Chapter – Four
Analysis & Interpretation

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Analysis and Interpretation

4.1. Data Frequencies

The data of every participant are classified, converted in numeric format where ever require and entered in worksheets using MS Excel 2007 according to defined categories. All these variables are classified for calculation. Majority of the participants are members of financial organizations even prior to 2010; nearly 336 members are non-borrowers (including very scarce borrowers from Informal Sources) there are 264 participants who are borrowers (of formal source, it may possible some of borrowers' member of Informal Sources).

The Table – 4.1 gives the distribution of borrowers from formal and informal sources of financial support. The table shows that some of participants borrowed from both formal source and other sources also, during same period but more are from formal sources. This shows that households are less likely to participate in the informal financial sources and borrowings from financial source are prominent.

Table – 4.1: Distribution of Borrowers

Source	Financial Organization	Borrowers (Cases = 264)	Total	Remark
Formal Source (FS)	Commercial Bank	198	292	A borrower had Taken Loans More times during the study period (loan frequency)
	Cooperative Bank	52		
	SHG - BLP	42		
Informal source (IS)	SHG	24	161	
	Friends / Relatives	72		
	Moneylenders	53		
	Miscellaneous	12		
From Both Source	FS+IS	7	7	FS > IS

Source: Analysis from Survey Data

This distribution is grouped in the Table– 4.2 (Gender) and Table – 4.3 (Family Type) as percentage values from grouped data respectively. In the Table – 4.2 there are 45% males

and 11% females as non-borrowers from all the three blocks; while there are 36% males and 8% females as borrowers respectively.

Table -4.2 Block wise Borrowers (%) – Gender				
Main Blocks	**Gender**	**Non Borrower**	**Borrower**	**Total**
Ahwa	Male	17.3	14.0	31.3
	Female	4.2	2.5	6.7
Waghai	Male	16.6	10.8	27.4
	Female	4.3	2.3	6.6
Subir	Male	11.5	11.5	23.0
	Female	2.2	2.8	5.0
Total %		**56.0**	**44.0**	**100.0**
All Blocks	**Male**	**45.3**	**36.3**	**81.6**
	Female	**10.7**	**7.7**	**18.4**

Source: Analysis from Survey Data

In the table below Table – 4.3 having 29% non-borrowers are from Joint family and 27% belongs to nuclear families while there are 27% borrowers belongs to Joint family and 17% are from nuclear family respectively.

Table -4.3 Block wise Borrowers (%) – Family Type				
Main Blocks	**Family Type**	**Non Borrower**	**Borrower**	**Total**
Ahwa	Joint	10.0	10.8	20.8
	Nuclear	11.5	5.7	17.2
Vaghai	Joint	12.3	7.7	20.0
	Nuclear	8.5	5.5	14.0
Subir	Joint	7.0	8.2	15.2
	Nuclear	6.7	6.1	12.8
Total %		**56.0**	**44.0**	**100.0**
All Districts	**Joint**	**29.3**	**26.7**	**56.0**
	Nuclear	**26.7**	**17.3**	**44.0**

Source: Analysis from Survey Data

4.2. Statistical Techniques Used

The statistical analysis of the surveyed data depends on their characteristics and interpretations to be drawn. This helps for conclusions and findings of the study. Appropriate statistical techniques used in the study to analyze data since data collected from different districts through survey methods in two different format one normal generic and other based

on *Likert format*. Some of the following statistical techniques used in this (earlier in pilot) study:

- **Top Box Analysis -** In the absence of any benchmark or historical data the research study depends on *top-box* and *top-two-box scores* (boxes mean the response options) e.g. on a five-point scale, counting the number of respondents that selected the most favorable response "strongly-agree" fall into the top box. Dividing this top-box count by the total number of responses generates a top-box proportion. This idea is expressing a strong attitude with a statement used in standard *Likertitem* options (strongly disagree to strongly agree) to other response options.
- **Spearman's rho (correlation coefficient)** - The Spearman's rank-order correlation is the nonparametric data product-moment correlation. Spearman's correlation coefficient, (ρ i.e. rho) measures the strength and direction of association between two ranked variables. These two variables may be ordinal, interval or ratio. The Spearman correlation can be used when the assumptions of the Pearson correlation are markedly violated. However, Spearman's correlation determines the strength and direction of the **monotonic relationship** between two variables rather than the strength and direction of the linear relationship between these two variables, which is what Pearson's correlation determines.
- **Cronbach's alpha test** - Cronbach's alpha is a measure used to assess the reliability, or internal consistency, of a set of scale or test items (surveyed as *Likert data*) i.e. the reliability of any given measurement refers to the extent to which it is a consistent measure of a concept, and Cronbach's alpha (**α)** is one way of measuring the strength of that *consistency*. Cronbach's alpha is computed by correlating the score for each scale item with the total score for each observation (usually individual survey respondents or test takers), and then comparing that to the variance for all individual item scores: The resulting **α** coefficient of reliability ranges from 0 to 1 in providing this overall assessment of a measure's reliability. If all the scale items are entirely independent from one another (i.e., are not correlated or share no covariance), then **α** = 0; and, if all of the items have high covariance, then **α** will approach 1 as the number of items in the scale approaches infinity. In other words, the higher the **α** coefficient, the more the items have shared covariance and probably measure the same underlying concept. Although the standards for what makes a "good" **α** coefficient are entirely arbitrary and depend on your theoretical knowledge

of the scale in question, many methodologists recommend a minimum **α** coefficient between 0.65 and 0.8 (or higher in many cases); **α** coefficients that are less than 0.5 are usually unacceptable.

- **Test for normality** - An appraisal of the normality of data is an imperative pre-requirement for statistical tests as normal data is primary assumptions in parametric testing but the present study has non-parametric data. There are 2 core methods of assessing normality i.e. *graphically and numerically*. Statistical tests have the benefit of constructing an objective judgment (i.e. graphically) of normality, but there are some drawbacks, one of the main reasonsit is not sensitive enough with small sample size and too sensitive to large sample size. The normality tests are additional to the graphical assessment of normality and couple of the tests are Kolmogorov-Smirnov (K-S) test, Lilliefors corrected K-S test, Shapiro-Wilk test, Anderson-Darling test, Cramer-von Mises test, D'Agostino skewness test, Anscombe-Glynn kurtosis test, D'Agostino-Pearson omnibus test, and the Jarque-Bera tests. Considering all these tests the most popular is K-S test
- **Mann-Whitney U-Test –** One of the non-parametric alternative tests to the independent *sample t-test* which is used to compare two sample means drawn from the same population, and used to test whether two sample means are equal or not. Usually, the Mann-Whitney U test is used when the assumptions for the t-test are not met. Sometimes understanding the Mann-Whitney U is difficult to interpret because the results are presented in group rank differences rather than group mean differences. Mann-Whitney U test is a non-parametric test, so it does not assume any assumptions pertaining to any distribution but somehow there are some important assumptions such as :
  - The sample drawn from the population is random.
  - Independence within the samples and mutual independence is assumed. That means that an observation is in one group or the other (it cannot be in both).
  - Ordinal measurement scale is assumed.
- **Levene's Test for Equality of Variances**– it is used to know that variances are equal for all samples when the data arises from a non-normal distribution. The Levene's test also checks the postulation of equal variances priorimplementing a test like One-Way ANOVA. The homogeneity of variance across samples is tested as equal variances named. The assumption for such analysis is that variances of variables are

equal across groups and within. The Levene test is right test to check this assumption and substitute to the Bartlett test. The Bartlett test is more sensitive than the Levene test to departures from normality. The simplest definition of Levene test is

Test of hypothesis H_0: $\sigma 21=\sigma 22=\ldots=\sigma 2k$

H_a: $\sigma 2i\neq\sigma 2j$ may satisfies at least one pair (*i*, *j*).

Where i = 1,2…..k and j = 2, 3, …..n

- **Testing of Hypothesis** – There are only two possible evaluation responses for either a direct a null hypothesis *reject* or *fail to reject*. A null hypothesis is never accepted because one study cannot *prove* the universal truth of a direct or null hypothesis. It also is inappropriate to *partially reject* a hypothesis if the hypothesis is multifaceted i.e. There may several variables in a single statement. This gives two types of errors that can be made in evaluating hypotheses:
  - **Type I Error** – it results when the researcher rejects the null hypothesis when it is in fact true correct.
  - **Type II Error** – it results when the null hypothesis is not rejected when it should have been rejected.
- **Principal Component Analysis (PCA)** – The principal component analysis (PCA) is one of the statistical methods used to know underline variation and patterns in surveyed data. It is a statistical method that uses an orthogonal transformation to convert a set of observations of possibly correlated variables into a set of values of linearly uncorrelated variables called **principal components** or the vital means of variation. The number of principal components always less than or equal to the smaller of the number of original variables or the number of observations.
- **Factor Analysis (FA) - Factor analysis** is a technique that is used to reduce a large number of variables into fewer numbers of factors. This method extracts maximum common variance from all variables and puts them into a common score. As an index of all variables this score can use for further analysis. Factor analysis is part of *general linear model* (GLM) and this method also assumes several assumptions: such as – there is linear relationship, there is no multi co-linearity, it includes relevant variables into analysis, and there is true correlation between variables and factors. There are several methods are available, but principle component analysis is used most commonly.

- **Statistics Associated with Factor Analysis**

1. **Bartlett's test of sphericity** – This test is required to test the hypothesis for all those variables which are uncorrelated in the population; means the population correlation matrix needs to be an identity matrix.
2. **Correlation matrix**–This lower triangle matrix which displays the simple correlations (***r***), between all the possible pairs of variables which are included in this analysis and consist of all the diagonal components equal to 1.
3. **Communality**–The value represent the amount of variance a variable share with remaining other variables. This is the proportion of variance described by the common factors.
4. **Eigen value**–this signifies the total variance explicated by each factor.
5. **Factor loadings**–The values are correlations between variables and factors.
6. **Factor matrix**. It contains the factor loadings of all the variable son all the factors
7. **Factor scores** - Factor scores are composite scores assessed for each respondent on the derived factors.
8. **Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy**–it is employed to know the appropriateness of factor analysis usually high values are in range of 0.5 and 1.0.
9. **Percentage of variance** - The percentage values of the total variance attributed to each factor selected for every component where Eigen values are equal to or more than 1.

- **Kuppuswamy's socio-economic status scale (Appendix –III) -** Socio-economic scales are integral part in the assessment of social class of an individual/family, which can have an influence on various social factors. It is also vital for consideration when customizing health, education to the target audience. Socio-economic scales are dependent on evaluation of income and need to be updated with changing consumer price index. Socio-economic status is defined as an individual's or group's position within a hierarchical social structure. Socioeconomic status depends on a combination of variables, including occupation, education, income, wealth, and place of residence.

- **Discriminant Analysis** Discriminant analysis is a technique that is used by the researcher to analyze the research data when the criterion or the dependent variable is categorical and the predictor or the independent variable is interval in nature. The term categorical variable means that the dependent variable is divided into a number of categories. For example, three brands of computers, Computer A, Computer B and Computer C can be the categorical dependent variable.

  The objective of Discriminant analysis is to develop Discriminant functions that are nothing but the linear combination of independent variables that will discriminate between the categories of the dependent variable in a perfect manner. It enables the researcher to examine whether significant differences exist among the groups, in terms of the predictor variables. It also evaluates the accuracy of the classification.

  These statistical techniques were used to identify the impact and measure of effectiveness of microfinance services through credit, savings and insurance products.

4.3. Data Analysis

The survey data form (**Appendix - IV**) is divided into different parts with respect to different data characteristics and requirements for analysis which were collected from all the participants (borrower and non-borrower). The data collected were entered in worksheet using MS Excel 2007 software and also converting qualitative data into numeric format using code (**Appendix – V**). The basic statistics analysis was carried out for common data such as average, standard deviation, correlation of all other categorical data etc. These data will provide the domain and to analyze impact as per research study objectives. The responses are purely based on participant's perceptions once they were made to understand the questions and filled forms were collected on the spot.

4.3.1 Basic Data Analysis

The average age of all **600**surveyedparticipants (Table - 4.4) is 43.7 years this includes 82.0% male participants with average age 43.1 years and 28.0% of female participants with average age 44.2 years. The participant's ages are grouped in two different groups for further comparison in study i.e. first group of **age < 37** years and second group of **age > 36**. The average age in first group for males is 30.7 years, while female's average age

is 32.2 years and the average age of males in second group is 48.8 years, while female's average age is 50.1 years respectively. In first age group, there are total 177 participants having average age 30.9 and in second age group there are total 423 participants having average age 49.1.

Table – 4.4 Average Age of Participants (in years)

Gender	Number of Participants	Average Age	Age < 37		Age > 36	
			Number of Participants	Average Age	Number of Participants	Average Age
Male	490	43.1	154	30.7	336	48.8
Female	110	44.2	23	32.2	87	50.1
Overall	**600**	**43.7**	**177**	**30.9**	**423**	**49.1**

Source: Analysis from Survey Data

The personal economic level data received from participants were grouped and tabulated in Table – 4.5 as per three different blocks of Dang districts converted in **Kuppuswamy Scale's** format**.** The table shows thatnone of the participants belongs to Upper (I) and Lower (V) level respectively while 21% to Upper Middle (II), 64% to Lower Middle (IIII) and 15% to Upper Lower (IV) respectively.

Table –4.5 Block wise participants for different SES

Kuppuswamy Scale (SES)	Blocks			Total	%
	Ahwa	Vaghai	Subir		
Upper - I	0	0	0	0	**0.0**
Upper Middle - II	52	42	32	126	**21.0**
Lower Middle - III	150	138	96	384	**64.0**
Upper Lower - IV	26	24	40	90	**15.0**
Lower - V	0	0	0	0	**0.0**
Total	**228**	**204**	**168**	**600**	**100.0**
%	**38.0**	**34.0**	**28.0**	**100.0**	

Source: Analysis from Survey Data

In the above table the concept of Kuppuswamy's Scale for SES applied for the data received from participants as per given Table -4.6 below accordingly.

Table – 4.6: Different Indicators for Kuppuswamy Scale for SES

Indicator	Very Poor	Poor	Borderline	Self-Sufficient	Surplus
	Lover (V)	**Upper Lower (IV)**	**Lower Middle (III)**	**Upper Middle (II)**	**Upper (I)**
Housing	Homeless / Katcha Rented	Katcha Owned	Katcha Owned / Semi Pucca Rented	Pucca Rented / Semi Pucca Owned	Pucca Owned
Assets	without land, having some house hold items, may have some animals like goat / hens / sheep	having marginal portion of land for farming / few milch animals / fan, radio, bicycle	having small portion of land for farming / few milch and draught animals / fan, radio, bicycle, two-wheeler and TV	having big portion of land for farming / few milch and draught animals / well / tub-well, fan, radio, bicycle, motor cycle, telephone, fridge and TV	having very large land for farming / milch and draught animals / wells / tub-wells, tractor / lorry, fan, radio, bicycle, motor cycle, telephone, fridge and TV
Employment	daily wager / single earner / Unemployed	Unskilled worker / Semi-skilled Worker / hired farming / regular wage earner	Skilled worker / labourer / farming with owned less land / less paid salaried work	Skilled and experienced worker / Semi Professional / monthly salary	Professional / own business and land for farming / high monthly Salary

Source: Kuppuswamy Scale with minor modification by the Author

4.3.2 Correlation between categorical data variables (Spearman's rho)

The correlation between categorical data (Table - 4.7 types e.g. gender, age, social economic status, family type, block code etc. calculated at $p<0.05$ and shows significant (in bold) relationship, either positive or negative (irrespective of their numerical values).

