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DETERMINANTS OF RURAL CREDIT ACCESS DECISION-MAKING AMONG SMALL-SCALE RICE FARMERS IN CALINTAAN, OCCIDENTAL MINDORO, PHILIPPINES

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Abstract. Informal sources of credit prevail in the rural areas of developing countries, primarily catering to farm households – hence, this study was conducted to analyze the determinants of rural credit access decisions among small-scale rice farmers in Calintaan, Occidental Mindoro, the Philippines, using binary logistic regression. A total of 74 randomly selected farm household heads who have direct supervision in rice farming activities participated in the study. The binary logistic regression results indicated that gender, age, and education were the significant determinants of the rural credit decision. Informal sources of credit play a vital role in promoting the small-scale agricultural productivity of rice and they serve as the immediate source of agricultural financing when there is a shortage or absence of accessible formal credit providers. In light of the findings, this research recommends other factors, working sectors, and settings for future research. Some policy recommendations were also suggested, such as the formulation of a rural credit policy that would fit the socioeconomic status of the farmers and a government policy to bridge the gap between small-scale rice farmers and formal credit institutions.

Keywords: rural credit, rice farmers, credit access, decision, binary logistic regression

INTRODUCTION

The majority of rural people in developing countries typically depend on the employment provided by the agricultural sector (Linh et al., 2020). Agriculture is considered one of the most indispensable economic sectors that drive rural development. According to Kumar et al. (2007), credit is one of the most critical and effective determinants of rural development among agricultural inputs. Farm capital buildup is crucial as agricultural production ensures internal food security, reduces poverty and unemployment rate, and improves farmers' quality of life (Chandio et al., 2020). Farmers are generally confronted with several uncertainties and seasonal patterns of agricultural activities, which dictate the need for rural credit (Ololade and Olagunju, 2013). However, there still exists a significant demand gap for rural credit. The access to institutional providers remains low, and local money lenders continue to bridge this gap among rural households (Acharya, 2006). These informal credit providers then affect households' decisions to access formal credit (Phan, 2012) and usually exploit the borrowers (Catelo et al., 2017). According to Linh et al. (2020), the lack of capital among farming households and their incapability to borrow money based on income often constrained them in accessing formal credit. Collateral was

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also a key factor that affects borrowing (Tu et al., 2015). Similarly, lack of assets for use as collateral prompts other farmers in resorting to an informal lending scheme that charges higher interest rates (Sebopetji and Belete, 2009). Nevertheless, Moahid and Maharjan (2020) and Kiplimo et al. (2015) mention that having sufficient access to credit is key to promoting sustainable agricultural development. Regular access and proper credit utilization positively impact total income (Gan et al., 2017). Credit enhances the purchasing powers of farmers to acquire modern technologies that will improve their production. However, access to credit facilities becomes limited due to several constraints (Etonihu et al., 2013). Furthermore, rural credit serves as a vital factor in improving household income (Luan et al., 2016), and it improves the productivity and economy of a poor farmer (Adebayo and Adeola, 2008).

In the Philippines, credit accessibility is mainly affected by the age of the household head and household size accordingly (Gray, 2006). Moreover, the ability and capacity of a Filipino farmer to specialize in farming influences his demand for loans or credit (Nagarajan et al., 1998). On the other hand, the possibility of credit from the informal source is more likely when the borrower is less educated, married, and with a large household (Zapata, 2006). It is also worth mentioning that informal moneylenders dominate the rural credit market in the Philippines (Floro, 2019). According to Llanto (1993), informal moneylenders include traders, millers, large farmers, friends, relatives, landowners and recently, overseas contract workers. Additionally, women in the Philippines are more likely to be credit constrained than their male counterparts (Malapit, 2012). According to Mishra et al. (2017), women-headed farm households in the Philippines cannot satisfy their credit needs.

The average land holding of rice farmers in the Philippines is about three hectares which is also the average rice farming scale for most of Southeast Asia (Sebastian et al., 2000). According to Baba and Kolo (2021), a farmer whose area of farm holding ranges between one to five hectares of land is categorized as a small-scale farmer.

This study aims to determine the factors that possibly influence or predict a farmer's decision to access rural credit in the context of small-scale rice farmers in Calintaan, Occidental Mindoro, Philippines. Specifically, this study aims to address the following objectives:

(i)   Determine the socio-economic and institutional characteristics of small-scale rice farmers, and

(ii)   Evaluate socio-economic and institutional factors influencing rural credit access decision-making among small-scale rice farmers.

With the established premises, the following hypotheses are those that the study intended to test:

Ho1: The age of small-scale rice farmers does not predict the rural credit access decision.

Ho2: The gender of small-scale rice farmers does not predict the rural credit access decision.

