IMPACT OF MICROFINANCE SERVICES ON SMALL SCALE FARMERS' WELFARE IN RWANDA: A CASE STUDY OF NYAMAGABE DISTRICT

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Abstract:
   Microfinance services accessibility has been seen as strategy for breaking the vicious cycle of poverty in the rural areas of developing countries, particularly in Sub-Saharan Africa. This study analyzed the impact of microfinance services on small scale farmers' welfare in Nyamagabe District, Rwanda. 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. Data were collected using structured questionnaires that were administered to the sample of households' heads via person-interviews. Both groups shared the same socio-economic and physiographic environment and hence assumed to have similar economic status before participating in microfinance services. Analysis of data was carried out using descriptive statistics and Probit Model. A probit regression model is used to examine the factors influencing participation among small scale farmer's beneficiaries of microfinance. The results from descriptive statistics show that 48 percent of the household heads had participated in microfinance services while 52 percent of the household heads had not participated in microfinance institutions. The results from Probit analysis revealed that age, household size, main occupation, distance, annual interest rate, and saving had a significant impact on welfare of small scale farmers' participating in microfinance services. The study concludes that microfinance institutions have enhanced the living standard of small scale farmers in Rwanda. The study recommends that the extension of credits or financial services to small scale farmers is seen as an effective strategy to increase income and agricultural productivity.

Index Terms: Small Scale Farmers, Microfinance Services, Probit Model & Rwanda

Introduction:
   Microfinance over the years has been considered to be one of the most effective and flexible strategies in the fight against global poverty. Microfinance is regarded as one of the successful poverty reduction policies and has also been seen as a proposal to provide financial services to the low income population and as a strategy for empowering smallholder farmers (Nidia *at al.;* 2001). Microfinance is considered as a provision of a broad range of financial services such as savings, loans, payment services, money transfers and insurance to poor and low-income households (Putzeys, 2002). However, Microfinance Institutions (MFIs) 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).

   The characteristics of microfinance institutions are that they give access to financial and non- financial services to low income people, who wish to access money for starting or developing an income generation activity (Kirkpatrik et al. ,2002). Microfinance as a discipline has created financial products and services that together have enabled low-income people to become clients of a banking intermediary (Barr and al; 2005). However, participation in the microfinance programs by marginal and small

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farmers has improved their agricultural productivity (Mohammad & Rahaman, 2005). According to Ben *et* al., (2011) microfinance institutions play an important role in poverty reduction and social capital formation in Nigeria.

Anand (2006) also found out that the intervention of microfinance through self-help groups played a significant role in increasing the assets of the households of members of self-help groups and thus indeed provides a socio-economic protection system in the rural villages.

The microfinance sector in Rwanda contributes significantly to the provision of basic financial services. About 80 percent of the households holding an account in a financial institution are serviced by the People's Bank network, a microfinance organization (Rusagara, 2008). However, the reach of other MFIs remains limited, and most of them are fully stretched in the use of their resources. Accessing microfinance services is a major constraint to the improvement of small scale farmers' income and agricultural productivity (Christopher Dunford, 2006). This is mainly due to the behaviour of lenders in terms of hedging against small scale farmers borrowers' risks by demanding collateral which they lack, and also information asymmetry.

The Government of Rwanda aims to create an enabling environment for sustainable MFIs so that they will be capable of fully playing their role as partners in delivering development objectives. It is envisaged that microfinance would help to generate employment and to diversify sources of income and productivity, thereby contributing to the improvement of Rwanda's economy in a sustainable manner (MINECOFIN, 2008). The major policies and strategies of Microfinance Institutions (MFIs) in Rwanda are to develop financial infrastructure, support pro-poor innovation, build viable institutions and support social intermediation (Maes, 2007).

The majority of MFIs in Rwanda seem to lack capacity in several areas that are important to manage a financial institution profitably. Capacity building is needed in management, accounting, internal controls, development of new products, and setting up of Management Information Systems (MIS), which only very few institutions in Rwanda are able to provide (MINECOFIN, 2007).

