely adopted by the farmers in the study area. This suggests that farmers tend to accommodate risks during production. Some farmers tend to produce more to accommodate or make up for losses as a result of risk situations. However, production strategies appeared to be widely used among the smallholder farmers because the majority of risk situations occur at the production stage.

Farmers' Risk Preference/ Attitude

Farmers' preference or attitude towards risk explains many observed economic decisions. Their economic decisions are overshadowed by risk. Their attitude towards risk, therefore, tends to display an explanation for the many observed economic decisions Therefore; knowledge of farmers' attitude toward risk has important implications for the adoption of new farm technologies and the success of rural development programmes (Wik and Holden, 1998). Farmers' choice between the binary hypothetical outcomes was taken as an indication of their risk attitudes behaviour. The two hypothetical questions consisted of two possible outcomes with given objective probabilities, and the respondents were asked to state which of the two options they preferred. It was mentioned that there was no right or wrong answers to these questions. It is assumed that by answering the hypothetical questions farmers exhibited their true preferences. Their responses in this regards are presented in Table 4.

Table 4 reveals that 50% of the farmers in the study area have positive risk coefficients and were therefore categorized as risk preferring or seeking. Risk attitude largely depends on their socioeconomic characteristics. This implies that a fair proportion of the farmers in the study area placed higher preference on risk- taking behavior, followed by risk averse behavior (42.5%) by adopting mitigating strategies to averse risk in farming; and lastly risk neutral (7.5%). This result is not in agreement with that of Ayinde et al, (2008) who found out in his study that the risk-averse attitudes of small scale farmers ranked first, while risk neutral behavior ranked second and risk taking behavior ranked third among the small scale farmers' attitudes towards risk in crop production.

Determinants of Output among Smallholders in Ibiono Ibom Local Government Area, Akwaibom State

The multiple regression result of effects of risks and uncertainties and other factors in production is presented in Table 5. The result in table 5 shows that nine factors out of thirteen are significant at various

levels. The semi-log function was chosen as the lead equation for the analysis based on conformity with *a priori* expectation of signs, magnitude of coefficients, overall significance of the functional form (F-statistics) and explanatory power of the variables (adjusted R^2) included in the model. The F –value is statistically significant at 1% level which implies that the independent variables (Xs) included in the model were good, The R^2 value was 0.75 which indicates that 75% of the total observed variations in smallholders output were explained by the variables included in the model, while 25% of the variation was due to error. The F – ratio was significant at1% indicating the goodness-of-fit of the model. The results also show that 9 variables were statistically significant and conform to *a prior* expectation.

The coefficient of sex was statistically significant at 10% and negatively related to output. This inverse relationship implies that female farmers had more output than their male counterparts. This result is in consonance with the earlier findings of Nweke and Enete (1999) that arable crop production in Nigeria is female gender sensitive The increase in the output of the farmer depend more on other factors than their sex. This is in consonance with the findings of Effiong *et al* (2014) who found a negative relationship between sex and output of the farmer. The coefficient of age was statistically significant at 10% and positively related to the output. This implies that as the age of farmers increased, their output also increased. Expectedly, the increase in farmer's age come with demanding responsibilities and as such increase his knowledge, experience, income and efficiency. In contrast, Effiong *et al* (2014) found age to be negatively signed indicating that the farmers output decreases as the farmer's age increases. The coefficient for years of education was significant at1% and positively signed. This implies that as the educational level increases, the output increases. This is in conformity with *a- priori* expectation that the level of education of the farmers enhances their knowledge of risks and uncertainties and their technical and managerial efficiency. The more educated the farmers is, the more his/her efficiency in farming. This result is in agreement with the research findings of Salimonu and Falusi (2009) that farmers level of education increase their output.

