Chapter 3

RESEARCH DESIGN

Chapter 3
RESEARCH DESIGN

Chapter 3

Research Design

To obtain accurate and relevant information for solving any research problem, methodology is an important part. This chapter presents various aspects of the research methodology. It discusses the research methodology adopted for the analysis of primary and secondary data with the detailed discussion of the collection procedure of primary and secondary data. This chapter is divided into two sections: Section 1 deals with research methodology used for analysis of secondary data to evaluate the overall performance of MFIs working in different states of India and Section 2 deals with the research methodology used for analysis of primary data to understand the effect of various variables on loan portfolio and the behaviour and experience of bank's frontline workers and bank's facilitators.

SECTION I

Research Methodology: For Analysis of Secondary Data

This section presents discussion on the data source and sample, methodology adopted and statistical tools applied for analysis of the secondary data. An attempt is made to present the data regarding all MFIs working in different states of India with important financial indicators to distinguish the financial status of each MFI of India.

3.1 Sources of Data

The data are collected from three different sources *viz.* MIX Market, Sa-dhan and Microfinance India: State of the Sector Report. Following paragraphs discuss the details about the sources.

3.1.1 MIX Market

mix Market is the premier source for objective, qualified and relevant microfinance performance data and analysis. Incorporated in 2002, MIX is a non-profit organization headquartered in Washington, DC with regional offices in Azerbaijan, India, Senegal and Peru. Committed to strengthening financial inclusion and the microfinance sector by promoting transparency, MIX (Microfinance Information Exchange) provides objective, qualified and relevant performance information on microfinance institutions (MFIs), funders, networks and service providers dedicated to serving the financial sector needs for low-income clients. MIX provides instant access to

financial and social performance information covering approximately 2,000 MFIs around the world. MIX's Publications, Micro Banking Bulletin and MIX Microfinance World, feature through and timely analysis based on qualified data and research. MIX access one-stop market-level summaries for 110 countries that integrate data from MIX and external sources. MIX continuously updates information with interim as well as annual financial and social performance data. MIX also awards diamond rankings to indicate the level of transparency of each MFI on MIX Market.[1]

MIX presents a range of data on MFIs, from financial and operational data, to data on social performance, products and funding structure. Through a prioritization process reviewed and validated by regional microfinance experts, MIX Market displays MFI profiles from developing markets that are most representative of microfinance at each geographical level rather list all MFIs in the world. MIX collects financial and operational data from MFIs and partners using original source documents, such as audited financial statements, supported by additional questionnaires when necessary. Data collection is based on microfinance industry reporting standards and aligned with International Financial Reporting Standards (IFRS). To ensure the accuracy of submitted data, MIX's database review system conducts more than 135 quality checks. The financial data includes balance sheets, income statements and data found in the relevant notes to those statements, including detailed portfolio report information. MIX reviews data against audits and ratings and uses trend data and industry benchmarks for accuracy. Data is further reviewed against more than 150 business rules to identify potential reporting errors. All data submitted from an individual MFI can be viewed on each individual MFI's MIX Market profile. All data submitted to MIX is submitted on a voluntary basis so if one finds data is missing on an MFI's profile, it means the institution did not submit that data to MIX or the institution is no longer in operation.[2]

3.1.2 Sa-Dhan

Sa-Dhan Founded as the Association of Community Development Finance Institutions by SEWA Bank, BASIX, Dhan Foundation, FWWB, MYRADA, RGVN, SHARE and PRADAN in 1999, Sa-Dhan's membership has now grown to 240 with the collective loan outstanding and outreach in excess of Rs. 20,913 Crores and 2.68 crores poor, respectively. The Microfinance sector in India is still evolving and witnessing increasing entry of new players. Hence, Sa-Dhan as the designate national association of Community Development Finance Institutions (CDFIs) represents an "emerging but

rapidly growing sector". Given the nascent nature of the sector, Sa-Dhan has a crucial role to play in increasing capacities, affecting the evolution and adoption of best practices, increasing the number of service providers and contributing to improving the policy and operational context for Microfinance in India.[3]

3.1.3 Microfinance India: State of the Sector Report

It is an annual publication (Ford Foundation, Sage Publication, Access Publications etc.) on the microfinance sector which measures the growth and performance based on different criteria. Additionally the report makes documents regarding recent developments, analyzes the issues, and identifies policy choices with the overall objective of understanding the microfinance sector. Moreover, the report also makes available the statistical data on growth performance, different segments of the population and expansion across regions. By going through this report, one can understand operational climate and new innovations deeply that have been adopted during the recent year. Ultimately the *Microfinance India: State of the Sector Report* is the appreciated reference document for researchers, practitioners and policy makers in the microfinance sector (Based on the reports from the year 2007 to 2012).

