<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total No of Area/Branch Offices</td>
<td>2,291</td>
</tr>
<tr>
<td>Total No of village Organizations or groups</td>
<td>178,904</td>
</tr>
<tr>
<td>Total No of Members</td>
<td>4 millions</td>
</tr>
<tr>
<td>Percentage of Women Members</td>
<td>Not sex biased</td>
</tr>
<tr>
<td>Gross Loan Portfolio</td>
<td>US $ 456.1 million</td>
</tr>
<tr>
<td>Average Loan Size</td>
<td>US $ 114</td>
</tr>
</tbody>
</table>

**CHAPTER 4**

**RESEARCH METHODOLOGY**

In this chapter, a brief overview of various dimensions of the research, tools and techniques and methods used to achieve various research objectives have been discussed.
4.1 The Data and the Sample:
The study is primarily exploratory as well as descriptive and is focused on two countries India and Bangladesh.

India:
India is home to 1.2 billion people as of 2010. India constitutes approximately one sixth of the world’s total population. It is the world’s largest democracy and a key emerging market alongside China, Brazil and Russia. In terms of purchasing power parity (PPP) India is the world’s sixth largest economy as on 2009-10. The country’s growth is also strong, with real GDP growing in by 7.2% in 2009-10 and exports touching US$ 200 billion in the same period. The picture presented shows an environment where wealth is increasing for the nation but question remains whether it is accruing to all citizens.

Microfinance is one development approach that can contribute to achieving the national and international goal of improving the livelihoods of those Indians that are not yet seeing the benefits of growth. Therefore, it is important to see whether these institutions are sustainable in the long run or not.

Bangladesh:
Bangladesh has made significant strides in its economic sector since independence in 1971. However, Bangladesh’s poverty rate remains high, with nearly half of its 147 million people living below the poverty line. GDP equalled US $ 89 billion with a growth rate of 6% in the year 2009. The per capita income was US $ 1300 in the same period.

Bangladesh has done some pioneering work in the field of microfinance and, a significant contribution to the development of the country has been made by the several MFIs. Today Bangladesh is the home to the most extensive microfinance operations in the world. Starting from the resource of few pennies and with the clients in double digit counts, microfinance movement gained such a momentum that it has not only made great strides in Bangladesh in delivering financial services to the poor, specially women, but also has become a pioneer in the developing world. There are many MFIs working in Bangladesh and in the other parts of world, which have differences in their organizational structure and working methodology, but they all work on the common theory, philosophy and goal. Hence it is interesting to compare the financial performance of the countries (India and Bangladesh) on various financial indicators.

Data:
The population for the study is all MFIs of India and Bangladesh. The data has been sourced
from Microfinance Information Exchange, USA. The sample period undertaken for study of each objective is from the year 2005-06 to 2009-10. For the third objective, the data is taken for the year 2009-10. In some cases the data is not available. Therefore, in order to fill the missing data, the average of the latest two year’s data have been taken.

In this study, it is proposed to do a comparative analysis of the financial performance of microfinance institutions of India and Bangladesh. For this purpose a comprehensive financial performance indicators model used by MIX have been chosen after doing a comparative analysis of different models used by worldwide MFIs networking institutions. The comparative study of these models is shown in the Appendix-D.1. The data on the indicators, which have been explained in the following chapter 4.2 under the head “models and techniques”, have been taken from MIX data base (www.mixmarket.org)

Sample Frame:
The sample frame is the list of target population. The sample frame in this study is all those MFIs of India and Bangladesh which are reporting their performance data to Microfinance Information Exchange (MIX) USA.

Sample Size:
Further to do a comparative analysis of the financial performance, the data on 26 microfinance institutions (MFIs) of India and 26 microfinance institutions of Bangladesh are collected from the Microfinance Information Exchange (MIX), a not-for-profit private organisation that aims to promote information exchange in the microfinance industry. The database contains observation per institution from the Year 2005-06 to the Year 2009-10 for both the countries. The list of the sample companies is appended as Appendix-A.1 and A.2. For the analysis of the performance of Indian NGO and Indian NBFC, the sample size is 20 each for NGO and NBFC. The list of the sample of NGO MFIs and NBFC MFIs is appended as Appendix-A.3.

