DETERMINANTS OF CROP INSURANCE ACCEPTANCE AMONG AGRICULTURAL MARKETING CO-OPERATIVE SOCIETIES IN KILIMANJARO, TANZANIA

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Abstract

This paper assesses determinants of acceptance of Crop Insurance (CI) among Agricultural Marketing Co-operative Societies (AMCOS) in Kilimanjaro, Tanzania using binary logistic regression analysis. A cross-sectional research design was employed whereby 110 Agricultural Marketing Co-operative Societies (AMCOS) were sampled using simple random sampling technique. Data were collected using household survey, interview and documentary review methods. The study established that experience of AMCOS, AMCOS' deposits, AMCOS' savings and AMCOS' shares positively impact willingness of the AMCOS members to accept crop insurance. Other positive predictors were: Sales of produces, price of produces, education of AMCOS manager and Chairperson. On the other hand, amount of premium negatively impacted the decision of AMCOS members to accept crop insurance. It is recommended that: AMCOS must take initiatives to increase their amount of deposits, savings and shares because they have a potential to influence positively the ability to pay for crop insurance. The Government of the United Republic of Tanzania through Tanzania Cooperative Development Commission (TCDC) and Tanzania Insurance Regulatory Authority (TIRA) should encourage Insurance service providers to reduce the amount of premium in order to attract farmers to insure their crops.

Key words: *AMCOS, crop insurance, Willingness to Accept, Tanzania*

1. INTRODUCTION

The key leading role of insurance service in agriculture is indirect economic protection of life and property from the effects of natural forces which have no relation with man-made and accidents from the man-made disasters. Insurance promotes crop production and ensures farmer's back up in case of unforeseen events such as changes in weather and climate, hence making farming much more stable and more certain (Petrović *et al.,* 2013). Because of different risks inherent in crop production which lead to farm income uncertainty and low or no profit, many farmers express fears on their ability to meet overhead costs due to insufficient fund, family needs, and also repayment of debt (Akinrinola and Okunola, 2014).

The origin of crop insurance in the United States of America dates back to 1900s. This early crop insurance initiatives focused on wheat farming (Shields, 2015). According to this author, wheat farming was regarded by many farmers as a financially risky undertaking due to unpredictable weather, and shifts in agricultural supply and demand which often resulted in volatile market price. Currently crop insurance provision in United States of America (USA) and Canada exceed other countries and has reached the level of seventy three per cent (73%) support in crop insurance premium, Asia fifty per cent (50%) (Mainly China, Japan and India

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covered), Africa 3 per cent. Roughly, in many developing countries, agricultural insurance has been operating for only 10 -15 years (Rattani, 2016).

In Africa, crop insurance penetration in the continent seems to be very low with many of the African countries either having it or experiencing only at pilot stage to the crop producer. Rattani (2016) reports that while it is taking longer to establish crop insurance in Tanzania, in Kenya a fellow East African country things are moving quite well. The Government of Kenya and the co-operative movement in That country have championed the establishment of crop insurance schemes such as Kenya National Agricultural Insurance Programme (KNAIP) (Rattani, 2016). Other African Countries adopted crop insurance long time ago; Nigeria for example; established Nigerian Agricultural Insurance Scheme1983 which was designed to benefit the small, medium and large-scale farmers (Akinrinola and Okunola, 2014).

Sub-Saharan Africa (SSA) countries which have adopted crop insurance include Malawi, Kenya, Rwanda and Tanzania. However, crop insurance within these countries is still at inception and piloting stage. Other countries which have adopted crop insurance in Africa are Benin, Burkina Faso, Ethiopia, Mozambique, Zambia and Senegal (Ntukamazina *et al.,* 2017).For example, in Kenya crop insurance mainly offers seasonal crop credit and not all crops are covered (Osumba, 2016). In Uganda crop insurance just started during financial year 2016 to 2017 as a pilot scheme as Uganda agricultural insurance scheme (Sande, 2017).

The Government of Tanzania and the Private Sector have seen the importance of introducing crop insurance schemes in order to bost the agriculture sector in the country. Bhushan *et al.* (2016) suggested that potential crop insurance schemes can be introduced for the benefit of farmers for crops like maize, coffee, sunflower, sorghum, rice, tobacco and cotton. They further argued that, Tanzania Federation of Cooperative (TFC) and Tanzania Commission for Cooperative Development (TCDC) may champion the move because they have many affiliated member organizations. In this paper we argue that, TFC may establish insurance company in collaboration with other actors in the movement which could provide insurance services to AMCOS.