3.2 Methodology Adopted

From the source MIX Market, information available for 190 MFIs from the different states of India has been collected for the date 31st March 2012. Additionally for each MFI, information of 12 different financial indicators is also collected. From the source Sa-Dhan, Microfinance Map of India 2012 is available with the information of 230 MFIs having detail of two financial indicators. Those data of 230 MFIs are collected. For having an overall idea about the microfinance sector, Microfinance India State of the Sector Report, from 2006 to 2012 has been studied.

To examine the financial status of the MFIs, basic statistical tools such as proportion and average are used through the data of important financial indicators. To compare the data from various sources proportion with 100% stacked column chart is used. To have a comparative idea about the different MFIs from different sources, map of India with state wise distribution of MFIs has been presented.

3.3 Limitations of the Study

Only those MFIs, available at MIX, Sa-dhan and Microfinance India State of the Sector Report, are analyzed as part of analysis of secondary data. Hence, MFIs not reported to any of the above sources could not be included for this study.

SECTION II

Research Methodology: For Analysis of Primary Data

This section intends to discuss the research methodology adopted for analysis of primary data. Following paragraphs discuss – scope and coverage of the research study, research design of the research study, collection of primary data, sampling decision, a brief about structured questionnaires, hypotheses, methodology adopted and limitations of the study.

3.4 Sample Selection

3.4.1 Sample Selection: Organisation

Based on the study of the secondary data, it was found that SEWA Bank is the oldest microfinance provider in India and thereby also in Gujarat. The study area, **Gujarat**, is located on the western coast of India with the longest coast line of 1,600 km. Gandhinagar is the Capital of Gujarat and Ahmedabad is the Commercial Capital of Gujarat. Census Data 2011 shows that Gujarat has total population 6.03 crores (approx 4.99% of total Indian population) with literacy rate 79.31%. Urban Population of the state is 42.6% and Rural Population is 57.4%.[4] However, in 2009-10 (Tendulkar Methodology), total 136.2 lakhs (23%) people found living below poverty line. Among them, 91.6 lakhs (26.7%) were living in Rural area while 44.6 (17.9%) lakhs were living in Urban area.[5]

Sample area, **Ahmedabad**, is the most populated **district** in Gujarat State having total population of 7,214,225. Among them 15.96% (1,151,178) is the rural population while 84.04% (6,063,047) is the urban population.[6] The population of **Ahmedabad City** is 5,570,585.[7] As the researcher is also located in Gujarat, it was considered most appropriate to take up detailed study of this oldest microfinance provider of India *i.e.* **SEWA Bank.**

SEWA Bank- Ahmedabad: Started in 1974 with a simple savings and a simple loan account SEWA Bank has evolved into a composite financial institution offering a variety of savings and recurring deposit accounts, fixed deposits and secured and unsecured loans. On recognizing the diversity of occupational, economic and social backgrounds of SEWA Bank members with their very different financial requirements and made group lending suboptimal in the urban context, SEWA was one of the first MFIs to take the more challenging path of individual lending.[8]

In view of the data, it was decided to take **individual lending model** (different lending models of MFIs are discussed in Chapter 5) of the SEWA bank as a sample for the purpose of the study. However, SEWA bank is working in the urban area and rural area both but individual lending model is used only in urban area of SEWA bank. Thus, only **Urban Area of the SEWA Bank** is selected as a sample for the study purpose.

It was decided to conduct informal interviews with authorities of the SEWA bank to understand the individual lending model of the SEWA Bank.

At SEWA Bank, most of the loans are given as per the model (Exhibit 3.1) where there is a chain of SEWA bank to hand holder to banksathi to borrower. Hand holder is a bank's facilitator who monitors the Banksathi. Banksathi is the bank's frontline worker. She comes from the same communities of the borrowers and lives alongside them in the same neighbourhoods. Banksathi collects the cash from the borrowers whether it is loan instalment or saving scheme instalment. There are different Hand Holders and different Banksathis for different areas of the city. Other delivery model (Exhibit 3.2) is used only in the area where Banksathi is not available. For this the loan process is like SEWA bank to Hand Holder to Borrower.