Similarly, the samples of 14 Young MFIs, 14 Mature MFIs and 12 Old MFIs have been chosen to analyze the performance of age-wise Indian MFIs. The list of the sample companies of Young, Mature and Old MFIs have been appended to the Appendix-A.3.

Sampling Technique and Procedure:
The institutions selected, are based in large part on the quality and extent of their data. The quality of the MFIs have been seen and judged on the basis of their legal form, their age and the frequencies with which theses MFIs are reporting data to MIX. Some of the MFIs belong to NBFC category while others belong to NGO category. Similarly, MFIs can also be
categorised as Young, Mature and Old. These detailed data enable us to offer a more complete analysis of the performance of MFIs.

Simple random sampling is chosen for analysing the performance of MFIs of India and Bangladesh. Similarly, random sampling is chosen for analysing the performance of NBFC and NGO form of Indian MFIs.

In order to analyse the age-wise performance of MFIs of India, stratified random sampling is chosen. The life cycle approach categorised the MFIs on the basis of their age as under.

i) Age less than ten years - Young MFI.
ii) Age between 10 years and 15 years - Mature MFI.
iii) Age more than 15 years - Old MFIs.

In order to choose 26 MFIs from India and 26 MFIs from Bangladesh, all MFIs reported their data from 2005-06 to 2009-10 to MIX were listed down. In case of India, 70 such MFIs were found while in case of Bangladesh, 26 MFIs reported their data for the period. Each of these 70 Indian MFIs were then given a unique number. Twenty six MFIs were then chosen by simple random sampling method. Same procedure is adopted for the selection of sample for Indian MFIs having Young, Mature and Old age. NGO MFIs and NBFC MFIs are also chosen following the same procedure.

For analyzing the financial performance of NGO MFIs and NBFC MFIs of India, the sample size of 20 for NGO MFIs and 20 for NBFC MFIs have been taken on a random basis. Similarly, on a random basis, 14 Young MFIs, 14 Mature MFIs and 12 Old MFIs have been chosen to analyze the performance of age-wise Indian MFIs.

4.2 Models and Techniques:

For the conduct of the study, MIX model for performance evaluation is used. MIX model contains various financial indicators under eight broad categories which have been explained in the theoretical literature review section. Two categories namely Institutional Characteristics and Macroeconomic Indicators have been excluded, since these categories are not relevant for the financial performance analysis. However, the legal form and the age of MFIs are extracted from the category- Institutional Characteristics to broaden the analysis. One or two financial indicators from each of the remaining six categories are then chosen for the performance analysis. This section discusses different financial indicators to be used under the performance evaluation model of MIX and various tools and techniques used to carry out the research.

4.2.1 Financial Indicators Used For Financial Performance Evaluation:
1. Financing Structure:

**Capital/Assets** = Adjusted Total Equity/Adjusted Total Assets

It indicates how much of a safety cushion the institution has to keep so that creditors are not at risk. It also shows how well the MFI is able to leverage its equity to increase assets through lending. It is usually an important ratio for investors and lenders. Currently all NBFCs are required to maintain Capital Adequacy Ratio to Risk Weighted Assets of 12%. Considering the greater risks in the microfinance sector, the high gearing, and the high rate of growth, Malegam committee on “Issues and Concerns in the MFI Sector” has recommend that NBFC MFIs be required to maintain Capital Adequacy Ratio of 15% and subject to all of the Net Owned Funds should be in the form of Tier I capital.

2. Outreach Indicators

   a) **Number of Active Borrowers:**

   The number of loans extended per year and since inception show the ability of an MFI to reach more clients and achieve a degree of scale. However, effectiveness will also depend on portfolio quality.

   b) **Percent of Women Borrowers:**

   Percentage of Women Borrowers shows the commitment of MFIs towards social welfare and poverty alleviation.

3. Overall Financial Performance indicators

   a) **Return on Assets** = (Adjusted Net Operating Income - Taxes) / Adjusted Average Total Assets.

