PERFORMANCE OF MICROCREDIT ON BORO RICE PRODUCTION IN A SELECTED AREA OF BANGLADESH

A THESIS
BY

SHARMIN AKTAR PINKY

DEPARTMENT OF MANAGEMENT AND FINANCE
SHER-E-BANGLA AGRICULTURAL UNIVERSITY
DHAKA-1207, BANGLADESH

June, 2013

PERFORMANCE OF MICROCREDIT ON BORO RICE PRODUCTION IN A SELECTED AREA OF BANGLADESH

A THESIS
BY
SHARMIN AKTAR PINKY
REGISTRATION NO: 07-02281

A Thesis
Submitted to the Faculty of Agribusiness Management
Sher-e-Bangla Agricultural University, Dhaka
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE (M.S)
IN
MANAGEMENT AND FINANCE
SEMESTER: JANUARY-JUNE, 2013

Approved by:

_____

(Dr. Jahangir Alam)
Supervisor

_____

(Shah Johir Rayhan)
Assistant Professor
Co-Supervisor

_____

(Mosammod Mahamuda Parvin)
Chairman
Examination Committee
Department of Management and Finance
Sher-e-Bangla Agricultural University

CERTIFICATE

This is to certify that thesis entitled, **"PERFORMANCE OF MICROCREDIT ON BORO RICE PRODUCTION IN A SELECTED AREA OF BANGLADESH"** *submitted to the Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Dhaka, in partial fulfillment of the requirements for the degree of* **MASTER OF SCIENCE IN MANAGEMENT AND FINANCE,** *embodies the result of a piece of bona fide research work carried out by* **SHARMIN AKTAR PINKY** *bearing Registration No.* **07-02281** *under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.*

I further certify that such help or source of information, as has been availed of during the course of this investigation has duly been acknowledged.

………………………………

Dated:
Place: Dhaka, Bangladesh

………………………………….

(Dr. Jahangir Alam)
Supervisor

DEDICATED

TO

MY BELOVED PARENTS

ACKNOWLEDGEMENT

ABSTRACT

Microcredit provided by NGOs as well as GOs played a significant role to increase agricultural production. Performance of microcredit on Boro rice production was assessed in this study. The data was collected from some selected areas of Bogra district. The survey technique was adopted for collection of data from 90 farmers of which microcredit borrower farmers were 45 and non borrower farmers were 45 from the study areas. Cobb-Douglas stochastic frontier with inefficiency effect model was applied in the study to assess the effects of microcredit on farm performance. The study revealed that only 60 percent respondents were totally dependent on crop production in the study area. Others were partially dependent. Microcredit borrower farmers received, on average, Tk. 14177.77 (Tk. 13333.33 from ASA, Tk. 15142.85 from GB) at 20 percent effective interest rate. The borrower farmers utilized 93.36 percent of borrowed money on farm production. Due to availability of microcredit, the borrower farmers used more of inputs and achieved higher production per unit of land. They also received higher net return from boro rice cultivation. The BCR of borrower farmers was higher than non borrower farmers. The technical efficiency of borrower farmers was also higher than non borrowers. It was observed that the aged, educated and microcredit borrower farmers utilized the farm inputs more efficiently than others. The repayment rate was 100 percent for ASA and GB. The change of income and expenditure over the years was positive and higher for borrowers than the non borrowers. It revealed that the borrower farmers' livelihood and social status improved at a higher rate than the non borrower farmers. On the basis of the results of the study, some recommendations are given for expansion of the microcredit programme and increase its effectiveness in agricultural production in Bangladesh. They include increase the loan size, reduce the interest rate, increase supervision of loan and provide insurance facilities to borrowers.

Keywords: Microcredit, Production Performance, Input Utilization, Cobb-Douglas Stochastic Frontier Model, Repayment, Economic and Social Effect.

TABLE OF CONTENTS

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATE

LIST OF ABBREVIATION

- ASA= Association for Social Advancement
- BBS= Bangladesh Bureau of Statistics
- BRAC= Bangladesh Rural Advancement Committee
- BKB= Bangladesh Krishi Bank
- CDF= Credit Development Forum
- CGAP= Consultative Group to Assist the Poor
- C.V.=Coefficient of Variation
- *et al.* = Et alia (L) and others
- etc= Etiology (L) and others
- FY= Fiscal Year
- GB= Grameen Bank
- GDP= Gross Domestic Product
- GO= Government Organization
- g= Gram
- HYV= High Yielding Variety
- ha= Hectare
- HSC= Higher Secondary Certificate
- InM= Institution of Microfinance
- IGA= Income Generating Activities
- i.e.= That is
- Kg= Kilogram
- MFI= Micro-Finance Institution
- MRA= Microcredit Regulatory Authority
- mg= milligram
- NGO= Non Government Organization
- RAKUB= Rajshahi Krishi Unnayan Bank
- TMSS= Thengamara Mohila Sabuj Sangha
- Tk.= Taka (Bangladeshi Currency)
- UCPSCP= Updating and Extension of Agriculture Cluster Plots and Survey of Cost of Production Project

CHAPTER-1

INTRODUCTION

1.1 Background of the Study

Rice is the staple food of Bangladesh. It provides nearly 48% (Bangladesh Rice Knowledge Bank) of rural employment, about two-third of total calorie supply and about one-half of the total protein intake of an average person in the country (www.knowledgebank-brri.org/riceinban.php). Rice sector contributes one-half of the agricultural GDP and one-sixth of the national income in Bangladesh (www.knowledgebank-brri.org/riceinban.php). Almost all of the 13 million farm families of the country grow rice. Rice is grown on about 10.5 million hectares (www.knowledgebank-brri.org/riceinban.php).

About 75% of the total cropped area and over 80% of the total irrigated area is planted to rice (www.knowledgebank-brri.org/riceinban.php).

Total rice production in Bangladesh was about 10.59 million tons in the year 1971 when the country's population was only about 70.88 millions. However, the country is now producing about 34 million tons to feed her 150 million people. This indicates that the growth of rice production was much faster than the growth of population. This increased rice production has been possible largely due to the adoption of modern rice varieties on around 66% (www.knowledgebank-brri.org/riceinban.php) of the rice land which contributes to about 73% of the country's total rice production. Among the rice seasons, Boro is the most prominent season that produces over 50 percent of the total rice in Bangladesh (www.knowledgebank-brri.org/riceinban.php).

1.2 Nutritional Value of Rice

The nutritional value of rice is presented in Table 1.1. One can notice that rice is reach in carbohydrate, protein, vitamins and minerals.

Table 1.1: Nutritional Value of Rice

Nutritional Value per 100g (3.5oz)					
Energy	1527 KJ	Vitamins		Trace Meal	
Carbohydrate	80 g	Thiamine(B1)	0.0701m	Calcium	28mg
Sugars	0.12 g	Riboflavin (B2)	0.0149	Iron	0.80 mg
Dietary fiber	1.3 g	Niacin (B3)	1.62 mg	Magnesiu	25 mg
Fat	0.66 g	Pantothenic acid	1.014 mg	Manganes	1.088 mg
Protein	7.13 g	Vitamin (B6)	0.164 mg	Phosphoru	115 mg
Water	11.61 g			Potassium	115 mg
				Zinc	1.09 mg

Source: USDA Nutrient Database

1.3 Rural Financial Markets in Bangladesh

Rural finance is an important tool for the creation of employment opportunities in the rural areas. It promotes trade and agriculture and increases productivity in all other sectors of rural economy. For all these activities finance is the *sine qua non* (essential ingredient), which can be arranged through mobilization of domestic resources and channeling them to proper direction. Rural financial markets in developing countries are mainly characterized by the existence of both formal and informal arrangements. Formal financial markets are best characterized by the operation of institutional credit. Informal financial markets mainly depend on moneylenders.

Rural financial market condition in Bangladesh has remarkably changed overtime. After introducing microcredit by Grameen Bank, the rural credit market has improved. NGOs-MFI (Microfinance Institution) plays a significant role in credit market. The expansion of rural credit market in Bangladesh is shown in Table 1.2. It can be noticed that the share of NGOs is 37 percent in the rural credit market.

Table 1.2: Expansion of credit market in rural Bangladesh: Role of MFIs, 1988 to 2008

Sources of loan	Households borrowing from the source (%)		Average size of loan (US$)		Share of the source in total loan %)	
	1988	2008	1988	2008	1988	2008
Commercial banks	9.0	4.8	136	735	20.7	21.0
NGO MFIs	3.8	34.1	102	184	6.7	37.0
Moneylenders	14.6	4.6	155	537	39.0	14.8
Friends and relatives	16.9	4.9	115	920	33.6	26.8
All sources	44.3	44.8	131	374	100.0	100.0

Source: Hossain and Bayes (2009, 2010). The numbers are estimated from a longitudinal random household level survey in 62 nationally representative villages. Loans provided for commercial enterprises are not included.

Two decades back, 31.5 percent of households depended on moneylenders, friends and relatives for credit whereas only 3.8 percent depended on NGO-MFIs. In recent years (2008), these shares of borrowing sources have been increased from 3.8 percent to 34.1 percent. On the other hand, the share of moneylender, friends and relatives has been decreased from 31.5 to 9.5 percent (Hossain and Bayes, 2009, 2010).

1.4 Institutional Background: Microcredit in Bangladesh

Bangladesh is the pioneer country in introducing and implementing microcredit programmes. It developed the unique innovation of credit delivery to enhance income generating activities (IGA) through a collateral-free group-based lending strategy (Yunus, 1999; Hulme and Mosley, 1996; World Bank, 1994). Bangladesh has gained rich and promising experience and gained global recognition and out of nearly 9 million beneficiaries of microcredit supplied through the micro finance institutions (MFIs), 5.3 millions (around 60%) are from Bangladesh alone (Ahmed 1997).

The Microcredit Regulatory Authority reported in 2010 that 773 MFIs are working in Bangladesh. Among these, 349 MFIs still do not have any license from MRA and 424 have license including Grameen Bank (CDF-InM survey 2010). In 2010, loan amounting to Tk. 212.864 billion were disbursed (CDF-InM survey 2010). NGO-MFIs disbursed loan in agricultural sector amounting Tk. 374861.95 million, of which Crop loan comprised Tk. 193850.52 million, Fisheries Tk. 42870.92 million, and Livestock Tk. 138140.51 million (CDF-InM survey 2007-2010).

1.4.1 Grameen Bank (MFI under study)

The history of origin of Grameen Bank can be traced back to 1976, when Professor Muhammad Yunus launched an action research project to examine the possibility of designing a credit delivery system to provide banking services targeted at the rural poor. The initial activities started from Jobra village (adjacent to Chittagong University) and some in the neighboring villages in the following years (Khan and Rahaman, 2007). Grameen Bank see credit as an empowering agent, an enabling element in the development of socio-economic conditions of the poor who have been kept outside the banking orbit on the simple ground that they are poor and hence not bankable (Khan and Rahaman, 2007). If the poor people get this credit money under a very easy repay term, they can make self earning work projects themselves. To prove this ethics practically was the main target of Yunus's microcredit project. The small project which started in a remote village now has expanded in the whole world. The scenario of GB is presented in Table 1.3.

Table 1.3: The Present Status of Grameen Bank

Number of branches	2567
Number of members (million)	8.54
Number of active borrowers (million)	6.74
Average loan balance per borrower (in Taka)	161
Loan disbursement (million in Tk.)	126026
Total loan outstanding (million Tk.)	84381
Cost per borrower (Tk.)	1210
Overdue loans (million Tk.)	1496

Source: Performance indicators and ratio analysis, Dec 2013, Grameen Bank.

The eligibility criteria for GB membership are as follows:
- GB provides credit particularly for those women who own less than half an acre land or whose assets do not exceed the value of one acre of land; though this may be different in some cases.
- The average size of loan is about Tk. 5000 to Tk. 10,000.
- The rate of interest is charged by 10 percent on the amount of loan.
- Savings amount is at least Tk. 20 per member in a week.
- Number of installment is 44 in a year.

1.4.2 ASSOCIATION FOR SOCIAL ADVANCEMENT (ASA) (MFI under study)

ASA in Bengali means 'HOPE'. ASA is a non-governmental organization based in Bangladesh, which provides micro-credit financing. It was established in 1978 by Shafiqual Haque Choudhury. Innovations and simplifications of staff training, monitoring and bookkeeping are the three areas responsible for ASA's ability to effectively manage established units and pursue bold growth initiatives simultaneously. This makes the operations smooth and efficient. ASA offers a successful alternative microfinance model to that of the Grameen bank (Khan and Rahaman, 2007). The methodology of ASA is quite different from the methodology of others credit service. For example, other microcredit programs accept group liability for microcredit lending, which is the main feature of their program. ASA on the other hand, accepts individual liability, allowing for greater flexibility and simplicity (Ahmed & Hakim, 2004). ASA combines low cost operations and high growth to fuel its success. ASA arranges fund from its own source of money.

Eligibility of membership of ASA is as followings:

- Only those women get the priority in receiving loan who are deprived from savings and credit facilities.
- Minimum age of participants must be 18.
- A borrower can received Tk. 5000 to Tk. 6000 as an initial loan.
- The minimum amount of loan received by a borrower is Tk. 1000 & maximum Tk. 16000.
- The rate of interest determined as 12.5 percent.
- The received amount of loan is to be repaid within a year in 45 weekly installments.

1.5 Justification of the Study

Microcredit plays a vital role on changing farmer's lifestyle. Microcredit brings hope to farmer's life when they become frustrated on their financial condition. NGOs serve the microcredit mostly in the rural area. This study was conducted on the performance of microcredit in the north eastern region of Bangladesh. The region is very important for our agricultural production and most of the people are related with agriculture. Their economic and social status is not so developed and they mostly depend on credit. A number of NGOs are working in those areas. So it is important to observe the relative change in those areas due to credit given by different NGOs.

Microcredit is the extension of very small loans (microloans) to impoverished borrowers who typically face collateral problem, steady employment and a verifiable credit history. Microcredit mostly helps the poor women to uplift their condition. They prefer microcredit than the other types of credit. Farmers get microcredit when it is needed, the amount is suitable, the procedure of borrowing is easy than others. The reasons need to be evaluated for increasing its efficiencies.

The study will help to understand the relationship between microcredit and agricultural crop production. Microcredit takes intensive care of small and marginal farmers. The farm is divided by small size, such as the number of marginal holding is 38.08%, small holdings 50.30% and absolute landless 10.66% (BBS, 2008). Microcredit serves them for uplifting their financial condition and social status. The study shows the performance of microcredit on agricultural crop production which is very important for our future course of action.

A large number of institutions are working for providing credit facilities to the farmers. Many governmental (BKB, RAKUB) and nongovernmental organizations (Grameen Bank, BRAC, ASA etc) try to help the poor farmers. They have different credit programs and they mostly prefer group financing. They provide credit without collateral. This study evaluates the performance of some of NGOs activities and their credit programs.

1.6 Objectives of the Study

The broad objective of the proposed study is to evaluate the performance of microcredit on boro rice production in a selected area in Bangladesh. However, the following are the specific objectives:

1. To documents and compare the socio-economic characteristics of the borrowers and non borrowers.
2. To compare profitability of boro rice of borrowers and non borrowers.
3. To estimate technical efficiency and factor affecting efficiency of selected farmers.
4. To evaluate relative change in social and economic status of microcredit borrowers and non borrowers.
5. Draw some policy recommendations.

1.7 Limitations of the study

This is a study based on the effectiveness of microcredit on Boro rice production of small and marginal farmers. Though awareness has taken to eliminate the errors and inconsistency of the study but the study is not free from its limitations which are as follows:

- It was too much difficult and more time consuming to collect the primary data from different areas existing in Bogra, though timing for this study was limited.
- This was quite difficult to manage and organized the farmers under Boro rice production and to comprehend their regional language.
- Most of the farmers were illiterate or quite ignorant. So, sometime it was difficult to collects information. In some cases, respondents depend on their memories to answer the questions.
- The present study defines the relationship of some selected variables, but there are other variables that may have direct or indirect influence on Boro rice production.