Exhibit 3.1 Lending Through Banksathis

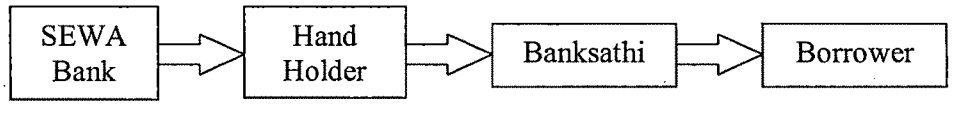


Exhibit 3.2 Lending Without Banksathis

Accordingly **Hand Holders (HH), Banksathis (BS) and Borrowers (BRWR)** are found to be the key players of the individual lending model of the SEWA bank. Hence, the three groups of people *viz.* borrowers; bank's frontline workers- *i.e.* banksathis and bank's facilitators- *i.e.* hand holders are selected as a important segment for the purpose of the research study. The primary data was collected through structured schedules as the researcher has to deal with the poor people and majority of them have been observed with low level of education.

3.4.2 Sample Selection: Components

As per the data provided by the SEWA bank (as on 13-05-2009), total number of Hand Holders, Banksathis and Borrowers were available as 17, 83 and 20,282 respectively.

3.4.3 Sampling Procedure: Pilot Survey

For data collection through questionnaire, it is always recommended to test the questionnaire. Considering that, based on informal interviews with office bearers of SEWA Bank, questionnaire was prepared. However, before going for final data collection, it was tested, by carrying out pilot survey of limited numbers of HHs, BSs and BRWRs from all 5 branches (including head office) of the SEWA bank. As per the guidance of the loan recovery officer, 5 HHs, 6 BSs and 59 BRWRs were selected as a sample for pilot survey (See Table 3.1).

Table 3.1 Branch wise Data Collection for Pilot survey

Name of The Branch	HHs	BSs	BRWRs
Head Office	1	1	10
Vasna	2	2	19
Behrampura	1	1	10
Madhupura	1	1	10
Rakhial	0	1	10
Total	**5**	**6**	**59**

3.4.4 Sampling Procedure: Final Survey

After analyzing the responses collected from pilot survey, the final survey was conducted with modified questionnaires. By way of the adjustment of timing with the SEWA bank, Final Survey of HHs and BSs was done during the month of February-2010 (02-02-2010 to 11-02-2010). While final survey of BRWRs was done during April 2010 to October 2010 (07-04-2010 to 10-10-2010). From this for the purpose of study, 16 Hand holders; 67 Banksathis and 484 Borrowers belonging to 5 branches (including head office) of the SEWA Bank are selected. Detailed discussion of the sample selection procedure of HHs, BSs and BRWRs is presented in the following lines.

A Hand Holders (HHs): Total 17 HHs were available from all branches (including head office) of the SEWA bank. As per the guidance of the SEWA bank, all HHs were selected as a sample for final survey. However, one HH from Madhupura branch was not available at the time of survey due to retirement from the job. Hence, data was collected from remaining 16 HHs. (See table 3.2) Thus, in the case of HH, sample selection was entire population.

Table 3.2 Final Survey: Sample Selection of Hand Holders

Name of the Branch	Total HHs/Selected HHs	Collected HHs
Head Office	2	2
Vasna	2	2
Behrampura	4	4
Madhupura	5	4
Rakhial	4	4
Total	**17**	**16**

B Banksathis (BSs): Out of total 83 available banksathis, some of them were found inactive and some of them even though active but not available. The remaining BSs were found active as well as available at the time of survey. Hence, as per the guidance of the SEWA Bank, only active and available BSs are selected as a sample. Table 3.3 shows the sample selection for the final survey.

Table 3.3 Final Survey: Sample Selection of Banksathis

Name of the Branch	Total BSs	Active & Available	Active & Not Available	Inactive
Head Office	8	8	0	0
Vasna	6	5	1	0
Behrampura	23	20	2	1
Madhupura	26	17	7	2
Rakhial	20	17	2	1
Total	**83**	**67**	**12**	**4**

- *Active & Available*: One who was in working position and available at the time of data collection of final survey.
- *Active & Not Available*: One who was in working position and/or had working experience less than one year. Time period considered for working experience was up to February 2010.
- *Inactive*: One who was not in working position at the time of final survey. Either they left the job or they were rusticated from the SEWA Bank.