Maghimbi (2007) argued that a decline in coffee crop production in Kilimanjaro region first emerged in the 1970s. The author further reports that low crops prices in the action market have been frequently seen among many causes as a primary cause for the stagnation and decline in Tanzanian coffee production especially since 1981/82. Akyoo *et al.* (2013) confirms that, there is demand for crop insurance in Kilimanjaro Region especially among smallholder farmers.

Coffee production in Tanzania is declining seasonally. For example in farming season 2015/2016 Coffee farmers in Kilimanjaro harvested only 3,314 tons while in 2016/2017 season the yield droped to 2,847 tons (Kimaryo, 2017). Mhando *et al.*(2013) also reports that, country average yield from coffee in 2007/08 was 44,744.8 tons, 2008/09 was 68,933.7 tons, 2009/10 was 35,667.9 tons, 2012/2013 was 33 086.7 tons, 2014/15 was 42,768, 2015/16 was 60,188 tons and 2016/17 was 46,963.5. These statistics prove that coffee yield in Kilimanjaro is below national average. Other challenges facing coffee production is low prices which have frequently been cited as the primary cause of the stagnation and decline in Tanzanian coffee production (Akyoo *et al.,* 2013). Coles and Mhando (2010) found that some coffee farmers in Tanzanian receive low price up to fifty percent (50%) of the auction price for the coffee they own per season Changes in weather and climate are other important issues to be considered if we want to revive coffee sub-sector in Tanzania. All these challenges

confirm that coffee farming in the country is risky. Coffee farming is currently not an economically profitable activity; farmers do not receive any incentives to invest in terms of time or capital for the improvement of productivity and quality of coffee produce (URT, 2012). To minimize these risks, crop insurance is highly recommended especially among smallholder farmers (Akyoo *et al.,* 2013). Crop insurance is known to be a viable tool to protect farmers against loss; other tools subsidies and contracting farming(Du *et al.,* 2015). However the acceptance rate of crop insurance among AMCOS in Tanzania is unclear. This paper therefore, assessed willingness of agricultural marketing co-operative societies to accept crop insurance as a solution to reduce losses in Kilimanjaro, Tanzania. Specifically this paper:

   (i) Assesses characteristics of the coffee agricultural marketing co-operatives societies in relation to acceptance of crop insurance in the study area;
  (ii) Determine attitude of AMCOS members towards crop insurance;
 (iii) Assess accessibility of crop insurance providers in Kilimanjaro region; and
 (iv) Determines factors affecting willingness of coffee Agricultural Marketing Co-operatives Societies to accept crop insurance in the study area.

1.1 Research Questions
This paper answered the following questions:
   (i) What characteristics best describes AMCOS in Kilimanjaro region? How do these characteristics influence willingness of AMCOS to accept crop Insurance?
  (ii) What is the attitude of AMCOS members towards crop insurance?
 (iii) Are the crop insurance service providers accessible and reliable?
 (iv) What factors influence willingness of AMCOS members to accept crop insurance?

2. TECHNOLOGY ACCEPTANCE MODEL AND CROP INSURANCE
This paper is based on the Technology Acceptance Model (TAM) propounded by Davis (1989). TAM is a framework which describes how users accept and use a particular technology; it is an information systems theory that have received a wider acceptance (Adams *et al.,* 1992; Davis *et al.,* 1989; Hendrickson *et al.,* 1993; Segars & Grover, 1993; Subramanian, 1994; Szajna, 1994; Park, 2009). Park (2009) argues that TAM is considered an influential extension of theory of reasoned action (TRA), according to Ajzen and Fishbe (1980). The model suggests that when users are presented with a new technology that never existed in their organization or community, a number of factors might influence their decision about how and when they will use it, notably: Perceived Usefulness (PU). This is defined as the degree to which a person believes that using a particular technology in place will enhance his or her job performance. Perceived Ease-of-Use (PEOU) defined as the degree to which a person believes that using a particular system would be free from effort (Davis, 1989). Figure 1 illustrates the Actual Use EPS as a product of external variables such as accessibility and/or the availability of the EPS itself. Other factors are perceived usefulness of the EPS, perceived ease-of-use, attitude toward using EPS and the behavioural intention to use EPS.
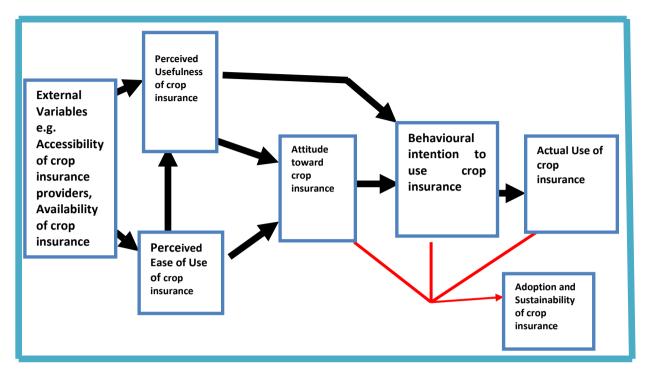
Figure 1: The Technology Acceptance Model**. Source:** Modified from Davis *et al.* (1989).

