DETERMINANT OF MICROFINANCE PROGRAMMES' PARTICIPATION AMONG SMALL FARMERS: AN EXPERIENCE OF RWANDA

Mutamuliza Eularie [*]

Vishwanatha [**]

ABSTRACT

This paper was carried out in Rwanda to analyze the factors that influence small farmers' decision to participate in microfinance programmes. In Rwanda, most commercial banks and other financial Institutions have shown little interest in providing credit to small farmers. Furthermore, these formal institutions demand collateral and other rigid requirements that are difficult for farmers to meet. Therefore, not much scientific research has been done in Rwanda where the majority of small scale farmers who depend on agriculture for their livelihoods do not have facilities to access the microfinance programmes for increasing their agricultural productivity. The analysis was based on household data collected from a survey of 240 smallholding farmers in Nyamagabe District located in Southern Province of Rwanda. Logit model and Descriptive statistics were used to analyze the data. The results from Logit model showed that age, education, home savings, annual total assets and off-farm income influenced the small farmers' decision to participate in microfinance programmes. The result from descriptive analysis showed that in Nyamagabe District, more men than women participated in microfinance activities and that 48.8 percent of the respondents had participated in microfinance programmes and 51.2 percent of the respondents did not participate in microfinance programmes. The results shows also that the main factors limiting small farmers to participate in

[*] **Research Scholar, Mangalore University, Department of Economics, Mangalagangothri, Mangalore, Karnataka**

[**] **Professor and Chairman of the Department of Economics, Mangalore University, Mangalagangothri, Mangalore, Karnataka**

microfinance programmes are lack of collateral, lack of awareness, lack of information, difficult loan condition and long distance from the homestead and microfinance office. The study finds that participation in microfinance programmes should improve small farmers' livelihoods. The emphasis should be put on the level of savings mobilization, so that small farmers could have a chance to participate in well functioning microfinance programmes for increasing their income and agricultural productivity.

Keywords: Microfinance programmes, Small farmers, Participation, Logit Model, Rwanda

1. Introduction

Many countries in Africa have included microfinance institutions as policy instruments to eradicate poverty. Improving microfinance programmes' participation for small farmers should increase agricultural productivity and the economic development of the country. It is generally believed that microfinance will increase incomes and expand financial markets by providing credit, savings, insurance and money transfer to small scale entrepreneurs (Hossain, 1998). Financial services are necessary for agriculture development in rural areas, and are an effective means of promoting rural consumption growth (Asian Development Bank, 2010). The accessibility to financial services would allow small farmers to save their cash reserves efficiently to better protect themselves and to increase liquid assets to smooth consumption against income shocks (Saweda & Winter-Nelson, 2009).

Microfinance sector in Rwanda is based on a financial innovation in rural and poor communities to offset the lack of access and inadequate provision of microfinance programmes facilities (Jan, 2007). The development of the microfinance sector is based on the concept that people possess the capacity to implement income generating activities, such as in agriculture, livestock and micro and small enterprises (Habyarimana, 2005). However, Microfinance Institutions tend to support informal activities which have a low market demand and the aggregate anti-poverty effect of microfinance in a slow growth economy is hardly felt (Khandker 2003). Microfinance programmes initiatives in Rwanda have increased in recent times, primarily as a response to the weak involvement of the traditional banks in small and micro- enterprises.

They are characterized by weak management information systems, and limited consideration of best practices. In 2005, they contributed up to 76 percent of credit to the economy, and up to 75 percent of savings were mobilized (MINECOFIN, 2007).

The Government strategy is to mobilize domestic savings and build an inclusive financial system in Rwanda, yet only 21 percent of adults have access to formal financial services and 52 percent of Rwandans are financially excluded.

Therefore, National Bank of Rwanda decided in December 2008 to establish at least one Savings and Credit Cooperatives Society (SACCOs) per sector with the main objective to allow unbanked but bankable people get access to financial services at low transaction costs (NBR, 2010). In Rwanda, financing of agricultural activities often requires credit because most of operators do not always have their own resources to develop their activities. Hence, to invest in production, processing, conservation, storage, transport or other related activity, establishment of a credit system suitable to the producers will contribute to the development of agricultural sector (Niyonsenga *et* al.2007).