Ho3: The household size of small-scale rice farmers does not predict the rural credit access decision.

Ho4: The education of small-scale rice farmers does not predict the rural credit access decision.

METHODOLOGY

An empirical study on the determinants of rural credit access decision-making among small-scale rice farmers was conducted in the rice-producing barangays of Calintaan, Occidental Mindoro, Philippines. The methodology provides information on the techniques used in conducting the study as well as the important stages of research.

The Study Area
The study was conducted in the municipality of Calintaan, province of Occidental Mindoro. Calintaan is a third-class coastal municipality and is 223.45 kilometers away to the south of Manila, the capital of the Philippines. It has a total land area of 382.50 square kilometers with seven barangays, a population of approximately 30,000, and more than 6,400 households according to the 2015 census (Philippine Statistics Authority, 2015). Its economy mainly relies on agriculture and considers rice a major crop commodity. Moreover, rice farming is the key agricultural activity in the entire province and is the main provider of seasonal livelihood for about 80 percent of the entire population, including young adults (NNC, 2019).

Research Design and Data Collection
The study adopted a quantitative-causal research design to determine the factors affecting the rural credit access decision among small-scale rice farmers. Primary data were collected through farm household surveys using structured questionnaires in the municipality of Calintaan. A two-stage sampling procedure was employed to collect the data. In the first stage, rice-producing barangays, namely Poblacion, Iriron, Dagupan, Poypoy, and

Concepcion, were selected, in which most of the household's main income depends on rice farming. In the second stage, representatives from each farming household that manage farm activities were selected randomly. This study has valid data from a total of 74 households in the municipality of Calintaan.

Method of Analysis

Factor Analysis

Factor analysis is mainly used to obtain a more manageable set of valuable factors before using them in regression analysis (Shrestha, 2021). This study was done on the two sets of predictor variables to rank their relative significance. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.664, above the commonly recommended value of 0.6, and Bartlett's test of sphericity was significant ($\chi2$ (55) = 358.395, $p < 0.000$). It suggests that the factor analysis is feasible. On the other hand, Principal Component Analysis (PCA) using Varimax rotation was used to develop simple and interpretable factors. These variables have communality values of above 0.5 which are considered ideal. There was no perfect multicollinearity based on the tolerance and variance inflation factor. Moreover, the variables with an eigenvalue of greater than 1 was entered in the binary logistic regression model. These variables are the optimal number of most relevant components in data analysis (Jamil et al., 2014).

The score values from the factor analysis served as the final set of independent variables to predict credit access decisions among small-scale rice farmers. The survey instrument collected information on the socio-economic and institutional characteristics of the households, and factor analysis gave four predictor variables to come up with a best-fitted model composed of age, gender, household size, and education. These predictors are assumed to be the most significant determinants for rural credit access decisions.

Binary Logistic Regression Analysis

A binary logistic regression model can be used to determine the relationship between a binary dependent variable and sets of independent or predictor variables. It is suitable for evaluating the probability of categorical membership using maximum likelihood estimation (Starkweather and Moske, 2011). This study used the binary logistic regression model to determine the

factors affecting rural credit access decisions among small-scale rice farmers. There were seven predictor variables on a categorical scale, five under the socio-economic factors, and two under the institutional factors. The final set of predictors based on the result of factor analysis was under socio-economic domains such as age, sex, household size, and education – these variables best fit the regression model and are significant to rural credit access decisions. It can be observed that factors under institutional characteristics did not qualify in the model. On the other hand, the credit access decision (binary factor; 1 = Yes, 0 = No) served as the dependent variable. According to Tranmer and Elliot (2008), socio-economic variables are usually categorical rather than interval scales. Also, the dependent variable is categorical in carrying out a logistic regression.

RESULTS AND DISCUSSION

This study used predictor variables such as age, gender, household size, and education to predict the small-scale rice farmers' rural credit access decision. This study conforms to the assumption of perfect multicollinearity between the predictor and dependent variable based on the variance inflation factor (VIF) test result – there are also no outliers with the boxplot. Hence, the model estimates are confirmed to be consistent and unbiased.

Socio-economic and institutional characteristics of small-scale rice farmers

As presented in Table 1, small-scale rice farmers who are also the heads of their households are at prime working-age with a mean of 42.8 years old. They are dominated by males (78.4%) with medium to large household sizes (mean = 6.51). The majority, or 56.8 percent, have attended or finished secondary school with more than ten years of rice farming experience (85.1%). Moreover, 91.9 percent have organizational membership, and 83.8 percent have access to extension services in the form of training or technical advice and consultancy from agricultural technicians, academe, non-government organizations (NGOs), and local government units (LGUs). However, only 45.9 percent of the respondents have access to rural credit. According to Baffoe and Matsuda (2015), rural areas in developing countries lack credit facilities. Likewise, in the municipality of Calintaan, most of the farmers rely on informal sources of rural credit, such as private lending investors, friends, and relatives.