TAM provides a basis with which one traces how external variables influence belief, attitude, and intention to use. Two cognitive beliefs are posited by TAM: perceived usefulness and perceived ease of use. According to TAM, one's actual use of a technology system is influenced directly or indirectly by the user's behavioural intentions, attitude, perceived usefulness of the system, and perceived ease of the system (Park, 2009). TAM also proposes that external factors affect intention and actual use through mediated effects on perceived usefulness and perceived ease of use. He further argues that TAM appears to be able to account for more than 50 percent of user acceptance.

TAM is relevant in explaining acceptance of crop insurance among AMCOS. Since, AMCOS traditionally deal with mobilization of farming inputs, collection and marketing of agricultural produces; hence, introduction of crop insurance is a new thing and could be influenced by those factors such as PU and PEOU which affect the adoption of new technology. If farmers who are also AMCOS members perceive that crop insurance is useful to them they will accept quickly the technology, if they perceive otherwise it may take long time and efforts to convince them to accept crop insurance. Likewise, if they perceive that it will be easy to use, they may adopt crop insurance quickly; if they perceive that it is not easy to use crop insurance, it could be difficult to convince them to accept it.

Several studies have examined TAM as a model to explain how people adopt and use various technologies such as e-learning (Selim, 2003; Lee *et al.,* 2005; Liu *et al.,* 2005; Pituch and lee, 2006; park, 2009), information technology (Dillon and Morris, 1996; Oliveira and Martins, 2011; Venkatesh *et al.,* 2012), internet usage (Portera and Donthu, 2006) and healthcare information systems (Paia and Huang, 2011). Likewise, Schepers and Wetzels (2007) listed 53 studies using any one of six basic TAM constructs (attitude, intention of use, real use, subjective norms, perceived usefulness, perceived ease of use). Of these 53 studies,

15 of them found a significant relationship between perceived usefulness and attitude, varying from 0.29 to 0.84, 15 out of 16 discovered a significant relationship between perceived ease of use and attitude, varying from 0.05 to 0.73, and 14 noted that there was a significant relationship between attitude and intention of use, varying from 0.11 to 0.75. Sun and Zhan (2006) also studied the principal relations existing between the different basic constructs of the TAM. They retained a total of 72 studies all of which measured the perceived ease of use, 71 measured perceived usefulness, 22 measured attitude, 47 measured intention of use, while 39 measured real usefulness. They were thus able to confirm the existence of significant paths between attitude and intention of use as well as perceived usefulness: intention of use and real use, perceived usefulness and attitude as well as intention of use, and perceived ease of use and attitude as well as intention of use.