Thus, in case of BSs also 100% of active and available BSs are selected as sample. Thus, for all practical purpose, it can be termed as 100% sample selection. Considering the records it is 80.72% (67/83).

C Borrowers (BRWRs): As it was very difficult to find a specific study on loan repayment behaviour, defaults in repayment and NPA, the study mainly intended to focus on the loan repayment performance of the borrowers of the SEWA Bank. For this purpose borrowers are selected from different categories of NPA. In the first step, as per the guidance of the SEWA Bank, BSs were selected as per their total number of NPA accounts. In the second step, BRWRs are selected (from different categories *viz.* Standard A, Standard B, Sub standard, Doubtful 1, Doubtful 2 and Doubtful 3) from those particular areas of BSs. In case of non-availability of any borrower from particular category, the borrower was replaced by other preceding category. Table 3.4 explains the procedure of selection of BRWRs in detail.

Table 3.4 Final Survey: Sample Selection of Borrowers

BSs with No. of NPA Account	No. of BRWRs Taken
1 ≤ 50	5
51 ≤ 100	10
Above 100	15

Categories of NPA	Explanation	No. of BRWRs Taken			Total BRWRs Taken for all Branches
		1 ≤ 50	51 ≤ 100	Above 100	
Standard A	Regular repayment	0	0	1	24
Standard B	Skip instalments for 0-90 days	1	2	2	65
Sub Standard	Skip instalments for 91-457 days	1	2	3	123
Doubtful 1	Skip instalments for 458-823 days	1	2	3	117
Doubtful 2	Skip instalments for 824-1554 days	1	2	3	106
Doubtful 3	Skip instalments for above 1555 days	1	2	3	49
Total		**5**	**10**	**15**	**484**

3.5 Data Collection

As mentioned in preceding para, for the purpose of data collection, structured questionnaires were prepared for all three target groups *viz.* Borrowers, Banksathis and Hand Holders respectively. Following para presents the logical aspects of the questions.

3.5.1 Questionnaire for Borrowers of the SEWA Bank

The questionnaire *(Appendix-1)* of borrowers included twenty one questions. Among them, question numbers one to seven contained the borrower's personal information. Question number eight, nine and ten contained the information about the borrowers' family members and their earnings. Question numbers eleven to thirteen were to know the decision making power of the borrower in her family. Question number fourteen and fifteen included the information regarding saving habits of the borrowers. Question sixteen and seventeen were asked to know the awareness about training programme. Question number eighteen was about the repayment schedule of the borrower. Question numbers nineteen and twenty included the details about borrowers' unsecured loan and secured loan. Last question was about the defaults in repayment and the reasons behind defaults.

3.5.2 Questionnaire for Banksathis of the SEWA Bank

Twenty five questions were framed in the questionnaire *(Appendix-2)* of banksathi. First eleven questions (except question 5) for banksathi were similar to the questionnaire of hand holder (*i.e.* question 1 to 10). Question number twelve was asked to know about the periodicity for collection of loan instalments. Question numbers thirteen to nineteen were again similar to question numbers eleven to sixteen of the questionnaire of hand holder. Question number twenty gathered the personal view about

the training given to the customers in the SEWA bank. Question number twenty one was asked to know the personal view if banksathi have ever been replaced with the other banksathi. Question number twenty two contained the detail about types of loan account opened by banksathi. At last, question numbers twenty three to twenty five were framed to gather the information about steps to be followed if borrower makes default, major reasons for default in repayment among borrowers and effects of defaults on the functions of the bank respectively.

3.5.3 Questionnaire for Hand Holders of the SEWA Bank

The questionnaire *(Appendix-3)* for hand holder included twenty two questions. Question one to seven included personal detail of hand holder and basic detail of her working profile in the SEWA bank. Question eight to ten were regarding loan disbursement procedure. Question number eleven and twelve contained the details about various types of loan products. Question numbers thirteen to sixteen were framed for collecting information regarding one of the loan products 'Daily Loan Collection' as a special focus. Question number seventeen was framed to know the personal view of hand holder about training given to the customers in the SEWA bank. Question numbers eighteen to twenty two were put to know personal views regarding monitoring of banksathi, steps to be followed if borrower make default, the negative effects of default on the functions of the bank and reasons for default in repayment of loan among the borrowers.