1.8 Definition and Conceptual Framework

- **Microcredit:** Microcredit is the extension of small loan to entrepreneurs too poor to qualify for traditional bank loans. It has proven to be an effective and popular measure in ongoing struggle against poverty. Microcredit refers to very small loans for unsalaried borrowers with little or no collateral, provided by legally registered institutions. The idea that poor people are also bankable without the conventional collateral was the motivating force behind establishment of microcredit (Islam 2011).

- **Micro Finance:** Microfinance, the provision of financial services including credit, savings and loans to low-income groups of people has become a key component of 'bottom-up' development and poverty reduction strategy in Bangladesh (Hulme & Moore, 2006). Microfinance offers poor people access to basic financial services, such as loans, savings, money transfer services, micro insurance and other financial products targeted at poor and low-income people (CGAP,2010)

- **Borrower:** A poor who borrows money from any microcredit organization and also participated as an interviewee for the study.

- **Respondent:** A person who was available for interview or provided required information.

- **Boro (The major food crop of Bangladesh):** The paddy which is planted in mid November to February and reaped in the month of April to June is called Boro. There are three types of Boro namely-Local Boro, High Yielding Variety (HYV) Boro and Hybrid Boro. Presently Boro tops the list of paddy production (BBS, 2008-09). About 44.67 percent of HH at national level cultivate Boro indicating that a large number of farmers grow Boro in Bangladesh (BBS, 2008-09).

- **Leasing:** Leasing means the land taken by the household for the cultivation of Boro paddy only on payment of money to the land owner. Leasing value per acre is found to be significantly different across divisions and varieties. Local leasing value has also been recorded in case of households who cultivated the crop in their own lands (BBS, 2008-09).

- **Land preparation:** Before sowing/planting of seeds/seedlings land has to be prepared by tilling. Generally land is tilled by local plough or power tiller. Presently in our country land is tilled mostly by power tillers (BBS, 2008-09).

- **Irrigation:** Irrigation is the most important input for growing paddy plants. In the first part of the crop season weather remains dry and at the growing stage of the plants rain fall seldom occurs. So, surface or underground water is applied to the paddy plants mainly by mechanical system which is run by electricity or diesel.

- **Miniket:** Miniket is the rice variety which is largely cultivated in the study area in Boro season.

- **Marginal Farmer:** The farmers who have the farm land between 0.05-0.49 acre called marginal farmers.

- **Small Farmer:** The farmers who have the farm land between 0.5-2.49 acres called small farmer.

CHAPTER-2

LITERATURE REVIEW

This chapter deals with a brief review of the results of the previous studies related to the present research work. This study is concerned with the performance of microcredit on Boro rice production. Microcredit is the most important topics in the world. It is beneficial to the researcher to review a large number of literatures to assess stock of knowledge and receive future guidelines for conducting the study. There exist a large number of studies related to this research. Lots of information and ideas collected from those studies are reviewed below:

Alam *et al* (2013) conducted a study of sustainable agricultural technologies for ultra poor people in 7 districts of Bangladesh and 5 districts of India. It evaluates the performance of Step Up project to upgrade the livelihood of the ultra poor through technology interventions in the field of agriculture. Eight participating NGOs are involved in adopting the low cost and highly profit generating technologies. This study showed a positive change of per capita income of the beneficiary households after the adoption of technologies.

Asghar *et al* (2012) depicted the impact of credit on the production of wheat crop in Faisalabad-Pakistan. This study showed that the credit has positive and significant impact on wheat production. The credit borrowed from ZTBL is positively affecting the production of wheat crop and indirectly became a helping hand for the poor rural farmers which may lead to increase their living standards.

Ashaolu *et al* (2011) examined the effect of access to credit on the productivity of rural farming households in Ogun State, Nigeria. Profit per hectare of credit users' farmer was greater than that of non-credit users, access to credit could lead to improved farmers' productivity and higher income in the form of revenue and profit. This study recommended that existing banks should be encouraged to have more rural outlets, while there should be federal government policy of empowering rural farmers to have access to more agricultural lands.

Alam (2005) conducted a study on the rural women in sadar upazila of Netrokona district considering their participation in micro credit programmes for poverty alleviation. It revealed that the micro credit of BRAC increased their income and

production. After joining the BRAC they found remarkable improvement in their living standard.

Asad (2003) evaluated the socio-economic condition of women beneficiaries under credit programme of BRAC in Mymensingh district with a view to assessing the socioeconomic impact of BRAC programmes on the respondents. Moreover, this study dealt with the factors associated with the success and problems of BRAC credit programme. The findings showed that the participation of women in BRAC credit encouraged them to adopt social development activities and none of the respondents was allowed to have new loan unless preceding loan was repaid.

Ahmed (2001) found that the impact of microcredit on income, food security, employment and assets are positive. The participants of microcredit improve their condition than non participants. Microcredit helped participant households to earn about 8 percent higher income than that of the non-participants. This study also found that microcredit programs have been successful in improving the economic condition of the members.

Alam (1988) analyzed the impact of interventions made by NGOs and GOs on socio-economic condition of the rural poor. This study was conducted in 10 districts of Bangladesh covered by three NGOs and two GOs. Observations suggested that NGOs and GOs not only had a great positive impact on the level of income, poverty and income inequality of the poor but had a positive impact on education, health and sanitation, family planning and nutrition status of the group members.

Chowdhury (2002) examined empirically the impact of micro-credit on poverty in Bangladesh. This study was focused on both objective and subjective poverty and particular attention was paid to the length of time programme participants have had access to micro-credit. A logit regression analysis supports two main findings. The first is that micro-credit is associated with both lower objective and subjective poverty. The second is that the impact of micro-credit on poverty is particularly strong for about six years with some leveling off after that point.

Faruqee (2010) mentioned how the microfinance works for the farmers and the MFIs provide their support to them. This study focused on the different factors related with agriculture. The overall situation of MFIs in our country is reflected in this paper. The

government organization and the non government organizations that provide the microcredit and their different features are mentioned. The borrowers and non borrowers perspectives are also focused.

Hakim (2004) noted the important issues related to microcredit in agriculture. This paper showed the present status of agriculture in our country on competitive basis and the condition of small and marginal farmers. They need the microcredit for improving and uplifting their livelihood. They are the most important part in economic development and potential hope for our future. The results showed that small and marginal farmers use microcredit efficiently and repay loans regularly. They also make regular savings.

Hashemi *et al* (1996) conducted a research on the effect of microcredit programmes of GB and BRAC on poor rural women in Bangladesh for poverty alleviation. The programmes were found to have significant effects on eight different dimensions of women's empowerment which were mobility, economic security, ability to make small purchases, ability to make large purchases, involvement in major household decisions, relative freedom from domination within the family, political and legal awareness and involvement in political campaigning and protests.

Ike *et al* (2011) examined the relative allocative efficiencies in input use by credit user and non credit user small scale poultry farmers in Delta State, Nigeria. Relative elasticity of production and returns to scale of the defined poultry farmers were examined in this study. They found that the credit user poultry farmers over utilized hired labour, family labour and underutilized feed input as well as drugs and veterinary services. The non credit user farmers over utilized three inputs namely hired labour, family labour and capital and underutilized feed input.

Islam (2011) observed from his study that the production and cost efficiency is positively related with microfinance. They found that those who receive microcredit have less waste and more food security. The economic profit and allocative efficiency are higher for borrowers than the non borrowers. The land fragmentation, household wealth, farm size, on farm training and off farm income share etc are the main factors of inefficiencies. Technical efficiency had significant positive relationship with the adoption rates of HYV.

Islam (1999) focused on the micro credit of SFDP for the rural poor in sadar upazila of Bogra district. The researcher studied the impact of SFDP credit operation on income, employment and asset position. It observed that the micro credit of SFDP had increased the members income and production. Moreover, after joining SFDP there was a remarkable improvement in the living standard of the participating households.

Khondkar (2013) analyzed food security through quantitative data and observed no difference between those who take credit and those who do not. But both in terms of per capita expenditure as well as calorie consumed, non-borrowers are found to be slightly in better position. Econometric analysis suggests that credit have positive contribution towards food security of individuals. This finding was supported by both of quantitative data sets as well as by qualitative FGDs.

Khandker (1998) emphasized that microcredit programmes were an effective policy instrument for reducing poverty among the poor people with skills to become self employment. It also showed that such programmes were more cost effective than some other types of antipoverty programmes and particularly important for Bangladeshi women who were restricted by social custom from seeking wage employment. Microcredit programmes made greater impact on household consumption when the borrowers were women.

Mazumder (2008) addressed the challenging issue of whether microcredit programs are tools for poverty alleviation of poor women at household level. This study identified the socioeconomic conditions of women and assessed the impact of microcredit programs on poverty alleviation of women at household level. The existing microcredit programs are not free from its constraints which deprive the proper implementation of microcredit on poverty reduction of poor women.

Mitu (2006) studied the impact of BRAC microcredit programs on the livelihood improvement of selected female borrowers in Shakhipur Upazila, Tangail. Microcredit helps the women borrowers to use their potentiality in productive purposes and earning income. They can contribute to their family expenditures that reflect their socioeconomic conditions. The women borrowers can contribute and enjoy freedom in decision making matters.

Morduch (1998) stated that the evidence on reducing vulnerability is somewhat clearer. The provision of microcredit has been found to strengthen crisis coping mechanisms, diversify income-earning sources, build assets and improve the status of women.

Omobolanle *et al.* (2010) analyzed the importance of accessing microcredit in promoting agricultural productivity in Ogun State, Nigeria. The researcher mentions the differences exist between microcredit borrowers and non borrowers. The study revealed that access to microcredit could have prospect in improving the productivity of farmers and uplifting the livelihoods of the disadvantaged rural farming communities. It also observed that microcredit has the potentials to enable various governmental and nongovernmental actors to realize the millennium development goals.

Parvin (2005) examined the impact of ASA credit program on income generation, assets position and finally to alleviate poverty of the beneficiaries. The findings showed that all stakeholders still remained below the poverty line although the poverty gap reduced after involvement with ASA credit programme. Findings also showed that maximum 43 percent of credit was used for non-farm business expenditure and minimum 6 percent was for current expenditure on farming during the study period.

Rahman *et al.* (1999) showed the nature and impact of competition in microcredit market on the performance of MFIs and borrowers. The study focused on different credit programs exist in the Tangail and Manikgang areas where MFIs provide their services in a competitive manner. This competitive nature helps to improve their services and borrowers are benefitted from competitive credit through improving efficiency. The authors suggest some policy options for efficient allocation of the resources of the MFIs on the basis of the study.

Sultana *et al* (2011) stated the impact of microcredit on rural women's economic empowerment. The research measured three economic indicators such as personal income, savings behavior and assets ownership and indicated significant differences between BRAC and non BRAC women. The study stressed the need of more loans to be expanded to low income women folk by different GOs and NGOs which would ultimately enhance their economic solvency and empower them economically.

Sheikh *et al* (2011) attempted to compare the impact of three microfinance programs on the economic welfare of poor people. They focused on mainly three most important microfinance programs in Bangladesh, namely Grameen Bank, BRAC and ASA. They also showed that BRAC is more successful than other two microfinance institutions. All the important factors of production are more productive in BRAC than in other programs.

Singh (2003) summarized that the poor people need money for their survival and as a result of it they become the part of the vicious cycle of poverty where at one time they approach to the money lenders and the other times to formal financial institutions. Microfinance is a middle path in which poor people can mobilize their savings, link it with credit and finally become self-employed.

Wadud (2013) found that the microcredit had a great impact on agricultural production performance, poverty reduction and food security in Bangladesh. Lack of education is one of the major factors of inefficiencies of input utilization. The microcredit borrower's level of efficiency is one percent higher than non borrowers and it reduces production cost by around 19%. The average income was higher in those microcredit receiving farms than non receivers.

Williams *et al* (2007) examined the effect of microcredit on food production using a cross sectional data obtained from both the beneficiaries and non beneficiaries of Nigeria Agricultural Credit and Rural Development Bank in Osun State. The technical efficiency indices were examined to access their productivity and its determinants using a stochastic production frontier. This model have significantly affected the total revenue for non beneficiaries while the labor and other costs significantly affected total revenue for beneficiaries.

Yamao (2009) showed that the amount of microcredit is insufficient to run income generating activities that can generate such earnings by which one can repay the weekly installments after mitigating the least requirements to survive. It was also found that NGO-MFIs disburse loan only to wealthier poor and no longer interested to the chronic or hardcore poor to reduce their severe poverty in Bangladesh, the pioneer of microcredit.

Yunus *et al* (1998) cited that Grameen Bank only concentrate on women because their experiences showed women to be better managers of their resources who do their jobs well. Men have employment opportunities outside home, but women tend to stay home. So Grameen Bank creates job opportunities for women. And there are now two income earners instead of one. So families can break out from difficult situations faster than if they depend on just one income earner.

Yunus (1994) in a study argued that credit induced self employment is expanded to have a spillover effect in the village labour market. Both participant and non participant households may respond to the changes and the impacts depend on these interactions.

Several studies were conducted in Bangladesh concerning the issue of impact of microcredit on poverty reduction, food security, woman empowerment, technical efficiencies etc. Empirical studies showed that microcredit have the positive effect on those issues. But they hardly gave any effort on the impact of microcredit on crop productivity especially on Boro rice production. Boro season covers almost over 50 percent of total rice produced in Bangladesh. This study focuses on the effects of microcredit on the productivity of Boro rice and its effect on technical efficiency of farmers in some selected areas of Bogra district.

CHAPTER-3

METHODOLOGY OF THE STUDY

3.1 Introduction

The word method originates in the Greek words *meta* and *hodos* which mean "a way" and methodology is thus defined as "the underlying principles and rules of organization of a philosophical system and inquiry procedure". The methodology of the study is adopted by various steps to select the best method fit to attain the set objectives of research. The main objective of the study is to assess the impact of microcredit on crop production. The survey method is selected to achieve the objectives of the study. Data used in the study have been collected from various published sources as well as through field investigation in selected areas.

3.2 Basic Design

The study is an exploratory study of different microcredit programs exist in Bogra along with analytical approach.

3.3 Research Method

Evaluating the performance of microcredit is not so easy. Microcredit not only performed for structural development but also improve borrower's status of mind. For this reason, the questionnaire was made in such a way that all the information related to their life style was included. Most of the information is expressed numerically and some information provides respondent's attitudes and status.

3.4 Selection Area and Sampling Technique of the Study

In this study a multistage random sampling technique was applied. In the first step, Bogra district in the north eastern region of Bangladesh was selected. This region is suitable for the study because most of the workforce is involved in crop agriculture (29.95%), followed by non crop agriculture (12.53%), commerce (18.11%), service (15.62%), transport (6.66%), wage laborer (2.2%) and others (14.93%). The weather condition, topography, soil quality etc are favourable for rice production. There are 29 NGOs working in Bogra region such as ASA, Grameen Bank, BRAC, TMSS, TSSS, Organization of Social & Economic Development, Focus Society, Palli Seba Sangstha and so on.

In the second stage among 12 upazillas and 108 unions in Bogra district, Kahaloo upazilla was selected through simple random sampling. Kahaloo upazilla is divided into 9 unions. In the third stage, two highly microcredit concentrated unions Jamgram and Malancha were randomly selected from the previously selected upazilla in Bogra of Bangladesh.

In the fourth stage, three most concentrated villages were randomly selected from those unions. The villages are Jamgram, Veti Sonai and Gokorno. The population of these villages is Jamgram-3988, Veti Sonai-1568 and Gokorno-832 (Bangladesh Jatio Tottho Batayon). The two largest NGOs ASA and Grameen Bank are operating their activities in those villages.

Plate 3.1: Map of Bogra District

The reasons behind the preference of the study areas were:

a) The microcredit programs of ASA and Grameen Bank which were the major small scale credit programs existed in the selected study areas that provided credit and other services to the small and marginal farmers.

b) The study areas were well communicated with researcher's house that helped her in data collection. It was also easier and less expensive to collect data from that area.

c) The large number of respondents and reliable sources of data were expected to obtain under these study areas.

d) Accessibility to the area is good due to developed communication system.

e) Expectation of good co-operation from the respondents to obtain reliable data.