3. METHODS AND TOOLS OF DATA GATHERING AND ANALYSIS

The study was conducted among Agricultural Marketing Cooperative Societies (AMCOS) in Kilimanjaro Region Tanzania (Fig. 2) and used cross-sectional research design. The design has been chosen because it allowed the collection and analysis of both qualitative and quantitative data in a single study and also helped in utilising resources available for carrying out the study. Again the study was designed to provide a meaningful and accurate picture of event and helped to explain socio-economic descriptors influencing agricultural marketing co-operative willingness to accept crop insurance.
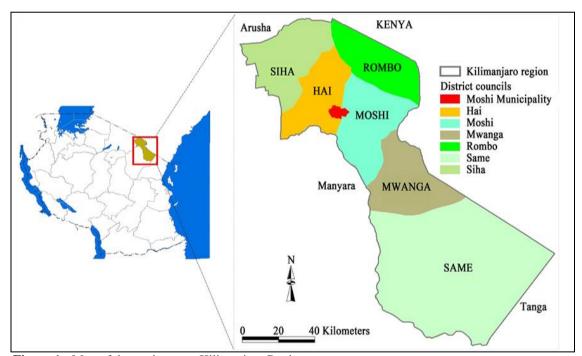

Figure 1 : Map of the study area - Kilimanjaro Region

The target population in this study was members of AMCOS in Kilimanjaro. A sample size of 110 AMCOS members was estimated using a formula by Yamane (1967). A total of 8 AMCOS were involved in a study two from each district which were purposively sampled. Specifically, 39 respondents were drawn from AMCOS in Moshi district, 17 from Rombo, 29 from Hai and 14 from Mwanga. In addition to 110 respondents, ten (10) key informants were selected from each AMCOS based on their experience of AMCOS businesses. A simple random sampling technique was used to select the targeted respondents.

Both qualitative and quantitative data were gathered. Qualitative data included sex composition and education level while quantitative data included number of members, availability of crop insurance provider, number of years in operation, crop produce, premium in TZS, sales, crop prices, loss on sales, tax and fees or levy on crops, accessed loans, warehousing costs, AMCOS deposits, savings and shares. These data were obtained using household surveys where questionnaire was applied. Other methods of data collection were checklist and documentary review.

The Household Survey applied self-administered questionnaire which included both closed ended and open-ended questions. Questionnaire was the main tool for primary data collection in this study because it was cost-effective and efficient in gathering information and accuracy in estimating the characteristics of a target population without interviewing the whole population. The questionnaire was designed and administered to 110 AMCOS members from in Kilimanjaro. Ten key informants were interviewed in addition to the 110 respondents. Interviews generally collected qualitative information which could not be collected using household survey. In selecting the Key Informants, first few experts working in the field were consulted to nominate the possible Key Informants who were most informative, experienced and possessed valuable information adoption of crop insurance in Tanzania. Then informants who had been recommended by more than one expert were selected. This increased the like hood that the informants would be useful in the study. In this regard, key informant who had good knowledge on agricultural marketing co-operative and benefit of crop insurance were interviewed, leader from crop insurance, as well as co-operative officers. The information was gathered in regard to interview method using a checklist. Face-to-face interviews were conducted where each interview took about half an hour and was recorded using a notebook. Documentary review was used to complement the household survey and Key Informants Interviews. It was necessary to review the status of adoption of Crop Insurance (CI) in Tanzania. Documents which were reviewed include TFC reports and AMCOS reports on the practice of crop insurance. The purpose for reviewing the documents was to triangulate information obtained from the respondents during household survey and interviews and also to establish the possible causes of failure of CI in Tanzania.

Qualitative data from key informant interviews were analyzed using Content Analysis (CA) method. First interviews were transcribed into word document. Then from these transcriptions key themes, concepts or phrases related to willingness to accept crop insurance were identified. This helped to organise the information into common themes that emerged in response to dealing with specific items. These themes were later organised into coherent a category which summarised the status of crop insurance in the study area and willingness of AMCOS to accept crop insurance. Qualitative and quantitative information were then used to provide meaningful study conclusion. Quantitative data on profile of AMCOS were analyzed using descriptive statistics while determinants of crop insurance were established using binary logistic regression. A binary logistic regression was preferred because the dependent variable (i.e. willing to accept) was dichotomous in nature that is, either an individual is willingness to accept crop insurance (1) or is not willing to accept crop insurance (0). The binary logistic regression model takes the following form:

Insurance (i) = α + Xitβ + υit

Logit $[p\ (\times)]$ =log $[\frac{p(x)}{1-p(x)}]$ =α+β₁x₁+β₂x₂+β₃x₃+ ε …………..…………………… (i)

Where insurance (i) defines whether the farmer subscribes or not insurance, α is the intercept, β is the vector of the estimated coefficients and υit is a random error. Following, we also compute the marginal effect of a particular explanatory variable on the probability to

subscribe crop insurance. Logit (p_i) is binary and represents the dependent variables Yin this case is willingness to accept crop insurance (1 if an individual is willing to accept crop insurance and 0 if not).