The microfinance industry in Rwanda has evolved over the years to support those who have for a long time been excluded by traditional commercial banks. Despite the increasingly important contribution assigned to microfinance in poverty reduction in Rwanda, little is documented about its impact on small scale farmers' welfare in Rwanda in general and in Nyamagabe District in particular.

Nyamagabe District, depending basically on agriculture would require strategies that break the vicious circle of poverty through provision of credit facilities. It would be important to monitor and appraise government and community efforts in poverty reduction and /or income generation, especially among the poor in rural areas. Therefore, the objective of the study was to analyze small farmers' participation and to assess the factors influencing this participation in microfinance services in Nyamagabe District, Rwanda.

Material and Methods:
Data Sources and Collection Methods:
The study used both qualitative and quantitative data from primary and secondary data sources. 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. Data were collected using structured questionnaires that were administered to the sample of households' heads via person-interviews. Both

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groups shared the same socio-economic and physiographic environment and hence assumed to have similar economic status before participating in microfinance services.

The primary data were analyzed using SPSS and STATA packages. The information obtained was used in the probit regression analysis of the factors that influence smallholder farmers' participation in microfinance services. The analysis included participants and non-participants in agricultural activities and others businesses. In addition, secondary data were collected from National Bank of Rwanda, Ministry of Finance and Economic Planning (MINECOFIN) and Rwanda Cooperative Agency (R.C.A).

Methodology:

Both Descriptive statistics and Probit Model were used to analyze the data. The socio-economic characteristics of respondents were analyzed using descriptive statistics. Descriptive statistics tools such as mean, standard deviation and percentages was used to analyze the quantitative data that were collected from primary sources while Probit model was used to examine the factors affecting participation among small scale farmer's beneficiaries of microfinance.

Probit Model:

Probit Model analysis was conducted to find out the factors that contribute significantly to microfinance services' participation by small scale farmers. The participation in microfinance services variables (Whether a small scale farmer has participated in microfinance services or not) was regressed on gender, age, education, household size, marital status, main occupation, total assets, annual interest rate, size land, distance, savings, and access to credit. Probit model is preferred as a binary and takes a value of 1 (one) if small scale farmers participate in microfinance services) and a value of 0 (if small scale farmers do not participate in microfinance services). The study used participants' microfinance services for estimating the model. Thus according to Green & David (2009), Probit equation is specified as:

$$Yi^* = \sum_{k=1}^{k} \beta_k \chi_{ki} + \varepsilon_i$$

$$Y_i = 1 \, if \, Y^* \succ 0$$

$$Y_i = 0 \, if \, Y^* \leq 0$$

Where participation in microfinance services estimates which has dichotomous realization on Y_i

β_k = Parameters of the kth variable to be estimated.

χ_{ik} = Variable determining participation decision in microfinance services

ε_i = Disturbance term

Variable Used in the Analysis:

X_1 = Gender of household head (male=1 and Female=0)

X_2 = Age of household head (in years)

X_3 = Education level of household head

X_4 = Household size

X_5 = Marital status of household head

X_6 = Main occupation of household head

X_7 = Total annual Assets of household head

X_8 = Annual Interest Rate (percentage)

X_9 = Size land of household head

X_{10}= Distance from homestead to microfinance office (Km)

X_{11} = Household head Savings

X_{12} = Household Access to credit

Impact on small scale farmers' welfare = β_0 + β_1 Gender+ β_2 Age+ β_3 Education+ β_4 Household size + β_5 Marital status + β_6 Main Occupation+ β_7 Total annual assets + β_8 Annual interest rate+ β_9 size land+ β_{10} Distance+ β_{11} Savings+ β_{12} Access credit + ε_i

Results and Discussion:

✓ Demographic and Socio-economic characteristics of smallholder farmers in Nyamagabe District

✓ Proportion of small scale participants and non – participants in microfinance services in Nyamagabe District