Table – 4.7 Correlation Between Categorical Data Variables (Spearman's rho)

Variables	Block Cd	Gender	Age	Age Group	Family Type	Quali.	Skill Status	Marital Status	Occu.
Block Cd	1.000	0.006	-0.066	-0.048	0.000	**-0.088**	-0.071	0.016	0.048
Gender	0.006	1.000	**0.117**	**0.105**	0.005	**-0.155**	**0.238**	**0.352**	**0.214**
Age	-0.066	**0.117**	1.000	**0.984**	**-0.232**	**-0.347**	0.070	**0.231**	-0.062
Age Group	-0.048	**0.105**	**0.984**	1.000	**-0.235**	**-0.345**	0.054	**0.226**	-0.063
Family Type	0.000	0.005	**-0.232**	**-0.235**	1.000	0.012	-0.055	0.027	**0.283**
Qual	**-0.088**	**-0.155**	**-0.347**	**-0.345**	0.012	1.000	**-0.175**	**-0.213**	**-0.112**
Skill Status	-0.071	**0.238**	0.070	0.054	-0.055	**-0.175**	1.000	0.079	0.064
Marital Status	0.016	**0.352**	**0.231**	**0.226**	0.027	**-0.213**	0.079	1.000	**0.128**
Occu.	0.048	**0.214**	-0.062	-0.063	**0.283**	**-0.112**	0.064	**0.128**	1.000

Source: Analysis from Survey Data

4.3.3 Survey Data Analysis

The survey form own designed (**Appendix – IV**) to collect primary data from 600 participants belongs to the three blocks of Dang districts of Gujarat; every possible basic and

useful information. The form consist of different parts such as – to create domain of basic social personal and economic environment (**Part – 0**), Credit Loan Related data with other data for analysis to check socio-economic impact on family income (**Part – I** and **Part – II**)), saving related data (**Part – III**), Micro Insurance related data (**Part – IV**), to capture data for analyzing the factors responsible for socio economic impact (**Part – V**) and factors responsible for problems faced by participants (**Part –VI**). Some of parts of the form having Likert *five point and two point Scale* Format used in factor analysis.

The data received in Part – I with reference to Table – 4.1 the borrowers (264) had spent their loan amount and the resultant change in income is presented subsequent analysis. Since most of the participants are from rural areas, the survey data showed that distinctive underlying motivation to use loan for their farming, livestock, social cause and medical related (Table – 4.8). This showed that many borrowers not only took credit for productive use i.e. 9% and 3% for cultivation and livestock respectively but also for different purpose ranging 5% and 3% for social functions and medical usage respectively.

Table – 4.8: End Use of Loan by Borrowers (cases = 264)

Purpose of micro-credit	**Code**	**Total**	**%**
1. Agricultural	**AG**	**164**	**8.9**
2. Animal Husbandry	**AH**	**49**	**2.7**
3. Small business	SB	5	0.3
4. Skill Development	SD	20	1.1
5. Purchase of land	PL	0	0.0
6. Purchase of house	PH	0	0.0
7. Improvement of land/House	IM	7	0.4
8. Medical	**MD**	**50**	**2.7**
9. Repaying old Debts	RD	1	0.1
10. Social Function	**SF**	**96**	**5.2**
11. Loss – Agri / Live Stock	AL	4	0.2
12. Any other	**MS**	**52**	**2.8**
	Total	**448**	**24.2**

Source: Analysis from Survey Data

The responses of borrowers from formal sources give an approximate assessment of benefits drawn by them Table – 4.9 reflects such perceptions; though 33% responded increase in income as compared to 63% to no change which leads on 28% feel due to formal source this could be positive changes.

Table – 4.9: Change in Income (Cases = 264)		
Change in Income after credit	**Freq.**	**%**
Increased	87	**33.0**
Decreased	11	4.2
No Change	166	**62.9**
Overall Change in Income	**FS**	**%**
Positive	74	**28.0**
Negative	4	1.5
No Change	186	70.5

Source: Analysis from Survey Data

The 28% of borrowers who reported the increase in income can be due to several reasons. Table – 4.10 reflects such perceptions of causes of increased income.

Table – 4.10: Reasons of Increase in Income (Cases = 264)		
Description	**Freq.**	**%**
Expanded small business	**46**	**17.4**
Good agricultural season	**69**	**26.1**
Sold in new markets	31	11.7
Increase in demand	39	14.8
None of them	3	1.1
Any Other	39	14.8

Source: Analysis from Survey Data

Nearly 2% borrowers, who reported the decrease in income, can be due to several reasons. Table – 4.11 reflects such perceptions of causes of decreased income.

Table – 4.11: Reasons of Decrease in Income (Cases = 264)		
Description	**Freq.**	**%**
Someone sick/died in the house	9	3.4
Marriage took place in the house	9	3.4
Natural disaster (flood, earthquake etc.)	0	0.0
Poor agricultural season	18	6.8
None of them	1	0.4
Any other	6	2.3

Source: Analysis from Survey Data

This study includes 336 participants who did not borrowed from any source depends on other reasons and 77% of the total participants who had not borrowed any loan said non-requirement for the sameand 35% reported that the cost of borrowing for them was high, as given in Table – 4.12. It showed that out of many of the Dang households which do not apply for formal loans are indeed not requiring it.

Table – 4.12: Reasons for Not Borrowing (Cases = 336)		
Description	**Freq.**	**%**
Not required	**259**	**77.1**
Already having debt	4	1.2
Lack of access to Formal resources	43	12.8
Rate of interest unaffordable	**118**	**35.1**
Lack of awareness of financial sources	37	11.0
Avoiding procedural difficulties	31	9.2
Lack of collaterals	3	0.9
Any other	0	0.0

Source: Analysis from Survey Data

The data received in Part – III, Part – IV, Part-V and Part-VI analyzed to understand the responses from participants and tabulated. The Table – 4.13 describes different types of questions (with defined variables and named as **SV variable**) raised to participants accordingly and responded by them.

Table – 4.13: Variables for Saving (in2 point *Likert format)*			
Variable	**Statements**	**YES**	**NO**
SV1	To face uncertainties relating to employment		
SV2	To face uncertainties relating to health		
SV3	For children education		
SV4	For children marriage		
SV5	For old age security		
SV6	To repay loan amount		
SV7	To maintain social status		
SV8	Any Other		

Source: Analysis from Survey Data

The Table – 4.14 shows block wise distribution of participants where questions asked for saving as habit and the benefits used accordingly (or in other words whether they are benefitted?). There are 73% participants doing saving and 27% are not saving. The analysis of various reasons is tabulated later in this study.

Table- 4.14: Block Wise Participant - Saving habits (%)				
Block	**Saving Habit**	**Non Borrower**	**Borrower**	**Total**
Ahwa	No	5.7	1.2	6.8
	Yes	15.8	15.3	31.2
Vaghai	No	10.3	1.2	11.5
	Yes	10.5	12.0	22.5
Subir	No	6.3	1.8	8.2
	Yes	7.3	12.5	19.8
All Blocks	**No**	**22.3**	**4.2**	**26.5**
	Yes	**33.7**	**39.8**	**73.5**

Source: Analysis from Survey Data

The Table – 4.15 gives other set of questions (with defined as **IN variables**) asked from the participant for their insurance habits and its benefits received.

Table – 4.15: Variables for Insurance (in2 point *Likert format)*			
Variable	**Statements**	**YES**	**NO**
IN1	Increase in financial security		
IN2	Increase in security against accident and death		
IN3	Increase in Peace of mind and feeling of protection		
IN4	Increase in risk bearing capacity		
IN5	Any other		

Source: Analysis from Survey Data

The Table – 4.16 shows the block wise analysis as per responses by participants who had awareness regarding micro insurance. There are 70% participants do not feel the importance of insurance while 30% participants vote for importance of insurance. The analysis of various reasons is tabulated later in this study.

Table – 4.16: Block Wise Participant Aware About Micro Insurance (%)				
Block	**Importance of Insurance**	**Non Borrower**	**Borrower**	**Total**
Ahwa	No	17.7	11.0	28.7
	Yes	3.8	5.5	9.3
Vaghai	No	16.5	7.5	24.0
	Yes	4.3	5.7	10.0
Subir	No	9.3	7.8	17.2
	Yes	4.3	6.5	10.8
All Blocks	**No**	**43.5**	**26.3**	**69.8**
	Yes	**12.5**	**17.7**	**30.2**

Source: Analysis from Survey Data

With reference to above data the Table – 4.17 reflects that the participants who feel the need of insurance is very less i.e. 41% only. The main reason may be lack of awareness and concept about the contribution of insurance.

Table – 4.17: Block Wise Participant who feel Need of Insurance (%)				
Block	**Need of Insurance**	**Non Borrower**	**Borrower**	**Total**
Ahwa	No	14.3	8.3	22.7
	Yes	7.2	8.2	15.3
Vaghai	No	14.3	5.2	19.5
	Yes	6.5	8.0	14.5
Subir	No	9.5	7.3	16.8
	Yes	4.2	7.0	11.2
All Blocks	**No**	**38.2**	**20.8**	**59.0**
	Yes	**17.8**	**23.2**	**41.0**

Source: Analysis from Survey Data

The Table – 4.18 gives different questions to measure the impact (both economic as SE and social as SS) of the facilities provided by financial institutes and subsequently responded (rate them) by participants.

Table – 4.18: Variables for Measuring Socio-Economic Impact(in5-point*Likert format)*

Variable	Statements	1	2	3	4	5
Economic Impact						
SE1	1. Improvement in Income level					
SE2	2. Enhanced asset position					
SE3	3. Increased Savings					
SE4	4. Increased business expense on purchase of inputs					
SE5	5. Increased domestic expense					
SE6	6. Increased employment opportunity					
SE7	7. Reduced indebtedness					
Social Impact						
SS1	1. Reduced dependence upon informal finance source					
SS2	2. Improvement in financial literacy					
SS3	3. Improved Market Knowledge for sale of product					
SS4	4. Role in decision making process has increased					
SS5	5. Improved household quality of life					
SS6	6. Better utilization of available resources					
SS7	7. Increase in capacity building through training					
SS8	8. Increase in source of Income contributed by Women family members					
SS9	9. Contributed to Women family members Education					
SS10	10. Contributed to Women family members Heath awareness					
SS11	11. Increase in involvement of women participation in Social Activities					
SS12	12. Improved women participation in local Panchayat					

The different variables for SE and SS are in 5 point Likert Scale format hence reply to every question (carries ratings 1to 5) as given by the participant. The assumption for these replies might affected by gender, family type, socio-economic status, qualification and family income grouping etc. and possibly these replies by participant could give different outcomes. A chronological of statistical tests was performed for the conclusion for data received. These tests are:

- **Reliability Analysis (Cronbach's Alpha) -** This test is confirming the data reliability before performing all statistical tests.

- **Top Box Analysis** – this test provides outcomes in % values for Likert Scale rating which indicates how participant are swing about the concept.
- **Normality test -** this test (i.e. Mann Whitney U Test) provides outcomes for every variable in the group with a pattern (not normal) of data follows for the responses within the confidence limit of 95% (i.e. p <=0.05).
- **Variability Test** – when above normality test performed it become necessary to confirm the variability between replies given by participant for group of the questions as well to test within also. This test is known as Lvevene's test which provides results for variance (F test) and for mean (t test) at p<=0.05.
- In above both these tests it could possible that some of the variables may have p <0.05 in normality test while for the same variables may not have p<=0.05 in variability tests. This leads conclusions about hypothesis mix in nature (i.e. partially accepted / rejected) and hence further test required to know about factors responsible for such variations depends on group belongs to gender, family type, social economic status or residence area etc.
- **Principle Component Analysis (PCA) and Factor Analysis (FA)-** The Principal Component Analysis (PCA) is conducted for set of **variables** independently to find out Eigen values which provide variability percentage of several dependent components of survey variables. Only those components (whose Eigen value is >1) will be considered for further calculation (i.e. factor analysis) which provides maximum variability.
- **Spearman Rank correlation (Spearman Rho)** -Using bivariate correlation between these two variables a partial correlation obtained which shows significant possible correlation for p<=0.05.

The variables for measuring problems faced by participant (part – VI) with different parameters such as saving (as MS), insurance (as MI) and credit loan (as MC) were defined group of questions accordingly given in Table -19.

The different variables for Challenges in availing Microfinance services of micro credit, savings and micro insurance services (MC, MS and MI) are in 2-point Likert Scale format hence participant reply to every question (carries ratings 1 and 2 or yes and no) accordingly. It was assumed that these replies might affected by gender, family type, socio-

economic status, qualification and family income grouping etc. and possibly gives different outcomes for conclusion making. Similar chronological statistical tests will also be performed for these variables and data as mentioned above.

Table – 4.19:Variables for Measuring Problems in Availing Microfinance Services (in2-point*Likert format)*			
Variable	**STATEMENTS**	**Yes**	**No**
Micro credit			
MC1	1. Adequate Loan amount		
MC2	2. Simple procedure in availing loan		
MC3	3. Reasonable Rate of interest on Loans		
MC4	4. Loan timely sanctioned		
MC5	5. Loan utilization check was done		
MC6	6. Easy Repayment policy		
MC7	7. Bank branch nearby		
MC8	8. Interaction with the bank staff is comfortable		
MC9	9. Waiting period is less		
MC10	10. Credit linkage with Marketing		
MC11	11. Credit linkage with Insurance		
MC12	12. Received training related to micro-credit		
Micro savings			
MS1	13. Ease in process of opening saving account		
MS2	14. Reasonable return on savings		
MS3	15. Easy in withdrawing		
Micro insurance			
MI1	16. Ease in taking micro insurance policy		
MI2	17. Ease in payment of premium		
MI3	18. Ease in claim settlement		
MI4	19. Complains and grievances are well handled		

4.3.4 Test for Data Reliability (Cronbach' alpha test)

It is essential to understand before analyses of data, the responses received from participants to every question in the survey are internally consistent; means how closely related a set of items are as a group. One way to think of reliability means other things being equal; one should get the same score on a questionnaire if they complete it at two different points of time (i.e. test-retest reliability). The other way to look reliability as two different people within the similar environment and domain (or similar IQ level) should get the same score. This is considered to be a measure of scale reliability.

Cronbach's alpha is a measure used to assess the reliability, or internal consistency, of a set of scale or test items. In other words, the reliability of any given

measurement refers to the extent to which it is a consistent measure of a concept, and Cronbach's alpha is one way of measuring the strength of that consistency. Cronbach's alpha is computed by correlating the score for each scale item with the total score for each observation (usually individual survey respondents or test takers), and then comparing that to the variance for all individual item scores. In addition to measuring internal consistency exploratory factor analysis (Kline P, 1994) is one method of checking dimensionality (Tavakol, Dennick, 2011). It is essential for every Likert-type scale data analyzes using Cronbach's alpha coefficient for internal consistency reliability.

4.3.4.1 Test for Variables for Savings Habit (SV Variables)

The Cronbach's Alpha calculated for **SV variables** (**Table – 4.20**) surveyed data is **0.801** and this α calculated for standardized data items is **0.784** which reflects excellent and most reliable to internal items consistency.

Table – 4.20 Reliability Statistics (SV Variables)

Cronbach's α	Cronbach's α for Standardized data items	Number of Variables
0.801	0.784	8

Improper use of alpha can lead situations in which either a test or scale is wrongly discarded or the test is criticized for not generating trustworthy results. Such situation is required to understand associated with concepts of internal consistency, homogeneity or dimensionality which may improve the use of alpha. Internal consistency is concerned with the interrelatedness of a sample of test items, whereas homogeneity refers to dimensionality.

Table – 4.21 Item-Total Statistics (SV Variables)

Actual Var.	Scale Mean if data Item Deleted	Scale Variance if data Item Deleted	Corrected data Item Total Correlation	Squared Multiple Correlation	Cronbach's α if data Item Deleted
SV1	2.180	4.108	0.600	0.430	0.765
SV2	2.180	4.101	0.604	0.410	0.764
SV3	2.222	4.103	0.621	0.396	0.761
SV4	2.230	4.274	0.526	0.318	0.777
SV5	2.347	4.417	0.530	0.331	0.777
SV6	2.220	4.299	0.508	0.301	0.780
SV7	2.180	4.228	0.532	0.421	0.776
SV8	2.513	5.382	0.083	0.119	0.821

The higher value; then Cronbach's Alpha indicates a best internal consistency of data items in the scale; which concludes that data collected from the respondents are standard and reliable. The **Table – 4.21** is final table with every SV variables data shows Cronbach's α as the 'contribution' or 'fit' of every data item to the scale giving useful statistics such as mean and standard deviation (as shown in the column "**Adj. Mean**" and "**Adj. Variance"**), adjusted Pearson correlations and squared multiple correlation (as per the columns shown in "**Item Total Corr**" and "**Multiple Corr."**), and the column "**Cronbach's α if data item Deleted**" presents the value that Cronbach's alpha would be if that particular item was deleted from the scale. Removal of any variable will not change the value of **Cronbach's α**. Therefore, such questions should not be removed from the survey.

4.3.4.2 Test for Variables for Insurance (IN Variables)

The Cronbach's Alpha calculated for **IN variables** (**Table – 4.22**) surveyed data is **0.887** and this α calculated for standardized data items is **0.884** which reflects excellent and most reliable to internal items consistency.