The agricultural sector in Nyamagabe District is characterized by the adoption of poor technology, dependency on unreliable climate, poor infrastructure, poor markets, and precarious income flows that deny the access of many rural households to credit facilities. Though microfinance institutions exist in Nyamagabe District, the participation of the small farmers in microfinance programmes is still low.

Lack of self-financing and lack of access to capital have been considered as the major contributors to the low agricultural productivity and low income. Despite the increasingly important roles assigned to microfinance in poverty reduction in Nyamagabe District, not much scientific research has been done and it is not clear whether the participation in microfinance programmes by small farmers has increased their welfare or not.

This study is of interest to the government, small farmers and all stakeholders in the agricultural sector. The objective of the study was to analyze the factors influencing small farmers'

participation in microfinance programmes in Nyamagabe District. The findings from the study allow implications essential for policy makers that would support implementation of effective microfinance programmes.

2. Methods and Materials

2.1. Data Sources and Collection Method

The study used both qualitative and quantitative data from primary and secondary data sources. Data were collected using structured questionnaires that were administered to the sample of households' heads via person-interviews. The primary data were collected from a stratified multistage sample of 240 households located in three sectors of Nyamagabe District, namely Gasaka, Kibirizi and Tare. The survey questionnaire contained detailed sections on demographic and socio-economic characteristics of the household. The analysis included participants and non-participants in agricultural activities and others businesses.

2.2. Empirical methods

The study used both Descriptive analysis and Logit model to analyze the data. The study analyzed the participation of farmers in the microfinance programmes, and the factors which contribute to this participation using a Logit Regression Model. Logit regression was well suited for describing and testing hypotheses about relationships between a categorical outcome variable and one or more categorical or continuous predictor variables. It was preferred as a binary. It takes a value of one (if smallholder farmers participate in microfinance programmes) and a value of 0 (if smallholder farmers do not participate in microfinance programmes). Because alternative outcomes are difficult to describe with an ordinary least squares regression (OLS) equation due to the dichotomy of outcomes, one may instead create categories for the predictor and compute the mean of the outcome variable for the respective categories (Dayton, 1992).

The study used the observed information on small farmers' choice (participate or not participate in microfinance programmes) and estimated the conditional probability of socio-economic factors influencing smallholder farmers' participation in microfinance programmes in Nyamagabe District (using the binary logit model).

The logistic model is derived as follows:

$$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + ...\beta_i X_i + \mu_i \quad \text{..... (1)}$$

This can be expressed in terms of probabilities as:

$$\pi = E(Y = 1/ X_{1....} X_i) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_i X_i \quad \text{..... (2)}$$

In this case, the outcome variable Y is dichotomous, taking on values of 1 (if smallholder farmers participate in microfinance programmes), and Y=0 (when they do not participate in the programmes).

In theory, the hypothetical population proportion of cases for which Y = 1 is defined as π = P(Y =1). Then, the theoretical proportion of cases for which Y = 0 is $1-\pi$ = P(Y = 0). Mathematical formulation is based on a linear model for the natural logarithm of the odds (i.e., the log-odds**)** in favor of Y = 1.

Taking the natural log of both sides of the equation we obtain:

$$LogitY = Natural\log(odds) =$$

$$\log_e\left[\frac{P(Y=1/X_1.....X_i)}{1-P(Y=1/X_1.....X_i)}\right] = \log_e\left[\frac{\pi}{1-\pi}\right] = \beta_o + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_i X_i$$

..... (3)

π is a conditional probability of the form P(Y=1| X_1,...,X_i)

That is, it is assumed that participating in microfinance services is depending on combinations of values of the predictor variables. The log-odds, as defined above is also known as the logit transformation of π and the analytical approach described here is known as logit analysis.

Using substitution method and simplifying the fraction, this equation becomes:

$$P(Y = 1/ X_1.....X_i) = \pi = \frac{e^{\beta_0+\beta_1 X_1+\beta_2 X_2+...+\beta_i X_i}}{1+e^{\beta_0+\beta_1 X_1+\beta_2 X_2+...+\beta_i X_i}} \quad \text{..... (4)}$$

The logistic function is sometimes presented in the form:

$$P(Y = 1/ X_1.....X_i) = \pi = \frac{1}{1+e^{-(\beta_0+\beta_1 X_1+\beta_2 X_2+...+\beta_i X_i)}} \quad \textbf{.....(5)}$$

Therefore, the probability of an event that the smallholder farmers do not participate in

microfinance service is $1-\pi$, and expressed as:

$$P(Y=0/X_1....,X_i)=1-\pi=\frac{1}{1+e^{\beta_0+\beta_1X_1+\beta_2X_2+.....+\beta_IX_I}} \quad \text{..... ..... (6)}$$

Where e = 2.71828 is the base of the system of natural logarithms.

