



Impact of Microfinance Loans on Paddy Production among Small Holder Farmers in Sri Lanka

By A. Kajenthini & A.Thayaparan

Vavuniya Campus of the University of Jaffna

Abstract- The objectives of this study are to analyze the impact of microfinance loans on paddy production among smallholder farmers and to identify the differences in paddy production who are the borrowers and non – borrowers of micro finance loans from micro finance institutions in Sri Lanka. For the above purposes, primary data were collected through a structured questionnaire considering six divisional secretariat divisions in Jaffna district, Sri Lanka for the period of 2014 – 2015. A total of 93 respondents were selected randomly from loan beneficiaries and non – loan beneficiaries from the study area. The collected data were analyzed thorough various econometrics techniques such as, frequency analysis, independent sample t test, simple regression using dummy variable and log – log regression model. Results of independent sample t test proves that there are differences in average production of paddy among the borrowers and non – borrowers while log – log model reveals that usage of fertilizer has negatively affect on paddy production, but other four inputs namely, seed, cost of labour, machinery and size of cultivated land positively impact on production of paddy who are the farmers received loans from micro finance institutions in Sri Lanka. Overall results suggest that loan beneficiaries who were received loans relatively better in accessing markets for paddy cultivation, and usage of inputs and also adoption of improved farming technologies in Jaffna district, Sri Lanka.

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1. INTRODUCTION

Rice is the staple food of Sri Lanka where small farmers grow it for both subsistence and commercial purposes. Generally small farmers are cultivating paddy production in their own land or rented land and even go for share cropping system to earn their subsistence income to maintain their standard of living. Lack of financial capabilities and pressure from the poverty force them to take microcredit loans from banks and other financial institutions to cultivate and harvest their agricultural crops specially paddy and other field crops. Consequently, poor farmers may be perpetually trapped in poverty due to lack of funds for purchasing inputs and productive investment in farming. Farmers cannot enter into the formal credit systems due to mortgage, high formality and unavailability of bank

branches in the remote areas. Thus, those credits are more helping to them in improve the agricultural production activities. The term microfinance refers to the provision of a broad range of financial services such as deposits, loans, payment services, money transfers, and insurance to poor and low-income households and their micro enterprises for enhancing their production activities. The idea of providing credits to poor farmers is as a tool for increasing their income, their production and thereby reducing poverty. Microfinance institutions offer financial services to farmers without mortgage and doing less procedural formalities as compared to formal banking channel in one hand and at a reasonable interest rate as compared to informal credit systems. Thus, microfinance institutions were introduced and viewed as an alternative source of financial services in rural areas in Jaffna district and as a result, the microcredit systems are much popular among small farmers in the above area. The micro credits may contribute to increase the productivity by enabling them to purchase necessary inputs for paddy production and also may help to finance for those activities which adds the value to the output of paddy.

There is a wide range of institutions specially, co- operative societies, local and international Non-Governmental Organizations (NGOs), commercial banks including both state-owned and private and development banks such as the Regional Development Banks (RDBs) and the Sanasa Development Banks (SDBs) that are involved in providing microfinance loans to low income groups in Jaffna district. In addition, Bank of Ceylon, people's bank, the Government's Samurdhi savings and other financial institutions (MFIs) also provide the microfinance loan to farmers and most of those banks provide microfinance to farmers based on the interest and guarantee of two or four borrowers.

The objectives of this study are to analyze the impact of microfinance loans on paddy production among smallholder farmers and to identify the differences in paddy production who are the borrowers and non – borrowers of micro finance loans from micro finance institutions in Sri Lanka.

Author α: Vavuniya Campus of the University of Jaffna.
e-mail: aruppillaithayaparan@yahoo.com

II. LITERATURE REVIEW

Alam (1988) has analyzed the role of targeted credit programs in promoting employment and productivity of the poor in Bangladesh. His study revealed that the users of microfinance can bring 81.5 percent of their cultivable land under high yield variety production compared to 76 percent of the non-users. Feder (1990) has studied on the relationship between credit and productivity in Chinese agriculture and based on his finding, credit is being cited as an important factor in agricultural production systems in China.