Table 1 shows the proportion of microfinance services participants and non-participants

Table 1: The proportion of microfinance services participation and non- participants

Characteristics	Participants in MFIs N= 115 (48%)		Non-Participants in MFIs N= 125 (52%)		Total N= 240 (100%)	
	Frequency	%	Frequency	%	Frequency	%
Gender						
Male	83	35	82	34	**165**	**69**
Female	32	13	43	18	**75**	**31**
Education						
Illiteracy	18	7.5	46	19	**64**	**26.5**
Primary	55	23	67	28	**122**	**51**
Secondary	31	13	7	3	**38**	**16**
University	8	3.25	2	0.75	**10**	**4**
Vocational	3	1.25	3	1.25	**6**	**2.5**
Marital Status						
Married	81	34	87	36	**168**	**70**
Widower/Widow	13	5	13	5	**26**	**10**
Divorced	4	2	4	2	**8**	**4**
Separated	6	2.5	7	3	**13**	**5.5**
Single	11	4.5	14	6	**25**	**10.5**

Source: Authors Field Survey

Gender:

Table 1 show that among the total households interviewed, the proportion of male headed households was 69 percent and that of female headed households was 31 percent. Among the participants, the number of female headed households was lower than that of male headed households. From table 1, the proportion of gender respondents shows that 35 percent of male and 13 percent of women had participated in microfinance services respectively while 34 percent of male and 18 percent of women had not participated in microfinance services.

Education:

Table 1 shows also that the proportion of illiterate respondents (that is, those who never went to school) for the whole sample was 27 percent, 7.5 percent for the participants and 19 percent for non-participants. The table further shows the proportion of farmers who attended primary school that is about 51 percent for the whole sample while 23 percent and 28 percent, participant and non-participant in

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microfinance services respectively. Also about 16 percent for the whole sample, 13 percent and 3 percent for participants and non-participants respectively have attended secondary school. Proportion of respondents with university education only 3 percent had participated in microfinance service while 0.75 percent had not participated. The table shows also that 1.25 percent of participants have attended the vocational training while 1.25 percent of non-participants had not participated in microfinance services.

Marital Status:

Table 1 shows also the marital status of the respondents. The proportions of marital status of the respondents, shows that about 70 percent of married respondents for the whole sample, 34 percent were participants while 36 percent were non-participants in microfinance services. Also about 10 percent for the whole sample who were widowers, 5 percent are participants while 5 percent are non-participants respectively. The table shows also that 4 percent of respondents who were divorced, 2 percent were participants and 2 percent are non-participant respectively in microfinance services. The table shows also that 2.5 percent of separated respondents were participants while 3 percent were non-participants in microfinance services. Also, 4.5 percent of single household were participant while 6 percent were non-participants in microfinance services.

Services offered by Microfinance Institutions in Gasaka, Kibirizi and Tare:

The figure 1 below shows the services offered by microfinance institutions. They provide different services to the clients and the most common are savings and credits

Figure 1: Microfinance services used by small farmers in Nyamagabe District, Rwanda
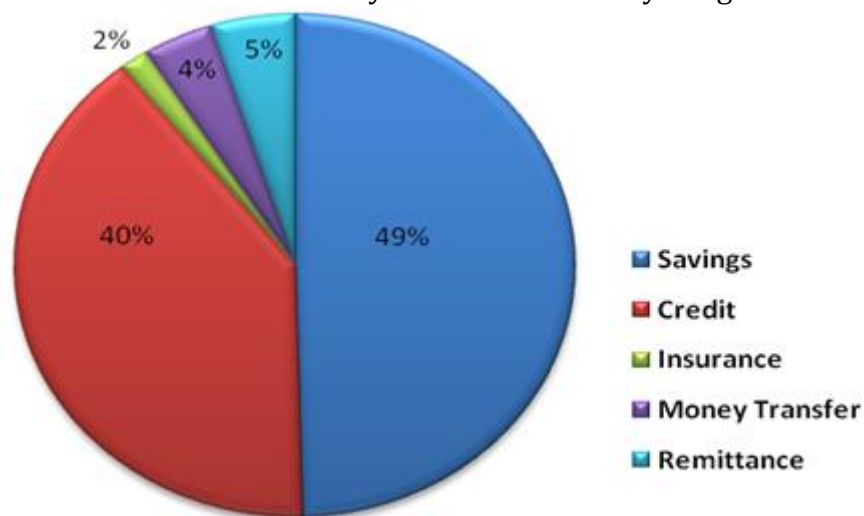
Sources: Author's Field survey