3.5 Sample Size

The population for the study encompasses the people who have been engaged in microcredit activities for at least two years and used the credit in crop activities as well as live in Bogra region, Bangladesh. The population was selected with long experience because they have enough knowledge and have experienced the reflection of their change.

For the study the sample size was 90 combining the 45 beneficiaries and 45 non beneficiaries. The addresses of borrowers were collected from the branch managers of the NGOs. The borrowers were randomly selected from the list collected from branch office. The non borrowers were selected randomly from each of the selected villages. Survey was conducted in three villages taking respondents equally. In these three villages, a number of NGOs and cooperatives are working. Among those NGOs Grameen Bank, ASA and their borrowers were selected randomly. The respondents were taken 30 from each village comprising 15 borrowers and 15 non borrowers.

Table 3.1: The sample distribution

Name of Villages	Borrowers	Non Borrowers	Total
Jamgram	15	15	30
Veti Sonai	15	15	30
Gokorno	15	15	30
Total	45	45	90

Source: Field Survey, 2013.

3.6 Preparation of Survey Schedule

For achieving the desired objective, it is very important to prepare a draft survey schedule and pre-testing it in the survey area. The draft survey schedule was pre-tested by researcher herself. The draft survey was conducted among 5 microcredit borrowers and 5 non borrowers of small and marginal rice farmers in selected areas. After this pre-test, the questionnaire was rearranged, improved and modified according to the practical experience and prepared it for final survey.

3.7 Pattern of the Questionnaire

A questionnaire is an important part of the research. After pre-testing, the researcher improved and updated the questionnaire and then selected respondents were requested to answer the questions. All of the questions were set according to the objectives of the study. To get the accurate answer from the respondent the researcher formulated the questionnaire very carefully. The questionnaire embodied the following parts:

1. General Information of Respondents
2. Respondent's Socio-economic Information
3. Farm Holding Status of the Respondents
4. Microcredit Information of Respondents
5. Information about Rice Production
6. Respondent's Opinion

The first part of the questionnaire contained respondent's identification, village and union name. Second part contained information about respondent's socio-economic conditions, their age, sex, education, occupation, income etc. Different code was used for this purpose. This part also contained questions about respondent's source of income, expenditure for food and non food items, asset information etc. The third part provided the farm holding status of the farmers such as the information on homestead land, owned land, land given to others, land taken from others, cost of land etc. The forth part of the questionnaire provided the microcredit related information. It included the source of credit, amount of credit, interest rate, purpose and repayment. These parts also included the attitudes of the respondents towards microcredit. The fifth part contained the rice production related information such as the unit cost of

inputs and the price and quantity of output. The last part of the questionnaire contained respondent's opinion about impact of microcredit on the livelihood status.

3.8 Period of Survey and Collection of Data

Data was collected during April to May in 2013 by the researcher herself. To measure the socio-economic changes of the respondents a before-after comparison was made and data were collected accordingly. Collection of reasonable and reliable data is not an easy task. Data was collected according to the structured questionnaire and face to face interviews had been carried out by paper and pencil. After fixing the survey schedule, the researcher herself stayed in the respective area and collected the primary data from individual households. Before beginning of the interview, the respondents were given a clear view and purpose of the study. The respondents were ensured that their information would be kept secret and be used only for the study. The questions were asked in a simple manner and explained when necessary. All data were recorded in interview period and information was checked carefully. The respondents were requested to provide accurate data as far as possible.

3.9 Data Processing

The collected data was processed through editing, coding, tabulating and classifying on the base of the characteristics. For completing pre tabulation task, data were verified to eliminate errors, inconsistency or omission in data collection and to avoid irrelevant information. Data were classified, tabulated and analyzed to accomplish the objectives of the study. Data were presented mostly in the tabular form, because it was of simple calculation, widely used and easy to understand. Raw data were inserted in computer using the concerned software MS Excel.

3.10 Analytical Technique

Data were analyzed with a view to achieving the objectives of the study. For this study, the following techniques were used:

    i)   Tabular technique
    ii)   Stochastic Frontier of Technical Efficiency

3.10.1 Tabular Technique

Tabular technique was applied to classify data in order to derive meaningful findings by using simple statistical measures like means, percentages and ratios.

3.10.2 Evaluation of Cost and Return Items

The cost of inputs is an important factor that influences the production. Farmers are bearing the cost of inputs through the capital. In the study area, the respondents used some purchased inputs as well as some household inputs. In the calculation, the cost of purchased inputs and household inputs were not calculated separately. The costs of inputs of boro rice were classified into two broad categories:

- i. Variable Cost
- ii. Fixed Cost

Variable Cost

The variable costs of boro rice production were converted into hectare per units. There were various variable costs such as:

- i. The labour cost
- ii. The land preparation cost
- iii. The cost of seed
- iv. The cost of manure
- v. The cost of fertilizer
- vi. The cost of insecticide & herbicide
- vii. The cost of irrigation
- viii. The cost of threshing
- ix. Interest on operating capital

Fixed Cost

The leasing cost of land was the fixed cost for boro rice production. The lease cost was formulated for one year. Here, the cost was calculated for boro season (six month) per hectare.

Return items

There were two return items such as- i) selling of product, ii) selling off by-product.

Net Return

To determine the net return of boro rice production, the total cost is deducted from the gross return. The formula is-

Net Return= Gross Return- Total Cost

BCR (Benefit Cost Ratio)

BCR is the ratio of present worth of benefit and present worth of cost. It indicates the benefit of per unit cost at present worth. BCR was calculated by using the following formula-

$$BCR = \frac{Gross\ Return}{Total\ Cost}$$

3.10.3 The Stochastic Frontier Production and Technical Inefficiency Model

Frontier techniques have been widely used in determining the farm-level efficiency in developing countries' agriculture since the publication of a seminal article of Farrell (1957) on efficiency measurement and subsequent development of several approaches to efficiency and productivity measurement. The most basic method of technical efficiency (TE) estimation is to map a production frontier (statistically or non-statistically, parametrically or non-parametrically), find the locus of maximum output levels associated with given input levels and estimate farm-specific TE as a deviation from the fitted frontier. Among different major approaches followed to measure and estimate efficiency, the stochastic frontier production function (SFPF) approach involving econometric estimation of parametric function (Aigner et al. 1976, 1977; Meeusen and van den Broeck 1977) and nonparametric programming, known as data envelopment analysis (DEA) (Charnes et al. 1978), are the most popular. The stochastic frontier is considered more appropriate for assessing TE in developing countries' agriculture, where the data are often heavily influenced by measurement errors and other stochastic factors such as weather conditions, diseases, etc. (Fare et al. 1985; Kirkly et al. 1995, 1998; Jaforullah and Devlin 1996; Coelli et al. 1998; Dey 2000; Dey et al. 2005). Several recent studies have applied stochastic frontier

technique for determining efficiency in agriculture in the developing Asian countries (Gunaratne and Leung 1996, 1997; Jayaraman 1998; Sharma and Leung 1998, 2000a, 2000b; Iinuma et al. 1999; Sharma 1999; Sharma et al. 1999; Bimbao et al. 2000; Dey et al. 2005; Irz and McKenzie 2003; Chiang et al. 2004; Singh et al. 2009) and African countries (Ekunwe and Emokaro 2009; Kareem et al. 2008).

There are two approaches to analyze determinants of technical efficiency or inefficiency. A number of authors (Pitt and Lee 1981; Kalirajan 1981) have first estimated stochastic frontiers to predict firm-level efficiencies and then regressed these predicted efficiencies upon farm-specific variables (such as managerial experience, ownership characteristics and production conditions) in an attempt to explain variations in output between firms in an industry. This is usually referred to as a two-stage procedure. Several economists have, however, criticized this procedure (Battese et al. 1989; Kumbhakar et al. 1991; Reifschneider and Stevenson 1991; Battese and Coelli 1995) arguing that the socioeconomic variables should be incorporated directly into the estimation of production frontier model because such variables may have a direct influence on the production efficiency. To overcome inconsistencies in the assumptions regarding the independence of inefficiency effects in this two-stage estimation procedure, Kumbhakar et al. (1991) and Reifschneider and Stevenson (1991) proposed a single-stage stochastic frontier model in which the inefficiency effects (u_i) are expressed as an explicit function of a vector of farm specific variables and a random error. Nevertheless, in spite of the criticisms, many studies have used two-stage approach; Simar and Wilson (2007) have mentioned that about 800 published articles and working papers have followed two-stage approach for measuring efficiency.

The SFPF for cross-sectional data can be specified as follows:

$$y_i = f(x_i; \beta) \exp(V_i - U_i) \qquad (1)$$

Where y_i is the production (or the logarithm of the production) of the i-th farm;

x_i is a (k×1) vector of (transformations of the) input quantities of the i-th farm.

β is an vector of unknown parameters to be estimated.

The V_i are random variables which are assumed to be independently and identically distributed N $(0, \sigma_v^2)$.

U_i 's are non-negative random variables which are assumed to account for technical inefficiency in production and are often assumed to be independently and identically distributed $|N(Z_i\delta, \sigma_u^2)|$.

Following Battese and Coelli (1995), Ui's can be expressed as:

$$U_i = Z_i\delta + W_i \qquad (2)$$

Where Z_i is a (1 x p) vector of variables that may influence efficiency of a farm;   is (p x 1) vector of parameters to be estimated and W_i's are the random variables defined by the half normal distribution with mean 0 and variance, σ_u^2. These assumptions are consistent with Ui being a half normal N $(Z_i\delta, \sigma_u^2)$ distribution (Battese and Coelli 1995).

The technical efficiency of production for the ith farm (TE_i) is defined as:

$$TE_i = \exp(-U_i) = \frac{Y}{f(x_i;\beta)\exp(V_i)} \qquad (3)$$

The prediction of the technical efficiencies is based on conditional expectation of expression in Eq. 3, given model assumptions.

The Empirical Model

In order to estimate the level of technical efficiency in a way consistent with the theory of production function, Cobb-Douglas type stochastic frontier production function was used. The Cobb-Douglas form of production function has some well known properties that justify its wide application in economic literature (Henderson and Quandt, 1971).

The Cobb-Douglas production function makes several restrictive assumptions. It is assumed that the elasticity coefficients are constant, implying constant shares for the inputs. The elasticity of substitution among factors is unity in the Cobb-Douglas form. Moreover, this being linear in logarithm, the output is zero if any of the inputs is zero and the output expansion path is assumed to pass through the origin. The Cobb-Douglas specification provides an adequate representation of the production

technology. In addition, its simplicity and widespread use in agricultural economics outweigh its drawbacks. It is less affected by multicollinearity problem and less suffered from degrees of freedom. The Cobb-Douglas stochastic frontier production function is given below:

$$\ln Y_i = \ln \beta_0 + \sum_{i=1}^{7} \beta_i \ln X_i + V_i + U_i$$

Where, Y = Output (kg), X_1 = Labour (man-days), X_2 = Land Preparation cost (Tk/ha), X_3 = Seed (kg), X_4 = Manure cost (Tk/kg), X_5 = Fertilizer (kg/ha), X_6 = Insecticide & Herbicide cost (Tk/ha), X_7 = Irrigation cost (Tk/ha), V is assumed to be independently and identically distributed random error, having N $(0, \sigma_v^2)$ distribution and U is non-negative one-sided random variable called technical inefficiency effects, associated with the technical inefficiency of production of the farmers involved. It is assumed that the inefficiency effects are independently distributed with a half normal distribution (U~ N $(0, \sigma_u^2)$|).

The model for the technical inefficiency effects in the stochastic frontier of equation is defined by,

$$U_i = \delta_0 + \delta_1 \text{EDU} + \delta_2 \text{ AGE} + \delta_3 \text{ FARMSZ} + \delta_4 \text{ MICROCREDIT} + W_i$$

where, EDU represents education level of farm operator, AGE is the age of the farm operator, FAMSZ is farm size, MICROCREDIT is microcredit and the Wi are unobservable random variables assumed to be independently distributed with a positive half normal distribution.

The β and δ coefficients are unknown parameters to be estimated, together with the variance parameters which are expressed in terms of:

$$\sigma^2 = \sigma_u^2 + \sigma_v^2 \qquad \text{And} \qquad \gamma = \sigma_u^2 / \sigma^2$$

where the γ-parameter has value between zero and one. The parameters of the stochastic frontier production function model are estimated by the method of maximum likelihood, using computer program-FRONTIER Version 4.1. A model for the inefficiency effects can only be estimated if the inefficiency effects are stochastic and have a particular distributional specification.

CHAPTER-4

SOCIO-ECONOMIC CONDITIONS OF BORROWERS AND NON BORROWERS

4.1 Introduction

Socioeconomic status is an economic and sociological combined total measure of a person's work experience and of an individual's or family's economic and social position in relation to others based on income, education and occupation (Wikipedia, 2010). The definition helps to understand the importance of respondent's socio-economic status. The attitudes of respondents are mostly influenced by their social and economic condition. The success of microcredit programs depends on the respondent's poverty status. This chapter identifies the socio economic information of borrowers and non borrowers under the microcredit programs of Grameen Bank and ASA. To know about the socio economic information of respondents some socio economic indicators are used for this study as: age of farmers, education levels, occupation, income and expenditure of farmer's households and holding assets of farmers. The utilization of microcredit, sources and repayment of microcredit also presented.

4.2 Distribution of Respondents According to Age

Age distribution of farmers is given in Table 4.1. There are two types of respondents such as borrower farmers and non-borrower farmers. Among borrowers, the highest number of borrowers (40 percent) belonged to age group 36-45 years. On the other hand, the highest number of non borrower farmers (37.78 percent) belonged to the age group 25-35 years.

Table 4.1: Age Distribution of Respondents

Age Group	Borrowers		Non Borrowers		All	
	No.	Percent (%)	No.	Percent (%)	No.	Percent (%)
25-35	11	24.44	17	37.78	28	31.11
36-45	18	40.00	15	33.33	33	36.67
46-55	12	26.67	10	22.22	22	24.44
56-65	4	8.89	3	6.67	7	7.78
Total	45	100	45	100	90	100

Source: Field Survey, 2013.

This Table also shows that the highest number of respondents (36.67 percent) exists in age group 36-45 years while the lower number of respondents (7.78 percent) exists in age group 56-65 years.

4.3 Education Levels of Respondents

Education of farmers enhances their knowledge and information about their production. Education helps the farmers to introduce new technologies as well as credit system. It was observed from the study that education level was little higher for the borrowers than non borrowers. The education levels of respondents in Table 4.2 shows that total illiterate members among borrowers and non borrowers were 37.78 percent, total 20 percent farmers were able to read and write, 16.67 percent in total farmers had received primary education. In case of secondary education level this value was overall 14.44 percent; total 8.89 percent and 2.22 percent respondents got the degree of SSC and HSC, respectively. It was observed that there is no respondent who has higher education above HSC level.