Sjah (2005) has identified the effect of loan provision on farming activities and he suggests credit used by farmers had little noticeable impact on improving agricultural income in Indonesia. Svay Sopheana, ChovElen, LengBunhor, Touch Visalsok, and Nigel Finch (2006) have examined the effect of microfinance on agricultural occupation: The case study in battambang province, Australia. Their results revealed that most households used micro-credit for buying agricultural equipments and it was found that microfinance contributes to increased income, household consumption and savings for households Australia.

Olagunju.I.F (2007) has examined the impact of credit use on research productivity of sweet potatoes farmer in Osun- State, Nigeria and he concluded that the farmers having credit have more output than non-credit farmers.

Nosiru,M.O.(2010) studied on microcredit and agricultural productivity in ogun State, Nigeria. They used Cobb-Douglas production function to analyze microcredit and agriculture productivity and they found that land size and capital are important variables affecting agricultural output positively among microcredit non-beneficiaries. Ashaolu, O.F.Momoh, S.Phillip, B.B and I.A.Tijani (2011) analyzed microcredit effect on Agricultural Productivity: A Comparative analysis of rural farmers in Ogun State, Nigeria. Their findings revealed that total cost per hectare of credit user farmers is higher than that of non-credit user farmers in the country.

Frank Girabi and Agnes Elishadai Godfrey Mwakaje (2013) have examined the impact of microfinance on agricultural productivity by smallholder farmers in Tanzania with the case study of Iramba District. Their findings revealed that, credit beneficiaries realized high agricultural productivity compared to the non-credit beneficiaries and credit beneficiaries have relatively better production than non- beneficiaries. Khan Mehedi Hasan, Md. Masum Billah, Sk. Sharafat Hossen and Tasnim Murad Mamun (2014) have evaluated the effect of microcredit on agricultural output: Evidence from Rural Bangladesh. Base on the Cobb-Douglas production function, they showed that microcredit beneficiaries produce 15% more rice than that of non-

beneficiary group significantly. Aminu Sulemana, Samuel Appiah Adjei (2015) has analyzed the microfinance impact on agricultural production in developing countries: A study of the pruu district in Ghana and found that microfinance is positively related to agricultural production and shows a significant impact on output level in the country.

III. METHODOLOGY

Micro finance is one of the major instruments in agricultural sector which helps to improve the productivity by improving farming technologies. In this background, this study has examined the impact of microfinance loans on paddy production among the farmers who are cultivating in Jaffna district, Sri Lanka. This study has used the respondents as a sampling framework considering six divisional secretariat divisions in Jaffna district covering 93 farmers with the two categories such as loan beneficiaries and non- loan beneficiaries who are involved in paddy cultivation. A structured questionnaire was used to collect the data which includes the information relevant to production of paddy, details of inputs including costs of seed, machinery, and costs of labour, usage of fertilizer and size of land.

a) *Methods of data analysis*

In the beginning, frequency analysis and descriptive statistics of the variables were analyzed and based on that, basic characters of each variable could be explained. Further, Independent sample t test, simple regression using dummy variable, log – log regression and quadratic model also applied in the study.

i. *Frequency statistics*

Frequency statistics is the basic tools to explain the features of the variables and thus frequency of loan beneficiaries and non – loan beneficiaries was analyzed.

ii. *Independent sample t test*

To identify whether there is any difference in average production of paddy among small holder farmers, independent sample t test was used.

iii. *Simple regression model*

To identify the impact of receiving micro finance on production of paddy, simple regression model using dummy variable was applied in the study.