The figure 1 shows that, in the survey locations, 49 percent of the household heads have access to savings services and that 40 percent of the household heads were able to borrow from those microfinance institutions. These credit services lead to the clients modifying their agricultural productivity and their small enterprises activities which in turn lead to increased income.

The changes in household income in turn lead to greater household economic security. Savings services have often been seen as a critical component in improving access to credit in Nyamagabe District. In this case, the smallholder farmers can accumulate money and then draw it for investing in physical and other household assets. Other services offered by microfinance institutions, like remittance, money transfer and insurance, are generally not used by the respondents. Only 5 percent of the

respondents used remittance, while 4 percents used money transfer and only 2 percent used insurance services.

The Main Purpose of Agricultural Loan for Smallholder Farmers:

The agricultural loans offer opportunities to smallholder farmers to obtain capital and mainly to increase their income. Figure 2 shows the main purposes of agricultural loans in Gasaka, Kibirizi and Tare. From the figure 2, 31 percentage of farmers used agricultural loans for buying seeds, 22.5 percent for buying seeds and fertilizers, 14.1 percent for buying farm equipment, 9.9 percent for buying land, 8.5 percent for investing in irrigation, 5.6 percent for buying only fertilizer, 4.2 percent for paying labor, and 4.2 percent for buying oxen. All those farm inputs lead to increasing agricultural productivity in Nyamagabe District.