$\beta_1 - \beta_p$= regression coefficients

α = Intercept

$X_{1, 1} - X_{p, 1}$= Independent variables or predictor variables

ε = Error term

Table 1 : Variables definitions and unit of measurement

Variable	Variables definition and unit of measurement
Dependent variable: Binary (1 if willing to accept crop insurance; 0 if not)	
Independent variables	
X_1-AMCOS member number	
X_2-AMCOS experience in years	
X_3- AMCOS deposit in TZS	
X_4-AMCOS Saving in TZS	
X_6 - Premium of crop insurance	
X_7- Crop Price attain in the market in TZS	
X_8 -Sales on crop produces in TZS	
X_9 -Education of AMCOS chair person	
X_{10}-Education of AMCOS manager	
X_{11}-Availability of crop insurance provider (dummy variable whereby 1 if available, 0 if not available).	
X_{12}- Levy payment on crop produces	
X_{13}- Crop collection in Kg	
X_{14} - Operational expenses in Tshs	
X_{15} Attitude towards crop insurance by AMCOS members	
X_{16} Accessibility of crop insurance providers	
X_{17} Users perception	
X_{18} Intention of AMCOS members to use crop insurance services	

4. FINDINGS AND DISCUSION

4.1 Characteristics of Agricultural Marketing Co-operative Societies

Table 2 presents profile of the studied AMCOS. On average the assessed AMCOS had 1412 members out of whom 1111 were males and 307 were females. Likewise, the studied AMCOS spent on average of 32 months in business and had accumulated deposits amounting to Tshs 69,808,256. The AMCOS had also mobilized Savings of TZS 25,325,406 and TZS 24, 422,938 as shares while at the same time they had collected 56,599 Tons of produces. The findings offer few insights: first, it is now clear that men outnumber women in AMCOS membership. This is not a good thing in a country where most smallholder farmers are women. This could as well mean that most smallholders are operating outside the cooperative sector, implying it will take time and more efforts for the government initiative of making sure that all strategic crops are sold via the cooperative window. The World Bank 2017 Population Estimates shows that Tanzania had 57,310,019 persons where 28,968,049 (50.6%) were females and 28,341,970 (49.4%) were males (World Bank, 2019). This is also evidence that most people are excluded in the cooperative sector.

Another insight which is brought by the findings is the low amount of deposits, savings and shares which could be attributed to small membership in AMCOS. The findings support that of Zikalala (2016) who established that the amount of Shares in a co-operative is proportional

to the number of mobilised members. The fewer members may be as a result of failure to expand the common bond beyond the type of crop grown; that is, the study was conducted among coffee growers, which is known to be a male crop while most women grow maize, rice, beans and other food crops these crops are also known to be excluded from the cooperative sector. The African culture also is something to blame here, where normally Males dominate the cash crops and women the food crops. A key informant interviewed (13th June, 2018) from Tarakea in Rombo District who is also a member of Tarakea AMCOS said:

> *"...Our AMCOS has fewer women members, this could be attributed to the fact that in African Culture a man is the head of a household, when the household head has been registered it is enough, no need for his Wife also to be a member, I haven't seen such a scenario where both husband and wife are members....".*

Table 2 : Profile of surveyed Agricultural Marketing Co-operatives in Kilimanjaro

	Minimum	Maximum	Mean	Mode	Median	Variance	Standard deviation
Total members	221	3994	1412	1237	1250	356718	597
Male	121	3450	1111	987	987	271577	521
Female	100	967	307	250	250	19274	138
AMCOS experience	14	34	31.56	34	34	21	4.626
Deposits	15200000	300000000	69808256	55000000	60000000	1.4723	38370605
Savings	2300000	62700000	25325406	20000000	19000000	1.6237	12742674
Shares	5000000	80000000	24422938	25000000	25000000	1.6813	12966504
Crop collection	0	153191	56599	55523	55523	7.15367	26746
Sales on Produce	0	510534000	219037528	356368000	225214600	1.4426	120108389
AMCOS Operational Expenses	2750000	136052239	46836472	40613404	40613404	7.96419	28220900

