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DETERMINANTS FOR PARTICIPATION FOR AGRICULTURE MICROINSURANCE

Matsika R,
Midlands State University, Insurance and Risk Management Department
Chatiza L

(Bcom) Midlands State University

Samugwede, H,

Midlands State University, Insurance and Risk Management Department
Gurira P,
Lecturer: Midlands State University, Banking and Finance Department

Abstract

Smallholder farmers play a significant role in providing food security in Zimbabwe. Risks such as droughts and floods have however over the years hampered agricultural production for these farmers. Agricultural microinsurance products aim at insuring these risks at a low cost. The study was motivated by the low uptake of these products in Zimbabwe. The main objective of the study was to examine the determinants of participation for agriculture microinsurance so as to improve their uptake and reduce the negative shocks that farmers face in case of a disaster. The target population was small holder farmers located in the Peri urban arrears of Harare and two agriculture microinsurance providers. Sampling techniques used were stratified random sampling and convenience sampling. The census method of data collection was also included in the research. A mixed research approach was adopted combining both quantitative and qualitative data. An exploratory research design approach was adopted with research data being collected by way of utilizing the questionnaires, interviews and secondary data made available to the researcher by the Zimbabwe farmers Association. Stepwise regression was then used to establish significant factors that influence the purchasing decisions of small holder farmers. Backward stepwise regression showed that 6 factors out of twelve factors are significant namely, price, trust, wealth and income, government schemes, product design, education and awareness. The other 6 factors were considered insignificant as they had no effect on the dependent variable. The significant factors were fitted in the logistics model regression model to assess the effect of the explanatory variables on farmer participation in agriculture insurance and 86.8% chance was established. The study recommended that awareness and education be conducted to the farmers, farmers should be innovative in their farming activities and subsidies/ incentives to be provided by the government so as to increase microinsurance uptake.

Keywords : microinsurance, development, agriculture ,small holder farmers

Introduction

Agriculture plays a very vital role by providing food security to the millions of people in Zimbabwe. At one point in time Zimbabwe was considered to be the bread basket of Africa. It is of paramount importance for Zimbabwe to reclaim this position . With the majority of the population being situated in rural areas agriculture is a key driver of economic and human development. Concerns for food security in the context of natural disasters have increased the interest in agricultural insurance. Small holder farmers continually have to deal with risks such as droughts and floods that affect their operations and ultimately their output. It is therefore imperative for the farmers to participate on microinsurance agricultural products to safeguard against such calamities. Factors that determine their participation should therefore be examined to ensure that these products reach every household.

1.0 Background to the study

Agriculture is a vital component in most African countries. In Zimbabwe, agriculture sector is the largest economic sector in the country. It heavily influences other economic sectors in particular the manufacturing sector. Agriculture contributes 11-14% of the GDP, provides employment to 70% of the population of Zimbabwe and 60 % of raw materials (BMI Research, 2017). Agriculture exports produce proximately $13.4 billion annually 40% of Zimbabwe's foreign exchange earnings are made through the exports. Most of the land in Zimbabwe is occupied by small scale peasent farmers. The partitioning of land, according to Cross (2016) states that 700 000 small scale peasant farmers on 16 million hectares of land, 65 000 small scale commercial farmers on about four million hectares of land and 6 000 large scale commercial farmers on about eight million hectares with two million hectares held by large scale estates and wild life conservancies.

The success of the agriculture sector has been derailed by natural disasters such as droughts and floods. According to the Herald report in February 2014 about 6000 people who lived around the Tokwe Mukosi basin were affected by floods due to excessive rains. The flooding was detrimental as it destroyed homesteads, grains and livestock. The affected community's mostly were low income earners who did not have any known insurance policies in effect to protect themselves against loss of property, crop and life. in addition rendering to the Sunday Mail report 2017 this year drought has so far left 100 000 cattle dead in each province namely Masvingo, Midlands and Matabeleland provinces. Risk & Insure Zimbabwe (2017) states that this year's rainy season left scores of families marooned in flood waters which damaged property and crops, killing both livestock and human life. With a coordinated insurance plan, it will be easier for such communities to recover from such unexpected costs.

The insurance industry consist of 20 non-life insurance, 8 reinsurance companies and 32 insurance brokers ,that offer a diverse range insurance products. The largest contribution comes from motor insurance with 43.31%,Agriculture consist of

0.88% percentage only being the least gross premium written from all other products. According to the report from the Sunday Mail 18 January 2017, levels of insurance uptake in the farming sector in the county are very low, farmers do not seem to fully appreciate insurance products offered by the insurance companies and their intrinsic value. Agriculture insurance uptake comparing with other sectors of the economy such as manufacturing, mining and service sector across is very low. According to BH24 Reporter (2017) the insurance penetration in Zimbabwe is estimated at 2%, provided for new products. These farmers view insurance as an unnecessary expense rather than a tool that curtails them from future risks (Makaudze, 2012).