Table 4.2: Education Levels of Respondents

Education	Borrower		Non Borrower		All	
	No.	Percent (%)	No.	Percent (%)	No.	Percent (%)
Illiterate	16	35.56	18	40.00	34	37.78
Able to read and write	08	17.78	10	22.22	18	20.00
Primary	08	17.78	07	15.56	15	16.67
Secondary	06	13.33	07	15.56	13	14.44
SSC	05	11.11	03	6.67	08	8.89
HSC	02	4.44	00	00	02	2.22
Total	45	100	45	100	90	100

Source: Field Survey, 2013.
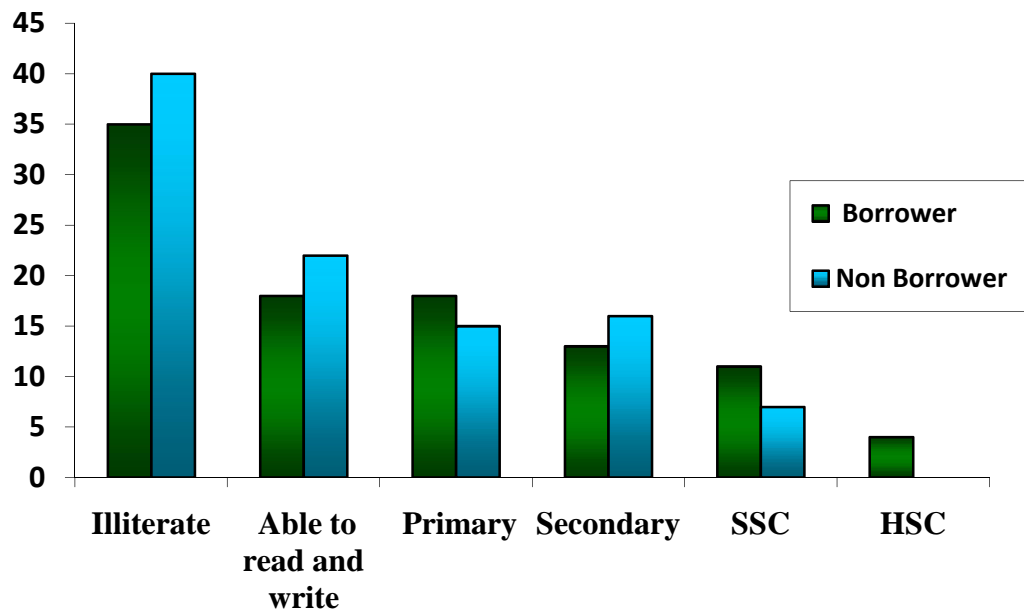
Figure 4.1: Education Levels of Respondents

Fig 4.1 represents the educational status of borrowers and non-borrowers under different microcredit program. It shows that 40 percent of non-borrowers and 36 percent of borrowers were illiterate where only 4 percent borrowers had HSC degree.

4.4 Occupation of Respondents

The main occupation of all the respondents is farming. All the borrowers and non borrowers are farmers. With farming, some of them are involve in other activities. The extent of the respondent's occupation is divided into four parts, such as only farmer, farmer and small business, farmer and day lobour, farmer and driver. The observation reveals that 60 percent of respondents are only involved in farming, 17.78 percent respondents are farmer and also running a small business, 15.56 percent work as day labour with farming and 13.33 percent deal with driving and farming. It was found that 64.44 percent of borrowers depended on farming activities against 55.56 percent non-borrowers.

Table 4.3: Respondents by Occupation

Occupation	Borrower		Non-Borrower		All	
	No.	Percent	No.	Percent	No.	Percent
Only Farmer	29	64.44	25	55.56	54	60.00
Farmer + Small Business	11	24.44	5	11.11	16	17.78
Farmer + Day Labour	3	6.67	11	24.44	14	15.56
Farmer + Driver	2	4.44	4	8.89	6	13.33
Total	45	100	45	100	90	100

Source: Field Survey, 2013.

4.5 Average Family Size and Composition

Family size (or number of family members) in this study has been defined as total number of persons living together and taking meal from the same kitchen under the administration of the same head of the family. The family member includes husband, wife, son, daughter, brother, father and mother. A person, who has been employed for household work of a family, for example, servant was not considered as the family member in this study. It appears from Table 4.4 that the maximum family members belonged to the age group 15 to 45 years for all farms. The average family size of the farmers consisted of 4.19 and 4.44 for borrower and non-borrower, respectively.

Table 4.4: Average Family Size and Age Composition of Family Members

	Borrower			Non-Borrower			All		
Below 15	Male	28	52.83	Male	33	53.22	Male	61	53.04
	Female	25	47.17	Female	29	46.77	Female	54	46.96
	All	53	100	All	62	100	All	115	100
15-45	Male	59	49.17	Male	68	55.28	Male	127	52.26
	Female	61	50.83	Female	55	44.72	Female	116	47.74
	All	120	100	All	123	100	All	243	100
Above 45	Male	18	56.25	Male	28	73.68	Male	46	65.71
	Female	14	43.75	Female	10	26.32	Female	24	34.29
	All	32	100	All	38	100	All	70	100
Average Family Size	4.19			4.44			4.32		

Source: Field Survey, 2013.

4.6 Distribution of Family Members by Literacy

The literacy status of borrower is slightly better than non borrower. The illiterate percentage of non borrower (34.53%) is greater than borrower (23.41%). Among all level of education, maximum family members receive primary and secondary education, for borrowers primary 24.39% and secondary 26.83% and for non borrowers primary 26.91% and secondary 17.94%. Taking all respondents together, 9.57% family members have up to SSC level and 8.18% family members have up to HSC and above level of education. Borrowers seemed to have ensured more education at higher level for their family members.

Table 4.5: Distribution of Family Members by Literacy

Education	Borrower		Non-Borrower		All	
	No.	Percent (%)	No.	Percent (%)	No.	Percent (%)
Illiterate	48	23.41	77	34.53	125	29.21
Able to read and write	5	2.44	17	7.62	22	5.14
Primary	50	24.39	60	26.91	110	25.70
Secondary	55	26.83	40	17.94	95	22.19
SSC	25	12.19	16	7.17	41	9.57
HSC and Above	22	10.73	13	5.83	35	8.18
Total	205	100	223	100	428	100

Source: Field Survey, 2013.

4.7 Average Size of Land Holding of the Respondents Household

The land holding of the respondents are categorized into several categories such as homestead land, own land in cultivation, rented in, mortgage in, rented out and mortgage out. Table 4.6 reveals that the average farm size of borrowers was 105.04 decimal and of non borrowers was 71.89 decimal. From the table, it was clear that there was no rented out, mortgage in and mortgage out land. The average farm size was calculated as:

Average Farm Size= Own Land + Rented in + Mortgaged in – Rented Out – Mortgaged Out

Table 4.6: Average Land Holding of Farm Families (Decimal)

	Borrower		Non-Borrower		All	
	Area	%	Area	%	Area	%
Homestead	8.41	7.41	6.79	8.63	15.2	7.91
Own Land in Cultivation	30.48	26.87	35.3	44.87	65.78	34.24
Rented in	74.56	65.72	36.59	46.50	111.15	5.78
Rented Out	00	00	00	00	00	00
Mortgage in	00	00	00	00	00	00
Mortgage Out	00	00	00	00	00	00
Total Land	113.45	100	78.68	100	192.13	100
Average Farm Size	105.04		71.89		176.93	

Source: Field Survey, 2013.

4.8 Average Amount of Microcredit & Source

The sources of microcredit were ASA and Grameen Bank which play the dominant role as microcredit providers. There were 53.33 percent borrowers receiving microcredit from ASA and 46.67 percent borrowers receiving microcredit from Grameen Bank. The average amount of credit given to all borrowers was Tk. 14177.77, whereas average amount of credit given by ASA was Tk. 13333.33 and that provided by Grameen Bank was Tk. 15142.85.

Table 4.7: Average Amount of Microcredit & Source (FY 2012-13)

Source of Microcredit	No. of Borrowers	% of Borrower	Average Amount
ASA	24	53.33	13333.33
Grameen Bank	21	46.67	15142.85
Total	45	100	14177.77

Source: Field survey, 2013.

4.9 Utilization of Microcredit

Microcredit is provided for one year and the selected borrowers operate it for one year. In this case, the microcredit borrowers were women but it was utilized for crop production by men. They have to repay the installment within 44-48 weeks by weekly installment. Without proper and productive utilization of microcredit, the income will be reduced and it will be difficult for repayment of credit. If the borrowers complete the cycle in due time, they can receive microcredit again. For this, it is very important for borrowers to utilize the credit in a productive way.

The selected borrowers spent the credit money for farm and nonfarm purposes. The pattern of utilization of credit by organization is presented in Table 4.8.

Table 4.8: Utilization of Microcredit

	Farming Purpose	Non Farm Purpose	Total
ASA (Tk)	12595.33 (94.46)	738 (5.54)	13333.33 (100)
Grameen Bank (Tk)	13990.85 (92.39)	1152 (7.61)	15142.85 (100)
Total	13293.09 (93.36)	945 (6.64)	14238.09 (100)

Figures within parentheses indicate percentages of total.
Source: Field survey, 2013.

Evidence shows that the borrowers of microcredit spent an average amount of Tk.13293.09 mainly in farming (around 93.36 percent) and Tk. 945 in nonfarm activities (6.64 percent). The borrowers of ASA spent 94.46 percent in farming activities such as purchasing input and machineries, providing labour cost, irrigation cost etc and 5.54 percent in nonfarm purposes such as family consumption, purchasing of medicine, pay for litigation etc. while the borrowers of Grameen Bank spent 93.36 percent in farming activities and 7.61 percent in nonfarm activities.

4.10 Repayment of Microcredit

The repayment of microcredit consists of two parts- principal amount and interest amount. The repayment cycle of microcredit is completed through weekly installment within one year. The interest rate of microcredit is 20 percent for both ASA and Grameen bank.

Table 4.9: Repayment of Microcredit (FY 2012-13)

Source of Microcredit	Average Amount to be Repaid			Total Repayment (%)
	Principal Amount (Tk)	Interest (Tk)	Total	
ASA	13333.33	4170	17503.33	100
Grameen Bank	15142.85	4542.86	19685.71	100
Total	14238.09	4356.43	18594.52	100

Source: Field survey, 2013.

The repayment of credit made by borrowers for ASA was on average Tk. 17503.33 including Tk. 13333.33 principal and Tk. 4170 interest. The repayment made to Grameen Bank by borrowers was on average Tk. 19685.71 including Tk. 15142.85 as principal and Tk. 4542.86 as interest. The repayment rate was 100 percent in both cases.

It is clear from observations representing the socio economic condition of the respondents that the socioeconomic condition of borrowers is slightly better than non borrowers. The education level of borrower farmers and their family members was relatively higher than non borrower farmers. The socio economic characteristics such as higher age, education level and agricultural occupation encouraged them to take microcredit. The utilization pattern and repayment of microcredit was good.

CHAPTER-5

PROFITABILITY OF BORO RICE PRODUCTION FOR MICROCREDIT BORROWERS AND NON-BORROWERS

5.1 Introduction

This chapter presents the inputs use pattern and yield of boro rice for borrowers and non borrowers. This chapter also presents the cost, return and profitability of the Boro rice production. The related cost items include land leasing cost, land preparation cost, fertilizer cost, seed cost, manure cost, insecticide cost, irrigation cost, threshing cost, labour cost and interest on operating capital. The average gross return and average net return are estimated in this chapter. The Benefit cost ratio (BCR) is also estimated for determining the profitability of the microcredit receiver and non receiver farms.

5.2 Input Use Pattern and Average Yield of Boro Rice

The average yield of boro rice and t-test for the difference in yield and application of production inputs between borrowers and non-borrowers are presented in Table: 5.1. It can be noticed that the borrowers obtained much higher yield per hectare than the non-borrowers. The borrowers also applied more inputs than non-borrowers. The differences were all statistically significant except land preparation (taka per hectare) and seed (kg/ha).

Table 5.1: Per hectare input use pattern and average yield of boro rice for borrowers & non borrowers

Mean	Borrowers	Non borrowers	Difference
Yield (kg/ha)	6719.27	4727.43	1991.84*
Labour(men days/ha)	105.34	83.23	22.11*
Land Preparation (taka/ha)	1496.58	1486.29	10.29
Seed (kg/ha)	20.88	18.35	2.53
Manure (kg/ha)	5264.29	3411.99	1852.3*
Fertilizer (kg/ha)	520.55	381.88	138.67*
Insecticide & Herbicide (taka/ha)	501.94	312.69	189.25*
Irrigation (taka/ha)	5164.54	4248.24	916.30**

Source: Field survey, 2013. (*, ** significant at 1% and 5% level, respectively)

Due to availability of credit, the borrower farmers had required capital in hand and used higher doses of inputs than non-borrowers. Thus they obtained higher yield per unit of land.

5.3 Benefit Cost Ratio Analysis

The benefit cost ratio analysis is presented in Table 5.3. For estimating BCR ratio, the total cost, gross return and net return are discussed below.

5.3.1 Cost incurred for leasing land

Leasing cost means the lease value of land. The lease value is calculated in Taka. The land, whether rented from others or owned, have the utility value. The total average lease cost for borrowers and non borrower were 6.16 and 7.76 percent of their total production cost, respectively.

5.3.2 Cost incurred for land preparation

Land preparation cost for Boro rice is the cost of power tiller use. It was almost fixed for a season. Its variability was small between 1411 to 1512 Tk. per hectare. It covered 1.78, 2.38 and 2.04 percent of total cost for borrowers, non borrowers and all farms, respectively.

5.3.3 Cost incurred for labour

Labour is most important production inputs. For Boro rice production, a large portion of production cost was covered by labour. The total average labour cost was Tk. 22193.83 for all farms which consist of 30.32 percent of total production cost. The labour costs were 26.36 and 35.67 percent of microcredit borrower and non borrower farms, respectively.

5.3.4 Cost incurred for seed

Seed is an important input in rice production. The production quantity and quality depend on good quality of seed. Two types of seedlings exist in local areas- one is broadcasting and another is transplanting. In Boro rice production, transplanting process is mostly followed by farmers. The price of Boro rice seed was Tk.30 per kg. Seed cost covered 0.804 percent for considering of total cost all farms and 0.745 and 0.884 percent for borrowers and non-borrowers, respectively.

5.3.5 Cost incurred for manure

Manure is the organic fertilizer for production. It increases the land fertility. Cow dung is largely used as manure. The price of manure is Tk. 0.5 per kg. The total value of manure was (Tk. 1954.93) 2.67 percent of total cost of production. The share of total cost going to manure was 2.96 and 2.28 percent for borrower and non borrower farms, respectively.

5.3.6 Cost incurred for fertilizer

The most important input is fertilizer. The fertilizers such as Urea, TSP, MP and Gypsum were used in Boro rice production. The prices of those fertilizers were Tk. 20, 28, 19 and 6 per kg. Among all these, Urea was used in a large quantity. Table 5.2 shows that the borrowers of microcredit spent a large amount of money on fertilizer and it was Tk. 29045.77 or 39.68 percent of total production cost. The non borrowers spent Tk. 21064.57 which was 33.83 percent of total production cost.

5.3.7 Cost incurred for insecticide & herbicide

The selected farmers used "Serious" as insecticide and "Kerate" as herbicide. The price of "Serious" was Tk.30 per bottle and "Kerate" was Tk. 50 per packet. Almost all farmers used these insecticide and herbicide. It contributed 0.586 and 0.431 percent to total production cost.

5.3.8 Irrigation cost

Boro rice is planted in November to February. In this period, there exists a shortage of water and Boro rice needs a huge amount of water. For this reason, supplementary irrigation was arranged through motor pump run by electricity. The irrigation contributes a large part of production cost. It was 6.14 and 6.82 percent of total production cost for borrower and non borrower farms, respectively.

5.3.9 Threshing cost

Threshing cost was incurred for the use of threshing machine. It covered 2.63 and 3.51 percent of total cost for microcredit borrower and non borrower farms, respectively.

5.3.10 Interest on operating capital

Interest on operating capital was estimated at Tk. 5376.30, 4007.35 and 4691.83 which stood at 6.39, 6.44 and 6.41 percent of total cost for borrower, non borrower and all farms, respectively.

5.4 Gross cost of Production

Gross cost of production is incurred by the summation of all cost items of production. Here, Tk. 82121.26, 62271.76 and 72196.53 were the gross cost for microcredit borrowers, non borrowers and all farms together, respectively. From the Table 5.2, it is evident that the gross cost of production for borrower farms was greater than non borrower farms. The borrowers did not compromise with the use of production inputs.