3.6 Processing of the Data and Analytical Design

The duly filled in the questionnaires were edited to detect any defect or error, to improve reliability of the analysis.

For analysis and interpretation, it was important to classify the raw data. Classification involves the distribution of collected data into different categories. As the questionnaire was structured and the response categories were pre determined, the different questionnaires for the different response categories were prepared. The structure of the questionnaire was mixed one having open ended, close ended as well as information sharing type of questions.

When a mass of data are assembled, it becomes necessary for the researcher to arrange the same in some kind of concise and logical order. This procedure is referred to as tabulation. Thus, tabulation is the process of summarising raw data and displaying the same in compact form (*i.e.* in the form of statistical tables) for further analysis.[9] In a broader sense, tabulation is an orderly arrangement of data in columns and rows. In the

present survey, tables of three response categories have been prepared and the data collected were classified and tabulated according to socio-demographic factors, economic factors, loan related factors and factors related to financial literacy of the borrowers.

3.7 Hypotheses

To understand the repayment behaviour of BRWRs, 17 hypotheses are framed to apply chi-square test (section 3.7.1) and to understand the difference between proportions of defaults for groups, 17 hypotheses are framed to apply *z*-test (section 3.7.2). This resulted into 34 hypotheses. Hypotheses for BRWRs are framed covering four major factors *viz.* "socio-demographic factors", "economic factors", "loan related factors" and "factors related to financial literacy". Moreover, to understand the similarity of the opinions between BSs and HHs, 7 hypotheses are framed (section 3.7.3).

3.7.1 Hypotheses for Borrowers (Based on Chi-square test)

For examining the effects of different factors on level of defaults among the borrowers following factors have been tested by dividing into for different types *viz.* Socio Demographic Factors, Economic Factors, Loan Related Factors and Factors Related to Financial Literacy of the Borrowers.

3.7.1.1 Socio Demographic Factors

Borrowers' repayment behaviour and/or capacity are dependent on their social factors too. Accordingly, it is important to know how social factors affect on the repayment behaviour of BRWRs. For examining the association between socio demographic factors (*viz.* Age, Religion, Marital Status, Education Level, Household Situation, Decision to take the loan, Decision to use the loan and Decision to use the profit) with number of defaults following 8 hypotheses are tested through chi-square test.

H_{01} There is no relationship between borrower's age and number of defaults.

H_{02} There is no relationship between borrower's religion and number of defaults.

H_{03} There is no relationship between borrower's marital status and number of defaults.

H_{04} There is no relationship between the level of education and the number of defaults.

H_{05} There is no relationship between the varying proportion of earning members in the borrower's family and the number of defaults.

H_{06} There is no relationship between person making decision to take the loan and the number of default.

H_{07} There is no relationship between person making decision to use the loan and the number of default.

H_{08} There is no relationship between person making decision to use the profit and the number of default.

3.7.1.2 Economic Factors

This part deals with three factors *viz.* uncertainty of borrower's income, annual per capita income of the borrower and borrower's habit of regular savings. To examine the economic factors with number of defaults following 4 hypotheses were tested using chi square test.

H_{09} There is no relationship between level of certainty of income and number of default.

H_{010} There is no relationship between borrower's level of income and number of defaults.

H_{011} There is no relationship between borrower's habit of regular saving (in other than SEWA Bank) and number of defaults.

H_{012} There is no relationship between borrower's habit of regular saving (in SEWA Bank) and number of defaults.

3.7.1.3 Loan Related Factors

Under this head three factors have been tested to know the relationship with level of defaults such as amount of loan, purpose of the loan and frequency of borrowings. Following hypotheses were tested using chi square test.

H_{013} There is no relationship between the amount of loan and number of default.

H_{014} There is no relationship between purpose for which loan is taken and number of defaults.

H_{015} There is no relationship between frequency of borrowings by the borrowers and number of defaults.

3.7.1.4 Factors Related to Financial Literacy of the Borrowers

This part deals with two factors *viz.* borrowers with proper training and borrowers with awareness about rates of interest charged on loan taken by them. To examine these factors with number of defaults following hypotheses were tested making use of chi square test.