Table – 4.22 Reliability Statistics (IN Variables)

Cronbach's α	Cronbach's α for Standardized Items	Number of Variables
0.887	0.884	5

The higher value; then Cronbach's Alpha indicates a best internal consistency of data items in the scale; which concludes that data collected from the respondents are standard and reliable. The **Table – 4.23** is final table with every SV variables data shows Cronbach's α as the 'contribution' or 'fit' of every data item to the scale giving useful statistics such as mean and standard deviation (as shown in the column "**Adj. Mean**" and "**Adj. Variance"**), adjusted Pearson correlations and squared multiple correlation (as per the columns shown in "**Item Total Corr**" and "**Multiple Corr."**), and the column "**Cronbach's α if data item Deleted**" presents the value that Cronbach's alpha would be if that particular item was deleted from the scale. Removal of any variable will not change the value of **Cronbach's α**. Therefore, such questions should not be removed from the survey.

Table – 4.23 Item-Total Statistics (IN Variables)					
Actual Var.	**Scale Mean data Item Deleted**	**Scale Variance if data Item Deleted**	**Corrected data Item Total Correlation**	**Squared Multiple Correlation**	**Cronbach's α if data Item Deleted**
IN1	0.513	1.152	0.851	0.757	0.832
IN2	0.492	1.128	0.839	0.768	0.837
IN3	0.618	1.478	0.679	0.474	0.875
IN4	0.557	1.239	0.833	0.708	0.837
IN5	0.653	1.693	0.486	0.242	0.909

4.3.4.3 Test for Variables for Measuring Problems in Availing Micro credit(MC), Saving (MS) and Micro Insurance (MI) Service.

The Cronbach's Alpha for these data variables is calculated together (19 variables) and separately (for Micro Credit - 12 variables, for Micro Savings – 3 variables while for Micro Insurance - 4 variables) to understand the side effects for all three independently and collectively.

Table – 4.24 Reliability Statistics (MC Variables)		
Cronbach's α	**Cronbach's α for Standardized data items**	**Number of Variables**
0.976	0.976	12

The Cronbach's Alpha value for problem arises in micro credit **MC variables, (Table – 4.24**) of surveyed data is **0.976** and this α calculated for standardized data items is **0.976** shows excellent and most reliable to internal items consistency.

The Cronbach's Alpha value for problem arise in micro savings **MS variables, (Table – 4.25**) of surveyed data is **0.978** and α calculated for standardized data items is **0.978** shows excellent and most reliable to internal items consistency.

Table – 4.25 Reliability Statistics (MS Variables)		
Cronbach's α	**Cronbach's α for Standardized data items**	**Number of Variables**
0.978	0.978	3

The Cronbach's Alpha value for problem arises in micro insurance **MI variables, (Table – 4.26)** of surveyed data is **0.893** and α calculated for standardized data items is **0.828** shows excellent and most reliable to internal items consistency.

Table – 4.26 Reliability Statistics (MI Variables)		
Cronbach's α	**Cronbach's α for Standardized data items**	**Number of Variables**
0.893	0.828	4

4.3.4.4 Test for variables for Measuring Social impact (SS) & Economic Impact (SE)

The Cronbach's Alpha value for both surveyed data variables is also calculated together (i.e. all 19 variables) and independently where for Economic Impact there are 7 variables and for Social Impact there are 12 variables to understand the impact .

The Cronbach's Alpha value for Economic Impact **SE variables, (Table – 4.27**) of surveyed data is **0.911** and this calculated for standardized data items is **0.913** shows excellent and most reliable to internal items consistency.

Table – 4.27 Reliability Statistics (SE Variables)		
Cronbach's α	**Cronbach's α for Standardized data items**	**Number of Variables**
0.911	0.913	7

The Cronbach's Alpha value for Social Impact **SS variables (Table – 4.28)** of surveyed data is **0.946** and this α calculated for standardized data items is **0.947** shows excellent and most reliable to internal items consistency.

Table – 4.28 Reliability Statistics (SS Variables)		
Cronbach's α	**Cronbach's α for Standardized data items**	**Number of Variables**
0.946	0.947	12

The Cronbach's Alpha value for overall impact due to **SE and SS variables (Table – 4.29**) with combined surveyed data is **0.964** and this α calculated for standardized data items is **0.965** shows excellent and most reliable to internal items consistency.

Table – 4.29 Reliability Statistics (Both impact Variables)		
Cronbach's α	**Cronbach's α for Standardized data items**	**Number of Variables**
0.964	0.965	19

Cronbach's Alpha is an important concept in the evaluation of assessments and questionnaires. It is mandatory that researchers should estimate this quantity to add validity and accuracy to the interpretation of the collected data; though Cronbach's Alpha has frequently been reported in an uncritical way and without adequate understanding and interpretation. These explain the assumptions underlying the calculation of alpha, the factors influencing its magnitude and the ways in which its value can be interpreted. So Cronbach's Alpha measures how well a set of variables or items measures a single, one-dimensional latent aspect of individuals.

The result obtained in all above various tables for every variable independently with their analysis indicates that none of the question be removed from the survey; the results reflects overall reliability coefficient for a set of variables (i.e. every question is a variable and inter-dependent). If questions reflect different underlying other dimensions based on emotions such as motivation and commitment, Cronbach's alpha result will not be able to differentiate such data and hence to check their reliability after using Cronbach's alpha, another analysis test also performed known Principal *Components Analysis* (**PCA**).

4.3.5 Top Box Analysis (2-point Likert Scale Data)

The reliability test performed on various grouped data as mentioned above (i.e. 4.3.4) for the different variables conceptualized in survey questionnaire and replied by 600 participants. These questions are either on two-point *Likert scale* data *i.e.* 1= Yes, and 0 = No for the variables defined in **Saving (Table – 4.13)** and **Insurance (Table – 4.15)** respectively**.**

Technically, *Likert scale* data are *ordinal*. Rating scales are used widely; while exploring, data using multivariate analysis, then typically treat ratings as interval scales and then a rating of a '5' equals a value of 5, a rating of a '4' equals a value of 4, etc. which means the assumed difference between any two ratings are equal (e.g. the difference between 5 and a 4 is the same as the difference between a 4 and a 3). This assumption is useful in both creating and applying a regression equation and it could be partial while using mean scores since data models typically involve the entire rating scale as inputs. However, in every such study often preferred to measure ratings in terms of the percent of respondents who gave the highest rating (Top Box) or the percent of respondents who gave the two highest ratings (Top

2 Box). In order to bridge the difference between models built around mean ratings and the need for results focused on top box and top two box scores.

Saving Habit (SV Variables)

This part of survey instrument having **SV variables (2-point scale)** for instance having yes or *no* i.e. binary replies in nature and hence equal values of percentage could possible. This requires testing a single population proportion *p* equals to some value p_0 i.e. H_o: $p_1 = p_2$ where p_1 and p_2 are population proportion belongs to every individual group such as gender (male v/s female), residence area (rural v/s urban) etc. This also involves testing of two tailed alternate hypotheses as H_a: $p_1 \neq p_2$ i.e. to test the equality of two proportions against the alternative that they are not equal. The test will provide the enough evidence at the $\alpha = 0.05$ level to conclude the two populations.

Simple percentages were employed to analyze every question (Yes or No) responded by participants (borrower and non-borrower). The percentages of responses for SV1 thru SV8 variables were calculated and tabulated (**Table – 4.30**). The saving habits adopted by only borrower is 18% while the 14% participants having saving habits also adopted by non-borrowers.

Table – 4.30 Responses of Saving Habits (in %)

Var.	Descriptions	Borrowers & Non-Borrowers		Only Borrowers	
		Yes	No	Yes	No
SV1	To face uncertainties relating to employment	**40.2**	59.8	19.5	23.5
SV2	To face uncertainties relating to health	**40.2**	59.8	**21.7**	21.3
SV3	For children education	36.0	64.0	19.3	23.7
SV4	For children marriage	35.2	64.8	18.7	24.3
SV5	For old age security	23.5	76.5	13.0	30.0
SV6	To repay loan amount	36.2	63.8	**23.8**	19.2
SV7	To maintain social status	**40.2**	59.8	**22.0**	21.0
SV8	Any Other	6.8	93.2	3.2	39.8
Overall		**32.3**	**67.7**	**17.6**	**25.4**

Insurance (IN Variables)

In this part of survey instrument the IN variables (2-point scale) for instance having yes or *no* i.e. binary replies in nature and hence equal values of percentage could

possible. The **Table – 4.31** shows the percentages of responses from participants only 14% participants having insurance related importance which includes only 8% borrowers.

Table – 4.31 Responses of Insurance Habits (%)

Var.	Descriptions	Borrowers & Non-Borrowers		Only Borrowers	
		Yes	No	Yes	No
IN1	Increase in financial security	**19.5**	**80.5**	11.0	32.0
IN2	Increase in security against accident and death	**21.7**	**78.3**	11.5	31.5
IN3	Increase in Peace of mind and feeling of protection	**9.0**	**91.0**	5.3	37.7
IN4	Increase in risk bearing capacity	**15.2**	**84.8**	8.7	34.3
IN5	Any other	5.5	**94.5**	3.0	40.0
Overall		**14.2**	**85.8**	**7.9**	**35.1**

4.3.6 Top Box Analysis (5-point Likert Scale Data)

Economic Impact – (SE Variables)

The data collected for SE and SS variables infive point scale *Likert Scale* format *i.e.* 1 = Strongly Disagree, 2= Disagree, 3 = Neutral, 4= Agree and 5 = Strongly Agree as questions listed in Measuring Impact (**Table – 4.18**) above . The cumulative frequencies of all seven SE (variables) related questions as replied by every participant of Dang districts plotted below in **Figure – 4.1** shows how data are distributed and the variations in responses.

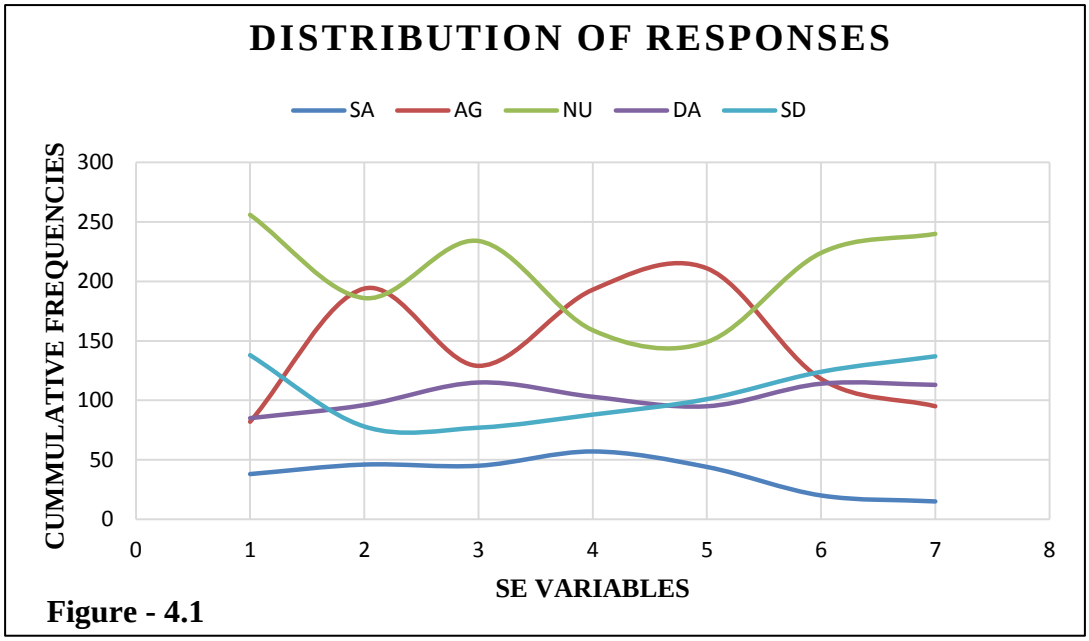


Figure - 4.1

The top box analysis of responses (in **Table – 4.32**) from 600 participants irrespective to any type of parameters (i.e. gender, family type) in Likert Scale (5-point) format shows nearer to NU (%A) i.e. nearly 32% while there are a smaller number of Strongly Agree (i.e. 13% TB) and Strongly disagree (i.e. 16% - %LB). These % values show that most of the participants neither understand the benefits could be drawn properly or not able to express in favor of these concepts at their district.

Table – 4.32 Top Box Analysis for Economic Impact (Cases= 600)

	Frequency of Responses						Top Box Calculated (%)					
Var.	**SA**	**AG**	**NU**	**DA**	**SD**	**Median**	**%H**	**%A**	**%L**	**TB**	**LB**	**NTB**
SE1	123	205	170	37	65	2	**54.7**	28.3	17.0	20.5	10.8	9.7
SE2	46	128	289	63	74	3	29.0	**48.2**	22.8	7.7	12.3	**-4.7**
SE3	149	192	110	73	76	2	**56.8**	18.3	24.8	24.8	12.7	12.2
SE4	14	217	182	105	82	3	**38.5**	30.3	31.2	2.3	13.7	**-11.3**
SE5	101	155	177	78	89	3	**42.7**	29.5	27.8	16.8	14.8	2.0
SE6	46	113	244	91	106	3	26.5	**40.7**	32.8	7.7	17.7	**-10.0**
SE7	59	88	184	103	166	3	24.5	30.7	44.8	9.8	27.7	**-17.8**
Total	**538**	**1098**	**1356**	**550**	**658**	**3**	**39.0**	**32.3**	**28.8**	**12.8**	**15.7**	**-2.9**

This could also check with differently with parameters combinations as in **Table – 4.33** possibly comparable between different groups such as gender, Family type etc.

Table – 4.33 Top Box Analysis for Economic Impact (with different groups)

Parameter	Groups	Frequency of Responses					Median	Top Box Calculated (%)						Cases
		SA	**AG**	**NU**	**DA**	**SD**		**%H**	**%A**	**%L**	**TB**	**LB**	**NTB**	
Gender	**Male**	454	888	1062	481	545	3	39.1	31.0	29.9	13.2	15.9	-2.7	490
	Female	84	210	294	69	113	3	38.2	38.2	23.6	10.9	14.7	-3.8	110
Family Type	**Joint**	335	731	830	297	159	3	**45.3**	35.3	19.4	14.2	6.8	**7.5**	336
	Nuclear	203	367	526	253	499	3	**30.8**	28.5	40.7	11.0	27.0	**-16.0**	254
Borrower	**Borrower**	278	535	543	238	212	3	45.0	30.1	24.9	15.4	11.7	3.7	258
	Non-Borrower	260	563	813	312	446	3	34.4	34.0	31.7	10.9	18.6	-7.8	342
Overall	**Total**	**538**	**1098**	**1356**	**550**	**658**	**3**	**39.0**	**32.3**	**28.8**	**12.8**	**15.7**	**-2.9**	**600**

The Top Box Analysis for replies on Economic Impact in different groups were analyzed for all the cases (for total sum 600) whereas the values of %H are varying from 30.8% thru **45.3%** while overall value is **39%** similarly NTB (net top box) values are varying from **7.5%** thru **-16%** while overall value is **-2.9%**which indicates that there are very high variations in every blocks of the district for economic impact which may be due to various factors (needs to find out) influencing causing changes to their leaving conditions.