The study has established also that, AMCOS spend TZS 46,836,472 as average operational expenses.This operational cost is above 21% of the total sales which stand at 219,037,528. It is established in their by laws that AMCOS members (farmers) will have to pay for the running costs for their AMCOS from sales of their produces. This implies that members of AMCOS involved in the study pay on average a total of 21% of their total sales as operational costs and they remained with 79% of the sales to be distributed among themselves before deducting taxes and other farming expenses. Despite the fact that, This paper did not establish profitability of the coffee sales but from these findings it is doubtful if the farmers do break even or gain any meaningful profit. These findings are contrary to what Kalindi and Tiruhungwa (2012) found that …. most of the farmers realized more money with greater profits at the end of the farming season. The difference between what This paper found and that of Kilindi and Tiruhungwa may be attributed to the fact of time lag, seven years have passed between the two studies and several developments could have happened in between including increments in operational costs. Another reason could be the scope of the study, Kilindi and Tiruhungwa studied only two AMCOS i.e. Mamsera and Nshara while the current study interviewed 110 AMCOS members and 10 Key Informants from 8 AMCOS in four districts of Kilimanjaro region namely, Mwanga, Rombo, Moshi, and Hai.

4.2 Willingness of AMCOS to Accept Crop Insurance

Willingness of AMCOS studied to accept crop insurance as a means of reducing risk and loss was assessed to see the extent members of AMCOS are willing to accept crop insurance against risks and losses. It was found that more than 87% of AMCOS members interviewed were willing to accept crop insurance and they perceived it to be useful and easy to practice (Figure 2).
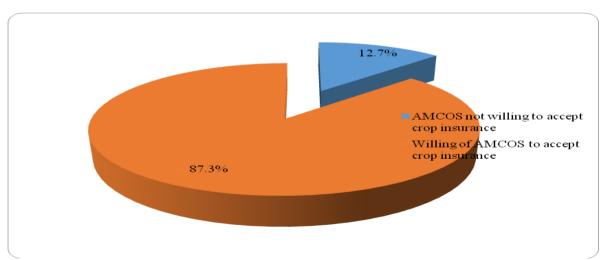

Figure 2: Willingness of AMCOS to accept crop insurance participation

Generally, we can say many AMCOS members in Kilimanjaro, Tanzania are willing to insure their crops against hazard such as bad weather, pests and diseases. This paper supports that of Falola*et al.* (2013) and Danso-Abbeam *et al.* (2014) who found that many cocoa farmers in Nigeria and Ghana respectively were aware of Agricultural Insurance and was willing to accept it as a cover for the farming hazards and risks. In addition, Danso-Abbeam *et al.* (2014) found that acceptance levels were high among cocoa farmers with more experience than those without. The reason is that, farmers with long many years in cocoa farming might understand the impact of farm perils on their economic life better than

their colleagues with less experience in cocoa farming and are therefore more likely to be interested in cocoa insurance policy.

4.3 Factors Affecting AMCOS Willingness to Accepting Crop Insurance

A binary logistic regression was performed to establish the factors which influence willingness of AMCOS members to accept crop insurance. The strength of model was assessed and produced a log likelihood 280.537, omnibus tests of model coefficients (Chi-square 48.436, sig. 0.000), Nagelkerke R Square 0.525; Cox and Snell R Square 40.869; Hosmer and Lemeshow Test (Chi-square= 6.347; sig. = 0.536) which together show that the estimated model strongly predicted the dependent variable (Table 3). This paper had a dichotomous dependent variable i.e. AMCOS's Willingness to Accepting Crop Insurance (1 if the AMCOS member was willing to Accept Crop Insurance and 0 if not). The independent variables are number of members, experience of the members, AMCOS deposits, AMCOS savings, AMCOS shares, crop collection, gross margin, availability of insurance company, crop price, education of manager and education of chairperson. This analysis permits the evaluation of the odds of membership in one of the two outcome groups based on the combination of predictor variable values. Predicted probabilities of an event occurring will be determined by Exp (β).

The findings indicated that experience of AMCOS is a strong predictor of the AMCOS's willingness to accepting crop insurance. The findings were statistically significant at $p < 0.05$, and Exp (B) = 1.251. Additionally, a Wald criterion of 2.576 illustrates that when experience of AMCOS, by 1.251 years in business, the odds ratio is 1.224 implying that AMCOS members are 1.224 times more likely to accept crop insurance. One of the reasons for this could be the fact that experience is a good teacher; AMCOS with many years in business could have witnessed many huddles in their activities and therefore are ready to grab any opportunity for change that comes around. This paper confirms that of Okoffo *et al.,* (2016) who established that experience positively impacts cocoa farmers' willingness to pay for crop insurance in Ghana.