Most of the farmers who are smallholder farmers view insurance to be unaffordable. Majority of the people in low and middle income countries live in poverty. According to Zimbabwe National Statistics Agency (2017) the cost of living standards stands between $430 and $574 for an average household of 5. It further denotes that Zimbabweans live below the PDL and they are struggling to afford a basic standard of living. The purchase of insurance will therefore be a strain on the already existing tight budget and will automatically be removed from the basic list. The poor have remained largely uninsured thereby exposing this sector to risks.

The introduction of microinsurance was a way of delivering effective and efficient insurance services and products as well as promoting financial inclusion. According to McCord and Roth (2006) microinsurance is the protection of economically challenged people against specific perils in exchange for regular premium payments which is proportional to the likelihood and of the risk involved. This means that low income people can use microinsurance where it is available as a way of managing risks. Agriculture microinsurance is about providing agriculture insurance to small scale farmers in developing countries McCord and Roth (2008)

According to The Microinsurance Network (2017) the current microinsurance penetration rate is pegged at 1.1% for all new products, agriculture microinsurance is standing at 0% relative to other microinsurance plans. In other countries in Africa such as South Africa, 64% of the population is covered under microinsurance while in Zambia, Namibia and Swaziland 22.2%, 15.1% and 21.4% of the population covered by microinsurance respectively. Their industries are experiencing increases in premium growth due to introduction of new microinsurance products.

The need for microinsurance has been identified as a critical instrument for providing effective and efficient insurance services, according to the report from the Zimbabwe independent of 25th October 2013.The report from The Herald 19 June 2017 also states that the IPEC launched a microinsurance regulatory framework that will facilitate the provision to low income earners due to the highly informalised nature of the economy. The primary objective of the frame work is to promote the

development of micro –insurance so as to establish the basis of legal framework for the regulation of microinsurance activities.

Risk & Insure Zimbabwe (2017) reported that 5 microinsurance products had been launched, with funeral cash plans dominating the new microinsurance products landscape. Nyaradzo introduced a low cost plan called SahwiLite, Moonlight rolled out a comprehensive funeral plus cash plan, and PSMAS also introduced a Shield Plan. Mobile operators also have ventured in this move as Net one has introduced a low cost mobile insurance product for their captive subscribers called One cover.Very few notable companies have targeted farmers in the newly introduced market.

According to Old Mutual website www.oldmutual.co.zw on the 18th of November 2016 the company launched drought insurance product targeted at farmers with one or two hectares of land primary to grow maize for subsistence. The Financial Gazette of 22 November 2016 states that from the day of the launch of the product 3000 famers have signed up for drought insurance cover out of a targeted 50 000 small scale farmers which is a very low response. Econet also has found a revolutionary way of using technology to provide microinsurance product called Eco-farmer designed to insure crops against drought and excessive rainfall on www.econet.zw/ecofarmer. According to figures released in the mobile operator's 2016 integrated financial report Eco farmer to date now has 250,000 subscribers. The last Eco farmer subscriber figures that were shared showed 550,000 in August last year thus a 54.54% drop in farmer participation.

According to Ackah and Owusu (2012) points out the determinants for insurance participation in general in Sub Saharan African literature, on microinsurance specifically seems more prevalent. They include lack of awareness of the existence of the available insurance products and also a very poor understanding of the concept of insurance.

1.1. Aim of the study

To examine the relationship between (Price, wealth and income, education and awareness, basis risk, trust, peer influence, religion, product design, distribution channel, government policies, age and gender,) and farmer participation in agriculture microinsurance.

2.0 Literature review

2.1. Theoretical Review

It is easy for any entrepreneur to see the need for agriculture microinsurance products but very difficult to effectively estimate the demand for it without knowing the drivers that can make smallholder farmers to purchase the product. According to Roth and McCord (2008) the demand assessment tends to draw inferences from historical trends. Improved understanding of demand helps in

designing appropriate products and steps that should be taken to ensure the adoption of the products by the poor households. Market research is the only tool that can improve the uptake f these unfamiliar services y determining what kind of insurance products these people need (Churchill and McCord 2012).

According to a research conducted by (Mirsink and Geuts ,2011) they mentioned that for us to understand the decision for microinsurance participation or the purchase of microinsurance its very critical for us to note the micro economies theories that are used in understanding the decision which are :

2.1.1.Standard Expected Utility theory

The expected utility theory assumes that demand for insurance is higher for risk averse individuals who mainly use insurance to mitigate losses (Neumann and Morgenstern, 1944;Schlesinger and Doherty,1985;Manning and Marquis, 1996). It explains demand by referring to insurance product characteristics which are premium and payouts, socio economic characteristics and it adopts that individuals are capable of measuring the probability of risk.