The coefficient of farming experience was significant at 10% and positively related to output. It shows that an increase in the years of farming experience will lead to a corresponding increase in output of farmers. Ogoke (2009) observed that the longer the years of farming experience, the more efficient the farmer becomes because the number of years a farmer has spent in the farming business may clearly give an indication of the practical knowledge he has acquired. This is an advantage in reducing farming risk which will help to boost production in any pre-determined period of farming business. The coefficient of income was significant at 1% and directly related to output. This implies that increase in income will lead to an increase in output. This implies that a unit increase on farm income of the respondents would lead to an increase in the reduction of risk on the output. Walker *et al.,* (2001) in Effiong *et al.,* (2014) however reported that increased income will assist farmers in tackling additional risk on the farm without being risk averse. This in essence will lead to an increase in output of the farmers and will also help farmers to generate income needed to manage other additional farm risks. This may be attributed to the fact that an increase in income will enable the farmer to adopt proper risk management practices.

The coefficient of cost of planting materials was statistically significant at 10% and directly related to output. This implies that any increase in the planting material will lead to an increase in output. Acquisition of some inputs like planting materials at subsidized rate due to their co-operative membership is suggestive of the increase in output as the more the planting materials as used by these arable crop farmers, the more the output and vice versa. This also implies that as a farmer increases the quantity of his planting materials, his output would also increase, hence the direct relationship of planting materials with farmer's output This result is consistent with Rowlinson (2008) who noted that planting material determines the quality and quantity of the farmers output. The coefficient of capital input was statistically significant at 10% and positively related to output. This implies that increase in the farmer's capital will result to an increase in output. This result indicated that the more capital investment, the more the propensity for higher output as a result of technical and managerial efficiency.. The coefficient of index of risk was statistically significant at 10% level and negatively related to output. The inverse relationship implied that the increase in the number of occurrence of risk and uncertainty will result to a decrease in the farmers output. Farmers face an ever changing weather, price fluctuation, output changes and changes in government policies which result in risk. Miranda (2002), observed that the production risk in farming are caused by unpredictable weather and hence uncertainty as to good output. Ajieh, (2010) found natural and social factors in risk and uncertainties influences output. Effiong *et al.* (2014) also found inverse relationship between risk situations and the farmers output. This may be attributed to the proneness of agriculture to risk and uncertainties. However, lack of information, poor record keeping, farmer's level of education and poor/lack of adoption of risk management strategies could be associated to the negative effect of risk and uncertainties on farmers output

Conclusion

The study investigated the agricultural risk management strategies among smallholder farmers in Ibiono Ibom in Akwa Ibom state Nigeria. From the results, it could be concluded that risks situations were highly prevalent among smallholder arable crop farmers in the study area which exert negative effect on the farmers' output, and hence income. There is generally low adoption of risks management strategies among the farmers. Financial institutions are encouraged to collaborate with insurance companies to insure agricultural credit facilities to indirectly insure crop farms due to inevitable risk involve in food crop farming business. Some of the farmers were found to be risk averse implying that they were not fully insured by their self-insurance strategies. In order to improve their welfare, policies that enhance access to insuring farm activities should be put in place.Farmers are encouraged to group themselves into societies, unions or cooperatives. This will facilitate positive interactions especially on risk sharing. This will also present a collective bargaining front, and serve as a conduct for transmitting government extension. Government and private insurance companies should consider developing insurance product for food crop farmers to patronize and use as shock absorbers against uncertain events. Banks and financial NGOs as well as government's Poverty Alleviation Fund programme are encouraged to strengthen the provision of credit assistance to arable crop farmers to enable them to adopt the most efficient risk management practices to increase produce beyond subsistent level.

References

Ajieh, P. C. 2010. Poultry Farmers Response to Agricultural Insurance in Delta State. *Nigerian Journal of Agric. Sc*. 1 (1): 43 – 47.