Table 1. Socio-economic and institutional characteristics of small-scale rice farmers

Characteristics	Mean	SD	Min	Max	Frequency	Percentage
Age	42.8	7.08	24	70		
Gender						
Male					58	78.4
Female					16	21.6
Household Size						
Extra Small	6.51	1.44	2	10	1	1.4
Small					4	5.4
Medium					32	43.2
Large					31	41.9
Extra Large					6	8.1
Education						
Did not attend school	10.57	1.99	0	14	1	1.4
Elementary Level					1	1.4
Secondary Level					42	56.8
Tertiary Level					30	40.5
Farming Experience						
Less or equal to 10 years	20.96	8.86	3	53	11	14.9
More than 10 years					63	85.1
Organizational Membership					68	91.9
Access Extension Services					62	83.8
Access Rural Credit					34	45.9

Source: own elaboration.

Determinants of rural credit access decision-making among small-scale rice farmers

A binary logistic regression was performed to ascertain the effects of age, gender, household size, and education on the likelihood that small-scale rice farmers will avail of rural credit. The logistic regression model was statistically significant, $\chi^2(4) = 53.784$, $p < 0.000$, based on the Omnibus Tests of Model Coefficients. It showed that excluding other variables in the model made no difference and that the model has the best fit (Maharjan and Joshi, 2011). The model explained 69.0% (Nagelkerke R^2) of the variance in availing rural credit and correctly classified 87.8% of the overall credit access decision. The Hosmer-Lemmeshow test (HL test) was performed to determine the goodness of fit for logistic regression (Hosmer et al., 2013). This test was also performed since the study has binary response variables. In

terms of model fit, the result suggests that the data fit the regression model since the Chi-square value is not significant ($p > 0.05$). The not significant value indicates no significant difference between the observed and model-predicted variables (Maharja and Joshi, 2011).

Among the four predictor variables namely, age, gender, household size, and education, only household size does not significantly affect the odds of rural credit access decisions.

Ho1: Age of small-scale rice farmers does not predict the rural credit access decision.
The coefficient of the farmers' ages was significantly associated with the odds of rural credit access decision with the likelihood of 10.571 (P-value < 0.05). According to Gray (2006), the age of Filipino farmers affects their credit accessibility. Based on the results,

Table 2. Binary logistic regression model

Omnibus tests of model coefficients				
		Chi-square	df	Sig.
Step 1	Step	53.784	4	0.000
	Block	53.784	4	0.000
	Model	53.784	4	0.000
Model Summary				
		-2 Log-likelihood	Cox & Snell R Square	Nagelkerke R Square
Step 1		48.315[a]	0.517	0.690
Estimation terminated at iteration number 7 because parameter estimates changed by less than 0.001.				
Comparison between the predicted and actual number of successes observed				
Observed		Predicted Credit		Percentage correct
		No	Yes	
Credit Access	No	35	5	87.5
	Yes	4	30	88.2
Overall Percentage				87.8
a. The cut value is 0.500				
Hosmer and Lemeshow test				
Step 1		Chi-square	df	Sig.
		12.001	8	0.151

Source: own elaboration.

small-scale rice farmers in the prime working-age were more likely to avail rural credit than other age groups. This corroborates with Sebopetji and Belete (2009), who found that their chance of taking credit decreases as the farmer ages. Furthermore, Tu et al. (2015) suggest that ageing household heads negatively affect the probability of borrowing. This is further supported by Mikkel and Finn (2003) who mention that households with a high household head age have a lower probability of borrowing since they are more likely to have lower capital demand. These findings do not conform to Adegbite and Adeleye (2011) and Omonona et al. (2010), who found in their research that age was negatively correlated with credit access.

Ho2: The gender of small-scale rice farmer does not predict the rural credit access decision.
The gender of the farm household head was significantly and negatively associated with the odds of rural credit access decision (P-value < 0.05). According to Malapit

(2012), women in the Philippines are more restricted in credit access than males. This corroborates with Mishra et al. (2017), who found that Philippine households with female household heads cannot satisfy their credit necessities. Likewise, this study found that males were more likely to avail themselves of rural credit than females. This is following the findings of Sebopetji and Belete (2009) who suggest that gender has a significant positive effect on the farmers' decision in availing credit such that males have a higher likelihood than females. According to Linh et al. (2020), male-headed households are likely to demand formal credit. However, in the case of rice farmers in the study area, the source of rural credit is predominantly informal. These were opposed by Akpan et al. (2013), who revealed that credit sourcing decreases in male farmers.