2.1.2. Prospect theory

The prospect theory is an alternative to the expected utility theory. It describes that participation in insurance by mentioning the decision to purchase in relation to its substitute. It assumes the importance of social and cognitive factors in understanding economic decision. Slovic (1984) adds that prospect theory recalls that individuals make imperfect assessments of information. Though prospect theory suggests that not objective probability of risk influence the decision to take up insurance. It has also added to the understanding that small design changes in the products and the way they are marketed can influence the decision to purchase insurance (Mullainathan and Shafir, 2009, Dalal and Morduch, 2010). The theory allows for studying of different product attributes and marketing on demand for insurance.

2.2. Review of Empirical studies

Several studies have been done both on a local level and international level. In a study done by Lin Liyne and Zhu Yu (2006), an analysis was carried out on the determinants of social insurance participation in China cities. In the study the researcher used both primary and secondary data. Descriptive and regression analysis was used to analyse data, the research proves that social policies of the cities affected participation in index insurance uptake. It is also likely that participation may also be determined by a combination of gender, perceived need and income of the households

Some interesting insights has been drawn by Makaudze and Miranda (2009) who asserts on the determinants for farmer participation are, collateral requirements required by financiers for farm insurance, awareness through marketing , and cost of insurance in Nigeria. The researcher used both quantitative and qualitative research methodologies, for collection of the primary data, questioners were

administered. They established that farmer who purchase insurance are likely to have experienced significant losses in the past. The nature of farming enterprise was also mentioned for example a tobacco farmer tends to insure because of high costs and profitability of that enterprise. This has an overall effect in increasing agriculture insurance uptake.

In South Africa Nxumalo and Oladele(2013) examined factors affecting participation in agriculture projects in Zululand district. They used the probit regression model which revealed that land ownership, age, households head and non-farm income were important determinants of farmer's participation. The major constrains were limited resources, unavailability of land and lack of funding which affected the farmers.

According to Karlan,Osei, Akoto and Udry (2012) , in a study carried out in Ghana an increase in microinsurance scheme participation was due to the fact that the farmers trusted the insurer and their credibility of paying coverage. According to Gineet al. (2008) trust in the insurance provider is a key determinant for insurance uptake. Peer influence is related to trust in some cases. In further explanation Derconet al. (2012) assessed the impact of peer referrals for health insurance participation and found out that referrals have a negative influence on insurance demands , others added that the negative effects of them may be due to lack of trust of the insurance institution.

According to Sync Consultant (2006) in Ghana, they researched on multiple linear regression approach to assess the driving factors of farmer participation in weather index insurance. Their main objective was to establish a relationship between the driving factors and farmers participating in such a cover. The research also analysed the assumptions of multi linear regression model, the findings were that participation can actually be boosted through educating the public on agriculture insurance, MFIs participation to increase deliver channels and promotion of marketed insurance products and they was a correlation between them. Elaborating on distribution channels Njuguna and Arunga (2012) alluded on the risks are immanent in microinsurance is inadequacy of distribution channel. One of the strategies used by microinsurance institution in India called BASIX- to sell their rainfall shortage insurance was to use an intermediary who was a trusted leader in the community to sell their product, who then informed other households about the product and hold marketing meetings.

To them these factors are appropriate to generate demand for insurance. They also saw in their findings that easing credit especially to the poor so that they can also have appropriate saving and borrowing instruments. These sentiments may be closely related to those raised by Hill and Robles (2010) in their results when they conducted a pilot survey in Ethiopia .Their study mainly focused on the introduction of subsidies which was an important step toward meeting Ethiopian ambition for universal agriculture microinsurance.

Njuguna and Arunga (2013) carried out a study to establish the risks that are immanent in the microinsurance business and their suggestions are in line with Karlinjn and Peter (2011) carried a study in India and found the following factors being determinants of household's decisions to take up agriculture microinsurance. Their study was based on informal trust and building factors that affect demand in microinsurance, therefore age, education, sickness, financial status,risk aversion and location dummies were the proven factors which are important for insurance uptake. Expounding on the issue of education the German institute for Economic Research (2009), highlighted that educating customers can be a potential challenge to developing the microinsurance sector. They point out the demand for insurance correlates with customers' perceptions and their beliefs. Study by Kamau (2013) disagrees the contribution of education to the low insurance penetration and also (Jose and Valluru 1997) agrees that education level of the farmer had little effect on the decision by the farmer to purchase insurance in Nesbraka

(Cole et al.,2013)after a research design of randomized treatment for varying discount on insurance purchase in India for rainfall insurance find significant price sensitivity for rainfall insurance product , a 10 percent price decline increases the probability of take up by10.4- 11.6 percent, thus indicating a price elasticity of 1.04-1.16. Cole et al.(2013) finds that even when prices are significantly below actuarially fair prices, fewer than half households purchase rainfall insurance, therefore he recommended heavy initial subsidies Mobarak and Rosengzweig (2012) did a similar study under rainfall insurance and found out that a 50 % price decline relative to the actuarial price increases the probability of take up, the further state that approximately 40 percent of treated households purchased insurance. Gaurav et al.(2011) however found that they is no effect on demand when he tested the effect of a money back guarantee for a full refund of the insurance premium in the rainfall insurance policy fails to pay out.