Table 5.2: Average Gross Cost of Production

Cost	Borrower		Non Borrower		All	
	Amount (Tk)	%	Amount (Tk)	%	Amount (Tk)	%
Leasing	5060.98	6.16	4833.07	7.76	4947.03	6.85
Land Preparation	1494.36	1.78	1486.30	2.38	1490.33	2.04
Labour	22175.90	26.36	22211.76	35.67	22193.83	30.32
Seed	626.31	0.745	550.65	0.884	588.48	0.804
Manure	2492.26	2.96	1417.56	2.28	1954.93	2.67
Fertilizer	37026.97	44.02	21064.57	33.83	29045.77	39.68
Insecticide & Herbicide	492.96	0.586	268.55	0.431	380.75	0.520
Irrigation	5164.55	6.14	4248.07	6.82	4706.31	6.43
Threshing	2210.67	2.63	2183.91	3.51	2197.29	3.001
Interest on Operating Capital	5376.30	6.39	4007.35	6.44	4691.83	6.41
Gross Cost	82121.26	100	62271.79	100	72196.53	100

Source: Own estimation, 2013.

5.5 Gross Return

Gross return is the money value of total output. In this study, gross return was calculated by summing up all the returns earned from selling paddy and the straw including home consumption of paddy. The total returns from selling of paddy and by product were estimated at Tk. 93260.17, 65628.44 and 79444.30 for borrowers, non borrowers and all farms, respectively.

The histogram (Figure 5.1) presents the total cost, gross return and net return of all farms, borrower and non borrower farms. It is clear from the figure that net return was higher for borrower farms than others.
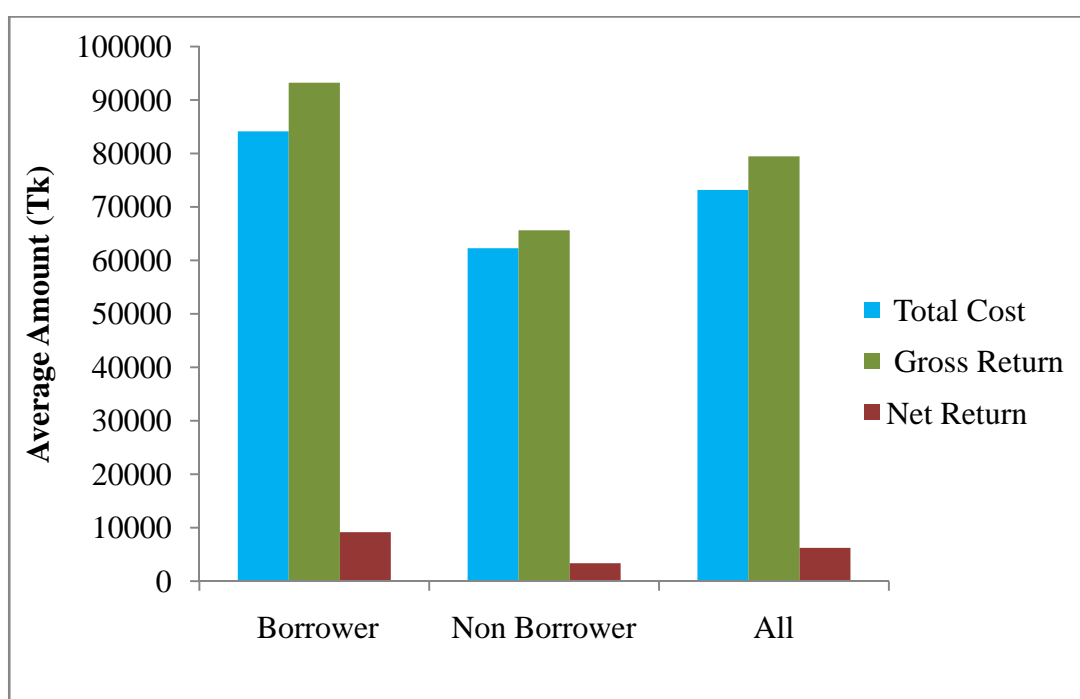
Figure 5.1: Cost, Return and Net Return of All Farms.

5.6 Net Return

Net return is calculated by deducting total cost from gross return. Net return from boro paddy production is presented in the following table 5.3. The net returns were Tk. 11138.91, 3356.63 and 7247.77 for the microcredit borrower farms, non borrower farms and all farms, respectively.

Table 5.3: Net Returns for Boro Rice Production

Particulars	Farm Categories		
	Borrower	Non Borrowers	All
Gross Return (Tk)	93260.17	65628.44	79444.30
Total Cost (Tk)	82121.26	62271.79	72196.53
Net Return (Tk)	11138.91	3356.63	7247.77
BCR	1.13	1.05	1.10

Source: Own estimation, 2013.

5.7 Benefit Cost Ratio (BCR)

Benefit cost ratio is estimated as the ratio of gross return and total cost of all observations. The benefit cost ratio of borrower farms, non borrower farms and all farms were found 1.13, 1.05 and 1.10, respectively. Comparison Between borrower farms and non borrower farms shows that the benefit cost ratio of borrower farms was greater than non borrower farms.

The foregoing discussion indicates that the borrower's investment is greater than non borrowers in their production. The borrowers provide greater amount of inputs in their Boro rice field for which they get good return than non borrowers. The higher BCR of borrowers shows the evidence of this statement.

CHAPTER-6

PERFORMANCE OF MICROCREDIT MEASURED BY STOCHASTIC FRONTIER MODEL

6.1 Introduction

This chapter shows the performance of microcredit through the estimation of technical efficiency using the Cobb-Douglas stochastic frontier model and technical inefficiency model. Technical inefficiency is modeled as a function of microcredit and socioeconomic characteristics such as education, age, farm size and income. The model quantifies the factor microcredit which reduces the inefficiency and the effect of microcredit to increase the productivity of the receiver farmers.

6.2 Descriptive Statistics of Variables Used

Summery statistics of variables are presented in Table 6.1. The average yield of farms 5723.35 kg per hectare and the coefficient of variation were 0.22 which indicates the variability of farm production. For the analysis, seven inputs, land preparation, labour, seed, fertilizer, manure, insecticide & herbicide and irrigation, were used to produce the single output rice. Fertilizer cost represents the coefficient of variation (C.V.) of 0.24. This indicates variability of fertilizer use among the farmers. Labour unit represents the C.V. is 0.14. This reflects variation of number of labour among farms. Irrigation costs constitute C.V. of 0.33. Land preparation cost, insecticide & herbicide cost, unit of manure and seed represent the C.V. of 0.02, 0.51, 0.41 and 0.09, respectively. These presented the variability of use those inputs among farmers.

Table 6.1 also shows that the amount of microcredit received by the farmers was, on average, Tk. 14177.78 with C.V. of 0.35. The average age and education level of the sample farmers were about 42 (C.V. of 0.23) and 4.23 (C.V. of 0.94) years, respectively. The mean value of the farm size was 0.36 (C.V. of 0.56) hectares.

Output (y) is defined as the yield of the observed boro rice production during the survey period. It is measured in kg per hectare. Labour (x_1) includes both family and hired labour. Land preparation (x_2) represents the rental value of power tiller used for production. Seed (x_3) represents the quantity of seed used in farm production. Manure (x_4) includes all organic fertilizer and the total quantity of manure used in farm production. Fertilizer (x_5) includes the quantity of Urea, TSP, MP and Gypsum used

in kg per hectare. Insecticide & herbicide costs (x_6) and irrigation cost (x_7) are the total insecticide & herbicide costs and irrigation cost, respectively, for Boro rice production.

Table 6.1: Descriptive Statistics of Variables (N=90)

	Mean	Coefficient of Variation	Minimum	Maximum
Yield (Kg/ha)	5723.35	0.22	3095.76	7933.94
Labour (man-day/ha)	94.28	0.14	120.10	70.57
Land preparation Cost (Tk/ha)	1491.44	0.02	1646.67	1383.20
Seed (Kg/ha)	19.62	0.09	22.56	16.22
Manure (Tk/ha)	4338.14	0.41	00	7561.22
Fertilizer (Kg/ha)	451.22	0.24	85.33	640.30
Insecticide & Herbicide (Tk/ha)	407.32	0.51	00	718.55
Irrigation (Tk/ha)	4706.40	0.33	00	5613.64
Education (Level)	4.23	0.94	00	11
Age (year)	42.18	0.23	27	62
Farm Size (ha)	0.36	0.56	0.05	0.94
Microcredit (Tk)	14177.78	0.35	8000	30000

Source: Field survey, 2013.

6.3 Results of Stochastic Frontier Model

The estimation of technical efficiency performance using Cobb-Douglas stochastic frontier model with half normal distribution and the technical inefficiency effects model is presented in this section. Technical inefficiency is modeled as a function of microcredit and socioeconomic characteristics like education level, age and farm size.

The maximum likelihood estimates of parameter of Cobb-Doulas frontier model for the whole sample which includes both the microcredit borrowers and non borrowers are presented in table 6.2. The coefficients of various inputs of production are positive and five out of seven were significant. The coefficient of labour and insecticide & herbicide cost were positive but insignificant. The returns to scale is 0.7510 implies

that the farms were operating. The positive coefficient implies that the inputs had the positive effect on production of Boro rice. With an increase of 1 percent of seed or manure or fertilizer, other things remain the same, the yield of Boro rice would be increased by 0.70, 0.07 and 0.38 percent, respectively.

Table 6.2: Results of Stochastic Frontier Model (N=90)

	Parameter	Coefficient	t-Ratio
Constant	β_0	4.35***	4.39
Labour (man-days/ha)	β_1	0.37	0.72
Land Preparation Cost (Tk/ha)	β_2	0.12***	5.29
Seed (Kg/ha)	β_3	0.70**	2.89
Manure (Tk/ha)	β_4	0.07**	2.94
Fertilizer (Kg/ha)	β_5	0.38***	3.73
Insecticide & Herbicide Cost(Kg/ha)	β_6	0.02	1.83
Irrigation Cost (Tk/ha)	β_7	0.03**	2.70
Variance parameters			
Sigma Squared	σ^2	0.129*	1.95
Gamma	γ	0.999***	12.92
Log Likelihood Value			34.71
Constant	δ_0	0.096***	9.86
Education (Level)	δ_1	-0.028**	-2.61
Age (year)	δ_2	-0.038*	-2.26
Farm Size (ha)	δ_3	-0.033	-0.03
Microcredit (Tk/person)	δ_5	-0.00005***	-3.71

Source: Own estimation, 2013. (*, **, *** indicates the significance level at 10%, 5% and 1% level respectively)

The coefficient of land preparation cost and irrigation cost were also positive and significant. With an increase of 1 percent of the cost of land preparation or irrigation, other things remain the same, the yield of Boro rice would be increased by 0.12 and 0.03 percent, respectively.

The overall technical inefficiency effects in the stochastic frontier with respect to the coefficients of parameters associated with sigma squared and gamma reported in

Table 6.2. The coefficients of the parameters, sigma squared and gamma are estimated to be 0.129 and 0.999 respectively and both are significant. These indicate that the technical inefficiency effects were a significant component of the total variability of output. This means that there had some substantial amount of inefficiency in farm production. There is some space for improvement of productivity in the farm.

In the technical inefficiency effects model, education, age and microcredit had the negative sign and significant in the inefficient effect model for the selected farm. The coefficient of age was negative and significant means the older farmers had less inefficiency than the younger farmers in the case of productivity. In the other sense, the older farmers are more efficient than younger farmers. The negative coefficient of education implies that the educated farmers are more efficient than the non educated farmers. The negative coefficient of microcredit implies that microcredit reduces the inefficiencies and increases the farm efficiency.

The age, education and microcredit increase the farm efficiency. The aged, educated and microcredit borrowers can utilize their inputs more efficiently and they increase the farm productivity as well as income. The estimated coefficient of farm size shows the negative sign but insignificant.

Microcredit Borrower: The results of the stochastic frontier model, variance parameters and inefficiency effects model of microcredit borrowers of 45 farmers are presented below.

Results show that all the   coefficients of production inputs are positive except labour and seed and four out of seven are significant. The coefficients of labour and seed were negative and insignificant. The returns to scale of 0.8897 imply that farms are operating. It is decreasing return to scale.

The coefficient of production input of manure and fertilizer were positive and highly significant. With an increase of manure or fertilizer at 1 percent, other things remain constant, the yield of Boro rice production would be increased by 0.15 and 0.01 percent, respectively.

Table 6.3: Stochastic Frontier Result for Microcredit Borrower (N=45)

	Parameter	Coefficient	t-Ratio
Constant	β_0	0.83***	8.33
Labour (man-days/ha)	β_1	-0.36	-0.62
Land Preparation Cost (Tk/ha)	β_2	0.15	1.80
Seed (Kg/ha)	β_3	-0.26	-0.55
Manure (Tk/ha)	β_4	0.15**	2.10
Fertilizer (Kg/ha)	β_5	0.01***	3.88
Insecticide & Herbicide Cost (Tk/ha)	β_6	0.02**	2.63
Irrigation Cost (Tk/ha)	β_7	0.25*	1.97
Variance parameters			
Sigma Squared	σ^2	0.019*	2.15
Gamma	γ	0.999***	16.78
Log Likelihood Value			50.62
Constant	δ_0	0.128***	5.505
Education (Level)	δ_1	-0.011***	-2.99
Age (year)	δ_2	-0.003***	-4.66
Farm Size (ha)	δ_3	-0.210**	-2.69
Microcredit (Tk)	δ_4	-0.00008**	-2.24

Source: Own estimation, 2013. (*, **, *** indicates the significant level at 10%, 5% & 1%).

The coefficient of production input cost such as insecticide & herbicide cost and irrigation cost were positive and significant. The increase of insecticide & herbicide cost or irrigation cost at Tk.1, other things remain constant, the yield would be increased by 0.02 and 0.25 unit, respectively.

The coefficients of parameters of sigma squared and gamma are 0.019 and 0.999 respectively and both were significant. These imply that inefficiency part of the composite error term was significant. There is scope for enhancement of farm productivity.

Table 6.3 shows the result of technical inefficiency effect model, the coefficient of education, age, farm size and microcredit are negative. The negative coefficients imply that education, age, farm size and microcredit reduce the technical inefficiency. These factors influence the farmer's efficiency and the borrower farmers utilize their farm inputs in a more productive way.

Microcredit Non-borrower: The results of the stochastic frontier, the variance parameter and inefficiency effect model for the microcredit non-borrower of 45 farmers are shown in Table 6.4.

Table 6.4: Stochastic Frontier Result for Microcredit Non Borrower (N=45)

	Parameter	Coefficient	t-Ratio
Constant	β_0	5.90***	5.94
Labour (man-day/ha)	β_1	-0.69	-0.81
Land Preparation Cost (Tk/ha)	β_2	0.82*	2.35
Seed (Kg/ha)	β_3	0.03	1.59
Manure Cost (Tk/ha)	β_4	0.01**	2.64
Fertilizer (Kg/ha)	β_5	0.01***	3.82
Insecticide & Herbicide Cost (Tk/ha)	β_6	-0.03	-1.16
Irrigation Cost (Tk/ha)	β_7	0.02*	1.95
Variance parameters			
Sigma Squared	σ^2	0.118**	2.79
Gamma	γ	0.994***	16.97
Log Likelihood Value			7.02
Constant	δ_0	-0.609	-0.08
Education (Level)	δ_1	-0.017	-1.76
Age (year)	δ_2	-0.002	-0.13
Farm Size (ha)	δ_3	0.006**	2.93

Source: Own estimation, 2013. (*, **, *** indicates the significant level at 10%, 5% & 1%).

All the coefficients are positive except labour and insecticide & herbicide. The coefficient of labour unit and insecticide & herbicide cost are negative but insignificant. The returns to scale is 0.7318 implies that the farms are operating at below the optimal level. Here, the farms have a large scope for improvement to enhance their productivity.

The coefficients of parameters of microcredit non-receiving farms are positive except labour, and insecticide and herbicide cost, and four out of seven are significant.

In the technical inefficiency model, the coefficient of farm size was positive and significant. Here, the increase of farm size of the non borrower farmers reduces their efficiency. The coefficient of education level was negative and significant. It implied that increased education level helps to reduce technical inefficiency (Wadud, 2013). The coefficient of age was negative but insignificant.

