International Journal of Economics, Business and Management Research

Vol. 4, No. 12; 2020

ISSN: 2456-7760

ANALYSIS OF INSURANCE STRATEGIES MITIGATING FARMERS' RISKS IN OGUN STATE, NIGERIA

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Abstract

The study analyzed the insurance strategies mitigating farmers risk in Ogun State, Nigeria. Data for the study were collected with the aid of pre-tested questionnaire through a multistage sampling technique, which culminated in the final selection of 90 respondents from the record of insured farmers obtained from the only NAIC office in Abeokuta North Local government in Ogun State. Descriptive statistics such as mean, percentages, frequencies, standard deviation, minimum and maximum value were used to analyze and describe the data on socio-economic characteristics of farmers that patronize NAIC, the insurance strategies available for farmers, the types of risk that farmers insured against and the challenges to agricultural insurance in Ogun State. Tobit regression model was used to determine how effective these strategies are to mitigate business risk of farmers. The mean age for the study was 43.4 years, mean year of educational acquisition was 13.9 years and the mean value of farming experience was 12.4 years. Also, most of the respondents were male, they were married and had average household size. The Tobit regression result on business risk of Log likelihood function (36.85308) showed that credit, number of labour and capital base with normalized coefficients of 1.17e-07, 0.0079835 and 3.63e-08 respectively were important variable that significantly had effect on business risks of respondents while other variables such as age, household size, educational level, farming experience, liabilities owed, asset owned, annual income and total farm size were not significant although they all met the a priori expectations. The study concluded that most of the insured farmers were faced with different challenges and they employed different strategies to mitigate the various kinds of risks encountered. The study recommends that government should implement agricultural policy on agricultural insurance which will help to enlighten farmers on the importance of agricultural insurance in detail.

Keywords: Insurance strategies, mitigation, farmers' risks and Tobit

1.0 INTRODUCTION

Agricultural business is a business that earns most or all of its revenue from agriculture: Agricultural business also entails the production, processing, supply of food, trading of farm equipment, machinery, agro-chemical, suppliers, import and export of agricultural product (Iwena, 2015). Agriculture in Nigeria is a branch of the economy, providing employment for about 30% of the population as of 2010 (Wikipedia, 2010).

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Agricultural business involves a lot of risk and uncertainty from the first to the last stage of production. With millions invested into crop and animal production in the country, the result are not seen because these risks occur though they were not planned for. Risk among agribusiness investments has become increasingly popular in recent years. The Nigerian agribusiness environment is full of risks and uncertainties arising from several factors. This is obvious considering that agribusiness investment depends on vagaries of the environment and nature (Asogwa1, 2014.) For an individual farmer, risk management involves finding the preferred combination of activities with uncertain outcomes and varying levels of expected returns (Harwood, *et. al.*, 1999) suggest that the farmer who purchases crop insurance use more chemical inputs than the farmers who do not purchase crop insurance (Horowitz and Lichtenberg, 2004).

Agricultural finance is defined as act of acquisition and use of capital in agriculture (Iwena, 2015). Financial sector institutions in developing countries lend a disproportionately lower share of their loan portfolios to agriculture compared to agriculture sectors share of GDP (World Bank 2018). The development of Agriculture requires financial services that can support: larger agriculture investment and agriculture-related infrastructure that requires long term funding (World Bank, 2018).

Risk can be defined as imperfect knowledge where the possibilities of the possible outcomes are known, and uncertainty exist when these possibilities are not known (Hardaker, *e.t al*, 1991) as long as agriculture remains a source of livelihood to keep the nation, these risks and uncertainties cannot be totally avoided. Agriculture has been the provider of food for the teeming population and the largest employer of the country (Amaza, 2000). Sources of risks and uncertainties include climate and weather condition, animal diseases, changes in prices of agricultural inputs (seeds, fertilizer), plague of insects, etc. Most of these uncertainties which cannot be predicted always leave fatal impressions on the farmers. Traditionally, farmers have managed risks by using less risky technologies of lower but reliably yielding drought-resistant crops; by seeking diversification both in terms of production activities on-farm and income generating activities off-farm; and by devising informal and formal risk sharing arrangements (Friedberg, 2003).