H_{016} There is no relationship between borrower's training and number of defaults.

H_{017} There is no relationship between borrower's awareness about rates of interest and number of defaults.

3.7.2 Hypotheses for Borrowers (Based on Difference between Proportions)

For examining the difference between the proportions of defaults among various groups of factors, following hypotheses were tested using *z* test. Hypotheses were tested for the said major factors *viz.* socio demographic factors, economic factors, loan related factors and factors related to financial literacy as discussed in the preceding paras.

3.7.2.1 Socio Demographic Factors

H_{018} There is no significant difference in the proportion of default between various age groups.

H_{019} There is no significant difference in the proportion of default between borrowers following different religions.

H_{020} There is no significant difference in the proportion of default between various marital statuses of borrowers.

H_{021} There is no significant difference in the proportion of default between various education levels.

H_{022} There is no significant difference in the proportion of default between varying proportions of earning members in the borrowers' family

H_{023} There is no significant difference in the proportion of default between various groups of persons making decision to take loan.

H_{024} There is no significant difference in the proportion of default between various groups of persons making decision to use loan.

H_{025} There is no significant difference in the proportion of default between various groups of persons making decision to use profit.

3.7.2.2 Economic Factors

H_{026} There is no significant difference in the proportion of default in the loans taken by borrowers pursuing different economic activities.

H_{027} There is no significant difference in the proportion of default in loans taken by borrowers at various levels of annual per capita income.

H_{028} There is no significant difference in the proportion of default between groups of regular and irregular savers (other than SEWA bank).

H_{029} There is no significant difference in the proportion of default between groups of regular and irregular savers (in the SEWA bank).

3.7.2.3 Loan Related Factors

H_{030} There is no significant difference in the proportion of default between various levels of amount of loan.

H_{031} There is no significant difference in the proportion of default between various purposes of loan.

H_{032} There is no significant difference in the proportion of default between various levels of frequency of borrowing by the borrowers.

3.7.2.4 Factors Related to Financial Literacy of the Borrowers

H_{033} There is no significant difference in the proportion of default between groups of trained and non-trained borrowers.

H_{034} There is no significant difference in the proportion of default between groups of aware and non-aware borrowers about the rates of interest.

3.7.3 Hypotheses for Banksathis and Hand holders

To examine the similarity between opinions of Banksathis and Hand holders following common and comparative aspects have been tested such as 1) Factors to decide loan amount; 2) Reasons: Daily loan not in use; 3) Steps: If borrowers make default; 4) Reasons of defaults: BSs v/s HHs; [this aspect was also common and comparable with opinions of BRWRs. Therefore, following aspects were also tested *viz.* 5) Reasons of defaults: HHs v/s BRWRs and 6) Reasons of Defaults: BSs v/s BRWRs] and; 7) Effects of defaults on the bank.

To examine the above aspects seven hypotheses are framed.

H_{01} There is no similarity of opinions between BSs and HHs regarding factors to decide loan amount.

H_{02} There is no similarity of opinions between BSs and HHs regarding reasons for daily loan collection not in use.

H_{03} There is no similarity of opinions between BSs and HHs regarding steps to be followed in case of default.

H_{04} There is no similarity of opinions between BSs and HHs regarding reasons of defaults.

H_{05} There is no similarity of opinions between HHs and BRWRs regarding reasons of defaults.

H_{06} There is no similarity of opinions between BSs and BRWRs regarding reasons of defaults.

H_{07} There is no similarity of opinions between BSs and HHs regarding negative effects of defaults to the bank.

3.8 Methodology Adopted

The primary data were collected, classified, computerized and tabulated. Descriptive statistics *viz.* frequencies, percentage and arithmetic mean are used to analyze the responses of primary data. Pie charts are used to present the data. To test the above hypotheses various statistical tools are applied. Following paragraphs discuss the same.

➔ **Methodology adopted for testing of Hypotheses**

For testing of hypotheses regarding responses received from the borrowers, Chi-Square test as well as z test was applied while to examine the similarity of opinions of banksathis and hand holders, Spearman's Rank Correlation Coefficient were applied.

3.8.1 Chi-square as a Non-Parametric Test[10]

Chi-square is an important non-parametric test and as such no rigid assumptions are necessary in respect of the type of population. One requires only the degrees of freedom (implicitly of course the size of the sample) for using this test. As a non-parametric test, Chi square can be used (i) as a test of goodness of fit and (ii) as a test of independence.