Research on traditional insurance markets found that both wealth and income are relevant, (Outreville 2013) review that greater levels of national income are associated with a higher insurance uptake. Unfortunately in microinsurance markets wealth is a signal of access to credit. Households without access to credit have less ability to reduce consumption in case of a shock and they thus may place higher value on insurance as a means to reduce volatility. This reasoning is underlined by Gollier(2013) in his theoretical model. Households which lacks access to credit may not have funds which are enough to buy insurance even though a shock may be more damaging to them than the wealthier households. Cole et al.(2013) supports this line of thought as he observed that take up increases by 140 percent when households are given enough money to buy at least one policy. In addition one authors speculate as to the effects to take up even higher level of cash disbursement.

Because of multicolinearity issues most studies include either income or wealth in their analysis. It appears that wealth affects microinsurance and traditional products markets differently although we expect a positive sign in both markets. In

traditional market income represents potential loss, that is the higher the anticipation of losses the higher the level of insurance purchased as we have noted above a household has a lower risk aversion with increasing wealth, but most empirical findings support the loss potential theory. Within the microinsurance market lower income individuals may actually have a greater need for insurance cover than wealthy because of the relative influence of the same type of shock. Even so after the above discussion limited resources do not necessarily fully explain the low uptake rates in emerging microinsurance markets.

Gheyssens and Gunther (2012), explainsreligion is somehow related to risk attitudes as well as a sense of cohesion within a certain area. Cole et al. (2012) adds by saying those with what they regard as strong faith individuals/group of people tend to rely solely on God which results in more risk taking. Another study by Noussairet (2012) does not conform to it, the researcher explains that more religious people demonstrate higher levels of risk aversion. Several cross country studies measure insurance demand in Islamic countries, have found a negative correlation between insurance demand and religion (Noussairet (2012).

According to Churchill (2002) the reseacher looked at the importance of appropriate product design and concluded by saying we have to be aware of the risks that the low income households face, how often and the resulting loses. If the client voice their preferences it will go a long way towards appropriate product design (Churchill 2007) consumers do not want to be overwhelmed with materials about the product, the simpler the product the better the understanding which will eventually enhances up take. Florida Medical study the respondents complained about being too much overwhelmed by a product in the report say that same respondents were annoyed or put off.

Government schemes and policies are crucial in improving farmer participation especially in agriculture insurance. The schemes outreach for very low income people,most insurance products supported by the government would have strict market, design and rating methodology (ILO 2009).According to Akpanet al., (2015) they offer tax relief and incentives for education and also awareness campaigns for microinsurance products, to most farmers in Africa government remains their main source of inputs in most of their agriculture related activities. In an instance they distribute scarce public resources to the poorest of the poor. According to Nxumalo and Oladele (2013) explains that to determine which groups to subsidise and to what extent and for how long it's ultimately a political question but which needs to be informed by a sound understanding of the poor population. In his study Akpanet al., (2015) agreed with the statement, membership in political party or involvement in any political movement increases the chance of a famer or a village to participate in agriculture insurance.

3.0 Methodolody

3.1 Model specification

Logistics regression model

Quite a number of researchers that deal with similar issues of participation have so far conducted and this research borrows much from such authorities as Jutting (2003) and Weinberg (2001) who have adopted logistics regression models in their studies. This study adopts almost the same LOGISTIC procedure which was developed from the need to analyse qualitative (dichotomous) dependent variable within the regression framework. Logistics Regression Analysis is a statistical technique for analysing data in which they are one or more independent variables that determine outcome. It is also often used to investigate the relationship between discrete response and a set of explanatory variables. In any regression analysis the key quantity is the mean value of the response variable given the values of the independent variable:

$$E(Y/x) = \beta 0 + \beta ix$$

Where Y -denotes the response variable, X -denotes a value of the independent variable and i -values denote the model parameters. The quantity is called the conditional mean or the expected value of Y given the value of x. the dependent variable of the research is, FARMER PARTICIPATION. The modified logistic model used the following equation;

$$g(x) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 \ldots + \beta_n x_{n+\mu}$$

Where g(x) stands for the function of the independent variables:

$\beta_0$is the constant of r egression

$\beta_1, \beta_2, \beta_3, \beta_4, \ldots\ldots\beta_n$are coefficients of regression and μ is an error term

Logistic regression determines the coefficients that make the observed outcome (insured or not insured for agriculture microinsurance) most likely using the maximum likelihood technique.

3.1.2. Model Assumption

According to Wright (1995) logistic regression does not assume a linear relationship between the dependent and independent variables, the dependent variables do not need to be normally distributed, there is no homogeneity of variance assumption, in other words, the variances do not have to be the same within categories, normally distributed error terms are not assumed and the independent variables do not have to be interval or unbounded.