Social Impact – (SS Variables)

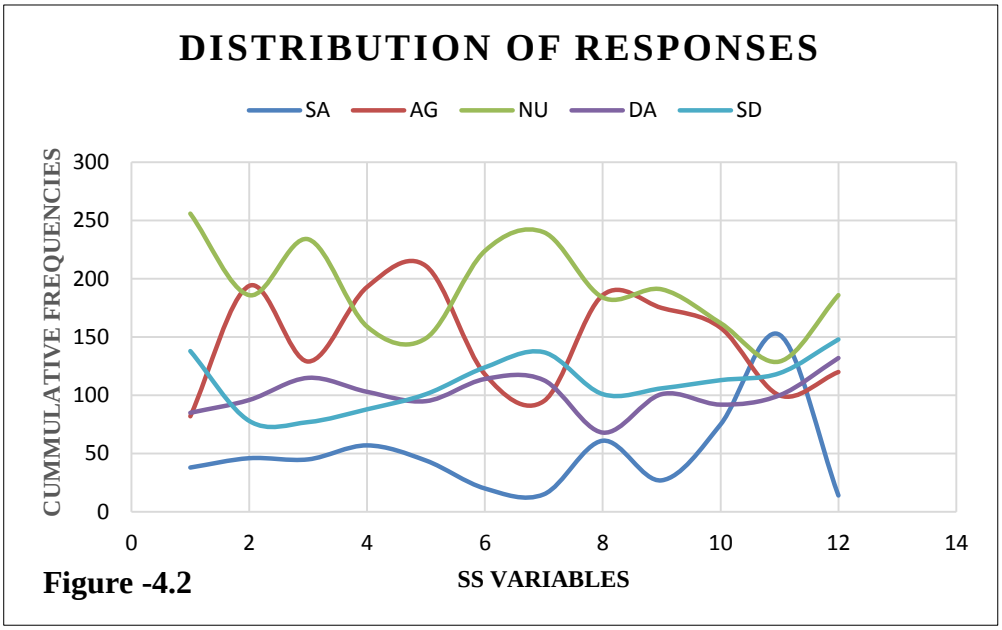


Figure -4.2

Table – 4.34 Top Box Analysis for Social Impact (Cases = 600)												
Var.	**Frequency of Responses**					**Median**	**Top Box Calculated (%)**					
	SA	**AG**	**NU**	**DA**	**SD**		**%H**	**%A**	**%L**	**TB**	**LB**	**NTB**
SS1	38	82	256	85	138	3	20.0	42.7	37.2	6.3	23.0	**-16.7**
SS2	46	194	186	96	78	3	40.0	31.0	29.0	7.7	13.0	**-5.3**
SS3	45	129	234	115	77	3	29.0	39.0	32.0	7.5	12.8	**-5.3**
SS4	57	193	159	103	88	3	41.7	26.5	31.8	9.5	14.7	**-5.2**
SS5	44	211	149	95	101	3	42.5	24.8	32.7	7.3	16.8	**-9.5**
SS6	20	118	224	114	124	3	23.0	37.3	39.7	3.3	20.7	**-17.3**
SS7	15	95	240	113	137	3	18.3	40.0	41.7	2.5	22.8	**-20.3**
SS8	61	186	184	68	101	3	41.2	30.7	28.2	10.2	16.8	**-6.7**
SS9	27	175	191	101	106	3	33.7	31.8	34.5	4.5	17.7	**-13.2**
SS10	75	158	162	92	113	3	38.8	27.0	34.2	12.5	18.8	**-6.3**
SS11	152	100	129	100	119	3	42.0	21.5	36.5	25.3	19.8	5.5
SS12	14	120	186	132	148	3	22.3	31.0	46.7	2.3	24.7	**-22.3**
Total	**594**	**1761**	**2300**	**1214**	**1330**	**3**	**32.7**	**31.9**	**35.3**	**8.3**	**18.5**	**-10.2**

The **Figure – 4.2** shows the graphical presentation of data for SS variables as distributed and having variations in responses. The analysis of all these 600 participant data (Table – 4.34) irrespective of any parameters shows that most of the responses are near to NU (%A) i.e. nearly 32% while there are less number of Strongly Agree (i.e. 8% - %TB) and Strongly disagree (i.e. 18.5% - %LB) this means that most of the participants not able to understand the benefits in favor of these concepts of within the district. This could also be

checked with different groups in **Table – 4.35** the Top Box analysis of data for different data groups such as gender, Family type etc.

Table – 4.35 Top Box Analysis for Social Impact (with different groups)

Parameter	Groups	Frequency of Responses					Median	Top Box Calculated (%)						Cases
		SA	AG	NU	DA	SD		%H	%A	%L	TB	LB	NTB	
Gender	**Male**	457	1434	1810	1053	1125	3	32.2	30.8	37.0	7.8	19.1	-11.4	490
	Female	137	327	490	161	205	3	35.2	37.1	27.7	10.4	15.5	-5.2	110
Family Type	**Joint**	361	1182	1392	718	379	3	**38.3**	34.5	27.2	9.0	9.4	**-0.4**	336
	Nuclear	233	579	908	496	951	3	**26.6**	29.8	47.5	7.6	31.2	**-23.6**	254
Borrower	**Borrower**	282	863	948	577	425	3	27.9	23.1	24.4	6.9	10.4	-3.5	258
	Non-Borrower	312	898	1352	637	905	3	29.5	32.9	37.6	7.6	22.1	-14.4	342
Overall	**Total**	**594**	**1761**	**2300**	**1214**	**1330**	**3**	**32.7**	**31.9**	**35.3**	**8.3**	**18.5**	**-10.2**	**600**

Source: Analysis from Survey Data

The Top Box Analysis for replies on Social Impact in different groups were analyzed for all the cases (for total sum 600) whereas the values of %H are varying from 26.6% thru 38.3% while overall value is 32.7% similarly NTB (net top box) values are varying from -0.4% thru -23.6% and overall value is -10.2% which indicates that there are very high variations in every blocks of the district for social impact because of various factors (needs to find out) influencing causing changes to their leaving conditions.

4.3.7 Top Box Analysis (2-point Likert Scale Data)

Problem for Micro Activities - Micro Savings – MS Variables

In this survey instrument several data related to credit, saving and insurance opted by participants were gathered to understand whether microfinance activities are really reaching to common people or they can understand the microfinance activities. The Table – 4.36 showing percentage values below for all the participants accordingly.

Table – 4.36: Demand for Microfinance Services

Microfinance Services	Participants	% (cases = 600)
None	336	56.0
Credit only	264	44.0
Savings only	441	73.5
Insurance only	246	41.0
Credit and Savings	239	39.8
Savings and Insurance	244	40.7
Credit and Insurance	139	23.2
Credit, Savings and Insurance	138	23.0

Source: Analysis from Survey Data

Problem in Availing Micro Credit Service– (MC Variables)

The survey form gives responses of the problems with Micro credit activities as defined by the MC variables (2-point scale) i.e. MC1 thru MC12 variables. The table (Table – 4.37) shows overall households' perception on challenges in availing micro credit service, of which 80% reported they faced challenges and only 20% showed satisfaction for the service availed. Out of these 20% participants, 15% are borrowers which were satisfied and 5% are non-borrower.

Table – 4.37 Responses of Problems in Availing Micro Credit Service (in %)

Var.	Descriptions	Borrowers & Non-Borrowers		Only Borrowers	
		Yes	No	Yes	No
MC1	Adequate Loan Amount	**21.2**	78.8	18.7	24.3
MC2	Simple procedure in availing loan	**24.2**	75.8	19.0	24.0
MC3	Reasonable Rate of interest on Loans	**23.2**	76.8	18.3	24.7
MC4	Loan timely sanctioned	**20.8**	79.2	16.0	27.0
MC5	Loan utilization check was done	**25.7**	74.3	19.0	24.0
MC6	Easy Repayment policy	**23.0**	77.0	16.8	26.2
MC7	Bank branch nearby	**22.0**	78.0	16.0	27.0
MC8	Interaction with the bank staff is comfortable	**26.7**	73.3	18.3	24.7
MC9	Waiting period is less	**18.5**	81.5	12.3	30.7
MC10	Credit linkage with Marketing	**10.2**	89.8	8.8	34.2
MC11	Credit linkage with Insurance	**11.5**	88.5	10.0	33.0
MC12	Received training related to micro-credit	**11.5**	88.5	9.0	34.0
Overall		**19.9**	**80.1**	**15.2**	**27.8**

Source: Analysis from Survey Data

Problem in Availing Micro Savings Service– (MS Variables)

In this survey instrument the MS variables (2-point scale) i.e. MS1 thru MS3 showing percentage values below in table (Table – 4.38). There are 57% participants who show interests in savings.

Table – 4.38 Responses of Problems in Micro Savings Service (in %)

Var.	Descriptions	Borrowers& Non-Borrowers		Only Borrowers	
		Yes	No	Yes	No
MS1	Ease in process of opening saving account	**57.5**	42.5	30.7	12.3
MS2	Reasonable return on savings	**57.3**	42.7	30.2	12.8
MS3	Easy in withdrawing	**56.8**	43.2	29.8	13.2
Overall		**57.2**	**42.8**	**30.2**	**12.8**

Source: Analysis from Survey Data

Problem in Availing Micro Insurance Service – (MI Variables)

The survey instrument having the MI variables (2-point scale) i.e. MI1 thru MI4 and the table (Table – 4.39) shows 24% participants feel about insurances.

Table – 4.39 Responses of Problems in Micro Insurance Service (in %)

Var.	Descriptions	Borrowers & Non-Borrowers		Only Borrowers	
		Yes	No	Yes	No
MI1	Ease in taking micro insurance policy	28.5	71.5	15.7	27.3
MI2	Ease in payment of premium	28.3	71.7	15.5	27.5
MI3	Ease in claim settlement	24.8	75.2	12.8	30.2
MI4	Complains and grievances are well handled	13.8	86.2	7.2	35.8
Overall		**23.9**	**76.1**	**12.8**	**30.2**

Source: Analysis from Survey Data

4.3.8 Test for Normality

The data collected through survey method in Likert Scales's format usually not normally distributed; and having greater variance in data set nearer to the central tendency. To conclude more likely assumption for normality required to perform t-test (in non parametric data tests are different). A simulation study was conducted by de Winter and Dodou that compares the capabilities of the two sample t-test and the Mann-Whitney test to analyze five-point Likert items for two groups. Is it better to use one analysis or the other? The researchers identified a diverse set of 14 distributions that are representative of actual Likert data.

Every Likert scale data is a multi-item scale and ordinal data without intervals. The resulting distribution is then assumed to be metric and can be tested for normality. So, five items each with a range of 1 to 5 would combine together to yield a Likert scale with a range from 5 to 25, with combined data is treated as being metric. This is one of the points of having multi-item Likert scales, which converts ordinal measures into metric data more suitable for multivariate analysis.

To analyze ordinal data statistically, non-parametric tests should be used i.e. Anderson-Darling Test. The basic choice between a parametric test and a non-parametric test are generally described as the following:

- Parametric tests, such as the 2-sample t-test, assume a normal, continuous distribution. However, with a sufficient sample size, t-tests are robust to departures from normality.
- Nonparametric tests, such as the Mann-Whitney test, do not assume a normal or a continuous distribution. However, there are concerns about a lower ability to detect a difference when one truly exists.

To test the normality of every data items means they are relatively close to the fitted normal distribution line. The p-value is greater than the significance level of 0.05 then we fail to reject the null hypothesis defined as follows:

Null hypothesis H_0 : Data follow a normal distribution (if $p > 0.05$)

Alternative hypothesis H_1 : Data do not follow a normal distribution (if $p < 0.05$)

Normality Tests – Saving Habit (SV Variables)

The normality test for these variables is the first step for testing of hypotheses for SV variables the Table – 4.40 below shows the non-normality results.

Table – 4.40 Normality Tests – SV Variables (Cases = 600)

Var.	Mean	Std. Dev.	Anderson Darling Value	p values calculated	Null Hypothesis
SV1	0.402	0.491	113.203	<0.005	H_1 accepted i.e. data are not normal
SV2	0.402	0.491	113.203	<0.005	
SV3	0.360	0.480	118.902	<0.005	
SV4	0.352	0.478	120.345	<0.005	
SV5	0.225	0.424	148.327	<0.005	
SV6	0.362	0.481	118.683	<0.005	
SV7	0.402	0.491	113.203	<0.005	
SV8	0.068	0.253	209.904	<0.005	

Source: Analysis from Survey Data

Normality Tests – Insurance Habit (IN Variables)

During testing of hypotheses, the results of data analyzed for IN variables shown in the Table – 4.41 and confirmed non-normality of the variables.

Table - 4.41 Normality Tests – IN Variables (Cases = 600)					
Var.	**Mean**	**Std. Dev.**	**Anderson Darling Value**	**p values calculated**	**Null Hypothesis**
IN1	0.195	0.397	161.121	<0.005	H_1accepted i.e. data are not normal
IN2	0.217	0.413	154.123	<0.005	
IN3	0.090	0.286	201.523	<0.005	
IN4	0.152	0.360	177.287	<0.005	
IN5	0.055	0.228	214.865	<0.005	

Normality Tests – Economic Impact (SE Variables)

The normality test for SE variables shows non-normality results in Table 4.42.

Table – 4.42 Normality Tests –SE Variables (Cases = 600)					
Var.	**Mean**	**Std. Dev.**	**Anderson Darling Value**	**p values calculated**	**Null Hypothesis**
SE1	2.527	1.198	26.815	<0.005	H_1 accepted i.e. data are not normal
SE2	2.985	1.058	32.443	<0.005	
SE3	2.558	1.323	26.786	<0.005	
SE4	3.040	1.085	32.273	<0.005	
SE5	2.832	1.276	20.209	<0.005	
SE6	3.163	1.153	24.619	<0.005	
SE7	3.382	1.294	23.461	<0.005	

Normality Tests – Social Impact (SS Variables)

The normality test for SS variables shows non-normality results in Table 4.43.

Table – 4.43 Normality Tests – SS Variables (Cases = 600)					
Var.	Mean	Std. Dev.	Anderson Darling Value	p values calculated	Null Hypothesis
SS1	3.333	1.165	29.143	<0.005	H_1 accepted i.e. data are not normal
SS2	2.943	1.144	24.298	<0.005	
SS3	3.083	1.102	22.132	<0.005	
SS4	2.953	1.208	22.946	<0.005	
SS5	2.997	1.218	27.495	<0.005	
SS6	3.340	1.110	25.830	<0.005	
SS7	3.437	1.082	29.254	<0.005	
SS8	2.937	1.225	25.061	<0.005	
SS9	3.140	1.153	25.852	<0.006	
SS10	3.017	1.293	20.774	<0.007	
SS11	2.890	1.460	23.803	<0.008	
SS12	3.467	1.133	25.628	<0.009	

Normality Tests – Microfinance Activities

Problem in Availing Micro Savings Service (MS Variables)

The normality test for MS variables shows non-normality results in Table 4.44.

Table – 4.44 Normality Tests – MS Variables (Cases = 600)					
Var.	**Mean**	**Std. Dev.**	**Anderson Darling Value**	**p values calculated**	**Null Hypothesis**
MS1	0.575	0.495	110.865	<0.005	H_1 accepted i.e. data are not normal
MS2	0.573	0.495	110.723	<0.005	
MS3	0.568	0.496	110.314	<0.005	

Normality Tests –Problem in Availing Micro Insurance Service (MI Variables)

The normality test for MI variables shows non-normality results in Table 4.45.

Table – 4.45 Normality Tests – MI Variables (Cases = 600)					
Var.	**Mean**	**Std. Dev.**	**Anderson Darling Value**	**p values calculated**	**Null Hypothesis**
MI1	0.285	0.452	134.411	<0.005	H_1 accepted i.e. data are not normal
MI2	0.283	0.451	134.829	<0.005	
MI3	0.248	0.432	144.341	<0.005	
MI4	0.138	0.345	182.438	<0.005	

Normality Tests –Problem in Availing Micro Credit Service (MC Variables)

The normality test for MC variables shows non-normality results in Table 4.46.

Table – 4.46 Normality Tests – MC Variables (Cases = 600)					
Var.	**Mean**	**Std. Dev.**	**Anderson Darling Value**	**p values calculated**	**Null Hypothesis**
MC1	0.212	0.401	155.765	<0.005	H_1 accepted i.e. data are not normal
MC2	0.242	0.429	146.309	<0.005	
MC3	0.232	0.422	149.354	<0.005	
MC4	0.208	0.407	156.874	<0.005	
MC5	0.257	0.437	141.950	<0.005	
MC6	0.230	0.421	149.872	<0.005	
MC7	0.220	0.415	153.042	<0.005	
MC8	0.267	0.443	139.184	<0.005	
MC9	0.185	0.389	164.942	<0.006	
MC10	0.102	0.302	196.917	<0.007	
MC11	0.115	0.319	191.628	<0.008	
MC12	0.115	0.319	191.628	<0.009	

The normality tests for 2 point Likert Scale data and 5 point Likert Scale data leads data are non-normal and skewed in nature as results from top box analysis; this leads us to test the different hypothesis to conclude the impacts on different group and behaviour of data. The possible tests of these non-parametric data are Mann Whitney U test and Levene's Test.

4.4 Test of Hypotheses

A hypothesis is a specific statement of prediction. It describes in concrete (rather than theoretical) terms what is expected to happen with present research study. Not all studies have hypotheses. Sometimes a study is designed to be exploratory (inductive research). There is no formal hypothesis, and perhaps the purpose of the study is to explore some area more thoroughly in order to develop some specific hypothesis or prediction that can be tested in future research. A single study may have one or many hypotheses. In this present research study, some of the hypotheses formulated to analyze the impact and factors responsible.