In this case, production of paddy considered as dependent variable and micro finance loans treated as independent variable which is categorized into two such as 1 for loan borrowers and 0 for non- borrowers from micro finance institutions. The regression model can be written as:

$$Q = \beta_0 + \beta_1 D_1 + u$$

Where:

Q - Production of paddy in Kg

β_0 - constant

β_1 - coefficient of dummy variable
 D_1 - dummy variable of microfinance
 0 for non- borrower
 1 for borrower
 u - Error term.

iv. *Log – log regression model*

To examine the impact of microfinance on paddy production, log – log regression model was used.

$$\ln Q_i = \beta_0 + \beta_1 \ln X_{1i} + \beta_2 \ln X_{2i} + \beta_3 \ln X_{3i} + \beta_4 \ln X_{4i} + \beta_5 \ln X_{5i} + u$$

Where:

$\ln Q$ = Log of paddy yield in Kg

β_0 - constant

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are the coefficients of each independent variable.

X_1 = Seed

X_2 = Fertilizer

X_3 = Wage for labour

X_4 = Machinery expenses

X_5 = Size of land

In case of the log- log model, it can be used to explain the impact of each explanatory variable on the dependent variable in terms of percentage as well as the elasticity of output with respect to each independent variable.

v. *Quadratics model of fertilizer*

Quadratic function is used quite often in applied economics to capture the decreasing or increasing marginal effect. To find out the maximum amount of

The farmers who received micro finance loans from the institutions, they were able to purchase different types of inputs and thus those inputs were taken as independent variables in this model. The following model was used in the analysis.

paddy production by usage of fertilizer, the researcher has used quadratic model which is considered paddy production as dependent variable and fertilizer as independent variable. The model as given by:

$$Q = \beta_0 + \beta_1 X_1 + \beta_2 X_2^2 + u$$

Where:

Q = Production of paddy

X_1 = Usage of fertilizer

X_2 = Squared of fertilizer

u = Error term

IV. RESULTS AND DISCUSSIONS

According to the frequency of borrowers and non- borrowers among small holder farmers, out of 93, 72% of them were received loans and 28% of them not received loans from micro finance institutions in the study area. The results are given in the table 01.

Table 01: Results of frequency test for credit and non-credit users

	Frequency	Percentage
Credit user	67	72
Non-credit user	26	28
Total	93	100

An investigation on how the loans was used in paddy production was done by the frequency analysis and its results show that 22% of the farmers from loan

beneficiaries used their loans to purchase of seed and pesticides and to pay for wages while only 1% of them used it for purchase of land.

Table 02: Frequency of usage of loans on various purposes

Activity	Frequency	Percentage
Purchase of land	01	1
Purchase of Fertilizer	10	15
Purchase of seed and pesticides	15	22
Purchase of farming equipment	06	10
Pay for wage	15	22
Repay the previous loan	10	15
Others	10	15
Total	67	100

15% of the beneficiaries used the loans to repay their previous loans and thus they were unable to purchase many other inputs to increase the production. Independent sample t test was applied to identify the

whether there is a difference in production of paddy among borrowers and non-borrowers. This test is useful to compare the mean values of production among borrowers and non-borrowers.

Table 03: Results of independent sample t test

	Levene's test for equality of variance				t-test for equality of means		
	F	Sig	t	df	Sig(2tailed)	Mean Difference	Std Error Difference
Equal variance assumed	4.045	.047	-4.915	91	.000	-798.617	162.479
Equal variance not assumed			-6.341	82.260	.000	-798.617	125.944

According to the results of independent sample test, significant value is less than 0.01 proves that there is a difference in average production among the borrowers and non-borrowers of microfinance loans. Based on the mean value, the farmers who were received loans from microfinance institutions able to produced 798.617 more production than who were not

received the loans suggests that micro finance loans help them to raise their production. Apart from the independent sample t test, simple regression using dummy variable also applied to identify the impact of micro finance loans on production paddy in Jaffna district. The simple regression results were displaced in the following table.

Table 04: Results of Simple regression using dummy variable

Variables	β	Std. Error	Standardized coefficients	t	Sig
Constant	1168.846	137.909		8.475	0.000
Micro finance	798.617	162.479	0.458	4.915	0.000

Based on the above regression results, the farmers who were received loans they were able to use those loans to purchase inputs which lead to increase the average production by nearly 799 kg than the farmers who are not received the loans. Also standardized coefficient of micro finance indicates that 45% of microfinance loans were contributes to the production of paddy in Jaffna district and all the results are statistically significant at 1% level.