β_0 = the constant term or intercept

β_i = regression coefficient

X_i = vectors of explanatory variables

Variables used in the Model

X_1= Gender of household head (hhgender): (Male = 1, females = 0)

X_2 = Age of household head (hhage) in years

X_3 = Education level of household head (hheduc)

X_4 = Marital status of Household Head (hhmaritalst)

X_5 = Distance from homestead to microfinance office (Distance)

X_6 = Home Savings (HSavings)

X_7 = Perception of Credit Eligibility (Percredel)

X_8 = Off-farm income (Off_farm_inc)

X_9= Total annual Assets (Totalassets)

μ_i = The error term

3. Results and Discussions

3.1. Table 1. Descriptive Statistics of Demographic and Socio-economic characteristics of the small farmer's households

Variables	*Minimum*	*Maximum*	*Mean*	*Std. Dev.*
Age of Household	20	82	42.4	14.819
Household education	1	5	2.05	0.904
Household size	1	7	3.8	2.059
Household s' annual total income (in USD)	60,000	6,000,000	625,299	804,871.303

Source: Author survey

The results from table 1 show that the mean age of the household heads was 42.4 years with a standard deviation of 14.8 years. The youngest respondent was 20 years, while the oldest was 82 years. This suggests that economically active individuals headed households, which may imply active economic development in the study area. The study shows also that the mean household size was 3.8 approximated to 4 persons per household with a standard deviation of 2. The smallest family had 1 member and the largest had 7 members. This suggests that households with big family sizes were more likely to participate in microfinance programmes to improve their livelihoods.

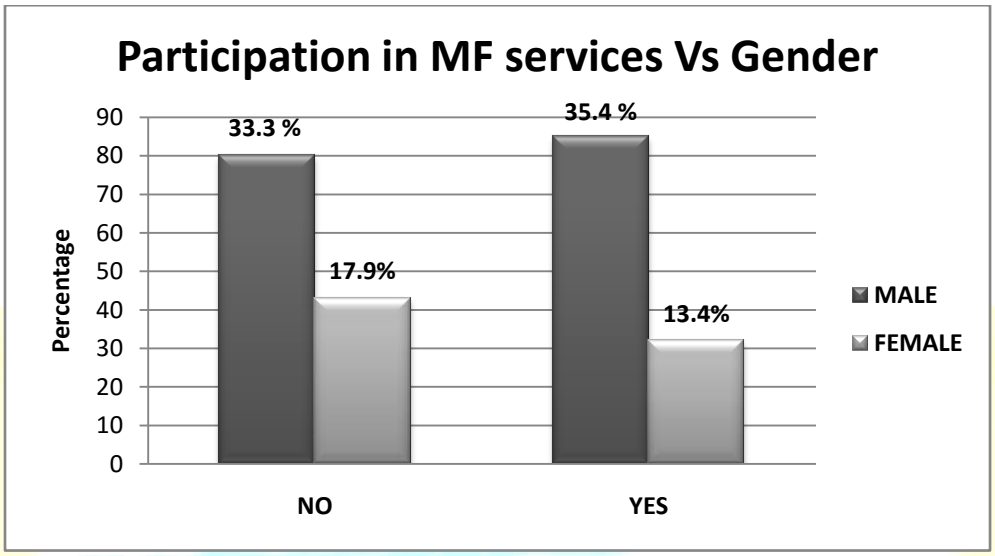
Mean education of respondents was 2.05 years indicating that the farmers have relatively low levels of education. Results also show that the mean distance to the nearest Microfinance Institution was reported to be 1.51 kilometers. Hence farmers have better access to microfinance programmes for increasing their income.

The Table 1 also shows that most of the households had a low annual total gross income. The mean annual household income was 625,299 Rwandan francs, approximated to 890 USD and based on the household revenues from agriculture production, livestock production and revenues from salaried employees, gifts, commerce, home transfer and subventions or income from any other business initiated by the households, this is approximately 2 dollars a day per household. It points out that the majority of the household in the study area could hardly meet their basic needs.