Saving habit variables (SV variables)

H.1o Microfinance intervention has not made socio-economic improvement by inculcating saving habits in different gender beneficiaries of Dang District of Gujarat State.

H.1a Microfinance intervention has made socio-economic improvement by inculcating saving habits in different gender beneficiaries of Dang District of Gujarat State.

H.2o Microfinance intervention has not made socio-economic improvement by inculcating saving habits in different family type beneficiaries of Dang District of Gujarat State.

H.2a Microfinance intervention has made socio-economic improvement by inculcating saving habits in different family type beneficiaries of Dang District of Gujarat State

4.4.1 Mann-Whitney U-test

This is a non-parametric equivalent test of the independent *t* test for two independent groups or variables such as family type (joint and nuclear) and gender (male and female) for ordinal data and the dependent variables such as SV, IN, MC, MS, MI, SE and SS respectively were either ordinal or continuous. The Mann-Whitney U test is used for nonparametric data analysis; could be an alternative and independent t-test which may not true for some other cases. The Mann-Whitney U test supports for data different conclusions and assumptions made about data's distribution as it is made for t-test. The basic assumptions for these tests to check two populations are different with differences in medians between groups. The different conclusions based on the shape of the distributions of data. Several assumptions for this test need to be met. The most important are:

a. Coincidence of the sample and
b. Independence of observations.

In Mann-Whitney U test for every null hypothesis most important test to understand the two groups come from the same population. In other terms, it stipulates that the two independent groups are homogeneous and have the same distribution. The two variables corresponding to the two groups, represented by two continuous cumulative distributions, are then called stochastically equal. The Mann-Whitney test usually compares the mean ranks of two group's rather comparing medians and distributions. The test result depends on the *p* value for a query that could be – "*What was the chance that a randomly selected value from the population with the larger mean rank was greater than a randomly selected value from the other population?"*

Other possible additional assumptions are – the two populations have the same shape of the distributions, data must not be influenced by any other and all data drawn using random sampling assuming homogeneity of variance. The Mann-Whitney test can be considered a test of medians for different groups of data i.e. male with female (gender), joint with nuclear (family type), or different socio economic status etc. The $p < 0.05$ for Mann-Whitney test provides basis for conclusion in accepting the assumption of identically shaped distributions

SV Variables

Table – 4.47 Mann Whitney U-test (Gender)								
	SV1	**SV2**	**SV3**	**SV4**	**SV5**	**SV6**	**SV7**	**SV8**
Mann Whitney U	26105.0	26595.0	25570.0	26745.0	26695.0	25385.0	25805.0	26495.0
Wilcoxon W	146400.0	32700.0	31675.0	32850.0	32800.0	145680.0	146100.0	32600.0
Z	-0.61	-0.25	-1.01	-0.15	-0.21	-1.14	-0.82	-0.63
p values	0.54	0.80	0.31	0.88	0.83	0.25	0.41	0.53

The Mann-Whitney test in Table – 4.47 for Gender Grouping can be concluded that the difference between medians in case of gender type (male v/s female) was not statistically significant (as p >0.05)and hence the null hypothesis is not rejected (i.e**. H1o**). The mean ranks for every SV variables are higher except for SV6 (for *to repay loan amount*) *and* SV7 (for *to maintain social status*) variables where mean rank for female is higher. This suggests that in these two variables females are more responsive than man.

Table – 4.48 Mann Whitney U-test (Family Type)								
	SV1	SV2	SV3	**SV4**	SV5	SV6	SV7	SV8
Mann Whitney U	38364.0	43740.0	41640.0	37200.0	42240.0	42108.0	43740.0	43740.0
Wilcoxon W	94980.0	78720.0	76620.0	72180.0	77220.0	77088.0	78720.0	78720.0
Z	-3.35	-0.34	-1.55	-4.10	-1.36	-1.28	-0.34	-0.66
p values	**0.00**	0.73	0.12	**0.00**	0.17	0.20	0.73	0.51

In case of family type grouping (joint v/s nuclear) Table – 4.48 the p values for variables SV1 and SV4 is <0.05 which are statistically significant and hence the null hypothesis (i.e. **H2o**) is partially rejected but the mean ranks values for these two variables SV1 (for *to face uncertainties relating to* employment) and SV4 (*for children marriage*) also higher in case of joint family type in supporting these two variables than other variables.

Insurance habit variables (IN variables)

H.3o Microfinance intervention has not made socio-economic improvement by inculcating insurance habits in different gender beneficiaries of Dang District of Gujarat State.

H.3a Microfinance intervention has made socio-economic improvement by inculcating insurance habits in different gender beneficiaries of Dang District of Gujarat State.

H.4o Microfinance intervention has not made socio-economic improvement by inculcating insurance habits in different family type beneficiaries of Dang District of Gujarat State.

H.4a Microfinance intervention has made socio-economic improvement by inculcating insurance habits in different family type beneficiaries of Dang District of Gujarat State.

The Mann-Whitney test Table – 4.49 can be concluded that the difference between medians for gender type (male v/s female) was not statistically significant as p >0.05 and hence the null hypothesis is fail to reject **(H.3o)**; but the mean ranks values with respect to gender grouping for IN variables is higher for male than female concludes that the responses from male are more than female in case of insurance habit.

Table – 4.49 Mann-Whitney U-test (Gender)

	IN1	**IN2**	**IN3**	**IN4**	**IN5**
Mann Whitney U	26515.0	26900.0	25780.0	26145.0	26335.0
Wilcoxon W	32620.0	147195.0	31885.0	32250.0	32440.0
Z	-0.39	-0.04	-1.44	-0.79	-0.95
p values	0.70	0.97	0.15	0.43	0.34

In case of family type grouping (joint v/s nuclear) for all variables p>0.05 hence not statistically significantthus the null hypothesis is failed to reject **(H.4o)**; but the mean ranks values for variables IN3 (*Increase in peace of mind and feeling protection*)is higher for nuclear type of family while others are higher for joint family type (Table – 4.50) in case of insurance habit.

Table – 4.50 Mann-Whitney U-test (Family Type)

	IN1	**IN2**	**IN3**	**IN4**	**IN5**
Mann Whitney U	43908.0	43692.0	43080.0	43740.0	43296.0
Wilcoxon W	78888.0	78672.0	99696.0	78720.0	78276.0
Z	-0.31	-0.44	-1.22	-0.47	-1.27
p values	0.76	0.66	0.22	0.64	0.20

Economic Impact – SE Variables

H.5o Microfinance intervention has not made improvement in economic status in different gender beneficiaries of Dang District of Gujarat State.

H.5a Microfinance intervention has made improvement in economic status in different gender beneficiaries of Dang District of Gujarat State.

H.6o Microfinance intervention has not made improvement in economic status in different family type beneficiaries of Dang District of Gujarat State.

H.6a Microfinance intervention has made improvement in economic status in different family type beneficiaries of Dang District of Gujarat State.

H.7o Microfinance intervention has not made improvement in economic status of different borrowers of Dang District of Gujarat State.

H.7a Microfinance intervention has made improvement in economic status in different borrowers of Dang District of Gujarat State.

The Mann-Whitney test values in Table – 4.51 provides details for the conclusion that the difference between medians for gender type (male v/s female) was not statistically significant as p>0.05 and hence the null hypothesis (i.e.**H.5o**) is fail to reject; except for variable SE7 (for *reduced* indebtedness) but the mean ranks values with respect to gender grouping for SE variables the values for SE1 lower (for *improvement in income level*) and SE4(for *increased business expenses on purchase of inputs*) variable is higher both cases to female; needs to observe for further calculations.

Table – 4.51 Mann-Whitney U-test (Gender)

	SE1	**SE2**	**SE3**	**SE4**	**SE5**	**SE6**	**SE7**
Mann Whitney U	23927.0	26031.0	26264.0	26565.5	26397.0	26289.5	23313.0
Wilcoxon W	144222.0	32136.0	32369.0	146860.5	32502.0	32394.5	29418.0
Z	-1.91	-0.60	-0.43	-0.24	-0.35	-0.42	-2.28
p values	0.06	0.55	0.67	0.81	0.73	0.67	**0.02**

In Table – 4.52 with family type grouping (joint v/s nuclear)for all variables p<0.05 which means statistically significant thus the null hypothesis (i.e.**H.6o)**is not rejected; the mean ranks values for all SE variables is higher for nuclear family type than joint family type which means nuclear family type beneficiaries responded fairly than joint type.

Table – 4.52 Mann-Whitney U-test (Family Type)							
	SE1	**SE2**	**SE3**	**SE4**	**SE5**	**SE6**	**SE7**
Mann Whitney U	36276.0	32409.5	35655.0	30702.5	34376.5	30928.0	30810.0
Wilcoxon W	92892.0	89025.5	92271.0	87318.5	90992.5	87544.0	87426.0
Z	-3.98	-6.06	-4.25	-6.76	-4.86	-6.65	-6.62
p values	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

In case of borrower grouping (borrower v/s no-borrower) to analyze questions on economic impact the $p<0.05$ for some of the SE variables (Table– 4.53) which means statistically significant thus the null hypothesis (i.e.**H.7o**) is rejected while for variables SE1 thru SE3 the $p >0.05$ and hence null hypothesis not rejected this make SE variables more vulnerable and needs to further analysis; the mean ranks values for SE variables is higher in case of non-borrower than borrower which indicates non borrowers has influence the responses.

Table – 4.53 Mann-Whitney U-test (Borrower)							
	SE1	**SE2**	**SE3**	**SE4**	**SE5**	**SE6**	**SE7**
Mann Whitney U	42827.5	41602.0	41917.0	38627.5	39632.5	37797.5	27932.0
Wilcoxon W	76238.5	75013.0	75328.0	72038.5	73043.5	71208.5	61343.0
Z	-0.64	-1.28	-1.08	-2.73	-2.19	-3.14	-7.94
p values	0.52	0.20	0.28	**0.01**	**0.03**	**0.00**	**0.00**

Social Impact – SS Variables

H.8o Microfinance intervention has not made improvement in social status in different gender beneficiaries of Dang District of Gujarat State.

H.8a Microfinance intervention has made improvement in social status in different gender beneficiaries of Dang District of Gujarat State.

H.9o Microfinance intervention has not made improvement in social status in different family type beneficiaries of Dang District of Gujarat State.

H.9a Microfinance intervention has made improvement in social status in different family type beneficiaries of Dang District of Gujarat State.

H.10o Microfinance intervention has not made improvement in social status of different borrowers of Dang District of Gujarat State.

H.10a Microfinance intervention has made improvement in social status in different borrowers of Dang District of Gujarat State.

The Mann-Whitney test values in the Table – 4.54 leads to the conclusion that the difference between medians of various SS variables for gender grouping (male v/s female) was not statistically significant (p >0.05)and hence the null hypothesis (i.e. **H.8o**) is rejected (i.e. except variables SS8, SS11 and SS12 respectively p<0.05; the mean ranks values with gender grouping of SS variables are higher in all cases to male than female leads for further analysis.

Table – 4.54 Mann-Whitney U-test (Gender)

	SS1	**SS2**	**SS3**	**SS4**	**SS5**	**SS6**
Mann Whitney U	25528.5	24679.0	26163.0	24262.5	25604.0	24003.0
Wilcoxon W	31633.5	30784.0	32268.0	30367.5	31709.0	30108.0
Z	-0.91	-1.43	-0.50	-1.69	-0.85	-1.87
p values	0.36	0.15	0.62	0.09	0.40	0.06
	SS7	**SS8**	**SS9**	**SS10**	**SS11**	**SS12**
Mann Whitney U	25112.5	23061.0	25252.0	25570.0	23014.0	23817.0
Wilcoxon W	31217.5	29166.0	31357.0	31675.0	29119.0	29922.0
Z	-1.17	-2.45	-1.07	-0.86	-2.45	-1.97
p values	0.24	**0.01**	0.28	0.39	**0.01**	**0.05**

Table – 4.55 Mann-Whitney U-test (Family Type)

	SS1	**SS2**	**SS3**	**SS4**	**SS5**	**SS6**
Mann Whitney U	36330.0	34541.0	30996.5	36258.0	33268.0	29526.0
Wilcoxon W	92946.0	91157.0	87612.5	92874.0	89884.0	86142.0
Z	-4.00	-4.83	-6.60	-3.96	-5.45	-7.32
p values	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	SS7	**SS8**	**SS9**	**SS10**	**SS11**	**SS12**
Mann Whitney U	29973.0	35099.5	33460.0	33582.5	36288.5	33664.0
Wilcoxon W	86589.0	91715.5	90076.0	90198.5	92904.5	90280.0
Z	-7.14	-4.54	-5.35	-5.24	-3.91	-5.24
p values	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

In case (Table – 4.55) of family type grouping (joint v/s nuclear) for SS variables p<0.05 which means all are statistically significant thus the null hypothesis (i.e. **H.9o**) is not rejected; the mean ranks values for all SS variables are higher in nuclear family

type than joint family type reflects the responses from nuclear family type are more conclusive; the further analysis may reflect more clarity.

In case of borrower grouping (borrower v/s no-borrower) for SS variables some of the questions on social impact the p<0.05 represented by variables such as SS1, SS5, SS7, SS8 and SS10 thru SS12 are statistically significant thus the null hypothesis (i.e. **H.10o**) is fail to reject; but at the same time other variables SS2 thru SS4, SS6 and SS9 the p >0.05 which makes null hypothesis accepted and hence with this contradictions it become necessary to analyze further.; the mean ranks values for all SS variables are higher in case of non-borrower than borrower.(Table – 4.56)

Table – 4.56 Mann-Whitney U-test (Borrower)

	SS1	**SS2**	**SS3**	**SS4**	**SS5**	**SS6**
Mann Whitney U	35387.0	42193.0	40462.5	42214.5	38967.5	40577.0
Wilcoxon W	68798.0	75604.0	73873.5	75625.5	72378.5	73988.0
Z	-4.37	-0.95	-1.81	-0.93	-2.54	-1.75
p values	**0.00**	0.34	0.07	0.35	**0.01**	0.08
	SS7	**SS8**	**SS9**	**SS10**	**SS11**	**SS12**
Mann Whitney U	39601.5	39368.5	40913.5	38667.5	38074.5	38959.0
Wilcoxon W	73012.5	72779.5	74324.5	72078.5	71485.5	72370.0
Z	-2.25	-2.34	-1.58	-2.66	-2.94	-2.54
p values	**0.02**	**0.02**	0.11	**0.01**	**0.00**	**0.01**

Challenges in Availing Micro Credit Services – (MC Variables)

H.11o There are problems faced in availing micro credit services by different gender beneficiaries of Dang District of Gujarat State.

H.11a There are no problems faced in availing micro credit services by different gender beneficiaries of Dang District of Gujarat State.

H.12o There are problems faced in availing micro credit services by different family type beneficiaries of Dang District of Gujarat State.

H.12a There are no problems faced in availing micro credit services by different family type beneficiaries of Dang District of Gujarat State.

The Mann-Whitney test (Table – 4.57) here concludes that the difference between medians for gender group (male v/s female) for every MC variables p >0.05 and hence the null hypothesis is fail to reject **(**i.e.**H.11o);** but the mean ranks values with respect

to gender grouping for MC1, MC2, MC9 thru MC12 variable is higher for male and for MC3 thru MC8 is higher for female shows different responses for other reasons that needs to observe by other calculations.