3.1.2. Wald statistic

Wald statistic assess the contribution of individual predictors in a given model. The Wald statistic is used to assess the significance of coefficients. It is the ratio of the

square (t^2) of the regression coefficient to the square of the standard error of the coefficient. Only significant coefficients are included in the logistic regression equation.

3.2. Data types and sources

The primary instrument shall be a questionnaire whose questions shall require binary choice response as well as continuous response. The population for this research was drawn from the peri urban districts of Harare. Stratified sampling helped in determining the contribution of each strata into the sample, so that each strata is appropriately represented. Convenience Sampling was also used in selecting members who are available at the time of the study into the sample (Sekeran&Boagie,2009).

Table 3.1:District for the farmers

District	**Number of farmers**
Chishawasha	20000
Goromonzi	15462
Domboshava	15000
Total	**50462**

The krejciemorgan sample size table designed by Krejcieand Morgan in 1970 was used to calculate the sample size for the current study. A 95% confidence level was used with a margin error of 0.1 on the population of fifty thousand four hundred and sixty two (50462) participants. A sample size of ninety six (96)participants was obtained. This is in line with Matataet al. (2009) who argued that having 80 to 120 persons are adequate for most socio economic studies in the Sub Sahara Africa.

Following the determination of the sample size above, it was necessary to calculate the size of each strata. The outcome is presented in Table 3.3 below with values calculated using the formula:

Sample size of strata = size of entire sample/population size x strata size.

Table 3.2: Sample size per School

District	Number of farmers	Sample size in strata
Chishawasha	20000	96/50462×20000=38.04=38
Goromonzi	15462	96/50462×15462=29.41=29
Domboshava	15000	96/50462×15000=28.53=29
Total	**50462**	**96**

Based on the above calculations a sample of 96 respondents was taken from the districts, with Chishawasha which had 20000 farmers contributing 38 respondents, Goromonzi which had 15462 contributing 29 respondents and Domboshava with 15000 contributing 29 respondents.

Census sampling technique was employed to obtain data from 2 operational managers of the two insurance companies providing microinsurance namely Old mutual and Econet.

3.3. Data analysis

3.3.1Stepwise Regression

According to Zhang (2016) stepwise is automatically performed by a statistical package.Stepwise regression is a method of building up a model by adding or removing the variables based solely on the t-statistics or using the T-tests or F-tests. It can be called a combination of the forward and backward selection method. In the research there are just less than 12 variables that determine farmer participation in agriculture microinsurance and the researcher aims at looking at few variables that determine their participation to a greater extend by using the stepwise regression. The dependent variable in this study is farmer participation- this included farmers who are currently small holder farmers at the time of the research who have purchased agriculture microinsurance and those who had been involved in small holder farming and had purchased agriculture microinsurance in the past.

The independent variable in this paper encompasses factors that determine the purchasing decision for agriculture microinsurance products which are economic factors (price, wealth and access to credit), structuralfactors (distribution channels, product design and age and financial literacy and education), cultural and social factors (trust and peer effects, risk aversion and basis risk and financial literacy and education), personal and demographic factors (gender) and government schemes. The selection of variable was guided by findings of the research and the theoretical foundation.

There are three approaches that can be used which are forward selection, backward selection and both forward and backward selection at the same time.

3.3.2 Backward elimination

Zhang (2016) alluded that backward elimination is a stepwise approach, the process works by starting with all the variables in the model and eliminate one by one which ever variable that is less significant in the model.The researcher will use this method as the most appropriate for the study. It works way down and not up. The process is repeated until only significant variables are left.

3.3.3 Cross tabulation

This type of table is used to describe the relationship between two categorical variables, it is also known as contingency table analysis. It is a joint frequency distribution of cases based on two or more variable of interest. The SPSS provides one with the flexibility of choosing a variable the researcher find appropriate and on which axis. It allows one to display percentages so that the output will not be cluttered.

3.3.4 Tests of significant.

To ensure model is fit for this study, the data was tested to ensure regression assumptions were not violated. The regression assumptions tested for were: Linear relationship, Multivariate normality, No or little multicollinearity, No auto correlation and Homoscedasticity

The t-tests were employed to determine the significance of the constant term and the coefficients of terms. The importance of each of the regressions was determined by carrying out the t-test at 95% confidence level. The coefficient of determination adjusted R2 was used to measure the extent to which independent variables explained the variations in the dependent variable. The researcher used adjusted R2 as it measured the coefficient of determination better (Kanguri, 2016)

4.0 Data analysis and presentation

4.1 Response rate

The researcher distributed 96 questionnaires to farmer's.This was done so as to get responses from all cross sections of the experienced study population. The response rate is an important factor as it ensures that the data is reliable. According to Babbie and Mouton (2001), a response rate of 50% is adequate to conduct an analysis, while 60% and 80% are considered as good and very good respectively.The summary of the response rate is given in table 4.1 below