From the above observation, the inputs of production were almost same for Boro rice production between borrowers and non borrowers. The difference among socioeconomic characteristics was microcredit. Microcredit plays a vital role in the production of Boro rice. There exists a difference of returns to scale between borrowers and non borrowers at 0.1642.

6.4 Levels of Farm Specific Efficiency Performance

The frequency distribution of estimated farm specific efficiencies of all selected farms, microcredit borrower farms and microcredit non-borrower farms are presented in the Table 6.5. The farm specific efficiencies for all farms show the substantial variability in the Table. The range of efficiencies is 30-98 percent and the mean efficiency is 75.10 percent for total microcredit borrower and non borrower. The associated histogram of efficiency index is presented in Figure 6.1.

Table 6.5: Frequency Distribution of Efficiency Index (N=90)

Efficiency Index	No. of Farms	Percentage of Farms	Cumulative Frequencies
0-50	11	12.22	11
50-60	07	7.78	18
60-70	11	12.22	29
70-80	23	25.56	52
80-90	16	17.78	68
90-100	22	24.45	90
Mean Efficiency	Maximum Efficiency		Minimum Efficiency
75.10	98		30

Source: Own estimation, 2013.

The majority of farms, 25.56 percent holds under 70-80 efficiency index group were technically efficient; 24.45 percent of farms under 90-100 efficiency index group were technically efficient; 17.78 percent of farms under 80-90 efficiency index group

were technically efficient, 12.22 percent of farms under 60-70 and 0-50 efficiency index group were technically efficient; 7.78 percent of farms under 50-60 efficiency index group were technically efficient. However no farms are fully efficient. Therefore it appears that there is considerable room for improvement in productivity through increased technical efficiency.

Figure 6.1: Frequency Distribution of Efficiency Index of Microcredit Borrowers and Non-Borrowers.

6.4.1 Efficiency Index of Microcredit Borrower Farms

Table 6.6 shows the farm specific efficiency for microcredit borrowers. The efficiency level of farms range between 60-98 and the mean efficiency is 88.97 for microcredit borrowers. It implies that the farms have a good space for improvement.

Results reveal that 51.11 percent, the majority of farms under 90-100 efficiency index group were technically efficient and 28.89 percent of farms under 80-90 efficiency index group were technically efficient; 17.78 percent of farms under 70-80 efficiency index group were technically efficient and only 2.22 percent of farms under 60-70 efficiency index group were technically efficient. Therefore, it appears that there is considerable scope for improvement in productivity through increased technical efficiency.

Table 6.6: Frequency Distribution of Efficiency Index of Microcredit Borrower Farm (N=45)

Efficiency Index	No. of Farms	Percentage of Farms	Cumulative Frequencies
0-50	0	0	0
50-60	0	0	0
60-70	01	2.22	1
70-80	08	17.78	9
80-90	13	28.89	22
90-100	23	51.11	45
Mean Efficiency	Maximum Efficiency		Minimum Efficiency
88.97	98		60

Source: Own estimation, 2013.

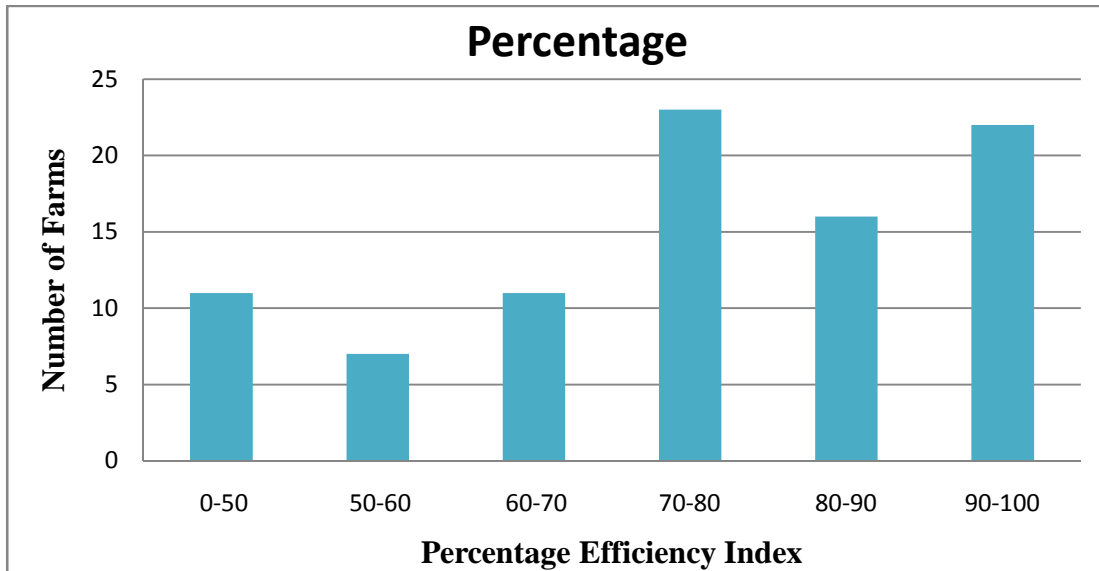The histogram shows the efficiency index of microcredit borrowers.
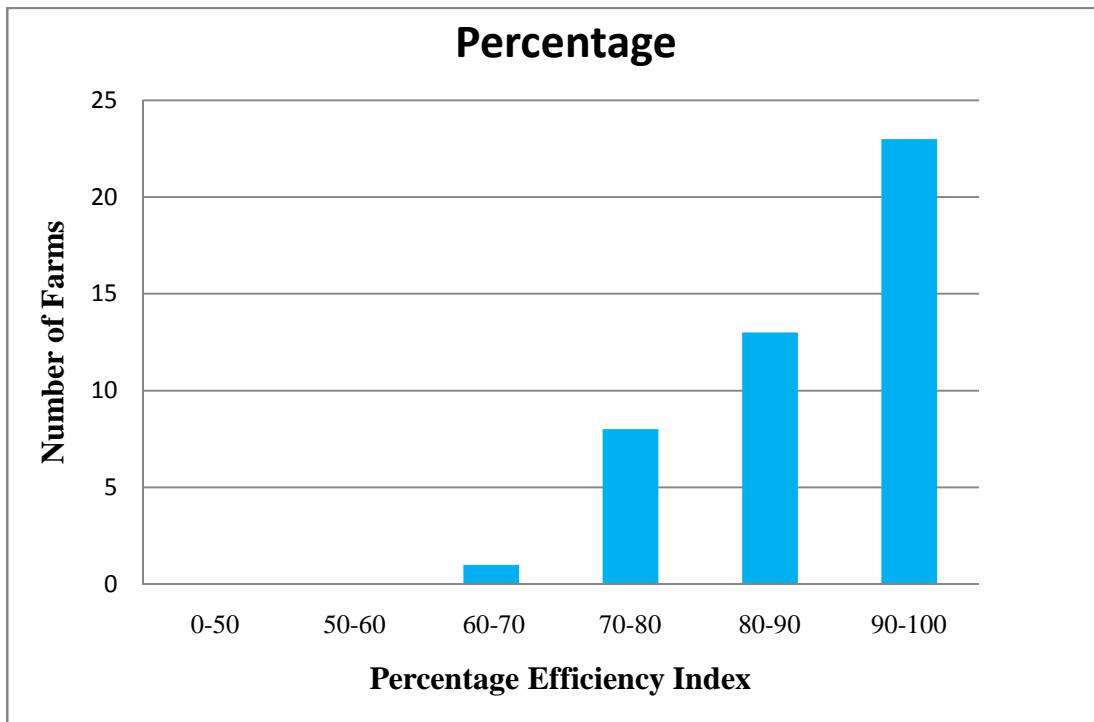
Figure 6.2: Frequency Distribution of Efficiency Index of Microcredit Borrower.

6.4.2 Efficiency Index of Microcredit Non Borrowers Farms

Table 6.7 represents the farm specific efficiency index for microcredit non borrowers. The range of efficiency is 42-96 percent and the mean efficiency is 73.18 percent of microcredit non borrowing farm.

Table 6.7: Frequency Distribution of Efficiency Index of Microcredit Non Borrower Farms (N=45)

Efficiency Index	No. of Farms	Percentage of Farms	Cumulative Frequencies
0-50	5	11.11	5
50-60	4	8.89	9
60-70	9	20.00	18
70-80	10	22.22	28
80-90	9	20.00	37
90-100	8	17.78	45
Mean Efficiency	Maximum Efficiency		Minimum Efficiency
73.18	96		42

Source: Own estimation, 2013.

The analysis reveals that the majority of farms, 22.22 percent farms under 70-80 efficiency index group were technically efficient, 20.00 percent farms under 60-70 and 80-90 efficiency index group were technically efficient, 17.78 percent farms under 90-100 efficiency index group were technically efficient, 11.11 percent farms under 0-50 and 8.89 percent farms under 50-60 efficiency index group were technically efficient. No one farm is fully efficient. So there is a large scope for improvement in productivity through increased technical efficiency. The histogram presenting the efficiency index is placed in Figure 6.3.
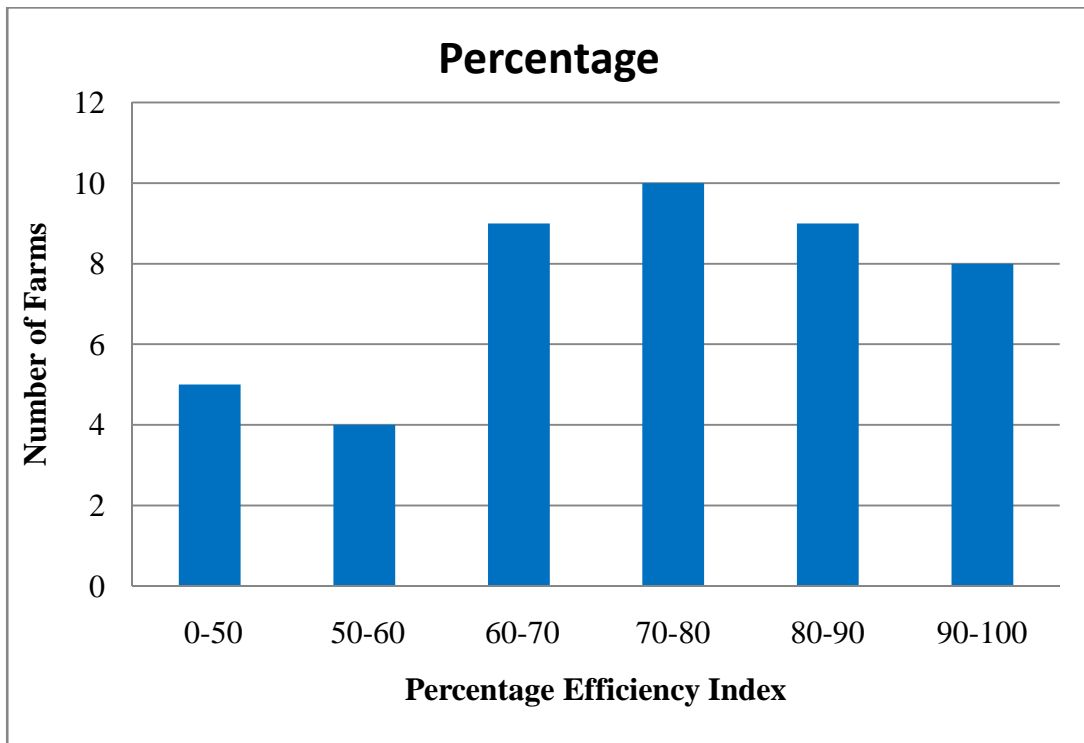
Figure 6.3: Frequency Distribution of Efficiency Index of Microcredit Non Borrowers.

The efficiency performance of microcredit borrowers and non borrowers are shown in Table 6.6 & 6.7. It is evident that the efficiency performance of microcredit borrowers is 15.79 percent higher than microcredit non borrowers. The difference is much higher because the microcredit shares a good portion of their production cost. Microcredit not only provides their financial assistance but it enhances the farmer's confidence and makes them mentally stronger in production process.

CHAPTER-7

RELATIVE CHANGE IN SOCIAL AND ECONOMIC STATUS OF MICROCREDIT BORROWERS & NON BORROWERS

7.1 Introduction

The social and economic status of small and marginal farmers is not so good in rural Bangladesh. This chapter presents the relative change of social and economic status of the selected farmers. The study represents the small and marginal farmers in selected areas of Bogra district. It also considers the microcredit as a financial tool that influences their income and expenditure as well as their overall living standard. This chapter includes empirical discussion on the change of household income and expenditure on food items & non food items, the change of housing condition, the change of toilet condition, the change of drinking water source and the change of household assets. The average duration of borrowing microcredit by respondents was 4 years. For this, the change of income and expenditure was considered within a 4 year time interval. The research was conducting on Boro rice production and it covers almost four to six month from planting to harvest. For this reason, half yearly income was considered.

7.2 Half Yearly Income of Respondents Household

Income is the most important indicator of socio-economic status of the people living in rural Bangladesh. Average half yearly income of the respondent households has been estimated from the earnings of all active members of the family from various income generating activities during the study period.

Household income is calculated from different types of income activities: agriculture, trade, business, day labour and driver etc.

Table 7.1 shows the total half yearly income shares from different sources of income. In the context of crop activities, the income share of household is 57.18 percent higher compared to other activities income share, where 13.37 percent income comes from other farm activities and 29.44 percent income comes from nonfarm activities. It is clear from the Table 7.1 that crop cultivation is the dominant source of income for both borrowers and non borrowers.

Table 7.1: Half Yearly Household Income of the Respondents

Income Source	Borrower		Non Borrower		All	
	Amount (Tk)	%	Amount (Tk)	%	Amount (Tk)	%
Crop income	37066.67	57.92	21000.22	56.45	29033.45	57.18
Other Farm Income	8691.11	13.58	4891.11	13.15	6791.11	13.37
Non Farm Income	18233.33	28.48	11311.11	30.40	14772.22	29.44
Total	63991.11	100	37202.44	100	50596.78	100

Source: Field Survey, 2013.

7.3 Half Yearly Expenditure of the Respondents

In the present study the half yearly household expenditure is divided into two categories such as expenditure for food items and expenditure for non food items. The expenditure for non food items include expenditure on health care, education, housing, clothing and other household expenditures such as loan repayment, transportation, fuel, electricity, poultry/dairy feed and festivals etc.

Table 7.2 reveals that the half yearly food item expenditure for the borrowers was 54.06 percent and that of the non borrowers was 57.78 percent of their total expenditure. The half yearly non food expenditure for the borrowers was 35.93 percent (housing, education, health, and clothing) and for the non borrowers was 33.68 percent. The other expenditure of borrowers was 9.99 percent and of the non borrowers was 5.89 percent of their total expenditure. The respondents in total spend a large portion of their money on food item accounting for 55.92 percent. The borrowers spend a good portion of their income on education (10.70%) and health (4.01%) comparatively higher than non borrower's education (7.33%) and health (1.46%) expenses. The borrowers spend on repayment of loan with installment.

Table 7.2: Half Yearly Expenditure of the Respondents

	Expenditure	Borrower		Non Borrower		All	
		Amount (Tk)	%	Amount (Tk)	%	Amount (Tk)	%
Food Item	Food	25793.33	54.06	19426.67	57.78	22610	55.92
Non Food Item	Housing	3493.33	7.32	3666.67	10.91	3580	9.12
	Education	5106.67	10.70	2466.67	7.33	3786.67	9.02
	Health	1914.44	4.01	493.33	1.46	1203.89	2.74
	Clothing	6635.56	13.90	4700	13.98	5667.78	13.94
Other Item	Others	4770.34	9.99	2865.6	5.89	3817.97	7.94
Total		47713.67	100	33618.94	100	40666.30	100
Savings	Total	16277.44	25.43	3583.50	9.63	9930.48	19.63

Source: Field Survey, 2013.