Agricultural insurance is defined in the Nigerian Agriculture Insurance Scheme (NAIS operation guideline 1989) as the stabilization of income, employment, price and supplies of agricultural products by means of regular and deliberate savings and accumulation of funds in small instalment by many farmers in favorable time, periods, to defend some of a few of the participants in bad times/ periods.

In order for the aforementioned risk to be managed whenever they occur, insurance is deemed necessary and important as it helps to resuscitate the farm even when unavoidable losses occur and thus helps the continuity of farm business which provides food and employment for a reasonable percentage of the rural dwellers. Within agricultural insurance, farmer can be saved from these losses or damages to crops and livestock. Therefore, this study is aimed at analyzing insurance strategies mitigating farmers' risks in Ogun State, Nigeria

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2.0 METHODOLOGY

2.1 Study area

The study was carried out in Ogun State, Nigeria. It was created in February 1976 and borders Lagos State to the south, Oyo and Osun States to the north, Ondo to the East and the Republic of Benin to the west. Abeokuta is the capital and largest city in the State. The State comprises of twenty Local Government Areas. The 2006 census recorded a total population of 3,751,140 residents with an area of 6,472 square miles (16,762 square km). The State has an average temperature of 27.1ºc and average rainfall of 1238mm thus the city has a tropical climate with latitude 6.9075ºN 3.5813ºE. Agriculture the economic mainstay of Ogun State produces; rice, corn (maize), cassava (manioc), yams, plantains and bananas. Cocoa, kola nuts, tobacco, rubber, palm oil and palm kernels, cotton and timber are the main cash crops.

2.2 Sampling technique and sample size

Multistage Sampling Techniques was used in this study. The first stage was the purposive sampling of Abeokuta North Local Government because of the presence of the only NAIC office in Ogun State. The second stage involved the Random Sampling of 90 farmers from the records of insured farmers obtained from NAIC.

2.3 Data analysis

2.3.1 Descriptive statistics

Descriptive statistics such as mean, percentages frequencies, standard deviation, minimum and maximum values were used to; describe the socio economic characteristics of farmers that patronize NIAC, identify the insurance strategies available for farmers, ascertain the kind of risks that farmers insure against and identify the challenges to agricultural insurance in Ogun State.

2.3.2 Tobit regression model

Tobit regression model was used to determine how effective these strategies are to mitigate business risks of farmers. The Tobit model assumed that use of these strategies was a continuous decision. It expressed farmers' use of these strategies as a function of linear combination of observable explanatory variables, some unknown parameters, and a stochastic error term (u_i). In its simplest form, the Tobit model is presented as:

$$Y = \beta_0 + \beta_i X_i + U_i$$

Algebraically expressed for the ith farmer, the Tobit model is explicitly expressed as:

$$Y = \beta_0 + \beta_1 X_{1+} \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_0 X_{10} + \beta_1 X_{11} + u_i$$

Where:

$0 \leq Y \leq 1$

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Y is the observed dependent variable i.e. business risk measured in the number of strategies adopted by farmers divided by overall strategies (contracting, training of employees, vertical integration, enterprise diversification, liquidity reserve etc.)employed/ available in the study area.

β_0 is the intercept or the rate of effectiveness of these strategies that will occur regardless of the level of independent variable.

β_i = estimated slope coefficients of the explanatory variables

X_i = explanatory variables i.e. X_1…….X_{11}

Where

X_1= Age (years)

X_2=Income (₦)

X_3=Asset worth (₦)

X_4=Liabilities (₦)

X_5=Amount of credit obtained (₦)

X_6= Household size (Number)

X_7= Labour size (Number)

X_8= Farming experience (Years)

X_9= Level of education (Years)

X_{10}= Farm size (Hectare)