3.1.2. Household participation in the microfinance programmes categorized by gender

This section presents, by gender category, the extent to which small farmers participated in the microfinance programmes in Gasaka, Kibirizi and Tare.

Figure1. Participation in microfinance services



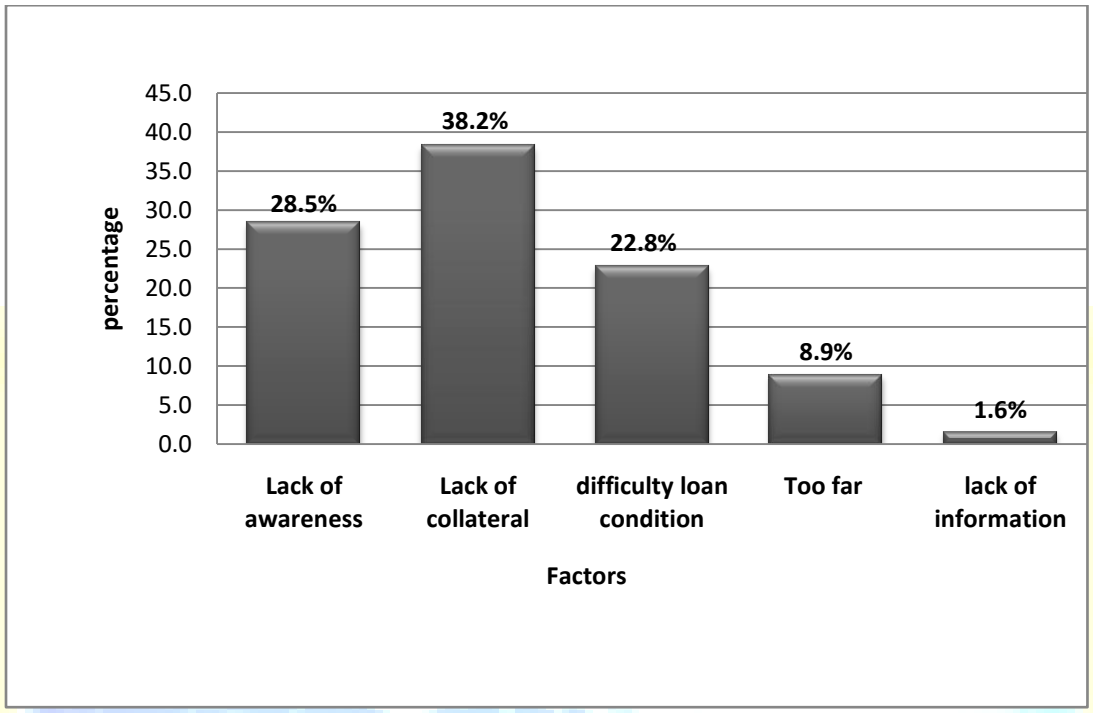
Source: Author survey

Figure1 shows that out of the 240 respondents, 85 males (35.4 percent) and 32 females (13.4 percent) had participated in microfinance programmes in the last 12 months, while 80 (33.3 percent) males and 43 females (17.9 percent) had not participated in microfinance programmes. The results show that in Nyamagabe District, more men than women participated in microfinance activities. Despite the existence of microfinance programs to improve women participation in targeted microfinance services, there were fewer women in microfinance services.

3.1.2. Factors limiting participation in microfinance programmes

The figure 2 below gives the factors that limit the participation in microfinance programmes in Gasaka, Kibilizi, and Tare in Nyamagabe District. In this case, 38.2 percent of the households reported that the main factors which limit their chance to participate in microfinance programmes are the lack of collateral, while 28.5 percent of the households reported lack of awareness, 22.8 percent of the households reported difficult loan conditions, 8.9 percent reported long distance to travel to get services and 1.6 percent reported lack of information.