Table 3 : Factors Affecting AMCOS's Willingness to Accepting Crop Insurance

Variables	Coefficient (B)	S.E.	Wald	Df	Sig.	Exp(B)
Number of members	0.004	0.008	0.302	1	0.583	1.996
Experience of AMCOS	1.224	0.295	2.576	1	0.000	1.251
AMCOS deposits	1.110	0.060	1.011	1	0.015	1.430
AMCOS savings	1.021	0.348	1.071	1	0.009	1.468
AMCOS shares	0.653	0.101	1.305	1	0.049	1.607
Crop collection	0.101	0.408	1.027	1	0.507	1.590
AMCOS Operation expenses	0.390	0.310	2.168	1	0.682	1.072
Availability of insurance company	-1.452	0.008	0.070	1	0.999	0.800
Price of produces	0.210	0.014	0.512	1	0.005	1.010
Education of AMCOS manager	1.091	3.086	0.459	1	0.009	0.124
Education of AMCOS chairperson	0.348	0.801	0.189	1	0.000	1.417
Amount of premium	-1.216	0.592	1.865	1	0.000	1.134
Levy payment	-0.234	0.093	0.031	1	0.562	0.776
Sales produce	1.083	0.321	2.152	1	0.003	0.004
Constant	1.187	5.641	0.814	1	0.000	0.069

Nagelkerke R Square = 0.525; Cox and Snell R Square = 40.869; Hosmer and Lemeshow Test (Chi-square= 6.347; sig. = 0.536); Omnibus Tests of Model Coefficients (Chi-square = 48.436; sig. = 0.000); Likelihood = 280.537; the influence different factors towards willingness to accept crop insurance.

Other strong predictor of AMCOS's willingness to accept crop insurance was AMCOS deposits. It was found that AMCOS deposits positively impacts AMCOS's willingness to accept crop insurance. The findings were statistically significant at $p< 0.05$ and Exp (B) = 1.430 with a Wald of 1.011 which implies that AMCOS deposits, contributed positively to predicting willingness to accepting crop insurance, the more the amount of deposits the higher the likelihood of AMCOS members to accept crop insurance. The findings further indicated that when AMCOS deposits raises by 1.430 units, the odds ratio is 1.110 implying that AMCOS deposits1.110 times more likely to accept crop insurance. This means AMCOS with high deposits are more likely to accept crop insurance compared to others.

It was also found that AMCOS savings strongly predicted of the AMCOS members' willingness to accepting crop insurance ($p<0.05$ and Exp (B) = 1.468). The model produced a Wald criterion of 1.071 which implies that AMCOS savings positively predicted the willingness of AMCOS members to accept crop insurance other factors remain the same. The findings further indicated that when AMCOS savings are increased by 1.468 Tshs, the odds ratio is 1.021 which means AMCOS with more savings are 1.021 more likely to accept crop insurance than those with lower savings. Indeed, Ellis (2016) in Ghana had similar observation; he found that among other factors willingness to purchase crop insurance among farmers is influenced by amount of savings.

Likewise, it was found that AMCOS shares in Tshs strongly predicted the AMCOS's willingness to accepting crop insurance. The findings were statistically significant at $p < 0.05$ and Exp (B) = 1.607 and a Wald of 1.305 which illustrates that AMCOS shares contributed positively in predicting willingness of AMCOS to accepting crop insurance. This implies that, the more the shares the more the likelihood that an AMCOS in question will accept crop insurance. The possible explanation is that shares may be sources of AMCOS capital as reported by Zikalala (2016) that cooperative societies acquire their capital from the sale of shares to members. Therefore, shares show financial health of an AMCOS, when shares are increasing sends a signal to AMCOS mangers and members that they are financially good and can use that capital to purchase the crop insurance.