X_{11}= Capital base (₦)

u_i =Stochastic Error Term

3.0 RESULTS AND DISCUSSION

3.1 Socio-economic characteristics of the respondents

Table 1 below showed the socio-economic characteristics distribution of the respondents in the study area. The age distribution of respondents showed that 42.2 percent of the respondents were between the ages of 41 and 50. Also, the result further revealed that 20 percent and 18.9 percent of the respondents were between the ages of 41-50 and 51-60 respectively,10 percent and 8.9 percent of the respondents were less than or equal to 30 year swhile 8.9 percent were above 60 years. For the gender distribution of respondents it was observed that majority of the respondents were predominantly male constituting about 70%, while the female were only 30%. The educational qualification of the respondents revealed that 36.6% of the total respondents and

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24.5% of the total respondents spent 13-17years and 18-20years in school respectively. Also, 22.3%, 14.4% and 2.2% of the total respondents spent 7-12years, 4-6years and 21-30years in school respectively.

The marital status of respondents showed that majority of the respondents (76.7 percent) were married, 20 percent, 1.1 percent and 2.2 percent constituted respondents that were single, divorced and widowed respectively. The household size of respondents showed that most of the respondents (50 percent) had household size of 1-4 persons. Also, 44.4 percent of the total respondents had a household size of 5-8 persons and 5 percent of the total respondents had household size greater than 8 persons. The total farm size of the respondent showed that 35.6 percent of the distribution cultivated 0.5ha and below, 21.1 percent cultivated 1.6-2.0 ha, 18.9 percent cultivated more than 2.0 ha, 16.6 percent cultivated 0.6-1.0 ha, while 7.8 percent of the distribution cultivated 1.1-1.5 ha.

The credit received by respondents showed that 46.7 percent received less than or equal to ₦100,000, 21.1 percent received above ₦400,000, 14.4 percent received between ₦201,000-₦300,000, 12.2 percent received between ₦101,000-₦200,000, while 5.6 percent received between ₦301,000-₦400,000 credit from different financial institutions. The years of farming experience of respondents showed that 61.1 percent of the total respondents have about 1-10 years of farming experience, 25.6 percent falls within the range of 11-20 years, 10 percent of the respondents have farming experience of about 21-30 years. Only 3.3 percent of the total respondents have farming experience above 30 years.

The monetary value of liabilities owed by respondents to others revealed in this study that 43.3 percent owed less than or equal to ₦100,000, 33.3 percent owed above ₦400,000, 13.4 percent owed between ₦101,000-₦200,000, 7.7 percent owed ₦201,000-₦300,000, while 2.3 percent owed ₦301,000-₦400,000. The monetary value of asset owned by respondents of this study showed that, 64.4 percent owned assets worth above ₦800,000, 12.2 percent owned assets worth less than or equal to ₦200,000, 10 percent owned assets worth between ₦401,000-₦600,000. 7.8 percent owned assets worth between ₦601,000-₦800,000, while 5.6 percent owned assets worth between ₦201,000- ₦400,000. The annual income of respondents as revealed by the study indicated that 40 percent realized above ₦1,200,000 per year, 21.1 percent realized between ₦901,000-₦1,200,000 per year, 16.7 percent realized less than or equal to ₦300,000 per year, 14.4 percent realized between ₦301,000-₦600,000 per year while 7.8 percent realized between ₦601,000-₦900,000 per year.

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Table 1: Socio-economic characteristics of the respondents

Socio-economic characteristics	frequency	percentage	mean
Age (years)			
≤30	9	10.0	43.37
31-40	38	42.2	
41-50	18	20.0	
51-60	17	18.9	
>60	8	8.9	
Gender			
Female	27	30.0	
Male	63	70.0	
Educational qualification			
4-6			
7-12	13	14.4	13.89
13-17	20	22.3	
18-20	33	36.6	
21-30	22	24.5	
	2	2.2	
Marital status			
Single	18	20.0	
Married	69	76.7	
Divorced	1	1.1	
Widowed	2	2.2	
Household size			
1-4	45	50.0	4.61
5-8	40	44.4	
>8	5	5.6	
Total farm size			
≤ 0.5	32	35.6	1.63
0.6-1.0	15	16.6	
1.1-1.5	7	7.8	
1.6-2.0	19	21.1	
>2.0	17	18.9	
Credit received			
≤ 100,000	42	46.7	397,000
101,000-200,000	11	12.2	
201,000-300,000	13	14.4	
301,000- 400,000	5	5.6	
>400,000	19	21.1	
Farming experience			