Quadratic regression is very useful to identify the increasing or decreasing marginal returns of a variable input in a production process. In this study, usage of fertilizer was considered as one of the variable inputs to find out the maximum usage of fertilizer the farmer able to use. After the maximum usage of fertilizer, as the farmer uses more and more fertilizer, the production will not increase further because of diminishing marginal returns. Based on quadratic model, the following estimated regression model was obtained.

$$\text{Production} = 1347.081 + .064X_1 - 0.0000074 X_1^2$$

Based on the above regression result shows that β_1 is positive and β_2 is negative which imply that usage of fertilizer has diminishing effect on production. In the beginning, as fertilizer has increased production also increased and then reached the maximum level and there after it has declined. To find out the maximum usage of fertilizer, the following formula is used.

$$\begin{aligned} X^* &= \beta_1 / (2\beta_2) \\ &= 0.064 / 2(0.00000748) \\ &= 429.53 \end{aligned}$$

It suggests that, production of paddy is maximized where the farmer use the fertilizer at nearly 430 kg and after that even the usage of fertilizer has increased, production will not be increased.

Finally, to identify the impact of microfinance on production of paddy among the farmers who received loans, log – log model was applied. The estimated results were exhibit in the table below.

Table 05: Log- log regression results for borrowers

Variables	β	Std. Error	Standardized coefficients	t	Sig
Constant	445.351	208.581		2.135	.037
Seed	.008	.017	.045	.471	.039
Fertilizer	-.014	.008	-.170	-1.776	.081
Wage	.035	.009	.392	4.045	.000
Machinery	.020	.009	.246	2.225	.030
Land	19.512	5.183	.401	3.765	.000

R Square: 0.586

Adjusted R Square: 0.552

Above table shows that all variables are statistically significant at 1%, 5% and 10% and out of them, payment for wage and size of land have more statistically significant influence on paddy production than other variables. Further, standardized coefficients show that wages and size of land have more contributed to the yield of paddy in the study area. In the log – log model the coefficient of each variable represents the elasticity and seed input has inelastic while land has more elastic. As size of land increases by one percent, paddy yield will increase by 19 percent keeping other factors held constant. Thus, the result reveals that, the farmers who received loans from the institutions, they used those funds to purchase land and pay the wages for labors.

V. CONCLUSIONS

This study examines the impact of the microfinance loans on paddy production among small hold farmers in Jaffna district, Sri Lanka. Out of 93 farmers, 72% of them received loans and 28 % of them not received any loans from microfinance institutions. Results of independent sample t test suggest that on average production of paddy is higher for the farmers who were receive the loans by nearly 798Kg compared to non- beneficiaries in Jaffna district, Sri Lanka. Apart from the independent sample t test, simple regression using dummy variable for loan beneficiaries and non-beneficiaries, microfinance significantly positive impact on production of the farmers who were received loans and they were able to use it for purchase of various inputs which leads to raise their production of paddy in the study area. According to log – log model reveals that, size of cultivated land and payments for labors are significantly affect on production even they spend only 1% on purchase of land, it is the major contributor to the production of paddy in Jaffna district, Sri Lanka.

Finally, based on the results, it can be concluded that loans given the microfinance institutions have significantly impact on the paddy sector in the above district in Sri Lanka. Due to the loans, the farmers were able to apply new techniques in production by purchasing and using inputs, it helps them to increases the production of paddy than the non – beneficiaries. So, micro finance loans are playing a vital role in increasing production of paddy and thus farmers should be encouraged to practice new production techniques in their farming with the usage of microfinance loans. On the other side, it should be monitored by the institutions whether the loans are properly and efficiently used by the borrowers in their farming and cultivation activities. As the loans given by them, if they adopt flexible rate of interest and the maturity period for repay their loans, it may help farmers to get the funds easily than other institutions. These kinds of practices may encourage the farmers to involve in their production in the effective

way which lead to raise the contribution of agricultural to the gross domestic product in the economy of Sri Lanka.

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