Ho3: The household size of small-scale rice farmers does not predict the rural credit access decision.

According to Gray (2006), household size affects credit accessibility in the Philippines. Zapata (2006) also mentioned that a Filipino from a large household is more likely to borrow from informal sources. In this study, it was found that household size does not significantly predict the intention of the household head to access rural credit (P-value > 0.05). This confirms Kedir (2003), who also found that household size is not a significant determinant of credit. On the other hand, Akpan et. al (2013) mention that household size is an important policy variable that affects credit decisions. Nonetheless, Duy et al. (2012) found that access to credit is negatively related to family size.

Ho4: Education of small-scale rice farmers does not predict the rural credit access decision.

An increasing number of years of education completed was associated with reducing the likelihood of availing of rural credit (P-value < 0.05). This supports the study by Sebopetji and Belete (2009), claiming education has a significant negative effect on credit use decisions by farmers. The study argues that the decrease in the likelihood of farmers taking credit as the number of years of formal education increases and that highly educated small-scale farmers are financially stable. In the current study, it is important to note that the type of rural credit scheme that prevails is informal, which means that farmers do not avail credit from institutional sources. Hence, according to Zapata (2006), educated individuals will opt for formal credit sources like banks because they better understand the concept of effective interest rates. This also corroborates with Chandio et al. (2020), who found that formal education positively affects agricultural loan demand by smallholder rice farmers. It can be inferred that access to formal credit is positively associated with higher education, while access decision to informal credit is negatively associated with high educational attainment.

CONCLUSIONS

This study acknowledges a certain limitation related to sample size, which can be considered for further research. Nevertheless, the result of the study can be applied to other rice-producing municipalities of Occidental Mindoro where informal credit is prevailing. The study found that informal sources of credit play a vital role in promoting the agricultural productivity of small-scale rice farmers in rice-producing barangays of Calintaan, Occidental Mindoro, Philippines. They serve as the immediate source of agricultural financing when there is a shortage or absence of accessible formal credit providers. This paper analyzed the determinants of rural credit access decisions among small-scale rice farmers in Calintaan, Occidental Mindoro, Philippines. Calintaan is mostly agricultural, and its major commodity is rice. The binary logistic regression analysis revealed that rural credit access is determined by the farm household head's age, gender, and education, which is also incharged in managing rice farm operations. Male farmers are more likely to avail themselves of rural credit than their female counterparts. This is evident as male farmers mostly decide on farm finances, and females are mainly in charge of household finances. But as they age, their tendency to access rural credit decreases. They have a higher likelihood of demanding credit when they are at the prime working-age, and it decreases as they mature and become elderly. It can also be concluded that education significantly affects the farmers' decision making in accessing rural credit. Those farmers with shorter years of attendance in formal schooling are more likely to avail of rural credit than those with long years of education. This is because most rural credit providers are informal, such as private lenders, friends, or relatives who are charging interest. Knowledge of financial management is crucial in order for them to understand credit risks and interest rates. The government and non-government organizations give financial literacy training as one of their agricultural extension services.

Table 3. Determinants of rural credit access decision: parameter estimates from binary logistic regression

Predictors	B	S.E.	Wald	df	Sig.	Exp(B)
Age	2.358	1.017	5.372	1	0.020	10.571
Gender	−4.094	0.991	17.076	1	0.000	0.017
Household Size	−0.591	0.560	1.112	1	0.292	0.554
Education	−1.320	0.529	6.229	1	0.013	0.267
Constant	−1.073	0.522	4.216	1	0.040	0.342

Source: own elaboration.

RECOMMENDATIONS

In light of the conclusion, the following are hereby recommended for policy implementation and future research undertakings:

(i) The study results suggest some policy recommendations to enhance further and influence the rural credit access decision among small-scale rice farmers. Since informal credit sources prevail in the municipality, formal credit institutions should formulate a rural credit policy that would fit the socio-economic status of the farmers. A government policy would also be necessary to bridge the gap between small-scale rice farmers and formal credit institutions. However, we cannot disregard informal credit providers since they are an important substitute when there is a shortage or absence of formal sources (Linh et al., 2020).

(ii) Other variables can still be explored and tested to determine their influence on small-scale rice farmers' rural credit access decisions. This study was contextualized with a rural community where there is the dominance of informal credit providers serving the small-scale rice farmers who are at the same time the heads of the farm households. Further studies can be conducted in the future to explore factors affecting credit access decision of other population segments or working sectors using the same or other sets of explanatory or predictor variables. In this study, the effect of credit rationing and interest rates were not considered as explanatory variables as these are primarily considered in the formal credit sources. Hence, a more comprehensive study involving formal and informal sources can be considered a future research endeavor.

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