Alimi, T. and Ayanwale, A.B. (2005). Risk and Risk Management Strategies in Onion Production in Kebbi State of Nigeria. *Journal of Social Science,* 10(1), 1-8

Aye, G.C. and Oji, K. O. (2007). Effect of Poverty on Risk Attitudes of Farmers in Benue State, Eastern Nigeria, *Journal of Sustainable Tropical Agricultural Research*. 14: 81-88.

Ayinde, E. O., Omotesto, A. O. and Adewumi, O. M. 2008. Risk Attitudes and Management Strategies of Small Scale Crop Producer in Kwara State, Nigeria. A Ranking Approach. *African Journal of Business Management* 2 (12): 217 – 221.

Briner, R. and Finger, R. 2012. The Effect of Price and Production Risks on Optimal Farm Plans in Swiss Dairy Production considering 2 different Milk Quota System. *Journal of Dairy Science,* 96: 2234-2246

Effiong, *E. O.* Enyenihi, E. A. and George, A. A. 2014. Analysis of farming risk among small scale poultry farmers in Etim Ekpo Local Government Area of Akwa Ibom State, Nigeria. *Nigerian Journal of Agriculture, Food and Environment.* 10(1): 59-64.

Ekong, A. 2010. An Introduction and Analysis of Organization of Villages and Communities. hpps//:uniilorin.edu.ng./AXR%20204.P

Food and Agricultural Organization (FAO), 2001. FAO Rice Conference 2001. Accessed Online at www.fao.org on 23rd July, 2017.

Howden, S. M., Soussana, J. F., Tubiello, F. N., Chhetri, N., Dunlop, M. and Meinke, H. 2007. Adapting agriculture to clima-te change. Proc. Natl. Acad. Sci. USA, 104:19691–19696

Iheke, O. R., and Nwaru, J. C. 2014. Impact of Innovation on Smallholders' Productivity and Poverty Status: The Case of Arable Crop Farmers in South-East, Nigeria. *Asian Journal of Agricultural Extension, Economics & Sociology* 3(4): 301-318

Iheke, O.R and Igbelina,C.O (2016), Risks Management In Poultry Production In Ikeduru Local Government Area Of Imo State, Nigeria. *Nigeria Journal of Agriculture, Food and environment*, 12(1) 67-74

Kuyrah J,N, Obare G, Herrero M, Waishaka M (2006). "Agricultural Income Risk and Rural Poverty Dynamics Strategies of smallholder producers in Kenya" Contributed paper, presented at the International Association of Agricultural Economics Conference; Gold Coast, Australia, August., pp. 12-16.

Meuwissen, M. P. M., Huirne, R. B. M. and Skees, J. R. 2003. Income insurance in European agriculture. *Euro Choices* 2:12–17.

Miranda, M. J. 2002. Area Yield Crop Insurance Reconsidered. *American Journal of Agricultural Economics.* 73: 233-236.

National Population Commission (NPC), (2006). National Population Report, Abuja, Nigeria

Nweke, F.I. and Enete, A.A. Gender Surprises in Food Production, processing and marketing with - emphasis on cassava in Africa. COSCA Working Paper No. 19 Collaborative study of cassava in Africa. IITA Ibadan, Nigeria

Nwibo, S U. and Okorie, A (2013). Determinants of Entrepreneurship among Agribusiness Investors In South-East, Nigeria. *European J. Bus. Mgt.* 5(10):115-123

Ogoke, C. M. 2009. Agricultural Insurance in present and future Agricultural Development in Niger State, Nigeria. Agriculture Systems in Africa, 5 (2): 45 – 50

Onyenweaku, C. E. and Ohajianya, D. O. 2005. Technical efficiency of swamp and upland rice farmers in south Eastern Nigeria, *Journal of Sustainable Tropical Agricultural* Research 14:81-88

Rowlinson, P. 2008. Adapting Livestock Production Systems to Climate Change-Temperate Zones. Proceedings of the Livestock and Global Change Conference. May 2008, Tunisia.

