Performance of Microfinance Institutions in North East India: Data Envelopment Analysis based efficiency analysis

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Abstract

Micro Finance Institutions (MFIs) emerged with unparallel scope to poor people who did not have access to commercial banks. It involves the provision of micro-credit, savings and other services to the poor that are excluded by the commercial banks for collateral and other reasons. It is an empirical study and analytical in nature and the study will be conducted on secondary data. According to the Mix Market data base ten MFIs are providing services and all are taken for the study. The outcome of the data analysis revealed sufficient evidence to establish an efficiency among the branch offices. Accuracy of the efficiency is depend upon the accuracy of the reported by the North East MFIs. The study will try to identify some of the hidden facts/ figures relating to the efficiency of the MFIs in Assam. It offers a beneficial source of information to Asomi, MFIs in Assam. The result of this study would help the MFIs to better understanding the micro finance and MFIs may try to improve their branch level efficiency through this research work.

Keywords:- DEA, Efficiency, MFIs, North East India

Introduction

Microcredit is the practice of offering small loans to poor people who are not traditionally being served by the commercial bank Microcredit was first founded in Bangladesh in the 70s and 80s by Nobel laureate Mohammad Yunus and the organization he founded, Grameen Bank. Following the success of Grameen Bank, this financial innovation has not only been used in Bangladesh alone, but also has been replicating by the most other countries in the world with some modification based on contextual differences.

A large section of the Indian population is uncovered by formal financial system. In the year 2011, Indian census report has showed that 102 million households out of a total of 247 million in India are not covered by the banking system and 65 percent of these households are in rural areas. It is noticeable, however, that between 2001 and 2011 there was 23 percent of increase in the number of household services by banks but this growth was more prominent in the rural areas[1]. Microfinance in India evolved in order to fill the gap created by formal banking sector. Therefore, microfinance is referred to as the alternate commercial sector targeting the poor[2]. Microfinance has become a global industry and it is increasing at a noticeable rate worldwide. It continues to add 13 percent borrowers annually since 1999[3]. In developing countries Microfinance Institutions (MFIs) emerged with huge opportunity to the poor people who do not have access to commercial banks. The MFIs face unique challenges because it must achieve dual objectives- outreach i.e. provide financial services to the poor and sustainability i.e. cover its cost.[4]

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Research Limitations:

Accuracy of the efficiency is depend upon the accuracy of the reported by the North East MFIs.

Significance of the study:

The present study is an attempt to identify some of the hidden facts of NER MFIs.

This study may be helpful to financial institutions in improving their efficiency. Prospective savers will be able to identify the efficient MFIs of this region.

Objectives of the study

1. To measure the level of technical efficiency of MFIs of the NER; and

Hypotheses:

1. Ho_1= There is same level of technical efficiency among MFIs in the NER; and

Methodology:

This Study is an empirical and analytical in nature. It has been conducted on secondary data. It is based on annual data financial year 2011-12. According to the **MIX Market data base** ten MFIs are operating in North East India on 25-04-2014. Based on Data Envelopment Analysis (DEA), efficiency analysis had been performed to find out the best practice MFIs among the North East India. Table:1 contains information about MFIs:

Table: 1 Detail List of NER MFIs

Sl. No.	MFIs	Parent State	Date of Establishment	Status	Product(s) Offered	Main Funding Source(s)
1	ASOMI	Assam	1-1-2001	NBFI	Loan	Loan, Shareholders, Capital
2	RGVN(NE)	Assam	1-1-1996	NBFI	Loan	Grant, Loan & Savings
3	GRAMEEN SAHARA	Assam	1-1-2005	NGO	Loan	Grant
4	NIGHTANGLE	Assam	2-10-1997	NGO	Loan	Grant
5	BANDHAN	West Bengal	11-4-2001	NBFI	Loan, Insurance	Loan, shareholders, capital
6	KANKLATA MAHILA URBAN CO-OPERATIVE	Assam	2009	Co-Operative	Loan	Grant
7	Chanura Microfinance Manipur (CMM)	Manipur	2007	NGO	Loan	Grant
8	Youth Volunteers' Union Microfinance (YMF)	Manipur	1970	NGO	Full scale financial Services, Health, Education, Loan	Loan, Shareholders, Grant
9	Youth Volunteers' Union Financial Services (YFS)	Manipur	9-7-1993	NBFI	Full scale financial Services, Health, Education,	Loan, Shareholders, Grant

					Loan	
10	Weaker Section Development Society (WSDS)	Manipur	26-7-1989	NGO	Health, Education, Loan	Loan, Grant

Source: MIX Market data base

Concept of Efficiency:

Production is an act of transforming input into output because the objective of production is to create value through transformation[5]. To evaluate the efficiency of firms relative to the best production, it is necessary to have a quantify standard. That standard can only be determined by those productive units which share a common technology[6].