Table 4.1: Questionnaire response rate

	Target	Successful	Success rate
Questionnaires	**96**	**84**	**87.5**
Interviews	**2**	**2**	**100**

Source: Research data (2017)

Ninety six (96) questionnaires were distributed to farmers. Eighty four (84) questionnaires were returned, correctly filled in that they were considered useful for analysis. The other twelve (12) were never returnedTherefore, an 87.5% questionnaire response rate was attained and it was concluded that it was possible to continue with the analysis of the data collected so as to make the necessary recommendations. Two (2) interviews were successfully conducted with management f the two companies currently offering the products.

The results show that most of the respondents 67% were male and while 33% were female. The gender disparity in the sample is a typical of the situation in many households in Zimbabwe where the patriarchal system has created an environment whereby the males are the householders. Highest age of the respondents had 40 to 49 years 43%, followed by 50 years 28%, 30 to 39 years 17%, and those below 30 years 12%. Most of the respondents held a diploma 35% as their highest academic qualification. This was followed by certificates 29%, higher degree 21%, undergraduate degree 9% and secondary 6%. It has been shown that most respondents were equally qualified to be able to interpret and address the questions, the researcher only needed understanding and correct interpretation of the questions regardless of the level of academic qualification. The household income was another key variable considered. This had to be income from employment, self employment, or any other activities that one may undertake on a casual basis. Most of those respondents who were neither self- employed nor employed could at least afford to get a $100 from part time activities per month. The income range was between $100 and $2800 per month.

4.4 Relationship between factors and farmer participation in agriculture microinsurance

The study sought to present the major factors for farmer participation in agriculture microinsurance in Zimbabwe

4.4.1 Regression using Backward Selection

A stepwise selection method was performed to eliminate those variables having insignificant coefficients. The backward selection method was applied as the potential variables are modest seized set. All the twelve factors that were considered as having an impact on farmer participation in agriculture

microinsurance in Zimbabwein this study are represented in Table 4.4. No variables were eliminated in the first step 1 as they all met the significance criteria.

In step two Product accessibility was eliminated with a significance of 0.423 and in step three, Religion restriction was eliminated with a significant level 0.385. The significant level is 0.05.

Step four to six show the elimination of fear of being denied full indemnification; Poor customer experience and Influence from peers. These had insignificant p-values, that is greater than 0.05.

Factors in the equation in the last step

The results of the last step are shown in Table 4.7.

The final stage shows the last stem of the stepwise elimination process. It shows the factors with p-value less than 0.05, hence these were deemed significant. Therefore, only six factors were deemed significant in the study

4.4.2 Logistic Regression Model

A regression model was performed to assess the effect of the explanatory variables on farmer participation in agriculture microinsurance.

Model Summary

Table 4.11 below is a representation of the model summary.

Table 4.11: Model Summary

Step	-2 Log likelihood	Cox and Snell R Square	NagelkerkeR Square
7	115.387	0.546	0.667

The -2 Log likelihood values for the stepwise selection in the above the goodness of fit of the model on the data. The current study yielded a -2 Log likelihood value for of 115.387 with a Cox and Snell R Square of 54.6% and the Nagelkerke R Square of 66.7%. The Cox and Snell R Square value and the Nagelkerke R Square value helps to gauge the substantive significance of the model. Therefore, the significance of the model for this study ranges from 54.6% to 66.7%. This denotes a high significance level, and denotes that the Logistic regression model is a good fit on the data.

Table 4.12 indicates the variables that are used to come up with the final model at the 5% significance level.

Table 4.12: Final Model and Variables in the equation

Factors	(β)	S.E	Wald	Df	Sig.	Exp(β)
Price	-1.817	0.392	23.754	1	0.000	0.163
Education and awareness	1.047	0.226	27.748	1	0.001	2.849
Government schemes	0.652	0.268	8.582	1	0.000	1.919
Lack of trust	-0.869	0.264	12.843	1	0.005	0.419
Income	0.851	0.289	9.776	1	0.000	2.342
Productcoverage not adequate	-0.664	0.329	5.648	1	0.003	0.515
Constant	1.885	0.904	3.347	1	0.054	6.586

Interpretation of the Model

The fitted model becomes:

$$Y = 1.885 - 1.817x_1 + 1.047x_2 + 0.652x_3 - 0.869x_4 + 0.851x_6 - 0.664x_{10} + \mathbf{e}$$

Where: x_1 is the price,

$x_2$is Education and Awareness,

$x_3$is Government schemes,

$x_4$is lack of trust,

$x_5$isNo adequate resources, and

$x_{10}$is Product coverage not adequate.