Salimonu, K. K. and Falusi, A. O. 2009. Sources of Risk and Management Strategies among Food Crop Farmers in Osun State, *Nigeria*. *African Journal of Food Agriculture*, Nutrition and Development, 9 (7): 25-38

Sckokai, P. and Moro, D. 2005. Modeling the impact of the CAP reform on farm investments. In Proc. XI EAAE Congress "The Future of Rural Europe in the Global Agri-Food System," Copenhagen, Denmark. Food, Resource and Economic Institute, Frederiksberg, Denmark.

Wik, J. and Holden, K. L. (1998). 'Uncertainty, risk, and wealth and income distribution in peasant agriculture', *Jour-nal of Development Studies*, 9: 15 -26

Table 1: Distribution of respondents according to their socioeconomic characteristics

Socioeconomic characteristics	Frequency	Percentage	Mean
Gender			
Male	53	66	
Female	27	54	
Age			
21-30	8	10	
31-40	40	50	
41-50	20	25	
51-60	10	13	
61-70	2	3	49.8
Marital Status			
Single	28	35	
Married	49	62	
Widowed	2	3	
Divorced	1	1	
Level of education			
No formal education	1	1.25	
Primary	13	16.25	
Secondary	45	56.25	
Tertiary	21	26.25	
Farming experience			
1-5	14	17.5	
6-10	7	8.5	
11-15	13	16.25	
16-20	4	5.0	
21-25	6	7.5	
26-30	15	18.75	
31-35	0	0.0	
36-40	11	13.75	
41-45	10	12.5	23
Household size			
1-3	11	13.75	
4-6	30	37.5	
7-9	28	35.0	
10-11	11	13.75	6
Income			
10,000-100,000	49	61.25	
101,000-200,000	10	12.5	
201,000-300,000	7	8.75	
301,000-400,000	-	-	
401,000-500,000	10	12.5	
501,000-600,000	1	1.25	
601,000-700,000	1	1.25	
701,000-800,000	1	1.25	203,778.8
Membership of cooperatives			
Yes	49	61.2	
No	31	38.8	

Source: Field Survey, 2017

Table 2: Distribution of Respondents According to Severity of Risk Situation in the Study Area

Risk situations	SA		A		UD		DA		SD		∑x	$\bar{x}$
	F	%	F	%	F	%	F	%	F	%		
Disease outbreak	31	38.8	21	26.2	14	17.5	6	7.5	8	10.0	301	**3.8**
Pests & diseases	18	22.5	24	30.0	25	31.2	12	15.0	1	1.2	286	**3.6**
Natural disaster (heat stress)	1	1.2	9	11.2	14	17.5	35	43.8	21	26.2	114	**2.2**
Price fluctuation	13	16.2	12	15.0	26	32.5	20	25.0	9	11.2	240	**3.0**
Government policy	4	5.0	5	6.2	22	27.5	32	40.0	17	21.2	167	**2.3**
Market	27	33.8	24	30.0	11	13.8	10	12.5	8	10.0	292	**3.7**
Climate change	10	12.5	8	10.0	31	38.8	15	18.8	16	20.0	221	**2.8**
High cost of inputs	30	37.5	29	36.2	19	23.8	2	2.5	-	-	327	**4.1**
Death of the farmer	28	35.0	19	23.8	10	12.5	18	22.5	5	6.2	287	**3.6**
Theft and burglary	10	12.5	48	60.0	17	21.2	5	6.2	-	-	308	**3.8**
Health status of the farmers	2	2.5	16	20.0	27	33.8	25	31.2	10	12.5	215	**2.7**
Fire outbreak	14	17.5	22	27.5	23	28.8	8	10.0	13	16.2	256	**3.2**
Power failure	33	41.2	25	31.2	11	13.8	9	11.2	2	2.5	318	**4.0**
Grand mean												**3.3**

Field Survey, 2017. Key: SA = Strongly Agree, A = Agree, UD = Undecided, DA = Disagree, SD= Strongly Disagree; Mean = 3.0