Table – 4.57 Mann-Whitney U-test (Gender)						
	MC1	**MC2**	**MC3**	**MC4**	**MC5**	**MC6**
Mann Whitney U	25965.0	26775.0	26495.0	26925.0	26720.0	26440.0
Wilcoxon W	32070.0	32880.0	146790.0	147220.0	147015.0	146735.0
Z	-0.85	-0.14	-0.38	-0.02	-0.19	-0.43
p values	0.40	0.89	0.70	0.98	0.85	0.67
	MC7	**MC8**	**MC9**	**MC10**	**MC11**	**MC12**
Mann Whitney U	26710.0	26750.0	26545.0	26595.0	25855.0	25555.0
Wilcoxon W	147005.0	147045.0	32650.0	32700.0	31960.0	31660.0
Z	-0.20	-0.16	-0.37	-0.41	-1.21	-1.54
p values	0.84	0.87	0.71	0.68	0.23	0.12

Table – 4.58 Mann-Whitney U-test (Family Type)						
	MC1	**MC2**	**MC3**	**MC4**	**MC5**	**MC6**
Mann Whitney U	42288.0	39912.0	38304.0	39252.0	37224.0	39036.0
Wilcoxon W	77268.0	74892.0	73284.0	74232.0	72204.0	74016.0
Z	-1.38	-2.84	-3.93	-3.44	-4.47	-3.46
p values	0.17	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	MC7	**MC8**	**MC9**	MC10	MC11	MC12
Mann Whitney U	41028.0	36132.0	39900.0	43404.0	43260.0	44160.0
Wilcoxon W	76008.0	71112.0	74880.0	100020.0	99876.0	100776.0
Z	-2.20	-5.09	-3.14	-0.86	-0.94	-0.16
p values	**0.03**	**0.00**	**0.00**	0.39	0.35	0.87

For family type grouping (joint v/s nuclear) in Table – 4.58 in MC variables whereas MC2 thru MC9 $p < 0.05$ are statistically significant so that the null hypothesis (i.e.**H.12o**) is partially rejected because for variables MC1 and MC10 thru MC12 the $p>0.05$. The mean ranks values for variables MS1 thru MC9 is higher in case of joint family type and for MC10 thru MC12 is higher in case of nuclear family type gives different reasoning to analyze further.

Challenges in Availing Micro Savings Services – (MS Variables)

H.13o There are no problems in availing micro savings services by different gender beneficiaries of Dang District of Gujarat State.

H.13a There are problems in availing micro savings services by different gender beneficiaries of Dang District of Gujarat State.

H.14o There are no problems in availing micro savings services by different family type beneficiaries of Dang District of Gujarat State.

H.14a There are problems in availing micro savings services by different family type beneficiaries of Dang District of Gujarat State.

The Mann-Whitney test values in Table – 4.59 provides the conclusion that the difference between medians for gender type (male v/s female) the values p >0.05and hence the null hypothesis (i.e. **H.13o**) is failing to reject; the mean ranks values with respect to gender grouping for MS variables are higher for male than female shows male prefer need and importance of savings.

Table – 4.59 Mann-Whitney U-test (Gender)

	MS1	**MS2**	**MS3**
Mann Whitney U	24775.0	25730.0	26795.0
Wilcoxon W	30880.0	31835.0	32900.0
Z	-1.55	-0.87	-0.11
p values	0.12	0.39	0.91

Table – 4.60 Mann-Whitney U-test (Family Type)

	MS1	**MS2**	**MS3**
Mann Whitney U	40212.0	39444.0	38940.0
Wilcoxon W	75192.0	74424.0	73920.0
Z	-2.29	-2.72	-2.99
p values	**0.02**	**0.01**	**0.00**

In case of family type grouping (joint v/s nuclear) in Table – 4.60 for all MS variables p<0.05 which means statistically significant thus the null hypothesis (i.e. **H.14o**) is rejected; the mean ranks values for MS variables are higher in case of joint family than nuclear family type which shows that joint family type is more concerned about savings.

Challenges in Availing Micro Insurance Services – MI Variables

H.15o There are no problems in availing micro insurance services by different gender beneficiaries of Dang District of Gujarat State.

H.15a There are problems in availing micro insurance services by different gender beneficiaries of Dang District of Gujarat State.

H.16o There are no problems in availing micro insurance services by different family type beneficiaries of Dang District of Gujarat State.

H.16a There are problems in availing micro insurance services by different family type beneficiaries of Dang District of Gujarat State

The Mann-Whitney test values for MI variables in Table – 4.61 shows the conclusion that the difference between medians for both gender (male v/s female) was not statistically significant as p>0.05and hence the null hypothesis (i.e. **H.15o**) is fail to reject; the mean ranks values for gender grouping of MI variables in case of variable MI1 and MI2 are higher for fem male and for variable MI3 and MI4 are higher for male; both gender shares the importance of insurance but this needs to further analysis.

Table – 4.61 Mann-Whitney U-test (Gender)

	MI1	**MI2**	**MI3**	**MI4**
Mann Whitney U	26755.0	26700.0	26255.0	25685.0
Wilcoxon W	147050.0	146995.0	32360.0	31790.0
Z	-0.15	-0.19	-0.57	-1.29
p values	0.88	0.85	0.57	0.20

In case of family type grouping (joint v/s nuclear) in Table – 4.62for all MI variables the p >0.05 which means statistically not significant and hence the null hypothesis (i.e. **H.16o**) is failing to reject; the mean ranks values for MI variables are higher in case of joint family type than nuclear family type which conclude that joint family type feels more importance of insurance.

Table – 4.62 Mann-Whitney U-test (Family Type)

	MI1	**MI2**	**MI3**	**MI4**
Mann Whitney U	41880.0	42012.0	42684.0	43296.0
Wilcoxon W	76860.0	76992.0	77664.0	78276.0
Z	-1.50	-1.42	-1.06	-0.84
p values	0.13	0.15	0.29	0.40

4.4.2 Levene's Test for Equality of Variance

The Levene's test (Levene 1960) is used to test for all *k* different variables with an assumption of equal variances. The equal variances across variables are called homogeneity of variance which is important condition in *parametric test* such as t-test and F-test. Some statistical tests e.g. the analysis of variance (ANOVA i.e. F Values), assume that variances

are equal across groups (e.g. male v/s female, rural v/s urban etc.) or variables. If the significance (i.e. *p* values) from this test is less than 0.05, than variances are significantly different and parametric tests cannot be used and a non-parametric test (i.e. Levene's test) will probably have to verify the assumption. This test is an alternative to the Bartlett test and less sensitive because of departures from normality. If our data shows any strong evidence about distribution followed as normal then Bartlett's test has better performance. The Levene's test the following hypothesis: (for every i = 1, 2, 3….k and j = 2.3.4…..n)

H_0: $\sigma 21=\sigma 22=\ldots=\sigma 2k$ H_a: $\sigma 2i\neq\sigma 2j$ for at least one pair (*i*,*j*).

The assumed hypotheses required for testing of homogeneity of variances between data and their groups. Once data are tested through the **Mann-Whitney U-test;** the next step for data is to compare difference between two independent groups (e.g. gender or family type etc.) using SPSS software; this could possible through Leven's Test for equality of variance performed on different variables for different groups separately assuming variances are equal.

SV Variables

The Table – 4.63 gives Group Statistics for Gender grouping (male v/s female) having every variable the average values are comparable. There were 4 variables where average values for male are more than average values of female while other 3 variables where average values of female are more than average values of male. These averages show the trends of responses.

Table – 4.63 Group Statistics (Gender)

Var.	Gender	Mean	Std. Dev.	SE Mean
SV1	Male	0.40	0.49	0.02
	Female	0.43	0.50	0.05
SV2	Male	0.40	0.49	0.02
	Female	0.39	0.49	0.05
SV3	Male	0.37	0.48	0.02
	Female	0.32	0.47	0.04
SV4	Male	0.35	0.48	0.02
	Female	0.35	0.48	0.05
SV5	Male	0.24	0.43	0.02
	Female	0.23	0.42	0.04
SV6	Male	0.35	0.48	0.02
	Female	0.41	0.49	0.05
SV7	Male	0.39	0.49	0.02
	Female	0.44	0.50	0.05
SV8	Male	0.07	0.26	0.01
	Female	0.05	0.23	0.02

In this test for homogeneity of variance gives an F-statistic and a *p* value for every SV variables independently under gender grouping are tabulated in the Table – 4.64, it was observed that for variables SV3 and SV6 having p<0.05 (shown in bold) hence it shows that the variances are not equal and violating the assumption of homogeneity of variance an can be concluded that the null hypothesis is partially fail to reject. For variables SV1, SV2, SV4, SV5, SV7 and SV8 the p values are >0.05 for variance for these variables was assumed equal variances to conclude the null hypothesis is partially rejected. Such situations allows us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{male} = mean_{female}$; whereas again the p values for all variables are >0.05 and hence we accept our alternate hypothesis.

Table – 4.64 Independent Group Test (Gender)

Var.	Comparing Variances assumed	Levene's Test (Equality of Variances)		t-test (Equality of Means)					
		F cal	p cal	t cal	p cal	Mean Difference	SE Difference	95% CL of the Difference	
								Lower	Upper
SV1	Equal	1.17	0.28	-0.61	0.55	-0.03	0.05	-0.13	0.07
	Not Equal			-0.60	0.55	-0.03	0.05	-0.13	0.07
SV2	Equal	0.28	0.60	0.25	0.80	0.01	0.05	-0.09	0.11
	Not Equal			0.25	0.80	0.01	0.05	-0.09	0.12
SV3	Equal	5.03	**0.03**	1.01	0.31	0.05	0.05	-0.05	0.15
	Not Equal			1.03	0.30	0.05	0.05	-0.05	0.15
SV4	Equal	0.09	0.76	0.15	0.88	0.01	0.05	-0.09	0.11
	Not Equal			0.15	0.88	0.01	0.05	-0.09	0.11
SV5	Equal	0.18	0.67	0.21	0.83	0.01	0.04	-0.08	0.10
	Not Equal			0.21	0.83	0.01	0.04	-0.08	0.10
SV6	Equal	3.86	**0.05**	-1.14	0.25	-0.06	0.05	-0.16	0.04
	Not Equal			-1.12	0.26	-0.06	0.05	-0.16	0.04
SV7	Equal	1.96	0.16	-0.82	0.41	-0.04	0.05	-0.14	0.06
	Not Equal			-0.81	0.42	-0.04	0.05	-0.15	0.06
SV8	Equal	1.65	0.20	0.63	0.53	0.02	0.03	-0.04	0.07
	Not Equal			0.68	0.49	0.02	0.02	-0.03	0.07

The Table - 4.65 gives Group Statistics for Family Type grouping (joint v/s nuclear) having every variable the average values which are comparable. There were 7 variables where average values for joint family types are more than average values of nuclear while only 1 variable where average values of nuclear are more than average values of joint family type.

Table – 4.65 Group Statistics (Family Type)				
Variables	**Family**	**Mean**	**Std. Dev.**	**SE Mean**
SV1	Joint type	0.34	0.48	0.03
	Nuclear type	0.48	0.50	0.03
SV2	Joint type	0.41	0.49	0.03
	Nuclear type	0.39	0.49	0.03
SV3	Joint type	0.39	0.49	0.03
	Nuclear type	0.33	0.47	0.03
SV4	Joint type	0.42	0.49	0.03
	Nuclear type	0.26	0.44	0.03
SV5	Joint type	0.26	0.44	0.02
	Nuclear type	0.21	0.41	0.03
SV6	Joint type	0.38	0.49	0.03
	Nuclear type	0.33	0.47	0.03
SV7	Joint type	0.41	0.49	0.03
	Nuclear type	0.39	0.49	0.03
SV8	Joint type	0.07	0.26	0.01
	Nuclear type	0.06	0.24	0.01

The assumptions of equal variances for every SV variables under family type grouping is tabulated above in Table – 4.66; the p<0.05 (shown in bold) for F-statistic in variables SV3 thru SV6 having hence it can be concluded that the null hypothesis is partially fail to reject for these variables respectively, where it was assumed variances are equal while for remaining variables the p values are >0.05 and hence in these cases variances are not equal to conclude the null hypothesis is partially rejected. Such situations allows us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{joint} = mean_{nuclear}$; whereas again the p values for all variables are >0.05 and hence we accept our alternate hypothesis.

Table – 4.66 Independent Group Test (Family Type)									
Var.	**Comparing Variances assumed**	**Levene's Test (Equality of Variances)**		**t-test (Equality of Means)**					
		F cal	**p cal**	**t cal**	**p cal**	**Mean Difference**	**SE Difference**	**95% CL of the Difference**	
								Lower	**Upper**
SV1	Equal	27.39	**0.00**	-3.37	**0.00**	-0.14	0.04	-0.21	-0.06
	Not Equal			-3.35	**0.00**	-0.14	0.04	-0.21	-0.06
SV2	Equal	0.47	0.49	0.34	0.73	0.01	0.04	-0.07	0.09
	Not Equal			0.34	0.73	0.01	0.04	-0.07	0.09
SV3	Equal	9.82	**0.00**	1.55	0.12	0.06	0.04	-0.02	0.14
	Not Equal			1.56	0.12	0.06	0.04	-0.02	0.14
SV4	Equal	67.66	**0.00**	4.16	**0.00**	0.16	0.04	0.09	0.24
	Not Equal			4.22	**0.00**	0.16	0.04	0.09	0.24
SV5	Equal	7.66	**0.01**	1.37	0.17	0.05	0.03	-0.02	0.12
	Not Equal			1.38	0.17	0.05	0.03	-0.02	0.12
SV6	Equal	6.70	**0.01**	1.28	0.20	0.05	0.04	-0.03	0.13
	Not Equal			1.28	0.20	0.05	0.04	-0.03	0.13
SV7	Equal	0.47	0.49	0.34	0.73	0.01	0.04	-0.07	0.09
	Not Equal			0.34	0.73	0.01	0.04	-0.07	0.09
SV8	Equal	1.78	0.18	0.66	0.51	0.01	0.02	-0.03	0.05
	Not Equal			0.67	0.50	0.01	0.02	-0.03	0.05

IN Variables

The Table - 4.67 gives Group Statistics for Gender grouping (male v/s female) having every variable the average values which are comparable. All 4 IN variables having mean values for male are more than mean values of female.

Table – 4.67 Group Statistics (Gender)

Var.	Gender	Mean	Std. Dev.	SE Mean
IN1	Male	0.20	0.40	0.02
	Female	0.18	0.39	0.04
IN2	Male	0.22	0.41	0.02
	Female	0.22	0.41	0.04
IN3	Male	0.10	0.30	0.01
	Female	0.05	0.23	0.02
IN4	Male	0.16	0.36	0.02
	Female	0.13	0.33	0.03
IN5	Male	0.06	0.24	0.01
	Female	0.04	0.19	0.02

The assumptions of equal variances for every variable (IN variables) under gender grouping are tabulated in Table – 4.68; the p-value of F-statistic for variable IN3 is <0.05 (shown as bold) hence it can be concluded that the null hypothesis is partially fail to reject for this variable only when it was assumed variances are equal; while the p>0.05 for remaining variables hence in these cases variances are not equal to conclude, the null hypothesis is partially rejected. Such situations allow us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{male} = mean_{female}$; whereas again the p values for all variables are >0.05 and hence we accept our alternate hypothesis.

Table – 4.68 Independent Group Test (Gender)

Var.	Comparing Variances assumed	Levene's Test (Equality of Variances)		t-test (Equality of Means)					
		F cal	p cal	t cal	p cal	Mean Difference	SE Difference	95% CL of the Difference	
								Lower	Upper
IN1	Equal	0.62	0.43	0.39	0.70	0.02	0.04	-0.07	0.10
	Not Equal			0.39	0.70	0.02	0.04	-0.07	0.10
IN2	Equal	0.01	0.93	-0.04	0.97	0.00	0.04	-0.09	0.08
	Not Equal			-0.04	0.97	0.00	0.04	-0.09	0.08
IN3	Equal	8.95	**0.00**	1.44	0.15	0.04	0.03	-0.02	0.10
	Not Equal			1.70	0.09	0.04	0.03	-0.01	0.09
IN4	Equal	2.63	0.11	0.79	0.43	0.03	0.04	-0.04	0.10
	Not Equal			0.83	0.41	0.03	0.04	-0.04	0.10
IN5	Equal	3.73	0.05	0.95	0.34	0.02	0.02	-0.02	0.07
	Not Equal			1.09	0.28	0.02	0.02	-0.02	0.06

Table – 4.69 Group Statistics (Family Type)				
Var.	**Family**	**Mean**	**Std. Dev.**	**SE Mean**
IN1	Joint type	0.20	0.40	0.02
	Nuclear type	0.19	0.39	0.02
IN2	Joint type	0.22	0.42	0.02
	Nuclear type	0.21	0.41	0.03
IN3	Joint type	0.08	0.27	0.01
	Nuclear type	0.11	0.31	0.02
IN4	Joint type	0.16	0.37	0.02
	Nuclear type	0.14	0.35	0.02
IN5	Joint type	0.07	0.25	0.01
	Nuclear type	0.04	0.20	0.01

The Table - 4.69 gives Group Statistics for Family Type grouping (joint v/s nuclear) having every variable the average values which are comparable. There were 4 variables where average values for joint family types are more than average values of nuclear while only 1 (IN3) variable where average values of nuclear are more than average values of joint family type.