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1-10	55	61.1	12.36
11-20	23	25.6	
21-30	9	10	
>30	3	3.3	
Asset owned			
≤200,000	11	12.2	1,590,000
201,000-400,000	5	5.6	
401,000-600,000	9	10	
601,000-800,000	7	7.8	
>800,000	58	64.4	
Annual income			
≤300,000	15	16.7	1,390,000
301,000-600,000	13	14.4	
601,000-900,000	7	7.8	
901,000-1,200,000	19	21.1	
>1,200,000	36	40	

Source: field survey, 2018

3.2 Insurance strategies employed by farmers

The table below showed the multiple responses of the respondents to the available strategies available to mitigate risks. 65.6% of the respondents used the entrepreneurial diversification strategy (generating incomes from different crops and livestock activities), 10% of them used the financial leverage strategy (the use of borrowed funds to help finance the farm business), 6.7% of them used the vertical integration method (to retain ownership or control of a commodity across two or more phases of production and/or marketing), 13.3% of them used the contracting method (that prescribe production processes to be used and/or specify who provides inputs are called production contracts), 2.2% of them also used the hedging strategy (uses futures or options contracts to reduce the risk of adverse price changes prior to an anticipated cash sale or purchase of acommodity), 1.1% used the liquidity method (the farmer's ability to generate cash quickly and efficiently in order to meet financial obligations), 45.6% of them used the crop yield insurance strategy (pays indemnities to producers when yields fall below the producer's insured yield level) while 10% of them used the crop revenue strategy (pays indemnities to farmers based on gross revenue shortfalls instead of just yield or price shortfalls) and 8.9% of them used the household off farm employment strategy (can provide a more certain income stream to the farm household to supplement income from the farming operation). This result shows that entrepreneur diversification is the most used strategy amidst the respondents in this study i.e. most of the respondents established different enterprise in the farming business as a measure against risks and uncertainties.

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Table 2: Distribution of respondents by their reaction to each strategy

Strategies	Frequency	Percentage
Entrepreneurial diversification	59	65.6
Crop yield insurance	41	45.6
Contracting	12	13.3
Financial leverage	9	10.0
Crop revenue insurance	9	10.0
Household off farm employment	8	8.9
Vertical integration	6	6.7
Hedging	2	2.2
Liquidity	1	1.1

Source: field survey, 2018
Multiple responses

3.3 Type of risks being insured against

The table below shows the distribution of respondents according to the type of risk they insured while 5.6% of them insured against institutional risk (risks relate to fulfilling business agreements and contracts), 22.2% of them insured against financial risk (possibility of having insufficient cash to meet expected obligations, lower than expected profit and loss of net worth), 7.8% of them insured against market or price risk(the possibility of losing the market of the agricultural product or that the price received for the commodity will be less than expected) while 0nly 2.2% of the insured against personal or human risks (risks associated with individuals and their relationship with one and other, their families and farm business) and 51.1% of them insured against production risk(the possibility that farm yield or output levels will be lower than anticipated). This means that production risk was the most encountered for respondents of this study and thus insurance is done against this type of risk.

Table 3: Distribution of respondents by the type of risk they insured against.