Figure 2: The Main Purposes of Agriculture Loan
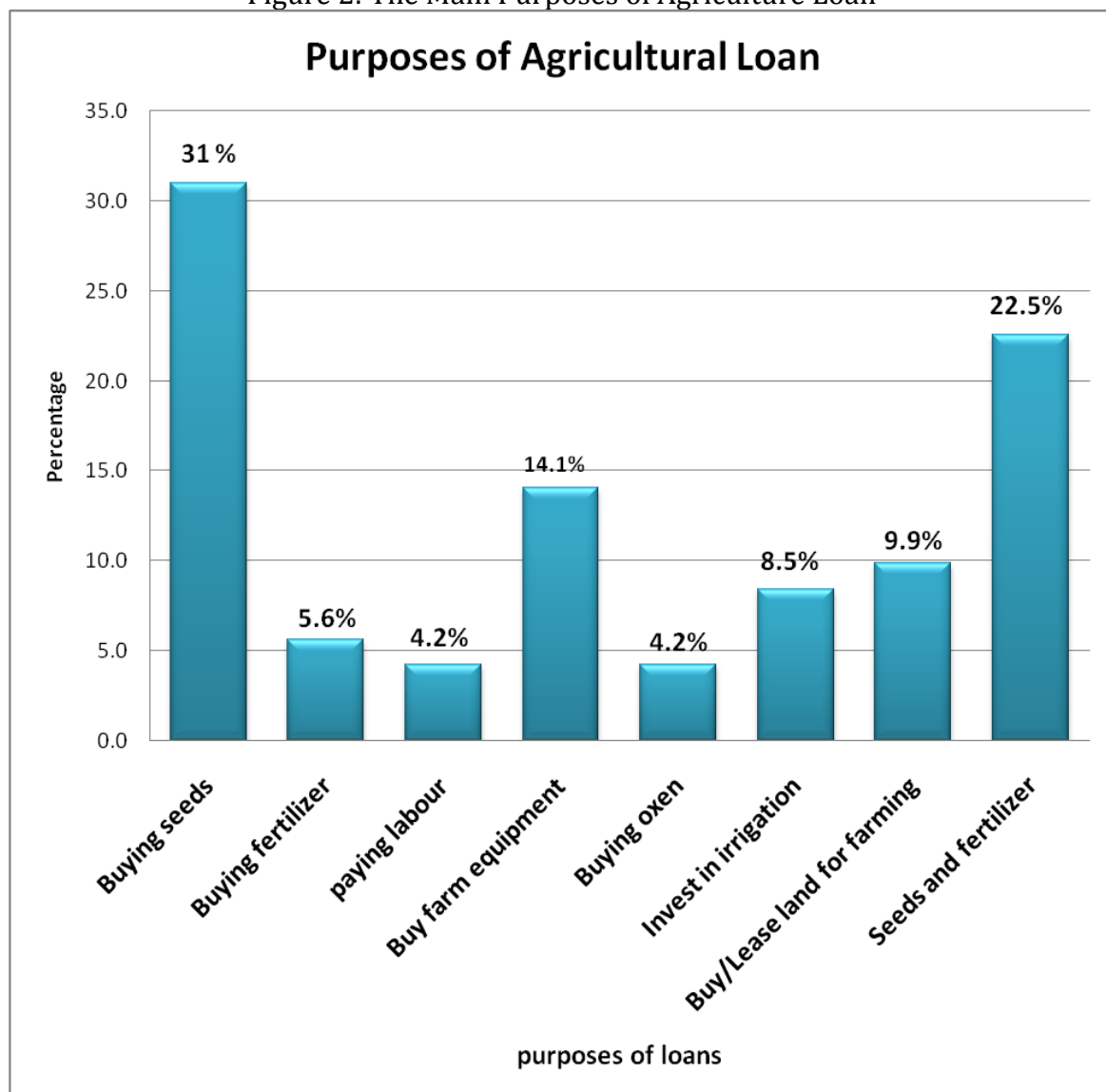
Source: Authors' Field survey

Analysis of Smallholder Farmers' Participation in microfinance services using the Probit Model:

Table 2: Probit Regression Results

Variables	Maximum Likelihood Estimates			Marginal Effects		
	Coef.	Std.Err.	P-Value	Coef.(dy/dx)	Std.Err.	P-Value
Gender	.3296289	.2566295	0.199	.1307353	.10162	0.198

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Age	.0223134	.0083811	0.008***	.0088498	.00333	0.008***
Education	.1520667	.137314	0.268	.0603117	.05454	0.269
Hh_size	-.1029121	.0606739	0.090 *	-.0408163	.02405	0.090*
Marital status	-.0447596	.0925143	0.629	-.0177523	.03668	0.628
hhOccupation	.0930923	.0526895	0.077*	.0369217	.02087	0.077*
Total_assets	5.26e-07	3.39e-07	0.121	2.08e-07	.00000	0.123
Ann_interate	-.0825329	.0226734	0.000***	-.0327337	.00907	0.000***
Size_land	.0702365	.2170941	0.746	.0278568	.08609	0.746
Distance	.8973727	.2988526	0.003***	.3559102	.11963	0.003***
Savings	1.055081	.4054218	0.009***	.391383	.12895	0.002***
Access_Cred	.0126503	.2696954	0.963	.005019	.10704	0.963
_Cons	-3.402179	.7905302	0.000***			

Number of Obs = 240
Pseudo R^2 = 0.4789
LR chi2 (12) = 159.15
Prob > chi2 = 0.0000
Log likelihood = -86.571207
Note: * significant at 10%, *** significant at 1%
Source: Author's Computation

Table 2 present the estimated results of the Probit model. The likelihood ration test has Chi-Square statistics equal to 159.15 with 12 degree of freedom. The Log likelihood is equal to -86.571207 and Pseudo R^2 equal to 0.4789. The results from table 2 give us the probability of household participation in microfinance services. The maximum likelihood estimates of the Probit regression model show that participation in microfinance services, age, household size, household main occupation, annual interest rate, distance and savings were important significant variables and affect small scale farmers' welfare. Therefore, the computation of marginal effects allows getting changes in probability of an event as consequences of unit change in independent variable.