Table – 4.70 Independent Group Test (Family Type)									
Var.	**Comparing Variances assumed**	**Levene's Test (Equality of Variances)**		**t-test (Equality of Means)**					
		F cal	**p cal**	**t cal**	**p cal**	**Mean Difference**	**SE Difference**	**95% CL of the Difference**	
								Lower	**Upper**
IN1	Equal	0.38	0.54	0.31	0.76	0.01	0.03	-0.05	0.07
	Not Equal			0.31	0.76	0.01	0.03	-0.05	0.07
IN2	Equal	0.77	0.38	0.44	0.66	0.01	0.03	-0.05	0.08
	Not Equal			0.44	0.66	0.01	0.03	-0.05	0.08
IN3	Equal	5.94	**0.02**	-1.22	0.22	-0.03	0.02	-0.07	0.02
	Not Equal			-1.20	0.23	-0.03	0.02	-0.08	0.02
IN4	Equal	0.88	0.35	0.47	0.64	0.01	0.03	-0.04	0.07
	Not Equal			0.47	0.64	0.01	0.03	-0.04	0.07
IN5	Equal	6.55	**0.01**	1.27	0.20	0.02	0.02	-0.01	0.06
	Not Equal			1.30	0.19	0.02	0.02	-0.01	0.06

The assumptions of equal variances for every variable (IN variables) under family type grouping are tabulated in Table – 4.70; if observe F-statistic the p values are <0.05 for variables IN3 and IN5 (shown in bold) hence it can be concluded that the null hypothesis is partially fail to reject for these variables respectively, where it was assumed variances are equal. In case of remaining other variables IN1, IN2 and IN4 the p values are >0.05 and hence in these cases variances are not equal to conclude the null hypothesis is partially

rejected. Such situations allow us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{joint} = mean_{nuclear}$; whereas again the p values for all variables are >0.05 and hence we accept our alternate hypothesis.

Economic Impact – SE Variables

Table – 4.71 Group Statistics (Gender)

Var.	Gender	Mean	Std. Dev.	SE Mean
SE1	Male	2.49	1.22	0.05
	Female	2.68	1.11	0.11
SE2	Male	2.99	1.06	0.05
	Female	2.95	1.06	0.10
SE3	Male	2.57	1.33	0.06
	Female	2.49	1.28	0.12
SE4	Male	3.03	1.10	0.05
	Female	3.06	1.04	0.10
SE5	Male	2.84	1.29	0.06
	Female	2.79	1.20	0.11
SE6	Male	3.17	1.16	0.05
	Female	3.14	1.13	0.11
SE7	Male	3.44	1.30	0.06
	Female	3.14	1.25	0.12

The Table - 4.71 gives Group Statistics for Gender grouping (male v/s female) having every variable the average values which are comparable. There were all the 5 variables where the mean values for male are more than mean values of female and for 2 variables where the mean values for female is more than male.

The assumptions of equal variances for every SE variables under gender grouping are tabulated in above Table – 4.72; the F-statistic for only one variable (SE7) having p <0.05 hence it can be concluded that the null hypothesis is rejected when it was assumed variances are equal. Such situations allows us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{male} = mean_{female}$; whereas again the p values for variable SE7 is <0.05 while other are >0.05 confirms that there is no significance difference and hence accept our null hypothesis.

Table – 4.72 Independent Group Test (Gender)									
Var.	Comparing Variances assumed	Levene's Test (Equality of Variances)		t-test (Equality of Means)					
		F cal	p cal	t cal	p cal	Mean Difference	SE Difference	95% CL of the Difference	
								Lower	Upper
SE1	Equal	2.88	0.09	-1.50	0.13	-0.19	0.13	-0.44	0.06
	Not Equal			-1.60	0.11	-0.19	0.12	-0.43	0.05
SE2	Equal	0.01	0.93	0.43	0.66	0.05	0.11	-0.17	0.27
	Not Equal			0.43	0.66	0.05	0.11	-0.17	0.27
SE3	Equal	1.38	0.24	0.59	0.55	0.08	0.14	-0.19	0.36
	Not Equal			0.61	0.54	0.08	0.14	-0.19	0.35
SE4	Equal	0.92	0.34	-0.25	0.80	-0.03	0.11	-0.25	0.20
	Not Equal			-0.26	0.79	-0.03	0.11	-0.25	0.19
SE5	Equal	1.75	0.19	0.37	0.71	0.05	0.13	-0.21	0.31
	Not Equal			0.39	0.70	0.05	0.13	-0.20	0.30
SE6	Equal	0.70	0.40	0.27	0.79	0.03	0.12	-0.21	0.27
	Not Equal			0.28	0.78	0.03	0.12	-0.20	0.27
SE7	Equal	5.73	**0.02**	2.21	**0.03**	0.30	0.14	0.03	0.57
	Not Equal			2.27	**0.02**	0.30	0.13	0.04	0.56

The Table - 4.73 gives Group Statistics for Family Type grouping (joint v/s nuclear) having every variable the average values which are comparable. There were all 7 variables where mean values for nuclear family type are more than mean values of joint family type.

Table – 4.73 Group Statistics (Family Type)				
Var.	Family	Mean	SD	SE Mean
SE1	Joint type	2.31	1.00	0.05
	Nuclear type	2.81	1.36	0.08
SE2	Joint type	2.74	0.92	0.05
	Nuclear type	3.30	1.15	0.07
SE3	Joint type	2.31	1.10	0.06
	Nuclear type	2.88	1.50	0.09
SE4	Joint type	2.76	0.91	0.05
	Nuclear type	3.40	1.18	0.07
SE5	Joint type	2.58	1.10	0.06
	Nuclear type	3.15	1.41	0.09
SE6	Joint type	2.88	1.05	0.06
	Nuclear type	3.52	1.18	0.07
SE7	Joint type	3.08	1.22	0.07
	Nuclear type	3.76	1.29	0.08

Table – 4.74 Independent Group Test (Family Type)									
Var.	**Comparing Variances assumed**	**Levene's Test (Equality of Variances)**		**t-test (Equality of Means)**					
		F cal	**p cal**	**t cal**	**p cal**	**Mean Difference**	**SE Difference**	**95% CL of the Difference**	
								Lower	**Upper**
SE1	Equal	33.54	**0.00**	-5.19	**0.00**	-0.50	0.10	-0.69	-0.31
	Not Equal			-5.00	**0.00**	-0.50	0.10	-0.70	-0.30
SE2	Equal	13.85	**0.00**	-6.59	**0.00**	-0.55	0.08	-0.72	-0.39
	Not Equal			-6.42	**0.00**	-0.55	0.09	-0.72	-0.38
SE3	Equal	58.94	**0.00**	-5.32	**0.00**	-0.57	0.11	-0.77	-0.36
	Not Equal			-5.13	**0.00**	-0.57	0.11	-0.78	-0.35
SE4	Equal	42.49	**0.00**	-7.48	**0.00**	-0.64	0.09	-0.81	-0.47
	Not Equal			-7.26	**0.00**	-0.64	0.09	-0.81	-0.47
SE5	Equal	31.90	**0.00**	-5.58	**0.00**	-0.57	0.10	-0.77	-0.37
	Not Equal			-5.41	**0.00**	-0.57	0.11	-0.78	-0.36
SE6	Equal	18.22	**0.00**	-7.04	**0.00**	-0.64	0.09	-0.82	-0.46
	Not Equal			-6.95	**0.00**	-0.64	0.09	-0.82	-0.46
SE7	Equal	7.34	**0.01**	-6.59	**0.00**	-0.68	0.10	-0.88	-0.48
	Not Equal			-6.55	**0.00**	-0.68	0.10	-0.88	-0.47

The assumptions of equal variances for SE variables under family type grouping are tabulated in Table – 4.74 above; the F-statistic of all variables SE1 thru SE7;the p values are <0.05 (shown in bold) hence it can be concluded that the null hypothesis is accepted as it was assumed that variances are equal. Similar situations allow us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{joint} = mean_{nuclear}$; whereas again the p values for all variables are <0.05 and hence we accept our null hypothesis. The Table – 4.75 shows Group Statistics for Borrower grouping (borrower v/s no borrower) of SE variables having the average values are more in non-borrower than borrower.

Table – 4.75 Group Statistics (Borrower)				
Var.	**Borrow Money**	**Mean**	**Std. Dev.**	**SE Mean**
SE1	Yes	2.47	1.14	0.07
	No	2.57	1.24	0.07
SE2	Yes	2.90	1.00	0.06
	No	3.05	1.09	0.06
SE3	Yes	2.48	1.28	0.08
	No	2.61	1.35	0.07
SE4	Yes	2.90	1.04	0.06
	No	3.15	1.11	0.06
SE5	Yes	2.71	1.27	0.08
	No	2.92	1.27	0.07
SE6	Yes	3.00	1.18	0.07
	No	3.28	1.12	0.06
SE7	Yes	2.88	1.39	0.09
	No	3.76	1.08	0.06

The Table – 4.76 for every variable (SE variables) under borrower's grouping with assumptions for equal variances given; the value of F-statistic only for one variable SE7 having values for p<0.05 (shown in bold) hence it can be concluded that the null hypothesis is partially accepted as it was assumed that variances are equal. Similarly, this allows us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{borrower} = mean_{non\text{-}borrower}$; whereas again the p values for SE4 thru SE7 variables are <0.05 and hence we accept our null hypothesis.

Table – 4.76 Independent Group Test (Borrower)

Var.	Comparing Variances assumed	Levene's Test (Equality of Variances)		t-test (Equality of Means)					
		F cal	p cal	t cal	p cal	Mean Difference	SE Difference	95% CL of the Difference	
								Lower	Upper
SE1	Equal	1.00	0.32	-1.09	0.27	-0.11	0.10	-0.30	0.09
	Not Equal			-1.11	0.27	-0.11	0.10	-0.30	0.08
SE2	Equal	1.02	0.31	-1.73	0.08	-0.15	0.09	-0.32	0.02
	Not Equal			-1.75	0.08	-0.15	0.09	-0.32	0.02
SE3	Equal	1.67	0.20	-1.19	0.24	-0.13	0.11	-0.34	0.08
	Not Equal			-1.20	0.23	-0.13	0.11	-0.34	0.08
SE4	Equal	3.75	0.05	-2.85	**0.00**	-0.25	0.09	-0.43	-0.08
	Not Equal			-2.88	**0.00**	-0.25	0.09	-0.43	-0.08
SE5	Equal	1.48	0.22	-2.04	**0.04**	-0.21	0.10	-0.42	-0.01
	Not Equal			-2.04	**0.04**	-0.21	0.11	-0.42	-0.01
SE6	Equal	0.26	0.61	-2.96	**0.00**	-0.28	0.09	-0.47	-0.09
	Not Equal			-2.94	**0.00**	-0.28	0.10	-0.47	-0.09
SE7	Equal	21.49	**0.00**	-8.75	**0.00**	-0.88	0.10	-1.08	-0.68
	Not Equal			-8.45	**0.00**	-0.88	0.10	-1.09	-0.68

Social Impact – SS Variables

The Table - 4.77shows group statistics with gender grouping (male v/s female) for SS variables; the average values for all 12 variables are more for male than female.

Table – 4.77 Group Statistics (Gender)

Var.	Gender	Mean	Std. Dev.	SE Mean	Var.	Gender	Mean	Std. Dev.	SE Mean
SS1	Male	3.36	1.18	0.05	**SS7**	Male	3.46	1.05	0.05
	Female	3.26	1.06	0.10		Female	3.32	1.20	0.11
SS2	Male	2.98	1.14	0.05	**SS8**	Male	3.00	1.22	0.06
	Female	2.78	1.17	0.11		Female	2.67	1.22	0.12
SS3	Male	3.09	1.10	0.05	**SS9**	Male	3.17	1.16	0.05
	Female	3.05	1.13	0.11		Female	3.03	1.10	0.10
SS4	Male	2.99	1.20	0.05	**SS10**	Male	3.04	1.31	0.06
	Female	2.78	1.21	0.12		Female	2.91	1.20	0.11
SS5	Male	3.02	1.23	0.06	**SS11**	Male	2.96	1.47	0.07
	Female	2.90	1.15	0.11		Female	2.58	1.40	0.13
SS6	Male	3.38	1.12	0.05	**SS12**	Male	3.51	1.14	0.05
	Female	3.17	1.06	0.10		Female	3.27	1.07	0.10

Table – 4.78 Independent Group Test (Gender)									
Var.	**Comparing Variances assumed**	**Levene's Test (Equality of Variances)**		**t-test (Equality of Means)**					
		F cal	**p cal**	**t cal**	**p cal**	**Mean Difference**	**SE Difference**	**95% CL of the Difference**	
								Lower	**Upper**
SS1	Equal	5.17	**0.02**	0.78	0.44	0.10	0.12	-0.14	0.34
	Not Equal			0.83	0.41	0.10	0.11	-0.13	0.32
SS2	Equal	0.15	0.70	1.64	0.10	0.20	0.12	-0.04	0.43
	Not Equal			1.61	0.11	0.20	0.12	-0.04	0.44
SS3	Equal	0.59	0.44	0.40	0.69	0.05	0.12	-0.18	0.27
	Not Equal			0.39	0.70	0.05	0.12	-0.19	0.28
SS4	Equal	0.05	0.82	1.65	0.10	0.21	0.13	-0.04	0.46
	Not Equal			1.64	0.10	0.21	0.13	-0.04	0.46
SS5	Equal	3.18	0.08	0.92	0.36	0.12	0.13	-0.13	0.37
	Not Equal			0.96	0.34	0.12	0.12	-0.12	0.36
SS6	Equal	4.22	**0.04**	1.75	0.08	0.20	0.12	-0.02	0.43
	Not Equal			1.82	0.07	0.20	0.11	-0.02	0.43
SS7	Equal	1.73	0.19	1.27	0.20	0.15	0.11	-0.08	0.37
	Not Equal			1.17	0.24	0.15	0.12	-0.10	0.39
SS8	Equal	0.05	0.82	2.51	**0.01**	0.32	0.13	0.07	0.58
	Not Equal			2.51	**0.01**	0.32	0.13	0.07	0.58
SS9	Equal	4.60	**0.03**	1.14	0.26	0.14	0.12	-0.10	0.38
	Not Equal			1.18	0.24	0.14	0.12	-0.09	0.37
SS10	Equal	2.94	0.09	0.97	0.33	0.13	0.14	-0.14	0.40
	Not Equal			1.02	0.31	0.13	0.13	-0.12	0.39
SS11	Equal	0.23	0.64	2.46	**0.01**	0.38	0.15	0.08	0.68
	Not Equal			2.54	**0.01**	0.38	0.15	0.08	0.67
SS12	Equal	3.01	0.08	1.99	**0.05**	0.24	0.12	0.00	0.47
	Not Equal			2.07	**0.04**	0.24	0.11	0.01	0.46

The assumptions of equal variances for SS variables under gender grouping are tabulated in Table – 4.78; the F-statistic for variables SS1, SS6 and SS9 having $p<0.05$ which conclude that the null hypothesis is partially rejected since it was assumed variances are equal. Such situations allow us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{male} = mean_{female}$; whereas again the p values for variables SS8, SS11 and SS12 are <0.05 while other are >0.05 confirms that there is no significance difference and hence accept our null hypothesis.

The Table - 4.79 gives group statistics for Family Type grouping (male v/s female) for all SS variables the average values are of all the 12 variables for nuclear family type are more than mean values of joint family type.