The intercept represents the average log odds of success (farmer participation in agricultural microinsurance) when all of the explanatory variables are zero. In such case, the following holds exp(β) = exp(1885) ≈ (6.586). This implies that there are approximately 6.586 chances of farmers participating in agricultural microinsurance. The odds ratio were converted to probabilities to make them probability predictions

$$Probability = \frac{odds}{1 + odds}$$

Substituting the values, we get:

$$\text{Probability} = \frac{6.586}{1+6.586} = 0.868$$

The result obtained indicates that there is an 86.8% chance that a farmer will participate in agriculture microinsurance, without considering any explanatory variables

4.4.3 Control variables

The model included some control variables in relation to the demographics of the respondents such as gender, which was necessary since age and gender influence decision of an individual to purchase microinsurance. However, gender and age respondents were considered as control variable as these variable will not influence policy decisions regarding encouraging the uptake of agriculture microinsurance.

4.4.4 Significant variables

This section considers variables that were found to be significant in influencing the uptake of agriculture microinsurance. These variables include price,government schemes, education and awareness, lack of trust and product design.

Price

Alpha level 5% therefore p value < 0.05 {statistically significant}, p value > 0.05 (statistically not significant).

H_1: Price is a key determinant that affects farmer participation in agriculture microinsurance.

The coefficient of price of the agriculture microinsurance is -1.817, this implies that exp(β) = exp(−1.817) ≈ (0.163). If (β_i) is negative, the factor will be less than one, which means that the odds are decreased. Therefore, a unit increase in the price of the agriculture microinsurance, ceteris paribus, leads to a decrease in the odds of increase infarmer participation in agriculture microinsurance. Thus, a high value of price of the agriculture microinsurance is associated with a decrease in farmer participation in agriculture microinsurance. This notion is supported by (Cole et al..,2013) who used a is simple model of demand after a research design of randomized treatment for varying discount on insurance purchase in India for rainfall insurance and found a significant price sensitivity for rainfall insurance product, a 10 percent price decline increases the probability of take up by10.4- 11.6 percent, thus indicating a price elasticity of 1.04-1.16.

H_o: Price is a not key determinant that affects farmer participation in agriculture microinsurance. Decision rule: Reject **H_o**: if | p-value | < 000.00 (from t-distribution statistical tables)

Government schemes

H_1: Government schemes have significance on farmer participation in agriculture microinsurance.

The coefficient of government schemes is 0.652, this implies that exp(β) = exp(0.652) ≈ (1.919). Therefore, a unit increase in government schemes,ceteris paribus, leads to an increase in the odds of increase in farmer participation in agriculture microinsurance. Thus, a high value of government schemes is associated with an increase in farmer participation in agriculture microinsurance. This result is in line with Akpanet al.., (2015) who explains that, an increase in participation is seen when government subsidies and incentives towards microinsurance services.

H_o: Government schemes do not have significance on farmer participation in agriculture microinsurance.

Decision rule: Reject **H_o**: if | p-value | < 000.00 (from t-distribution statistical tables)

Wealth and Income / No Adequate Resources

H_1: wealth and income affects farmer participation in agriculture microinsurance.

The coefficient of government schemes is 0.851 this implies that exp(β) = exp(0.851) ≈ (2.342). Therefore, a unit increase in wealth and income,ceteris paribus, leads to an increase in the odds of increase in farmer participation in agriculture microinsurance. Thus, a high value of wealth and income is associated with an increase in farmer participation in agriculture microinsurance.Clarke (2011) affirms the results, the study explains that they is appositive relationship between wealth and income and farmer participation, wealthier households have a higher chance of accessing credit and purchasing of microinsurance becomes feasible. Gollier (2013), agrees also as he alluded that take up for microinsurance increases when the less wealthy household are given enough money to buy at least one policy.

H_o:wealth and income do not affect farmer participation in agriculture microinsurance.

Decision rule: Reject **H_o**: if | p-value | < 000.00 (from t-distribution statistical tables)

Education and awareness

Alpha level 5%, therefore p value < 0.05 {statistically significant}, p value > 0.05 (statistically not significant).

H$_1$: Education and awareness is does have significance on farmer participation in agriculture microinsurance.

The Beta coefficient of education and awareness on agriculture microinsurance is 1.047, producing exp(β) = exp(1.047) ≈ (2.849). The result is the factor by which the odds change when education and awareness increases by one unit. Therefore, a unit increase in education and awareness, ceteris paribus, results in an increase in the odds of increase in farmer participation in agriculture microinsurance. As such, a high value for education and awareness is associated with an increase in farmer participation in agriculture microinsurance. Other studies conducted by Cole et al.(2012) share the same view as they show that education on insurance products is one of the major factors that determine purchasing decision by farmers.

H$_o$: Education and awareness is does not have any significance on farmer participation in microinsurance.

Decision rule: Reject **H$_o$**: if | p-value | < 000.01 (from t-distribution statistical tables)

Lack of trust

Alpha level 5%, therefore p value < 0.05 {statistically significant}, p value > 0.05 (statistically not significant).