Input Oriented Measured:

Input oriented measure address the question of 'by how much can input quantity be proportionally reduced without changing the output quantities produced'[7]. It means input(s) can be reduced without affect the output level.

Output Oriented Measured:

Output Oriented measures TE address the question as to 'by how much can output quantity be proportionally expand without altering the input quantities used'[8]. It means output can be increased without introducing inputs.

The output oriented measures could be explained focusing a change in output by using fixed level inputs.

Mathematical Framework:

DEA is a non-parametric method of measuring the efficiency of a Decision Making Units (DMUs)[9], here MFIs are called DMUs. In this technique, both Input oriented measure and output oriented measure have been used for the comparison of efficiency score[10].

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[8] Ibib Chapter V.

DEA is a linear programming methodology to measure the relative performance and efficiency of multiple DMUs when it involves multiple inputs and outputs.

Advantages of DEA:

- Capable of handling multiple inputs and outputs.
- Capable of being used with any input- output measurement.
- The sources of inefficiency can be analysed and quantified for every evaluated unit.

In DEA, efficiency can be measured by an input oriented process, which focuses on reducing inputs to produce the same level of output and output oriented process which aims to maximize output from a given set of input[11]. The DEA method is based on the common assumption of Constant Return to Scale (CRS) and the alternative assumption of Variable Return to Scale (VRS).

In the year 1978, Charnes, Cooper and Rhodes (CCR) provided the following formula to measure TE under CRS:

$$\text{Max } \sum_{r=1}^{s} u_r y_{r0}$$

$$\text{Subject to : } \sum_{r=1}^{s} u_r y_{rj} - \sum_{i=1}^{m} v_i x_{ij} \leq 0$$

$$\sum_{i=1}^{m} v_i x_{io} = 1 \quad -u_r \leq 0 \; ; -v \leq 0.$$

Where, y_{rj} and x_{ij} are positive known outputs and inputs of the jth DMU and u_r and v_i are the variable weight to be determined by solving above equation problems.

On the other hand, the following model provided by Banker, Charnes and Cooper (1984) dealt with the VRS version of DEA.

$$\text{Max } \sum_{r=1}^{s} u_r \, y_{ro} - u_0$$

$$\text{Subject } \sum_{r=1}^{s} u_r \, y_{rj}\text{t} - \sum_{i=1}^{m} v_i \, x_{ij} \; - u_o \leq 0$$

$$\sum_{i=1}^{m} v_i x_{i0} = 1$$

$$-u_r \leq 0, \; - v_i \leq 0.$$

u^* indicates the return to scale possibilities. An $u^* < 0$ implies increasing return to scale and $u^* > 0$ implies a decreasing return to scale. Our DEA ranges between 0-100.

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Selection of Inputs and Outputs:

For the study, two inputs and two outputs have been used.

Inputs are : Total No. of employees(X_1); and Operating Expenses(X_2).

Output is : Gross Loan Portfolio (Y_1). (All outstanding principals due for all outstanding client loans. His includes current, delinquent, and renegotiated loans, but not loans that have been written off.)

The Empirical Study:

The DEA technical efficiency for 10 MFIs is calculated by assuming both Constant Return to Scale and Variable Return to Scale technology. While measuring the technical efficiency of MFIs, both input oriented measured as well as output oriented measures have been used.

Table: 2 Efficiency Measurements by Model I

(Output Indicator = Gross Loan Portfolio)

Efficiency scores	VRS	CRS	Scale efficiencies	Returns-to-scale
Asomi	0.3521	0.3375	0.9585	increasing
RGVN(NE)	0.5537	0.5493	0.9921	increasing
Grameen Sahara	0.6034	0.5656	0.9374	increasing
Nightangle	0.9164	0.6927	0.7558	increasing
Kanaklata Mahila Urban Co-Operative	1.0000	0.4339	0.4339	increasing
Bandhan	1.0000	1.0000	1.0000	constant
CMM	0.1541	0.1259	0.8172	increasing
YMF	0.4435	0.3846	0.8673	increasing
YFS	0.6247	0.3190	0.5106	increasing
WSDS	1.0000	0.6821	0.6821	increasing
Mean	0.6648	0.5091	0.7955	

Author's calculation

In Table :2 under them Model I, the result show that one MFI is on the technical efficient frontier when CRS is assumed, while three MFIs are on the efficient frontier in the

case when VRS is assumed. The MFI that remains technically efficient under both CRS and VRS assumption is Bandhan. It is fully engaged in microfinance related activities.