Table 7.2 shows the savings of borrowers and non borrowers. Saving is the difference between income and expenditure. Results of our study shows that the borrowers can save 25.43 percent of their total income and the non borrowers can save 9.63 percent of their total income. The income, expenditure and savings of respondents are shown in Figure 7.1.
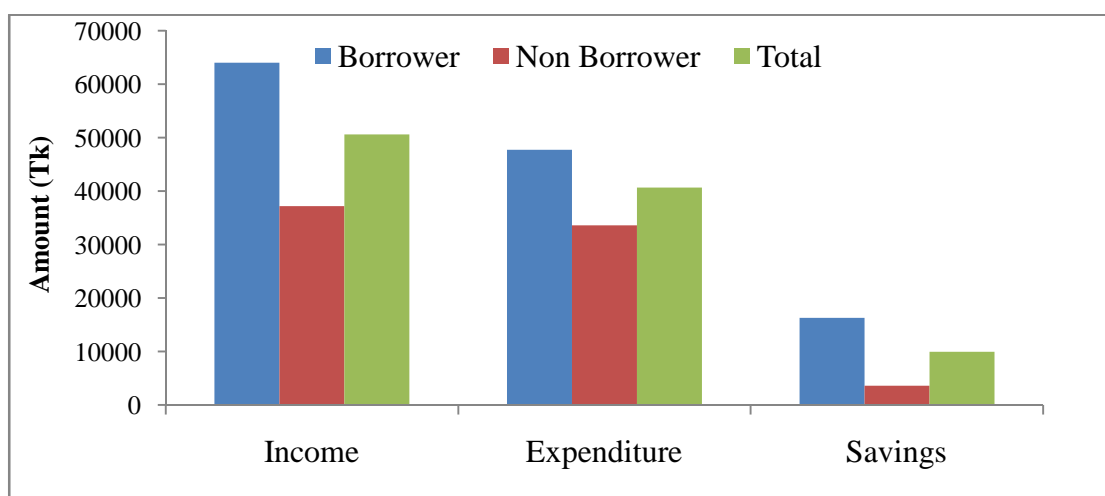

Figure 7.1: Half Yearly Income, Expenditure and Savings of Respondents

It can be noticed that the borrowers have higher level of income, expenditure and savings than the non borrowers. The borrowers not only spend higher amount of money on food but they also spend it on their children education, health care, clothing, housing and so on. The expenditure of non borrowers mainly covers food items.

7.4 Average Change in Food Expenditure

Food is the essential element of all expenditure items. Food expenditure covers a large portion of family expenditure. Table 7.3, shows the average change of food expenditure for borrowers and non borrowers during a certain time interval. The average change of food expenditure for borrowers was 66.76 percent and 41.07 percent for non borrowers. The difference between borrowers and non borrower's food expenditure was 25.69 percent. The difference implies that the livelihood status of borrowers has much improved than non borrowers.

7.5 Average Change in Non Food Expenditure

The non food items includes housing, education, health, clothing and other household expenditure like transportation, fuel, electricity bill, cigarettes, tea, installment of microcredit for borrowers and other accessories. Among all non food items, the average change in other expenditure for borrowers was 86.30 percent which was the highest because after getting microcredit, they had to pay loan installments. On the other hand, in case of non borrowers, it was 53.30 percent.

The average change in expenditure on education was 71.37 percent for borrowers and 39.13 percent for non borrowers. Here, it was the second highest change for borrower's expenditure. ASA and Grameen Bank both have the condition for borrowers to send their children to school. They also work for increasing awareness about different social responsibility such as education, health, domestic violence, bad effects of dowry system, using sanitary latrine, pure drinking water etc.

7.3 Average Change in Expenditure (Monthly)

Expenditure Particulars	Average Expenditure			
	Borrower		Non Borrower	
	Before	After	Before	After
Food	2413.33	4024.44	1915.56	2702.22
Percent Change	66.76		41.07	
Housing	387.13	624.44	198.89	305.56
Percent Change	61.29		53.63	
Education	345.56	592.22	178.89	248.89
Percent Change	71.37		39.13	
Health	936.67	1637.56	377.78	493.33
Percent Change	64.15		30.59	
Clothing	1244.44	1735.56	1171.11	1335.33
Percent Change	39.47		14.02	
Others	786.67	1465.57	267.67	410.35
Percent Change	86.30		53.30	

Source: Field Survey, 2013.

The average change of expenditure on housing, health and clothing were 61.29, 64.15 and 55.07 percent for borrowers, respectively. The average changes for non borrowers were 53.63, 30.59 and 28.97 percent, respectively. The average change represents the improvement of livelihood of borrowers and non borrowers. Here, the improvement of borrowers was better than non borrowers.

7.6 Changes in Housing Condition

Table 7.4 presents the housing condition of borrowers and non borrowers. Here, the study generated information on before and after status of borrowers and non borrowers. Almost 51.11percent borrowers had the Katcha ghar with straw roof, 40 percent borrowers had Katcha ghar with tin roof and 8.89 percent had no house of their own at all before intervention of microcredit. After getting microcredit, they had change their housing condition in such a way that 75.56 percent borrowers had Katcha

ghar with tin roof, 15.56 percent borrowers had pacca ghar with tin roof and 8.89 percent had Katcha ghar with straw roof. Every borrower had home to stay there.

Table 7.4: Change of Housing Condition

Particulars	Borrowers		Non Borrowers	
	Before	After	Before	After
No house at all	4	00	05	04
Katcha ghar with straw roof	23	4	28	22
Katcha ghar with tin roof	18	34	12	18
Pacca ghar with tin roof	00	07	00	01

Source: Field survey, 2013.

On the other hand, among all non borrowers, 62.22 percent had Katcha ghar with straw roof, 26.67 percent had Katcha ghar with tin roof, 11.11 percent had no house of their own to stay. After a four year period, 48.89 percent non borrower had Katcha ghar with straw roof, 40 percent had Katcha ghar with tin roof, 11.11 percent had no house of their own at all and one of them had pacca ghar with tin roof. The results show that the percentage change in the improvement of housing condition of microcredit borrower was better than non borrowers.

7.7 Changes in Toilet Condition

The toilet condition of borrowers and non borrowers is presented in Table 7.5. Before taking microcredit, 11.11 percent borrowers used open places or bushes, 42.22 percent were using Katcha latrine, 40 percent were using half sanitary latrine and only 6.67 percent were using sanitary latrine.

Table 7.5: Changes in Toilet Condition

Types of Latrine	Borrowers		Non Borrowers	
	Before	After	Before	After
Open places or bushes	5	00	05	05
Katcha latrine	19	05	27	21
Half Sanitary latrine	18	27	13	15
Sanitary latrine	03	13	00	04

Source: Field survey, 2013.

After taking microcredit, no one used open places or bushes, 11.11 percent were using Katcha latrine, 60 percent were using half sanitary latrine and 28.89 percent were using sanitary latrine. The percentage difference between before and after condition shows an improvement of borrower's social status.

7.8 Changes in Source of Drinking Water

Safe drinking water is essential for healthy life. For safe drinking water we need safe source of water. Before taking microcredit 46.67 percent borrowers used own tubewell as a source of drinking water, 35.56 percent borrowers used others tubewell and 17.78 percent used boiled water from ponds for drinking water. After taking microcredit, all of them used own tubewell water for drinking purpose.

Table 7.6: Changes in Source of Drinking Water

Type of source of Drinking Water	Borrowers		Non Borrowers	
	Before	After	Before	After
Water from river or pond	00	00	00	00
Boiled river or pond water	08	00	07	05
Others tube well	16	00	11	10
Own tube well	21	45	27	30

Source: Field survey, 2013.

The non borrowers condition was relatively poor in this regard, 60 percent used own tubewell, 24.44 percent used others tubewell, 15.56 percent used boiled water from ponds. After a period of 4 years, 66.67 percent used own tubewell, 22.22 percent used others tubewell water and 11.11 percent used boiled water from ponds. The percentage change overtime represents the improvement of their social status, but the borrowers performed much better than the non borrowers.

7.9 Changes in Assets

The change of assets of borrowers and non borrowers are given the Table 7.7. The change of assets was considered for the period before and after getting microcredit. The percentage change of assets is generally regarded as the change of social condition for the borrowers and non borrowers.

Table 7.7: Change of Assets

Assets	Borrower Household			Non Borrower Household		
	Before	After	Percent Change	Before	After	Percent Change
Khat	27	39	44.44	22	28	27.27
Chawki	17	15	-11.76	32	38	18.75
Chair	36	43	19.44	18	21	16.67
Table	30	43	43.33	11	15	36.36
Bench	28	33	17.85	23	18	-21.73
Showcase	15	29	93.33	05	7	40.00
Almirah	5	8	60.00	00	3	100.00
Alna	38	45	19.42	34	31	-8.82
Television	05	08	60.00	05	05	00
Wrist watch	22	35	59.09	15	17	13.33
Wall clock	15	25	66.67	20	17	-15.00
Fan	20	35	75.00	18	25	38.89
Bi-cycle	07	09	28.57	03	05	66.67
Rickshaw	0	05	100.00	05	09	80.00
Van	0	07	100.00	07	05	-28.57
Torch	28	43	53.57	39	45	15.38
Sewing Machine	11	16	45.45	11	15	36.36
Cow	15	27	80.00	25	18	28.00
Goat	10	15	50.00	17	20	17.65
Hen	38	42	10.52	32	37	15.63
Duck	33	39	18.18	32	40	25.00

Source: Field survey, 2013.

The different assets used in their daily life include khat, chair, table, watch, fan, rickshaw, van, bi-cycle, cow, goat, hen etc. The change of those assets represents improvement of status of the borrowers and non borrowers. Table 7.7 shows the change of borrower's assets is relatively higher than non borrower.

In conclusion, the change of social and economic status of microcredit borrowers was higher than non borrower.

CHAPTER-8
SUMMERY AND CONCLUSIONS

8.1 Summery and Conclusions

Rice is the staple food of the people of Bangladesh. Boro is the most important cereal crop which shares about 57% of total rice production (BBS estimate 2008-09). The production of Boro largely depends on the use of fertilizers, irrigation etc. Thus the production cost of Boro rice is higher than that of other rice. Farmers badly need a good amount of capital during Boro production period. Due to lack of capital, however, farmers cannot use modern technologies and improve their efficiency. The production of Boro rice is comparatively higher than others. Farmers can get a good return from Boro rice through the use of modern inputs if capital is available. The small and marginal farmers can make this capital available through credit.

Money begets money. Adam Smith said "Money, says the proverb, makes money. When you have got a little, it is often easy to get more. The great difficulty is to get that little" ("The Wealth of Nations" 1937, p. 93). It is very difficult for the poor to get small working capital from formal banking system for various reasons. A collateral free working capital as loan is the requirement at the door steps of the poor at the right time to help them facilitate and start feasible intended income generating activities (IGAs) (Ahmed, 1999). This study was conducted to see the performance of microcredit in boro rice production in a selected area of Bangladesh.

The broad objective of the proposed study is to evaluate the performance of microcredit on Boro rice production in a selected area of Bangladesh. The following are the specific objectives:

1. To documents and compare the socio-economic characteristics of the borrowers and non borrowers.
2. To compare profitability of boro rice of borrowers and non borrowers.
3. To estimate technical efficiency and factor affecting efficiency of selected farmers.
4. To evaluate relative change in social and economic status of microcredit borrowers and non borrowers.
5. Draw some policy recommendations.

The information used for the study was collected from Bogra district. The data was collected through pretested questionnaire. The sample size was 90 with 45 microcredit borrowers and 45 non borrowers and they are the members of ASA and Grameen Bank. The data was collected through face to face interview. The data was used to evaluate the performance of microcredit between borrower farmers and non borrower farmers. To evaluate the relationship between microcredit and boro rice production, the productivity and profitability was calculated. To estimate the technical efficiency, stochastic frontier model was used.

The socio economic status of the farmers in the selected area was almost the same. Their main occupation was farming and some of them were involved in driving, small business, day labour etc. The farmer's illiteracy rate was 37.78 percent and 20 percent farmers could read and write the name only, 42.22 percent were literate. So the literacy rate was not good among them. The family literacy rate was slightly better for borrowers than non borrowers and the borrower's tendency for higher education was better than non borrower's. The money was invested in a profitable manner and the repayment rate was good. All borrowers repaid their loan in time.

The analysis of data on Boro rice production shows that the borrower farmers received higher production per unit of land than the non borrowers. They used more production inputs and the cost of boro rice production was higher for them. The cost items were leasing cost, land preparation cost, labour cost, seed cost, manure cost, fertilizer cost, insecticide & herbicide cost, irrigation cost. The average cost of production for borrowers was Tk. 82121.26 per hectare and for non borrowers was Tk. 62271.79. The gross return was calculated by the sum of returns came from products and by products. The gross returns were Tk. 93260.17 and Tk.65628.44 for borrowers and non borrowers, respectively. The net return for borrowers was Tk. 11138.91 and Tk. 3356.63 for non borrowers. The benefit cost ratios were 1.13 and 1.05 for borrowers and non borrowers, respectively. The BCR of borrowers was higher than non borrowers. It appears that higher rice production, income and BCR was large due to microcredit received by the borrower farmers.

To estimate the technical efficiency, stochastic frontier model was used in the study. The model was used three times; for all respondents, for borrowers and for non borrowers. The technical inefficiency model for all respondents indicates that age,

education and microcredit have the negative sign which shows if those factors increased, the technical inefficiency would be reduced. The mean technical efficiency was 75.10 percent for all farmers, 88.97 percent for borrowers and 73.18 percent for non borrowers. The technical efficiency of borrowers is greater than non borrowers. It can be said that, the other factors remain the same, microcredit has the positive impact on farmer's efficiency levels.

The income and expenditure pattern of responding farmers was examined. It revealed that the half yearly income of borrower's was Tk.63991.11 which was higher than that of Tk. 37202.44 for non borrower. The borrowers expenditure was Tk. 47713.67 and that of Tk. 33618.94 for non borrowers. The borrower spent more of their income on food items as well as on education, clothing and health. The non borrowers spent mainly on food items and clothing. Savings of borrowers and non borrowers were 25.43 percent and 9.63 percent of their income, respectively. So it is clear that the socio economic condition of borrowers is better than the non borrowers.

The social and economic status of small and marginal farmers is not so good in Bangladesh. The relative change of social and economic status of the selected farmers was examined in this study. The change was measured by using the before and after data. The time period for measuring the relative change of social status was 4 years. It revealed that after interventions made by MFIs, the status of borrower members changed significantly over non borrowers.

In conclusion, it can be said that microcredit has positive impact on agricultural production, farmer's income and their livelihood. The government of Bangladesh should encourage this sector and help NGOs-MFI to take good initiatives to eradicate poverty.

8.2 Policy Recommendations

The recommendations made to expand the microcredit programme and increase its effectiveness are given below:

- The study reveals that the supervision should necessary for farmers. Most of the borrowers were illiterate so proper supervision will be helpful to them.
- Savings facilities should be increased.
- Training facilities should be started in those study areas.
- Public and private media should be used in favor of farmer's participation in development activities.
- The number of MFIs branch should be increased under the study areas.
- Weekly installments for the poor farmers are not better option. Therefore, the duration of installments must be increased and the cost of operation per unit of loan should be reduced.

References

Alam, J. (1988). Organizing the Rural Poor and Its Impact: The Experience of Selected Non Governmental Organisations and Governmental Organizations in Bangladesh. *Economic Bulletin for Asia and the Pacific,* Vol. 39, No. 1, pp. 33-42.

Alam, J., Pramanick, M., Rahman, H. and Alam, S. (2013). A Study of Sustainable Agricultural Technologies for Ultra Poor People in Bangladesh and India. NETZ Partnership for Development and Justice, NETZ Bangladesh, Dhaka.

Ashaolu, O.F., Momoh, S., Phillip, B.B and Tijani, I.A. (2011). Microcredit Effect on Agricultural Productivity: A comparative Analysis of Rural Farmers in Ogun State, Nigeria. *International Journal of Applied Agricultural and Apicultural Research.* IJAAAR 7 (1&2):pp.23-35.