Age:
The results revealed that *Age* was significant at 1 percent and has a positive impact on the small scale farmers' welfare. The marginal effect show that if the age of a small scale farmer increases by one year, the likelihood to participate in microfinance services will increase by .0088498 (0.8 percent). Therefore, old small scale farmers are more likely to participate in microfinance services for increasing their income and agricultural productivity.

Household Size:
The result revealed that the *household size* was significant at 10 percent and had a negative impact on small scale farmers' welfare. The marginal effect shows that if there is an increase of one family member, the likelihood to participate in microfinance services will decrease by 4 percent. Mostly, large household size could have various needs ranging from capital investment to consumption smoothening. It is likely to resort to participate in microfinance services to meet these needs.

Main Occupation:
The results revealed that *household main occupation* was significant at 10 percent and has a positive impact on small scale farmers' welfare. The marginal effect shows that, a unit increase in the main occupation, the probability to access microfinance services will also increase by 3.69 percent. Therefore main occupation could influence small scale farmers' decisions to request for additional money for increasing their agricultural productivity and their income.

Annual Interest Rate:

The results show that the *Annual interest rate* was significant at 1 percent and has a negative impact on small scale farmers' welfare. The marginal effect shows that, one percent of annual interest rate increase, the likelihood to participate in microfinance services is decreasing by 3.27 percent. Furthermore, there is evidence that beneficiaries of microfinance institutions are afraid to request credit because of higher annual interest rate and lack of collateral which could impact negatively their standard of living.

Distance:

The results show that *distance* from homestead to microfinance office was significant at 1 percent and affect positively small scale farmers' welfare. The partial effect shows that, an increase of 1 km from homestead to microfinance office will increase the likelihood to access microfinance services by 35.59 percent. Furthermore, small scale farmers located far from microfinance office are likely to participate in microfinance services because they are aware the advantage to participate in microfinance services in order to increase their livelihood and to reduce poverty even if the transport is too high.

Savings:

The results show that *saving* was significant at 1 percent and has a positive impact on small scale farmers' welfare. It is thus expected that the small scale farmers who had money are more likely to access microfinance services. The partial effect result shows that *savings* will increase the probability of participation in microfinance services by 39 percent. Therefore, small scale farmers having benefited money from selling their agricultural crops tend to increase their savings to microfinance institutions which lead to the improvement of their welfare.

Conclusion and Recommendations:

Microfinance is regarded as one of the successful poverty reduction policies in developing countries especially in Sub- Saharan Africa. This study analyzed the impact of microfinance services on small scale farmers' welfare in Nyamagabe District, Rwanda. The study used descriptive statistics and probit model to analyze the data.

From the survey of 240 small scale farmers, the results show that 115 were participated in microfinance services and the remaining 125 had not participated. The results shows that variables like age, household size, household main occupation, annual interest rate, distance and savings were statistically significant and had an impact on small scale farmers' welfare. Hence the overall analysis shows an improvement on the welfare of the small scale farmers in Nyamagabe District.

The study recommends the following policies aimed at improving small scale farmers' welfare:

- Microfinance Institutions should make effort to improve the standard of living of small scale farmers by providing them credit at lower interest rate in order to finance in their agriculture activities by using new technologies.
- The Government and other stakeholders should encourage small farmers to participate in the services provided by microfinance institutions especially savings and microcredit for improving their welfare.
- Policy makers interested in adressing credit accessibilty of small scale farmers in Rwanda should consider not only their standards of living but also contribute to the economic development of the country .
- Therefore, the policies regulating formal financial institutions should be revised and should be made more appropriate for the small scale farmers in Rwanda.

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