Table 3: Smallholder Farmers Coping Strategies to Deal with Risk in the Study Area

Risks severity situation	SA		A		UD		DA		SD		∑x	
	F	%	F	%	F	%	F	%	F	%		
Enterprise diversification	24	30.0	21	26.3	14	17.5	10	12.5	1	1.25	256	**3.3**
Insurance	-	-	3	3.8	7	8.8	33	41.3	37	46.3	136	**1.7**
Marketing strategies	35	3.8	25	31.2	11	13.8	1	1.2	8	10.0	318	**3.9**
Financial strategies	3	3.8	6	7.5	11	13.8	27	33.8	33	41.2	159	**2.0**
Production strategies	44	55.0	15	18.8	8	10.0	13	16.2	-	-	330	**4.1**
Risks coping	5	6.25	3	3.8	8	10.0	24	30.0	40	50.0	134	**1.7**
Grand mean												**2.8**

Field Survey, 2017. Key: SA = Strongly Agree, A = Agree, UD = Undecided, DA = Disagree, SD= Strongly Disagree; Mean = 3.0

Table 4: Farmers' Risk Preference/ Attitude

Category	Index	Frequency	Percentage
Risk preferring	< 1	40	50.0
Risk indifferent/neutral	1	6	7.5
Risk averse	> 1	34	42.5
Total		80	100.0

Source: Field survey data, 2017

Table 5: Estimated Coefficients of the effect of risks and other factors on the output of smallholder farmers in the study area

Variables	Linear	Exponential	Semi log +	Double log
Constant	3324.578	8.150	6651.804	1.324
	(2.228)***	(8.913)***	(11.334)***	(0.545)
Sex	-447.06	-0.511	-891.993	-0.743
	(-1.310)	(-2.440)**	(-1.944)*	-2.551)**
Age	4.023	0.009	648.511	0.370
	(2.290)**	(1.907)*	(2.348)*	(1.972)*
Education	28.923	0.004	399.629	0.071
	(5.950)***	(0.132)	(5.050)***	(1.830)*
Primary occupation	-82.300	-0.077	-35.354	-0.117
	(-0.596)	(-0.907)	(-0.101)	9-0.685)
Farming experience	9.592	0.002	420.526	0.003
	(8.690)***	(3.570)***	(1.962)*	(0.033)
Household size	-43.500	-0.014	220.904	0.045
	(-0.743)	(-0.390)	(0.613)	(0.255)
Income	0.000	2.301E-7	52.349	0.117
	(0.586)	(6.988)***	(3.330)***	(1.716)*
Membership to cooperative	-170.124	-0.008	-69.215	-0.066
	(-0.587)	(-0.044)	(-0.131)	(-0.255)
Farm size	-0.42	-2.569E-5	-230.946	-0.198
	(-1.977)*	(-1.988)**	(-1.120)	(-1.971)*
Labour	-0.000	-2.234E-7	-1.34.961	0.068
	(-0.747)	(-0.417)	(-0.538)	(0.554)
	(5.885)***	(1.676)	(3.063)***	(2.199)***
Cost of planting materials	5.313E-5	3.083E-8	257.252	0.134
	(5.596)***	(0.564)	(2.039)*	(2.171)**
Capital	0.002	1.476E-6	267.550	0.143
	(2.875)***	(1.706)*	(2.079)*	(2.282)**
Number of risks encountered	-99.522	-0.65	-908.842	-0.280
	(-1.956)*	(-1.745)*	(-2.260)*	(-1.430)
R^2	0.62	0.73	0.75	0.64
R Adjusted	0.60	0.71	0.72	0.62
F – Ratio	14.999***	12.813***	11.942***	12.419***

Source: Field survey data, 2017

Note: (*) = coefficients that are significant at 1%, (**) = coefficients that are significant at 5%, (***) = coefficients that are significant at 10%, Figures in parenthesis are the t-values.