   Return on Assets is a measure of the productive use of the company’s assets rather than the productive use of a firm’s equity in the case of ROE. ROA is different than ROE in that it measures profitability irrespective of the institution’s underlying funding structure and doesn’t discriminate against MFIs that are funded with equity. Therefore, ROA is a good measurement to compare commercial and non-commercial MFIs. A higher ROA means that the company is generating a higher return from employing their assets. In the case of MFIs, this will generally mean, they are generating a higher return from their loan portfolio. ROA includes the return on the loan portfolio of an MFI as well as other revenue generated from investments and other operating activities. A high ROA will matter to both commercial and noncommercial MFIs because it gives an indication of management’s capability to employ assets productively regardless of the source of funding. Productive assets mean that more is accomplished with the resources the MFI has, something of interest from both a commercial
and social impact standpoint.

b) Return on Equity = (Adjusted Net Operating Income - Taxes) / Adjusted Average Total Equity

Return on Equity is one of the most commonly used financial indicators for publicly held companies and therefore, for commercial for-profit MFIs, it is the most important profitability indicator. ROE measures an MFI’s ability to reward shareholders’ investment, build its equity base through retained earnings, and to raise additional equity investment. For a non-profit MFI, ROE shows its ability to build equity through retained earnings, and increased equity enables the MFI to leverage more financing to grow its portfolio. By excluding donations and non-operating revenues, ROE demonstrates an institution’s ability to generate income from its core financial service activity. ROE tends to fluctuate more than Return on Assets (ROA), defined above, and thus monthly measurements can be misleading. However, managers should look for a positive trend over several years and a similar or better ratio than competitors.

c) Operational Self Sufficiency = Financial Revenue / (Financial Expense + Impairment Losses on Loans + Operating Expense).

The OSS measures how well an MFI can cover its costs through operating revenues. It is the most basic measurement of sustainability, indicating whether revenues from operations are sufficient to cover all operating expenses. OSS focuses on revenues and expenses from the MFI’s core business and thus, reflects the MFI’s ability to continue its operations if it receives no further subsidies. A positive OSS trend can be achieved through growth and increased efficiency. The drives behind OSS should be considered when assessing an MFI. Is increases in OSS is due to larger loan sizes, high yields, low financial expenses, or efficient operations? OSS must be considered within the context of the MFI’s mission.

4. Revenue and Expenses Indicators

a) Yield = Adjusted Financial Revenue from Loan Portfolio / Adjusted Average Gross Loan Portfolio.

The yield on gross loan portfolio measures the ability of MFIs to generate financial revenue from its loan portfolio. Therefore the higher yield means the higher interest rate the MFIs are charging from its borrowers.

5. Efficiency Indicators

a) Operating Expense/Loan Portfolio = Adjusted Operating Expense / Adjusted Average Gross Loan Portfolio.
This ratio highlights personnel and administrative expenses relative to the loan portfolio and is the most commonly used efficiency indicator. It allows managers to compare quickly administrative and personnel expenses to the MFI’s yield on the gross portfolio. For this reason it is frequently referred to as the efficiency ratio. Lower ratio indicates that the MFI is more efficient in operation. Thus, MFIs should strive to have a downward trend in this ratio even when portfolio growth is flat. While this ratio may fluctuate from month to month, it should decline from year to year.

b) **Borrowers per Staff Member** = Adjusted Number of Active Borrowers / Number of Personnel.

This ratio is defined as the overall productivity of the MFI’s personnel in terms of managing clients, including borrowers, voluntary savers, and other clients. Since MFIs may want to create caseload targets for loan officers, this ratio is an easy and effective way to measure progress against such targets. The ratio will increase until it reaches the optimal range and plateau, but plateaus can be surpassed through structural or technological changes. The ratio should also be evaluated in light of portfolio at risk to ensure that productivity gains are not at the expense of asset quality.

6. **Risk and Liquidity Indicators:**

a) **Portfolio at Risk > 30 days** = (Outstanding balance, portfolio overdue > 30 days + renegotiated portfolio) / Adjusted Gross Loan Portfolio.

PAR is the most accepted measure of portfolio quality since the primary asset of an MFI is its gross loan portfolio. The most common international measurements of this ratio is PAR > 30 days and PAR > 90 days. PAR is important because it indicates the potential for future losses based on the current performance of the loan portfolio. PAR is the most widely accepted measure of loan performance in the microfinance industry. The ratio also includes renegotiated loans which prevents hiding troubled loans through rescheduling or refinancing and indicates a higher level of risk associated with clients that have had repayment problems. When referring to PAR, the number of days should always be specified. For the purpose of this study PAR > 30 days, the most common measure, will be used for all MFIs. PAR should be low and fairly stable for an MFI.