Figure 2: Factors limiting participation in microfinance programmes



Source: Author's survey

The collateral requirement from the formal and informal lenders in the study areas is an important feature limiting smallholder farmers to access the programmes offered by these institutions. The majority of these household own small parcels of land and depend on farming as the main source of their income. Others may not know about services offered by the lenders because of the lack of awareness and lack of information. Therefore, they fear borrowing and lack confidence in decision making to participate in microfinance programmes. Another factor is that most smallholder farmers lived in rural areas far from microfinance offices and this leads to high transportation costs that further constrained microfinance programmes access. Smallholder farmers also cited the very long credit procurement procedures as a limiting factor for participation in microfinance programmes.

3.2. Results from Logit Regression

Logit Regression Analysis was conducted to find out the factors that contribute significantly to microfinance programmes' participation by small farmers. The study defined participation in microfinance programmes as ''The observed small farmers' ability to borrow and have access to savings.''

The participation in microfinance programmes variable (whether a small farmer has participated in microfinance programmes or not) was regressed on gender, age, education, marital status, distance, Home savings , total annual assets, Perception of credit eligibility, and off-farm income. The factors that influence the likelihood of participation were found to be statistically significant were only the levels of age, education, savings access, total annual assets, and off-farm income. These results are presented in table 2.

Table 2: Estimates Results of the Logit Regression for Factors that influence participation in microfinance Programmes

Variables	Coef.	Std. Err.	P-value	Marginal Effects (dy/dx)
hhgender	.1776079	.4328865	0.682	.0428935
hhAge	.0290582**	.0143616	**0.043**	.0070177
Hheducation	.4776276**	.2429245	**0.049**	.1153502
hhMaritalstat	.1679166	.1472072	0.254	.040553
Distance	-.0148378	.2941358	0.960	-.0035834
HSavings	4.025625***	.5986532	**0.000**	.7021034
Percredel	.1582576	.4361623	0.717	.038467
Off_farm_inc	-.1018213*	.0606822	**0.093**	-.0245905
Total_assets	9.62e-07*	5.79e-07	**0.096**	2.32e-07
_cons	-5.430968	1.355027	0.000	

Number of Obs = 240

LR chi^2 (9) = 146.64

Pseudo R^2 = 0.4409

Prob >chi^2 = 0.0000

Log likelihood = - 92.96015

The predicted probability of Y = 0 .40783975

Source: Computed by the Author from the field survey data

Note *, ** and *** denote significance level at 10 %, 5 % and 1% respectively

Discussion

Table 2 presents the estimated results of the logistic model.

The likelihood ratio test has a Chi-square statistic which is the difference of the values of the two log likelihood functions (i.e. the null model -2 Log Likelihood and the full model -2 Log Likelihood), is equal to 146.64. The Log likelihood is equal to -92.96015 and the pseudo-R^2 = 0.4409.

Table 2 shows also the marginal effect on the significant variables on conditional probabilities. Therefore, the effect of changes in the statistically significant variables on the probability of participating in microfinance service was determined. Five variables were found significant: age, education, home savings, total annual assets and off-farm income. The predicted probability of y = 0 .40783975.

Age: The Logit results show that the coefficient for age is positive and significant at 5 percent level. The implication is that the age of the smallholder farmers has an influence on the participation in microfinance programmes. Marginal effects show that if the age of a small farmer increases by one year, the probability of participation in microfinance programmes will increase by 0.0070177 (0.7 percent). This finding suggests that the older household heads accumulate more experience (practical and professional wisdom) and have chances to participate in microfinance programmes to increase their income generating activities. In addition, the older farmers may be more familiar with the conditions of financial institutions and are thus also able to apply for loans.

Education: The results indicate that education is significant at 5 percent and influence positively the probability of participating in microfinance programmes. The partial effect of a unit increase in the number of school years attendance in the conditional probability of participation in microfinance programmes is 0 .1153502 (11.5 percent). Thus, an increased in level of education by 1 year, increases the probability of participation in microfinance programmes by 11.5 percent.

Meaning that household heads who have better level of schooling have also high chance of being participant in microfinance programmes. So, the likelihood of participation in the microfinance programmes will increase with knowledge.

Home Savings: The results indicate that Home savings is significant at 1 percent level and positively influence the households' participation in microfinance programmes. It is thus expected that the households who had kept the money in the house are more likely to participate in microfinance programmes. The marginal effect results show that home savings will increase the probability of participation in microfinance programmes by 70.2 percent.