Alam, M. F., Khan, M. A. and Huq, A. S. M. (2007). Technical efficiency in tilapia farming of Bangladesh: a stochastic frontier production approach. *Journal of the European Aquaculture Society,* Vol 20, no. 4, Aquacult Int (2012) pp:619-634.

Ahmed, S. and Hakim, M.A. (2004). Attacking Poverty with Microcredit. Polli Karma-Sahayak Foundation (PKSF), Dhaka.

Ahmed, S. (1997). Microcredit in Bangladesh : Achievements and Challenges. Palli Karma Sahayak Foundation (PKSF), Bangladesh.

Asghar, N. and Chughtai (2012). Impact of Agricultural Credit on Production of Wheat Crop: A Case Study of District Faisalabad-Pakistan. *AUDA,* vol. 4, no. 2/2012, pp. 43-51.

Association of Social Advancement Annual Report-2011, ASA-Tower, Bir Uttam ANM Nuruzzaman Sarak, Shayamoli, Dhaka-1207.

BBS (2012). Report on the Household Income, Expenditure Survey (2012). Bangladesh Bureau of Statistics, Statistical Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka. Bangladesh.

BBS (2008). Report on the Cost of Production of Aman Paddy 2008-09. Bangladesh Bureau of Statistics, Statistical Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka. Bangladesh.

BBS (2008). Report on the Cost of Production of Aus Paddy 2008-09. Bangladesh Bureau of Statistics, Statistical Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka. Bangladesh.

BBS (2008). Report on the Cost of Production of Boro Paddy 2008-09. Bangladesh Bureau of Statistics, Statistical Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka. Bangladesh.

BBS (2011). Yearbook of Agricultural Statistics of Bangladesh. Bangladesh Bureau of Statistics, Statistical Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka. Bangladesh.

BBS (2012). Statistical Pocketbook 2012. Bangladesh Bureau of Statistics, Statistical Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka. Bangladesh.

Bangladesh Economic Review (2006). Finance Division, Ministry of Finance (MoF), Government of Bangladesh, Dhaka.

CDF (2006). *Bangladesh Microfinance Country Profile by Credit and Development Forum (CDF),* Study Report, Credit Development Forum, Dhaka.

CDF (2010). *Bangladesh Microfinance Statistics 2010 by Credit and Development Forum (CDF),* Study Report, Credit Development Forum, Dhaka.

Chowdhury, A (2002). The Impact of Micro-credit on Poverty: Evidence from Bangladesh. A published article of Centre for Economic Policy Research (CEPR) and Institute for the Study of Labour (IZA).

Faruqee, R. (2010). Microfinance for Agriculture in Bangladesh: Current Status and Future Potential. Working Paper no. 8, Institute of Microfinance.

Grameen Bank (2011). Grameen Bank Annual Report-2011. Grameen Bank, Dhaka, Bangladesh.

Hakim, M. A., (2004). Microcredit and Agriculture: How to Make it Work. Asia Pacific Region Microcredit Summit Meeting of Councils. Palli Karma-Sahayak Foundation (PKSF), Dhaka.

Hashemi, S.M. (1996). Rural Credit Programs and Women's Empowerment in Bangladesh. *World Development,* vol. 24, no. 4, pp. 635-653.

Hossain, M., and Abdul Bayes (2009,2010), Rural Economy and Livelihoods Insights from Bangladesh, AH Development Publishing House.

Hoque, M.S. and M. Yamao (2009). Can Microcredit Alleviate Rural Poverty? A Case Study of Bangladesh. *International Journal of Human and Social Sciences*, pp. 4:13, 2009.

Hulme, D. and Moore, K (2006). Why Has Microfinance Been a Policy Success in Bangladesh (and Beyond?).

Hulme, D. and Mosley, P. (1996). Financing Against Poverty, London, Rutledge.

Ike, P.C. and Udeh (2011). Comparative Analysis of Allocative Efficiency in Input use by Credit and Non Credit User Small Scale Poulty Farmers in Delta State, Nigeria. *Asian Journal of Agricultural Sciences,* Vol 3(6):pp 481-486, 2011.

Islam, Z. (2011). Microfinance, Efficiency and Agricultural Production in Bangladesh. A published article. Department of Economics and Management, University of Helsinki, Finland.

Islam, M.S. (1999). Micro credit for the Rural Poor. A Study of Small Farmers Development Project (SFDP) in Sadar thana of Bogra District. Unpublished M.S. Thesis, Department of Agricultural Economics (Finance), Bangladesh Agricultural University, Mymensingh.

Khan, M. and Rahman, M. (2007). Impact of Microfinance on Living Standards, Empowerment and Poverty Alleviation of Poor People: A Case Study on Microfinance in the Chittagong District of Bangladesh.

Khatun, S. (2011). A Study on Productive Efficiency of Sugarcane in Bangladesh: Status and Potentiality. A PhD. Thesis, Department of Agricultural Economics, Bangladesh Agricultural University, Mymensingh.

Khandker, S.R. (1998). *Fighting Poverty with Microcredit Experience in Bangladesh*. The University Press Limited, Red Crescent Building, Dhaka, Bangladesh.

Khondker, B.H. (2013). The Role of Credit in Food Production and Food Security in Bangladesh. A published study for National Food Policy Capacity Strengthening Programme, Bureau of Economic Research, University of Dhaka.

Khan, M. and M. Rahaman (2007). Impact of Microfinance on Living Standards, Empowerment and Poverty Alleviation of Poor People: A Case Study on Microfinance in the Chittagong District of Bangladesh. A published M.S. thesis, Department of Business Administration, Umeå School of Business (USBE).

Ledgerwood, J. (1999). *Sustainable Banking with the Poor Microfinance Handbook: An Institutional and Financial Perspective.* The International Bank for Reconstruction and Development/THE WORLD BANK, 1818 H Street, N.W. Washington, D.C. 20433, U.S.A.

Mazumder T.S. (2008). A Comparative study of Different Microcredit Organizations in Sylhet City: An Approach Targeting Women. Department of Economics, Shah Jalal University of Science and Technology, Sylhet, Bangladesh.

Mitu, F. (2006). Impact of BRAC Microcredit Programmes on the Livelihood Improvement of Selected Female Borrowers of Shakhipur Upazilla, Tangail. An unpublished M.S. thesis, Agricultural Economics (Finance), Bangladesh Agricultural University, Mymensingh.

Morshed, M. (2009). Dynamics of Women Empowerment Through Microfinance: An Empirical Study in Selected Areas of Rajshahi District. An unpublished M.S. thesis, Department of Agricultural Economics (Finance), Bangladesh Agricultural University, Mymensingh.

Morduch, J. (1998). Does Microfinance Really Help the Poor: New Evidence from Flagship Programs in Bangladesh. Department of Economics and HIID, Harvard University and Hoover Institution, Stanford University.

Nosiru and Omobolanle, M. (2010). Microcredits and Agricultural Productivity in Ogun State, Nigeria. *World Journal of Agricultural Sciences,* vol. 6 (3), pp. 290-296, 2010.

Parvin, L. (2005). Impact of ASA Credit Programme on Poverty Alleviation in some selected areas of Mymensingh district. M.S. Thesis, Department of Agricultural Finance, Bangladesh Agricultural University, Mymensingh.

Rahman, K.M.M., Mia, and Bhuiyan, M.K. (2012). A Stochastic Frontier Approach to Model Technical Efficiency of Rice Farmers in Bangladesh: An Empirical Analysis. *A Scientific Journal of Krishi Foundation.* The Agriculturists 10(2):pp9-19 (2012).

Rahman, S. (2006). Impact of RDRS Poultry Credit (Layer) on Rural Woman in Some Selected Areas of Nilphamary District. Unpublished M.S. thesis, Department of Economics, Bangladesh Agricultural University, Mymensingh.

Singh, N. (2003). Perspectives on Emergence and Growth of Microfinance Sector. *Asia-Pacific Journal of Rural Development,* Vol. XIII, No.2.

Sarker R (2006). *Rural Financing and Agricultural credit in Bangladesh: Future Development Strategies for Formal Sector Banks.* The University Press Limited, Dhaka.

Sultana, S. and S.S. Hasan, (2011). Impact of Micro-Credit on Economic Empowerment of Rural Women. *A Scientific Journal of Krishi Foundation,* vol. 8(2), pp. 43-49, 2010.

Wadud, M. A. (2013). Impact of Microcredit on Agricultural Farm Performance and Food Security of Bangladesh. Working Paper no.14, Institute of Microfinance.

Williams, S., Ajao and Ogunniyi (2007). The Impact of Microcredit on Food Crop Production in Osun State, Nigeria. *Agricultural Journal* 2(2): 319-323, 2007.

World Bank (1994). The World Bank's Strategy for Reducing Poverty and, Hunger Environmentally Sustainable Development Studies, Monograph series, 3 (4).

Yunus, M. (1999). *Banker to the Poor. The autobiography of Mohammad Yunus, Founder of the Grameen Bank,* Aurum Press Limited, London.

Yunus, M. (1994). Credit for Self-Employment, A Fundamental Human Right. The Grameen Reader (GR), Grameen Bank, Dhaka.

Web Search

http://en.wikipedia.org/wiki/Agriculture_in_Bangladesh.

http://en.wikipedia.org/wiki/Bogra.

http://en.wikipedia.org/wiki/Microcredit.

http://en.wikipedia.org/wiki/Poverty_in_Bangladesh.

http://www.knowledgebank-brri.org/riceinban.php

http://www.grameeninfo.org/index.php?option=comcontent&task=view&id=24&Itmid=127

http://en.wikipedia.org/wiki/Socioeconomic_status

http://en.wikipedia.org/wiki/List_of_countries_by_household_final_consumption_expenditure_per_capita

http://www.cgap.org/p/site/c/template.rc/1.1.947/, accessed August 10, 2010

APPENDICES

APPENDIX (A)

An Interview Schedule for a Research Entitled:

"Performance of Microcredit on Boro Rice Production in a Selected Area of Bangladesh"

Household Survey Questionnaire

(Information will be used only for research purpose.)

Serial No.………. Date ………………….

Name of the Respondent………………………………….

Village or word………………………………….

Union…………………………………..

1) Family Information:

S. L.	Name	Relation with respondent	age	level of education	Occupation	
					Main	Secondary
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						

Relation with Respondent: Husband=1, Wife=2, Son=3, Daughter=4, Father=5, Mother=6, Son-in-law=7, Grand Child (Male)=8, Grand Child (Female)=9.

Occupation: Farmer=1, Housewife=2, Business=3, Day Labour=4, Driver=5, Tailor=6, Grocery=7, Service=8, Student=9.

2) **Farm size:** Please indicate the area of land owned and homestead area by your family

SL. No.	Type of Land Use	Code	Local	Hectare	Cost per hectare
(a)	Own land homestead area (including ponds, garden etc)	1			
(b)	Land under own cultivation	2			
(c)	Land given to others on borga or lease	3			
(d)	Land taken from others on lease or borga	4			
(e)	Others	5			
Total farm size					

3) Credit Received: Have you receive any credit? Yes/No (Code: Yes=1/No=2)
4) Mention the amount of credit received last years? (Code: ASA= 1, GB=2)

SL. No.	Sources of Credit received	Amount received	Interest rate	Purpose	Amount Repayment
(a)					
(b)					
(c)					

5) Duration of Involvement: …………….. Years

6) Credit used in Production:

Amount of Credit	Used in Crop Production		Non agricultural use
	Credit portion	Own Capital	

7) Production Cost:

a) Size of Land Planted:

b) Labour Cost:

S. L. No	Operation	No of labour		Total labour	Wage rate (tk./Man-days)		Total cost
		Family	Hired		Family	Hired	
1	Land preparation						
2	Seed bed Preparation						
3	Plucking of Seedlings						
4	Line/Trench marking						
5	Planting						
6	Earthing up						
7	Weeding						
8	Fertilizer application						
9	Pesticides/Insecticides application						
10	Harvesting						
11	Carrying						
12	Grading						
13	Special operation						

c) Cost of Power tiller:

Power tiller	unit	cost per unit	Total cost
1. Family Supplied			
2. Hired			

d) Material Input Cost:

Item		Unit	Cost per unit	Total Cost
1. Seed/Seedling				
2. Manure				
3. Fertilizers	1. Urea			
	2. TSP			
	3. MP			
	4. ZnSo4			
	5. Boric acid			
	6. Gypsum			
	7. DAP			
	8.other			
6. Pesticides				
7. Irrigation water				
8. Miscellaneous (if any)				
9. Others				

8) Gross Return:

Output	Quantity		Price per unit		Total return	
	Before	After	Before	After	Before	After
Product						
By product						
Total						

9) Income Sources:

Sources of Income Agriculture	Amount	Sources of Income Non Agriculture	Amount
Crop Production activities		Small Business	
Livestock		Service	
Poultry		Day Labour	
Others		Tailoring	
		Others	

10) Expenditure:

Items	Code	Amount		Items	Code	Amount	
		Before	After			Before	After
Food Consumption (monthly)	1			Health (yearly)	4		
Transportation cost (monthly)	2			Clothing (yearly)	5		
Education (monthly)	3			Other	6		

11) Change in housing unit:

SL. No.	Type of housing Unit	User		Non User	
		Before	After	Before	After
1.	No house at all				
2.	Katcha ghar with straw roof				
3.	Katcha ghar with tin roof				
4.	Pacca ghar with tin roof				

12) Change in toilet condition:

SL. No.	Type of latrine	User		Non User	
		Before	After	Before	After
1.	Open places or bushes				
2.	Katcha latrine				
3.	Half Sanitary latrine				
4.	Sanitary latrine				

13) Change in source of drinking water:

Sl. No.	Type of source of Drinking Water	User		Non User	
		Before	After	Before	After
1.	Water from river or pond				
2.	Boiled river or pond water				
3.	Others tube well				
4.	Own tube well				

14) Change in Assets

SL. No	Items of Assets	Number of Assets		SL. No.	Items of Assets	Number of Assets	
		Before	After			Before	After
1.	Khat			12	Wall clock		
2.	Chawki			13.	Fan		
3.	Chair			14.	Bi-cycle		
4.	Table			15.	Rickshaw		
5.	Bench			16.	Van		
6.	Showcase			17.	Torch		
7.	Wooden almirah			18.	Sewing matching		
8.	Alna			19.	Cow		
9.	Radio			20.	Goat		
10.	TV			21.	Hen		
11.	Wrist watch			22.	Duck		

Give thanks to the respondent for spending his/her valuable time and cooperation.

APPENDIX (B)

Farmer's Efficiency Index (Microcredit Borrowers)

Respondents (Farmer)	Efficiency Index
1	0.79
2	0.92
3	0.79
4	0.94
5	0.82
6	0.89
7	0.71
8	0.85
9	0.96
10	0.95
11	0.94
12	0.99
13	0.85
14	0.89
15	0.99
16	0.97
17	0.99
18	0.93
19	0.88
20	0.80
21	0.83
22	0.83
23	0.90
24	0.78
25	0.87
26	0.60
27	0.78
28	0.96
29	0.99
30	0.76
31	0.93
32	0.94
33	0.95
34	0.99
35	0.97
36	0.76
37	0.89
38	0.81
39	0.98
40	0.99
41	0.98
42	0.88
43	0.94
44	0.91
45	0.75

Farmer's Efficiency Index (Microcredit Non Borrowers)

Respondents (Farmer)	Efficiency Index
1	0.79
2	0.96
3	0.81
4	0.84
5	0.95
6	0.60
7	0.80
8	0.87
9	0.71
10	0.96
11	0.92
12	0.71
13	0.83
14	0.47
15	0.67
16	0.76
17	0.57
18	0.71
19	0.68
20	0.61
21	0.54
22	0.91
23	0.93
24	0.80
25	0.76
26	0.74
27	0.86
28	0.62
29	0.81
30	0.97
31	0.63
32	0.65
33	0.41
34	0.50
35	0.52
36	0.46
37	0.82
38	0.67
39	0.46
40	0.78
41	0.39
42	0.77
43	0.62
44	0.60
45	0.73