4.2.2 **Mann-Whitney U Test:**

In statistics, the Mann-Whitney U test (also called the Mann-Whitney Wilcoxon (MWW) or Wilcoxon rank-sum test) is a non-parametric statistical hypothesis test for assessing whether one of two samples of independent observations tends to have larger values than the other. It
is one of the most well-known non-parametric significance tests. It was proposed initially by the German Gustav Deuchler in 1914 (with a missing term in the variance) and later independently by Frank Wilcoxon in 1945, for equal sample sizes, and extended to arbitrary sample sizes and in other ways by Henry Mann and his student Donald Ransom Whitney in 1947.

Before testing the hypothesis using parametric test, the normality of data is checked. It has been found that the performance data on all indicators for both countries India and Bangladesh were not normally distributed. The descriptive statistics of the normality have been shown in Appendix B.8. Therefore, parametric test is more preferred for hypothesis testing. In case of independent two samples, the Mann-Whitney U test is applied.

The formula of U –statistics is:

\[ U_1 = R_1 - \frac{n_1(n_1 + 1)}{2} \]

Where \( n_1 \) is the sample size for sample 1, and \( R_1 \) is the sum of the ranks in sample 1.

It may be noted that there is no specification as to which sample is considered sample 1. An equally valid formula for \( U \) is

\[ U_2 = R_2 - \frac{n_2(n_2 + 1)}{2} \]

The smaller value of \( U_1 \) and \( U_2 \) is the one used when consulting significance tables.

This study compares the means of various performance indicators of two independent samples of the MFIs of India and Bangladesh. In this case of comparing the means of two countries sample data, where the data is not normally distributed standard, two sample independent Mann-Whitney U test is more suitable. The SPSS software is used for testing the hypothesis concerning means.

Similarly, the performance of NBFC and NGO forms of Indian MFIs has been analysed. The two samples independent Mann-Whitney U tests are implemented as the distribution of data of NBFC and NGO on all financial indicators are not normal. The SPSS software is used for testing the hypothesis concerning means.

4.2.3 Kruskal–Wallis One Way ANOVA:

In statistics, the Kruskal–Wallis one-way analysis of variance by ranks (named after William Kruskal and W. Allen Wallis) is a non-parametric method for testing whether samples originate from the same distribution. It is used for comparing more than two samples that are independent, or not related. The parametric equivalence of the Kruskal-Wallis test is the one-way analysis of variance (ANOVA). The factual null hypothesis is that the populations from
which the samples originate have the same median. When the Kruskal-Wallis test leads to
significant results, then at least one of the samples is different from the other samples. The
test does not identify where the differences occur or how many differences actually occur. It
is an extension of the Mann–Whitney U test to 3 or more groups. The Mann-Whitney would
help analyze the specific sample pairs for significant differences.

Since it is a non-parametric method, the Kruskal–Wallis test does not assume a normal
distribution, unlike the analogous one-way analysis of variance. However, the test does
assume an identically shaped and scaled distribution for each group, except for any difference
in medians.

The formula for the Kruskal–Wallis H-test statistic is

\[
H = \frac{12}{n(n+1)} \sum \frac{T_i^2}{n_i} - 3(n+1)
\]

Where:  \( T_i \) = rank sum for the \( i \)th sample \( i = 1, 2, \ldots, k \)

\( n \): The total number of observations across all groups

\( n_i \) : The number of observation for \( i \)th sample

For sample sizes of five or greater, the rejection region for \( H \) is based on the chi-square
distribution with \((k - 1)\) degrees of freedom.

The test does not identify where the differences occur or how many differences actually
occur. It is an extension of the Mann–Whitney U test to 3 or more groups. The Mann-Whitney
would help analyze the specific sample pairs for significant differences.

In this study, the three age categories are Young, Mature and Old microfinance institutions.
To compare the performance on various financial indicators (dependent variable) of age-wise
Indian MFIs, Kruskal–Wallis H test has been used. After checking the normality test using
Kolmogorov-Smirnov test and homogeneity of variance using Levene statistics (refer
Appendix B.5), it was found that the data is neither normally distributed nor the variance of
the population is homogeneous. Thus, these data are more appropriately analyzed using the
non-parametric Kruskal-Wallis H test than the parametric independent measures ANOVA.
The SPSS software is used to test the null hypothesis which states that there is no difference
among the age groups, and therefore the scores will not cluster systematically.