Totalassets: The coefficient of total annual assets variable is significant at 10 percent and has a positive influence on participation in microfinance programmes. Since the value of total assets owned influenced positively participation in microfinance services, this means that the amount of total assets owned increases the accessibility to microfinance programmes.

Off-farm income: The results from table 2 indicate that the coefficient for off-farm income is negative and significant at 10 percent level. Hence, the partial effect of a unit increase in off-farm income on the conditional probability of participation is -.024. This means that with each unit increase in off-farm income, the probability to participate in microfinance programmes will decrease by 0. 024 (2.4 percent). Thus, this finding suggests that households with high off-farm income are less likely to participate in microfinance programmes s to invest in farm activities.

4. Conclusions and Policy Implications

The microfinance institutions are evident tools for development due to the various programmes they offer and the role they performs towards the development of the Rwanda s' economy. It is expected that with the current reforms put in place by the National Bank of Rwanda through its regulatory authorities, microfinance institutions in Rwanda will be able to compete favorably in the global market and gainfully increase Rwanda economic development. Microfinance programmes are promising measures to serve low-income households in Nyamagabe District. Important to note is that especially the more diversified participation in microfinance programmes, hold the promise to adequately address the financial needs of the small farmers.

Marginal effects were estimated on the socio-economic factors that influence small farmers' participation in microfinance programmes using a Logit model. The results indicated that the coefficients for age, education, total annual assets, home savings, and off farm income were significant as the factors that influence smallholder farmers' participation in microfinance services.

The implication of these findings is that there is a need for policy measures to increase participation in the programmes offered by Microfinance institutions in Nyamagabe district. Participation in microfinance programmes for small is able to provide the opportunities to improve the quality of life in low-income households. The results in this study can still be summarized that the programmes offered by microfinance institutions in Rwanda, especially in Nyamagabe district could increase the income of the small farmers and agricultural productivity. The efforts to improve small farmers' human capital of in the form of education would go a long way to help facilitate the adoption of new technologies. Targeting small farmers with new agricultural technology can help improve their farm productivity. Promising policies in this direction include increasing their access to formal credit and access to savings for them to increase their livelihood.The government and microfinance institutions need to develop concrete strategies for mobilizing the saving culture among the farmers, both in urban and rural areas for sustainability of financial institutions and poverty reduction. The use of SACCOs and Microfinance programmes needs to be promoted and encouraged in order to provide an instrument for mobilizing savings and extending credit.

To increase physical assets of small farmers could be the collateral requirement of microfinance lenders to access easily the agricultural loans. The small farmers should participate in microfinance programmes to be able to increase their off-farm income for investing in agriculture which is the main source of income in Nyamagabe District.

References

1. Asian Development Bank (ADB). (2010). *''Financial Inclusion: Trends, Challenges and Policies''.* Seminar organized by Asian Development Bank, Shanghai, People's Republic of China.

2. Dayton C. Mitchell (1992). Logistic Regression Analysis. University of Maryland, USA.
3. Green William (2003) . Econometric Analysis. Fifth edition, New York University.
4. Habyalimana, Straton (2005). Getting traditional commercial banks involved in rural finance and microfinance: A strategic approach for poverty alleviation in Rwanda. Thesis Kigali: Université Libre de Kigali.
5. Hossain, M. 1998. Credit for the Alleviation of Rural Poverty: The Grameen Bank in Bangladesh. Research Report No. 55, IFPRI, Washington D.C.
6. Jan Maes (2007). Linkages between CARE's VS & LAs with Financial Institutions in Rwanda. Kigali, Rwanda.
7. Khandker, S. R (2003). Microfinance and Poverty. Policy Research Working No. 2945, World Bank, Washington D.C.
8. Minecofin (2007). Economic Performance Indicators 2006 and Outlook for 2007. Government printed ; Kigali-Rwanda.
9. National Bank of Rwanda, NBR (2010). Annual report, 2010. Government printed; Kigali-Rwanda
10. Niyonsenga Ildéphonse, Zaninka Claudine and Naivasha Eric (2007). A Critical, Forward Looking Review of the Microfinance Sector in Rwanda Kigali. Rwanda Microfinance Forum.
11. Saweda Liverpool, Lenis & Winter-Nelson, A. (2009). Poverty Status and the Impact of Formal Credit on Technology Use and Wellbeing among Ethiopian Smallholders. World Development Vol. 38, No. 4, 541–554