H$_1$: Trust is one of the major factors that affects farmer participation in agriculture microinsurance.

The coefficient of lack of trust is -0.869, this implies that exp(β) = exp(-0.869) ≈ (0.419). Therefore, a unit increase in lack of trust, ceteris paribus, leads to a decrease in the odds of increase infarmer participation in agriculture microinsurance. Thus, a high value of lack of trust is associated with a decrease in farmer participation in agriculture microinsurance.This result is in line with Gineet al. (2008) who said, trust in the insurance provider is a key determinant for insurance uptake.

H$_o$: Trust is not one of the major factors that affects farmer participation in agriculture microinsurance.

Decision rule: Reject **H$_o$**: if | p-value | < 000.05 (from t-distribution statistical tables)

Product Design/Product cover not adequate

H$_1$:Product design affect farmers purchasing decision in agriculture microinsurance.

The coefficient of product coverage inadequacy is -0.664, this implies that exp(β) = exp(-0.664) ≈ (0.515). Therefore, a unit increase in Product coverage inadequacy, ceteris paribus, leads to a decrease in the odds of increase infarmer participation in agriculture microinsurance. Thus, a high value of Product coverage inadequacy is associated with a decrease in farmer participation in agriculture microinsurance. This same view was later shared by Churchill(2002), who looked at the importance of appropriate product design and noted that we have to be aware of the risks that the low income households face, how often and the resulting loses so as to provide adequate cover for them.

H_o:Product design does not affect farmers purchasing decision in agriculture microinsurance

Decision rule: Reject **H_o**: if | p-value | < 000.03 (from t-distribution statistical tables)

It has been noted that age, gender, price, education and awareness, lack of trusts and product design are important at predicting farmers' participation in agriculture microinsurance.

Insignificant variables

Reflecting back on the backward regression model it starts with all candidate variables testing deletion of each, it deletes the variable in each stage so it deletes the variable whose loss gives the most statistically insignificant deterioration of the model fit. The tables below shows the variables that were deleted in each step.Alpha level 5%, therefore p value < 0.05 {statistically significant}, p value > 0.05 (statistically not significant). Step 3 and step 6 were control variables that were deleted that is gender and age respectively. Distribution channel, religion, basis risk and peer influence were rejected as they did not meet the significance criteria.

5.0 Conclusions and recommendations

The study also concludes that the following factors;**wealth and income, government schemes,** and **education** and **awareness**have a positive correlation with farmers' participation. This implies that an increase in any of the 4 factors result in higher demand/participation in micro agriculture products by farmers. According to the findings of the researcher recommends the following to insurance companies. They should take note of the following factors in their provision of agriculture microinsurance service;

Price of the product

Insurance companies should not downsize traditional insurance products so as to fit their prices into microinsurance needs. The new product should be priced appropriately taking into account prices that are determined by actuaries which would be fair and commensurate to the risks and also taking into consideration the provider's expense. According to Bauchet (2013) product pricing is the key factor to microinsurance development. Most microinsurance companies face difficulties in pricing the product. The researcher also recommends that the insurance companies should be efficient in data collection.

Education and Awareness

Educating the vast population through massive marketing can be a way that insurance providers can use to improve their gross premiums under agriculture microinsurance products. Farmers education and awareness of the product is very important, educating customers on the benefits of microinsurance is the only way a company can see results (German institute of Economic Research, 2009). By conducting educational campaigns among low income households educating them on the difference between conventional insurance and traditional insurance can change customer's perceptions' and beliefs about insurance. In India companies such Agriculture Insurance Company of INDIA Lombard (AICI) do massive promotions and campaigning programs on their microinsurance products notably rainfall insurance all over the country to enhance uptake.

Trust and partnerships

Providers should install trust and confidence to customers by firstly removing the opportunistic behaviour of insurers. Insurance is built on trust any negative experiences buy a farmer or peers can affect the level of trust (Derconet al. 2012).Clients fear to be cheated after they have paid their premiums to insurance companies, by removing the opportunistic behaviour trust can be rebuilt to customers so that they can be able to purchase microinsurance with confidence. According to Tellez (2012), insurance companies can increase trust by use of mobile network providers as they are more trusted by the publc, this in turn increase the number of volumes and also serves as a less cost distribution channel. In addition most individuals trust NGOs by use of them they can enhance trust to the farmers.

Product Design

Providers should design a microinsurance product specifically targeted for low income earners that should be simple, clear and with minimum exclusions. Churchill (2002) alluded that an appropriate product design should be aware of the risks faced by low income earners, how often do they face the risks and the resulting losses. The simpler the better the product as it enhances better product understanding. The researcher recommends that the products also include risks such

as theft that are not included as it is one of the major risks that is being faced by the farmers. In Kenya for agriculture microinsurance theft is an extension for a little additional premium for farmers who face such a risk and it should also be included.

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