Price of produces was another strong predictor of willingness of the AMCOS to accept crop insurance at $p < 0.05$ and Exp (B) = 1.010. Implying that price positively impacted willingness of AMCOS to accept and pay for the crop insurance. This could be explained by the fact that price signals profit, when price is good AMCOS members expect an increase in revenue and profit, with more funds they can be able to pay for crop insurance because insurance is also costly product. These findings are in agreement with the findings by Myyrä (2014) who found that farmers anchor their willingness to pay for crop insurances to the price levels introduced.

Another strong predictor of willing of AMCOS to accept crop insurance was education of AMCOS manager. The study has found that education level of AMCOS manager positively impacts the willingness of the AMCOS to accept crop insurance ($p < 0.05$, Exp (B) = 0.124 and Wald = 0.459). Likewise, it was found that education of AMCOS chairperson strongly predicted willing of AMCOS to accept crop insurance in the study area ($p < 0.05$, Exp (B) = 1.417and Wald = 0.189). This implies that education of AMCOS Managers and chairperson positively predicts willing of AMCOS to accept crop insurance. In other words, AMCOS with a well educated Manager and a Chairperson were more likely to accept crop insurance than their less educated counterpart. This could be true since education increases awareness; the more educated an individual is the more aware of the various risks including those

associated with farming. It is the awareness part which is more relevant than just a general education. These findings are in line with those of Ellis (2016) who observed that marital status, education, crop type, access to extension service, borrowing, savings and awareness of crop insurance influenced farmers willingness to purchase insurance.

Amount of premium in TZS negatively predicted the willingness of AMCOS to accept crop insurance, i.e. the bigger the amount to be paid as premium, the lesser the likelihood that a particular AMCOS will accept crop insurance. The findings were statistically significant at $p < 0.05$, Exp (B) = 1.134 and Wald = 1.865. Annual Premium payable to the insurance service providers add to the running costs of AMCOS, hence it is not surprising to see that higher premium discourages AMCOS managers to purchase crop insurance, the vice versa is true, when premium is cheap many AMCOS will be willing to purchase the crop insurance.

Furthermore, the study found that sales produce in TZS strongly and positively predicts willing of AMCOS to accept crop insurance ($p < 0.05$, Exp (B) = 0.004and Wald = 2.152). This implies that AMCOS with more sales are more likely to accept crop insurance than those with fewer sales. AMCOS charge fees from the handling of members' produces including the sale of produce collected. These fees are important sources of AMMCOS income. When income increases, the AMCOS tend to gain confidence that they can be able to pay for many activities including crop insurance, vice versa is true, little income discourages investments into risky activities like crop insurance.

5. CONCLUSION AND RECOMMENDATIONS

The study has found that many AMCOS members in Kilimanjaro are willing to pay for crop insurance as a cover against hazard such as bad weather, pests and diseases. It is important to note that, very few AMCOS members managed to recall initiatives to introduce crop insurance in Kilimanjaro by the Government and the cooperatives between 1970s and 1980s. This approval by the AMCOS members is an encouraging step towards establishment of a viable and strong crop insurance scheme in Kilimanjaro which can also be applied in other regions in Tanzania. The study has also established that experience of AMCOS, AMCOS deposits, AMCOS savings and AMCOS shares positively impacts willingness of the AMCOS members to accept crop insurance. Other positive predictors were: Sales of produce, price of produces, education of AMCOS manager and Chairperson. On the other hand, amount of premium negatively impacted the decision of AMCOS members to accept crop insurance.

It is recommended that:
  (i)   AMCOS must take initiatives to increase their amount of deposits, savings and shares because they have a potential to influence positively the ability to pay for crop insurance. They can do so by mobilizing more members, because even if number of members does not directly impact crop insurance it does influence the amount of shares, deposits and savings.

  (ii)   AMCOS must make efforts to increase more awareness on the risks associated with farming. Awareness can be created through tailor made training since this study has established that education impacts positively decision to establish crop ensurance. AMCOs members are encouraged to vote for the more educated members (especially those trained in agriculture and related disciplines) to be board Chairpersons. This will increase the number of board members with reasonable knowledge on farming risks and increase a probability of adopting insurance schemes. They can do so by

proposing a change in their by-laws which could be passed by the majority during their Annual General meetings.

(iii)   The Government of the United Republic of Tanzania through Tanzania Cooperative Development Commission (TCDC) and Tanzania Insurance Regulatory Authority (TIRA) should encourage Insurance service providers to reduce the amount of premium in order to attract farmers to insure their crops.

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