In Model I, average output oriented VRS, CRS and Scale efficiency are 66.48%, 50.91% and 79.55% respectively.

Under the output oriented measured the MFIs can increase their loan portfolio by 33.52% with the existing level of input by efficient utilization of the inputs, viz., number of employees and operating expenses.

Under the output oriented measured 90% of the MFIs are the stage of increasing return to scale while no one out of ten MFIs included in the study are at decreasing return to scale.

Table: 3 shows the virtual inputs and output of Model I

DMUs	**Total No. of Enployees**	Reduced	**Operating Expenses**	Reduced	**Gross Loan Portfolio**	Increased
Asomi	242.00	*0.00%*	40,868,057.91	*9.45%*	906,225,026.50	*183.97%*
RGVN(NE)	486.42	*1.93%*	82,256,146.78	*0.00%*	1,846,461,162.87	*80.61%*
Grameen Sahara	73.45	*3.36%*	10,871,535.23	*0.00%*	230,591,597.07	*65.73%*
Nightangle	42.00	*0.00%*	6,315,758.66	*18.74%*	124,023,102.96	*9.12%*
CMM	56.00	*0.00%*	8,734,419.49	*10.83%*	178,777,234.94	*548.99%*
YMF	77.00	*0.00%*	12,362,410.95	*17.23%*	260,908,437.85	*125.49%*
YFS	21.00	*0.00%*	2,687,767.41	*50.20%*	41,891,904.99	*60.07%*

Author's Calculation

In Table 3 shows the virtual inputs level and output level of the seven MFIs who could not reach the highest score under the CRS and VRS assumption. Here, virtual inputs explains that how much total number of employees and operating expenses may be reduced

and virtual output means that how much gross loan portfolio may increased without introducing the additional inputs.

In case of Asomi MFIs could have reduced 9.45% of operating expenses with increasing 183.97% of Gross loan portfolio. GRVN(NE) MFIs could have reduced 1.93% of **Total No. of Enployees** with increasing *80.61*% of Gross loan portfolio. **Grameen Sahara** MFIs could have reduced *3.36%* of **Total No. of Enployees** with increasing *65.73%* of Gross loan portfolio. **Nightangle** MFIs could have reduced *18.74%* of operating expenses with increasing *9.12%* of Gross loan portfolio. **CMM** MFIs could have reduced *10.83%* of operating expenses with increasing *548.99%* of Gross loan portfolio. **YMF** MFIs could have reduced *17.23%* of operating expenses with increasing *125.49%* of Gross loan portfolio. **YFS** MFIs could have reduced *50.20%*of operating expenses with increasing *60.07%* of Gross loan portfolio

Correlation Analysis:

This section examines the possible determinants of efficiency of MFIs in North East India. Here, I suggest different variables that can clarify the efficiency of MFIs.

These variables can be divided into different groups based on age, basic characteristics, financial management and performance. I used correlation in this section.

First variable considered is the ***age*** of the MFI. It is hypothesize become older may perform better than others.

The second category relates to the features of MFIs in terms of size i.e. total value of assets (TA). Hypothesize that larger firms may perform better than smaller size.

The last variable that represents the financial management of MFIs is Debt-Equity ratio. It is imagined that higher debt-equity ratio reduces firm efficiency.

Table: 4 Correlation coefficients between the different Technical efficiency measured and variables

Variables	CRS/TE	VRS/PTE	SE
Age	0.18972387	0.173984063	-0.050905
Assets	0.705166915	0.383186498	0.3752283
Debt-Equity Ratio	0.219105352	0.120857629	0.1859938

Author's calculations

In Table: 2 calculated the correlation coefficients between different efficiency measures and the variables defined above. The results show that the age, value of total assets

and debt/equity ratio are positively correlated with all efficiency measures except age under scale efficiency assumption.

The result from the correlation coefficient came to conclude that age and size of MFIs are important in determining the technical efficiency of MFIs.

Conclusion

This paper tried to investigate the efficiency level of ten MFIs in North East india and determinants of level of technical efficiency. For the efficiency analysis we used non-parametric Data Envelopment Analysis and considered input oriented and output oriented methods by assuming both CRS and VRS assumption.

While conducting DEA analysis for the year 2011-12, it has been found that out of 10 there are one microfinance institution is **Bandhan** that is on efficiency frontier under constant return to scale assumption and three microfinance institutions **Kanaklata Mahila Urban Co-Operative, Bandhan and WSDS** that are on efficiency frontier under variable return to scale assumption.

The inefficiency of MFIs in NER is mainly of technical nature. In order to increase the efficiency of the MFIs, there is the need of accelerating managerial skill and improving policy. Then it will meet the dual objectives of outreach and financial sustainability.

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