As a test of independence, χ^2 test enables one to explain whether or not two attributes are associated. Here, first the expected frequencies are calculated and then the value of χ^2 is computed. If the calculated value of χ^2 is less than the table value at a certain level of significance for given degrees of freedom, one concludes that null hypothesis stands which means that the two attributes are independent or not associated. But if the calculated value of χ^2 is greater than table value, then the inference would be that null hypothesis does not hold good which means two attributes are associated and association is not because of some chance factor but it exists in reality. It may, however, be stated that χ^2 is not measure of the degree of relationship or form of relationship between two attributes, but is simply a technique of judging the significance of such association or relationship between two attributes. χ^2 is calculated as follows for the research study.

$$\chi^2 = \sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

Where O_{ij} = observed frequency of the cell in i^{th} row and j^{th} column.

E_{ij} = expected frequency of the cell in i^{th} row and j^{th} column.

If two distributions (observed and theoretical) are exactly alike, $\chi^2 = 0$; but generally due to sampling errors, χ^2 is not equal to zero and as such one must know the

sampling distribution of χ^2 so that one may find the probability of an observed χ^2 being given by a random sample from the hypothetical universe. Instead of working out the probabilities, one can use ready table which gives probabilities for given values of χ^2. Whether or not a calculated value of χ^2 is significant can be ascertained by looking at the tabulated values of χ^2 for given degrees of freedom [d.f. = (c-1) (r-1) where 'c' means the number of columns and 'r' means the number of rows] at a certain level of significance. If the calculated value of χ^2 is equal to or exceeds the table value, the difference between the observed and expected frequencies is taken as significant, but if the table value is more than the calculated value of χ^2, then the difference is considered as insignificant *i.e.*, considered to have arisen as a result of chance and as such can be ignored.

For testing the hypotheses regarding borrowers, chi-square is calculated with the help of above formula.

3.8.2 *z* test for Difference between Proportion

If two samples are drawn from different populations, one may be interested in finding out whether the difference between the proportion of successes is significant or not. In such a case one takes the hypothesis that the difference between P_1, *i.e.* the proportion of successes in one sample, and P_2, *i.e.* the proportion of successes in another sample, is due to fluctuations of random sampling.[11]

In case of qualitative phenomena, one has data on the basis of presence or absence of an attribute(s). With such data the sampling distribution may take the form of binomial probability distribution whose mean would be equal to $n \cdot p$ and standard deviation equal to $\sqrt{n\,p\,q}$, where p represents the probability of success, q represents the probability of failure such that $p + q = 1$ and n, the size of the sample. Instead of taking mean number of successes and standard deviation of the number of successes, one may record the proportion of successes in each sample in which case the mean and standard deviation (or the standard error) of the sampling distribution may be obtained as follows:

Mean proportion of successes = $(n \cdot p)/n = p$

and standard deviation of the proportion of successes = $\sqrt{\frac{p\,q}{n}}$

If n is large, the binomial distribution tends to become normal distribution, and as such for proportion testing purposes we make use of the test statistic z as under:

$$Z = \frac{\hat{p} - p}{\sqrt{\frac{p\,q}{n}}}$$

where $\hat{p}$ is the sample proportion

If two samples are drawn from different populations, one may be interested in knowing whether the difference between the proportion of successes is significant or not. In such a case, one starts with the hypothesis that the difference between the proportion of success in sample one ($\hat{p}_1$) and the proportion of success in sample two ($\hat{p}_2$) is due to fluctuations of random sampling. In other words, one takes the null hypothesis as H_0: $\hat{p}_1 = \hat{p}_2$ and for testing the significance of difference, one works out the test statistic as under:

$$Z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\frac{\hat{p}_1\hat{q}_1}{n_1} + \frac{\hat{p}_2\hat{q}_2}{n_2}}}$$

where $\hat{p}_1$ = proportion of success in sample one

$\hat{p}_2$ = proportion of success in sample two

$\hat{q}_1 = 1 - \hat{p}_1$

$\hat{q}_2 = 1 - \hat{p}_2$

n_1 = size of sample one

n_2 = size of sample two

and $\sqrt{\frac{\hat{p}_1\hat{q}_2}{n_1} + \frac{\hat{p}_2\hat{q}_2}{n_2}}$ = the standard error of difference between two sample proportions .