Risks	Frequency	Percentage
Production or yield risk	46	51.1
Financial risk	20	22.2
Market or price risk	7	7.8
Institutional risk	5	5.6
Personal or human risk	2	2.2

Source: Field survey, 2018
Multiple responses

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3.4 Factors that determine how effective the strategies are to mitigate business risks of farmers

This section presents the results of Tobit model that showed how socio-economic characteristics of the farmers affected the risk mitigation strategies employed by the farmers. Business risk was measured in terms of the number of strategies adopted by respondents divided by overall strategies employed/available. The likelihood estimates of the Tobit model indicated that chi-square ($\chi 2$) statistic of 47.20 was highly significant ($P<0.0001$) suggesting that the model has a strong explanatory power. The pseudo coefficient of multiple determination (R^2) showed that 71.0 percent variation in the dependent variable was explained by the included independent variables. This implies that the model showed a good fit to the data. The result showed that the coefficients of the variables; capital base, credit and number of labour and were statistically significant at 1%, and 5% respectively, implying that these are the explanatory variables influencing the use of risk mitigation strategies in the study area.

Table 4: Tobit estimates of factors influencing business risks of farmers

Variables	Coefficient	Standard error	p-value
Age	-.0007111	.0023097	0.759
Household Size	-.0016742	.0079414	0.834
Educational level	-.0013922	.003225	0.667
Credit	1.17e-07**	4.65e-08	0.014
Farming experience	-.0014365	.0019042	0.453
Number of labour	.0079835**	.0036209	0.030
Liabilities owed	4.76e-09	3.33e-08	0.887
Asset owned	-6.85e-10	1.77e-08	0.969
Annual income	-9.82e-12	2.05e-08	1.000
Total farm size	.0045402	.0084992	0.595
Capital base	3.63e-08***	7.88e-09	0.000
Constant	1034729	.0557761	0.067
Loglikelihood	36.85308		
Number of observation	90		
Pseudo R^2	0.7104		
Prob>Chi^2	0.0000		
Lrchi^2	47.20		

Source: field survey 2018, ***significant at 1%, **significant at 5%, *significant at 10%.

3.5 Challenges facing agricultural insurance

The table below shows the different views of the respondents on the challenges facing agricultural insurance. where 32.2% of them faced the challenge of unstable income, 71.1% encountered the problem of fluctuation in production (due to climate changes), 10% have issues of illiteracy, 37.8% did not have sufficient information about insurance, 10% have problems paying their premium regularly, 8.9% were faced with the problem of shortage of agricultural insurance personnel(as a result of negligence by the government), 21.1% were faced with the

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problem of unavailability of regular farm inputs, 41.1% had problems accessing credit, 33.3% of them had the problem of operating on a small scale while 27.8% of them are faced with family and social responsibility.

Table 5: Distribution of respondents by their perceived challenges to agricultural insurance

Challenges	Frequency	Percentage
Fluctuation in production	64	71.1
Credit inaccessibility	37	41.1
Insufficient information about insurance	34	37.8
Small scale operation	30	33.3
Unstable income	29	32.2
Family and social responsibility	25	27.8
Unavailability of regular farm input	19	21.1
Illiteracy	9	10.0
Irregularity of premium payment	9	10.0
Shortage of agricultural insurance personnel	8	8.9

Source: Field survey, 2018

Multiple responses

Conclusion and recommendations

It can be inferred from the study that most of the respondents were in their productive years, fairly educated which availed them the opportunity to know the importance of agricultural insurance. This knowledge helped them to identify the risk they encountered and the strategies that they used to reduce their individual financial business risks. Production or yield risk and financial risk are the most encountered risks while entrepreneur diversification and crop yield insurance were observed to be the most employed strategies used to mitigate these risk.

The study also concluded that all the variables credit, number of labour and capital base were factors influencing the effectiveness of the strategies employed on the business risks encountered in the study area. This study also revealed that majority of the respondents (agriculturally insured farmers) were faced with the challenges of; fluctuation in production, insufficient information about insurance, credit inaccessibility, small scale operation, unstable income and family and social responsibilities while few of them were faced with the problems of; unavailability of regular farm input, illiteracy, irregularity of premium payment and shortage of agricultural insurance personnel.

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The following recommendations are made on the basis of the findings of this study.

- The government should help publicize and educate the general public on the importance of agricultural insurance in the farming business.
- Government should implement agricultural policy on agricultural insurance.
- Insured farmers should be properly monitored and educated on high maintenance of the farming business.
- Farmers should be educated on the types of risks available in farming and the strategies to mitigate such risks.

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