4.2.4 Multiple Linear Regression Analysis:
Multiple linear regression [45], [46] is the technique of estimating the value on criterion
variable from values on two or more other variables.

The formula for the multiple linear regression:

\[
\text{4.2.4 Multiple Linear Regression Analysis:}
\]
\[ Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots \text{etc.} \]

The various \( \beta \) (un-standardized regression coefficients) and \( X \) refer to the variables being included in the equation.

**Multicollinearity:**

A very high correlation between independent variables is known as multicollinearity. This implies the two variables are measuring the same variance and will over-inflate \( R \). Therefore only one of the two is needed. The Variance Inflation Factor (VIF) measures the impact of collinearity among the independent variables in a multiple regression model on the precision of estimation. It expresses the degree to which collinearity among the predictors degrades the precision of an estimate. Typically a VIF value greater than 10.0 is of concern.

This study proposes to check whether outreach, asset quality, age etc. of MFIs of India and Bangladesh affect the sustainability or not. It also proposes to find out the financial indicators that affect the sustainability so that they can be taken to develop the sustainability index model proposed in the third objective.

To understand the relationship between sustainability and performance indicators a Multiple Linear Regression analysis is carried out in respect of Indian MFIs and the MFIs of Bangladesh for the financial indicators data of 5 years i.e. from 2005-06 to 2009-10.

A multiple regression equation can be expressed as:

\[
Y = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} + \beta_8 X_{8it} + \epsilon_i \quad \text{--------------- (1)}
\]

Where:

- \( Y \) = dependent variable \{ (Operational Self Sufficiency (OSS) in percentage for firm ‘i’ during time period ‘t’)
- \( \alpha_i \) = Constant
- \( \beta_1 \) = Regression coefficient of Capital/Assets ratio. As per theory the Capital/Assets ratio is directly proportional to OSS. Higher Capital/Assets ratio means that the MFIs will be able to lend more, which will increase the portfolio size and earning capacities of MFIs. Therefore the sign of the coefficient should be positive.
- \( X_{1it} \) = Independent variable Capital/Assets ratio for firm ‘i’ during time period ‘t’
- \( \beta_2 \) = Regression coefficient of Number of Active Borrowers. It is argued that the increased number of borrowers enhances the sustainability. Therefore, the sign of the coefficient of Number of Active Borrowers should be positive.
- \( X_{2it} \) = Independent variable Number of Active Borrowers for firm ‘i’ during time period ‘t’
- \( \beta_3 \) = Regression coefficient of Yield. Higher Yield indicates that the MFIs are able to charge
higher interest rate from the borrowers. This implies that sustainability will be higher. Therefore, the sign of the coefficient of Yield should be positive.

\[ \beta_4 = \text{Regression coefficient of Operating Expense/Loan Portfolio} \]

Lower ratio indicates that the MFIs are incurring fewer expenses to serve the same client. Therefore, the lower ratio would imply higher OSS. So this coefficient should be negative.

\[ \beta_5 = \text{Regression coefficient of Portfolio at Risk > 30 days} \]

Portfolio at Risk > 30 days is inversely proportional to OSS. Lower PAR > 30 days imply higher OSS. Therefore, the sign of the coefficient of PAR > 30 days should be negative.

\[ \beta_6 = \text{Regression coefficient of Percent of Women Borrowers} \]

It has been conceived that the women are more sincere and honest in utilising the loan amount for the business purpose and repaying the loan. Therefore, the sign of the regression coefficient of Percent of Women borrowers should be positive.

\[ \beta_7 = \text{Regression coefficient of Debt/Equity ratio} \]

It has been found by the studies that capital structure affects the sustainability and have been proven that lower the ratio imply higher sustainability. Therefore, the sign of regression coefficient of Debt/Equity ratio should be negative.

\[ \beta_8 = \text{Regression coefficient of Inception} \]

It has been argued that the outreach of old MFIs are better than the young MFIs and therefore more sustainable. This means that the sign of the regression coefficient of Inception should be positive.

\[ \varepsilon_i = \text{Error term} \]

In order to develop the financial sustainability index model, the outcome of Multiple Regression Analysis is used along with scaling and weighted average. The factors which affect the Operational Self Sufficiency (dependent variable) of Indian MFIS and the MFIs of India will be used in constructing the sustainability index.