Then, one constructs the rejection region (s) depending upon the H_a for a given level of significance and on its basis one judge the significance of the sample result for accepting or rejecting H_0.[12]

3.8.3 Spearman's Rank Correlation Coefficient[13]

Where direct quantitative measurement of the phenomenon under study is not possible, for example, efficiency, honesty, intelligence etc., in such a case Spearman's rank correlation coefficient can be applied. In such a case one may rank or array the different items and apply the Rank Correlation for finding out the degree of correlation. The formula for computing rank correlation is as follows:

$$R = 1 - \frac{6 \sum D^2}{N (N^2 - 1)}$$

Where R denotes coefficient of rank correlation, D denotes the difference between paired ranks and N stands for the number of pairs.

The value of R always remains between -1 to +1. It is the only method of finding out relationship when ranks are given. The greatest use of the method lies in the fact that it enables us to measure the degree of relationship in case of such statistical series as

cannot be quantitatively expressed and where the coefficient of correlation cannot be used.

3.8.4 *t*-test[14]

It is interesting to know whether the calculated correlation coefficient of sample data is indicative of significant correlation. For this purpose one may use (in the context of small samples) normally either the *t*-test or the F-test depending upon the type of correlation coefficient. One uses the following tests for the purpose:

In case of simple correlation coefficient: One uses *t*-test and calculates the test statistic as under:

$$t = r\sqrt{\frac{n-2}{1-r^2}}$$

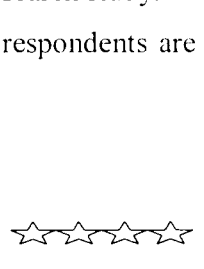
Where r denotes the correlation coefficient and (n-2) is degree of freedom.

This calculated value of *t* is then compared with its table value and if the calculated value is less than the table value, the null hypothesis is accepted at a given level of significance and may infer that there is no relationship of statistical significance between the two variables.

In this research study, *t*-test is applied by using above formula to know the significance of the value of rank correlation coefficient.

3.9 Limitations of the Study

1. The research study is limited only for the state Gujarat and Ahmedabad city.
2. Only urban area of Ahmedabad city is covered here.
3. This study carried out analysis of only one MFI and has studied only one model of microfinance.
4. Although, microfinance provides wide range of financial services, the study has taken only one financial facility – credit facility of the microfinance. .
5. The limitation of the threat of the primary data sources employed to the research project does prevail in this research study.
6. The responses given by the respondents are subject to their personal biases and choices as the case may be.



REFERENCES

1. http://www.themix.org/sites/default/files/MIX%20Brochure.pdf, [Electronic Copy], Accessed on 10-08-2013.
2. http://www.mixmarket.org/about/faqs#general2, [Electronic Copy], p.3, Accessed on 10-08-2013.
3. http://www.sa-dhan.net/#, [Electronic Copy], Accessed on 10-08-2013.
4. http://www.gujaratindia.com/state-profile/demography.htm, [Electronic Copy], Accessed on 29-07-2013.
5. http://planningcommission.nic.in/data/datatable/2504/databook_70.pdf, [Electronic Copy], Accessed on 28-07-2013.
6. http://www.census2011.co.in/census/district/188-ahmadabad.html, [Electronic Copy], Accessed on 10-08-2013.
7. http://www.census2011.co.in/city.php, [Electronic Copy], Accessed on 10-08-2013.
8. Ghate, P. (2007). *"Microfinance in India: A State of the Sector Report, 2007"* (p. 94). Ford Foundation.
9. Kothari, C. R. (2011). *"Research Methodology: Methods and Techniques."* (Second., p 127). New Delhi (India): New Age International Publishers.
10. Kothari, C. R. (2011). Ibid, (Second., pp. 236–238).
11. Gupta, S. P. (2009). *"Statistical Methods"* (Thirty Seventh., p. 897). New Delhi (India): Sultan Chand & Sons.
12. Kothari, C. R. (2011). Ibid (Second., pp. 218–221)
13. C B Gupta. (1978). *"An Introduction to Statistical Methods."* (Eighth., pp. 448–450). New Delhi (India): Vikas Publishing House Pvt. Ltd.
14. Kothari, C. R. (2007). Ibid, (p. 228)