Table – 4.79 Group Statistics (Family Type)									
Var.	**Family**	**Mean**	**SD**	**SE Mean**	**Var.**	**Family**	**Mean**	**SD**	**SE Mean**
SS1	Joint type	3.18	1.10	0.06	SS7	Joint type	3.15	1.00	0.05
	Nuclear type	3.55	1.20	0.07		Nuclear type	3.80	1.08	0.07
SS2	Joint type	2.73	1.04	0.06	SS8	Joint type	2.71	1.04	0.06
	Nuclear type	3.22	1.22	0.07		Nuclear type	3.22	1.38	0.08
SS3	Joint type	2.81	1.00	0.05	SS9	Joint type	2.90	1.02	0.06
	Nuclear type	3.43	1.13	0.07		Nuclear type	3.44	1.24	0.08
SS4	Joint type	2.76	1.04	0.06	SS10	Joint type	2.76	1.17	0.06
	Nuclear type	3.20	1.36	0.08		Nuclear type	3.34	1.37	0.08
SS5	Joint type	2.74	1.08	0.06	SS11	Joint type	2.68	1.35	0.07
	Nuclear type	3.33	1.30	0.08		Nuclear type	3.16	1.55	0.10
SS6	Joint type	3.04	0.99	0.05	SS12	Joint type	3.26	1.05	0.06
	Nuclear type	3.72	1.15	0.07		Nuclear type	3.73	1.19	0.07

Table – 4.80 Independent Group Test (Family Type)									
Var.	**Comparing Variances assumed**	**Levene's Test (Equality of Variances)**		**t-test (Equality of Means)**					
		F cal	**p cal**	**t cal**	**p cal**	**Mean Difference**	**SE Difference**	**95% CL of the Difference**	
								Lower	**Upper**
SS1	Equal	13.95	**0.00**	-4.01	**0.00**	-0.38	0.09	-0.56	-0.19
	Not Equal			-3.96	**0.00**	-0.38	0.10	-0.56	-0.19
SS2	Equal	9.03	**0.00**	-5.29	**0.00**	-0.49	0.09	-0.67	-0.31
	Not Equal			-5.19	**0.00**	-0.49	0.09	-0.67	-0.30
SS3	Equal	9.37	**0.00**	-7.06	**0.00**	-0.62	0.09	-0.79	-0.44
	Not Equal			-6.96	**0.00**	-0.62	0.09	-0.79	-0.44
SS4	Equal	37.55	**0.00**	-4.52	**0.00**	-0.44	0.10	-0.63	-0.25
	Not Equal			-4.38	**0.00**	-0.44	0.10	-0.64	-0.24
SS5	Equal	32.07	**0.00**	-6.12	**0.00**	-0.59	0.10	-0.79	-0.40
	Not Equal			-5.99	**0.00**	-0.59	0.10	-0.79	-0.40
SS6	Equal	32.56	**0.00**	-7.78	**0.00**	-0.68	0.09	-0.85	-0.51
	Not Equal			-7.65	**0.00**	-0.68	0.09	-0.85	-0.50
SS7	Equal	15.10	**0.00**	-7.52	**0.00**	-0.64	0.09	-0.81	-0.47
	Not Equal			-7.45	**0.00**	-0.64	0.09	-0.81	-0.47
SS8	Equal	36.38	**0.00**	-5.12	**0.00**	-0.51	0.10	-0.70	-0.31
	Not Equal			-4.95	**0.00**	-0.51	0.10	-0.71	-0.30
SS9	Equal	29.80	**0.00**	-5.79	**0.00**	-0.53	0.09	-0.72	-0.35
	Not Equal			-5.66	**0.00**	-0.53	0.09	-0.72	-0.35
SS10	Equal	14.98	**0.00**	-5.51	**0.00**	-0.57	0.10	-0.78	-0.37
	Not Equal			-5.41	**0.00**	-0.57	0.11	-0.78	-0.36
SS11	Equal	14.00	**0.00**	-4.05	**0.00**	-0.48	0.12	-0.71	-0.25
	Not Equal			-3.98	**0.00**	-0.48	0.12	-0.72	-0.24
SS12	Equal	12.71	**0.00**	-5.25	**0.00**	-0.48	0.09	-0.66	-0.30
	Not Equal			-5.17	**0.00**	-0.48	0.09	-0.66	-0.30

The assumptions of equal variances for SS variables under family type grouping are tabulated in Table – 4.80 above; the F-statistic values of SS variables having p <0.05 hence it can be concluded that the null hypothesis is rejected when it was assumed variances are equal. Such situations allow us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{joint} = mean_{nuclear}$; whereas again the p values for every variables are <0.05 confirms that there is no significance difference and hence accept our null hypothesis.

The Table – 4.81 shows group statistics for Borrower Type grouping (borrower v/s non-borrower) for SS variables the average values for all 12 variables ofnon-borrower are more than mean values of borrower.

Table – 4.81 Group Statistics (Borrower)

Var.	Borrow Money	Mean	SD	SE Mean	Var.	Borrow Money	Mean	SD	SE Mean
SS1	Yes	3.08	1.13	0.07	**SS7**	Yes	3.32	1.04	0.06
	No	3.54	1.14	0.06		No	3.53	1.10	0.06
SS2	Yes	2.88	1.11	0.07	**SS8**	Yes	2.81	1.22	0.08
	No	2.99	1.17	0.06		No	3.04	1.22	0.07
SS3	Yes	3.00	1.08	0.07	**SS9**	Yes	3.05	1.14	0.07
	No	3.15	1.11	0.06		No	3.21	1.16	0.06
SS4	Yes	2.90	1.17	0.07	**SS10**	Yes	2.86	1.27	0.08
	No	3.00	1.24	0.07		No	3.13	1.30	0.07
SS5	Yes	2.86	1.15	0.07	**SS11**	Yes	2.69	1.41	0.09
	No	3.10	1.26	0.07		No	3.04	1.48	0.08
SS6	Yes	3.25	1.05	0.07	**SS12**	Yes	3.33	1.11	0.07
	No	3.41	1.15	0.06		No	3.57	1.14	0.06

The assumptions of equal variances for all SS variables under borrower grouping are tabulated in Table – 4.82 below; the F-statistic for SS1, SS6 and SS7 variables the p <0.05 hence it can be concluded that the null hypothesis is partially fail to reject while in case of other SS variables p is >0.05 to when it was assumed variances are equal.

Table – 4.82 Independent Group Test (Borrower)									
Var.	**Comparing Variances assumed**	**Levene's Test (Equality of Variances)**		**t-test (Equality of Means)**					
		F cal	**p cal**	**t cal**	**p cal**	**Mean Difference**	**SE Difference**	**95% CL of the Difference**	
								Lower	**Upper**
SS1	Equal	7.85	**0.01**	-4.94	**0.00**	-0.46	0.09	-0.65	-0.28
	Not Equal			-4.95	**0.00**	-0.46	0.09	-0.65	-0.28
SS2	Equal	0.04	0.85	-1.25	0.21	-0.12	0.09	-0.30	0.07
	Not Equal			-1.26	0.21	-0.12	0.09	-0.30	0.07
SS3	Equal	0.34	0.56	-1.61	0.11	-0.15	0.09	-0.32	0.03
	Not Equal			-1.62	0.11	-0.15	0.09	-0.32	0.03
SS4	Equal	1.08	0.30	-1.02	0.31	-0.10	0.10	-0.30	0.09
	Not Equal			-1.03	0.30	-0.10	0.10	-0.30	0.09
SS5	Equal	2.31	0.13	-2.39	**0.02**	-0.24	0.10	-0.44	-0.04
	Not Equal			-2.42	**0.02**	-0.24	0.10	-0.43	-0.05
SS6	Equal	6.72	**0.01**	-1.69	0.09	-0.15	0.09	-0.33	0.03
	Not Equal			-1.71	0.09	-0.15	0.09	-0.33	0.02
SS7	Equal	4.50	**0.03**	-2.34	**0.02**	-0.21	0.09	-0.38	-0.03
	Not Equal			-2.36	**0.02**	-0.21	0.09	-0.38	-0.04
SS8	Equal	0.64	0.42	-2.27	**0.02**	-0.23	0.10	-0.43	-0.03
	Not Equal			-2.27	**0.02**	-0.23	0.10	-0.43	-0.03
SS9	Equal	1.09	0.30	-1.66	0.10	-0.16	0.09	-0.34	0.03
	Not Equal			-1.66	0.10	-0.16	0.09	-0.34	0.03
SS10	Equal	0.01	0.92	-2.58	**0.01**	-0.27	0.11	-0.48	-0.07
	Not Equal			-2.59	**0.01**	-0.27	0.11	-0.48	-0.07
SS11	Equal	0.16	0.69	-2.99	**0.00**	-0.36	0.12	-0.59	-0.12
	Not Equal			-3.01	**0.00**	-0.36	0.12	-0.59	-0.12
SS12	Equal	2.79	0.10	-2.66	**0.01**	-0.25	0.09	-0.43	-0.06
	Not Equal			-2.67	**0.01**	-0.25	0.09	-0.43	-0.07

Such situations allow us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{borrower} = mean_{non\text{-}borrower}$; whereas again the p values for SS1, SS5, SS7, SS8 and SS10 thru SS12 variables are <0.05 confirms that there is no significance difference and hence reject our null hypothesis.

Problems in Availing Micro Credit Service – MC Variables

Table – 4.83 Group Statistics (Gender)

Var.	Gender	Mean	Std. Dev.	SE Mean	Var.	Gender	Mean	Std. Dev.	SE Mean
MC1	Male	0.22	0.41	0.02	**MC7**	Male	0.22	0.41	0.02
	Female	0.18	0.39	0.04		Female	0.23	0.42	0.04
MC2	Male	0.24	0.43	0.02	**MC8**	Male	0.27	0.44	0.02
	Female	0.24	0.43	0.04		Female	0.27	0.45	0.04
MC3	Male	0.23	0.42	0.02	**MC9**	Male	0.19	0.39	0.02
	Female	0.25	0.43	0.04		Female	0.17	0.38	0.04
MC4	Male	0.21	0.41	0.02	**MC10**	Male	0.10	0.31	0.01
	Female	0.21	0.41	0.04		Female	0.09	0.29	0.03
MC5	Male	0.26	0.44	0.02	**MC11**	Male	0.12	0.33	0.01
	Female	0.26	0.44	0.04		Female	0.08	0.28	0.03
MC6	Male	0.23	0.42	0.02	**MC12**	Male	0.12	0.33	0.01
	Female	0.25	0.43	0.04		Female	0.07	0.26	0.02

Table – 4.84 Independent Group Test (Gender)

Var.	Comparing Variances assumed	Levene's Test (Equality of Variances)		t-test (Equality of Means)					
		F cal	p cal	t cal	p cal	Mean Difference	SE Difference	95% CL of the Difference	
								Lower	Upper
MC1	Equal	3.11	0.08	0.85	0.40	0.04	0.04	-0.05	0.12
	Not Equal			0.88	0.38	0.04	0.04	-0.05	0.12
MC2	Equal	0.08	0.77	0.14	0.89	0.01	0.05	-0.08	0.10
	Not Equal			0.14	0.89	0.01	0.05	-0.08	0.10
MC3	Equal	0.55	0.46	-0.38	0.71	-0.02	0.04	-0.10	0.07
	Not Equal			-0.37	0.71	-0.02	0.05	-0.11	0.07
MC4	Equal	0.00	0.97	-0.02	0.98	0.00	0.04	-0.09	0.08
	Not Equal			-0.02	0.98	0.00	0.04	-0.09	0.08
MC5	Equal	0.13	0.71	-0.18	0.85	-0.01	0.05	-0.10	0.08
	Not Equal			-0.18	0.85	-0.01	0.05	-0.10	0.08
MC6	Equal	0.69	0.41	-0.43	0.67	-0.02	0.04	-0.11	0.07
	Not Equal			-0.42	0.68	-0.02	0.05	-0.11	0.07
MC7	Equal	0.16	0.69	-0.20	0.84	-0.01	0.04	-0.09	0.08
	Not Equal			-0.20	0.84	-0.01	0.04	-0.10	0.08
MC8	Equal	0.10	0.75	-0.16	0.87	-0.01	0.05	-0.10	0.08
	Not Equal			-0.16	0.87	-0.01	0.05	-0.10	0.09
MC9	Equal	0.55	0.46	0.37	0.71	0.02	0.04	-0.07	0.10
	Not Equal			0.37	0.71	0.02	0.04	-0.06	0.09
MC10	Equal	0.70	0.40	0.41	0.68	0.01	0.03	-0.05	0.08
	Not Equal			0.43	0.67	0.01	0.03	-0.05	0.07
MC11	Equal	6.27	**0.01**	1.21	0.23	0.04	0.03	-0.03	0.11
	Not Equal			1.35	0.18	0.04	0.03	-0.02	0.10
MC12	Equal	10.44	**0.00**	1.54	0.12	0.05	0.03	-0.01	0.12
	Not Equal			1.78	0.08	0.05	0.03	-0.01	0.11

The assumptions of equal variances for MC variables under gender grouping are tabulated in above Table – 4.84; F-statistic of MC variables having the p <0.05 (shown in bold) in case MC11 and MC12 which concludes that the null hypothesis is partially fail to reject for these variables respectively, where it was assumed variances are equal; while for remaining variables the p >0.05 and hence in these cases variances are not equal to conclude the null hypothesis is partially rejected. Such situations allow us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{male} = mean_{female}$; whereas again the p values for all variables are >0.05 and hence we accept our alternate hypothesis.

The Table - 4.85 gives group statistics for family type grouping (joint v/s nuclear) for MC variables the average values of 9 variables for joint family type are more than mean values of nuclear while other 3 variables having mean value of nuclear family type is higher than value of joint.

Table – 4.85 Group Statistics (Family Type)

Var.	Family	Mean	SD	SE Mean	Var.	Family	Mean	SD	SE Mean
MC1	Joint type	0.23	0.42	0.02	**MC7**	Joint type	0.25	0.44	0.02
	Nuclear type	0.19	0.39	0.02		Nuclear type	0.18	0.38	0.02
MC2	Joint type	0.29	0.45	0.02	**MC8**	Joint type	0.35	0.48	0.03
	Nuclear type	0.19	0.39	0.02		Nuclear type	0.16	0.37	0.02
MC3	Joint type	0.29	0.46	0.02	**MC9**	Joint type	0.23	0.42	0.02
	Nuclear type	0.16	0.36	0.02		Nuclear type	0.13	0.34	0.02
MC4	Joint type	0.26	0.44	0.02	**MC10**	Joint type	0.09	0.29	0.02
	Nuclear type	0.14	0.35	0.02		Nuclear type	0.11	0.32	0.02
MC5	Joint type	0.33	0.47	0.03	**MC11**	Joint type	0.10	0.31	0.02
	Nuclear type	0.17	0.37	0.02		Nuclear type	0.13	0.34	0.02
MC6	Joint type	0.28	0.45	0.02	**MC12**	Joint type	0.11	0.32	0.02
	Nuclear type	0.16	0.37	0.02		Nuclear type	0.12	0.32	0.02

The assumptions of equal variances for every variable (MC variables) under family type grouping are tabulated in above Table – 4.86; the F-statistic for variables MC1 thru MC9 having the p <0.05 (shown in bold) hence it can be concluded that the null hypothesis is partially fail to reject for these variables respectively, because it was assumed variances are equal while for other remaining variables (e.g. MC10 thru MC12) having p>0.05 and hence in these cases variances are not equal to conclude the null hypothesis is partially rejected. Such situations allows us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{joint} = mean_{nuclear}$; whereas to confirms the significance

Table – 4.86 Independent Group Test (Family Type)									
Var.	**Comparing Variances assumed**	**Levene's Test (Equality of Variances)**		**t-test (Equality of Means)**					
		F cal	**p cal**	**t cal**	**p cal**	**Mean Difference**	**SE Difference**	**95% CL of the Difference**	
								Lower	**Upper**
MC1	Equal	7.88	**0.01**	1.39	0.17	0.05	0.03	-0.02	0.11
	Not Equal			1.40	0.16	0.05	0.03	-0.02	0.11
MC2	Equal	34.91	**0.00**	2.86	**0.00**	0.10	0.04	0.03	0.17
	Not Equal			2.91	**0.00**	0.10	0.03	0.03	0.17
MC3	Equal	70.54	**0.00**	3.97	**0.00**	0.14	0.03	0.07	0.20
	Not Equal			4.08	**0.00**	0.14	0.03	0.07	0.20
MC4	Equal	52.96	**0.00**	3.47	**0.00**	0.11	0.03	0.05	0.18
	Not Equal			3.56	**0.00**	0.11	0.03	0.05	0.18
MC5	Equal	93.10	**0.00**	4.54	**0.00**	0.16	0.04	0.09	0.23
	Not Equal			4.67	**0.00**	0.16	0.03	0.09	0.23
MC6	Equal	53.42	**0.00**	3.49	**0.00**	0.12	0.03	0.05	0.19
	Not Equal			3.58	**0.00**	0.12	0.03	0.05	0.19
MC7	Equal	20.40	**0.00**	2.21	**0.03**	0.07	0.03	0.01	0.14
	Not Equal			2.24	**0.03**	0.07	0.03	0.01	0.14
MC8	Equal	124.13	**0.00**	5.20	**0.00**	0.19	0.04	0.12	0.26
	Not Equal			5.36	**0.00**	0.19	0.03	0.12	0.25
MC9	Equal	43.53	**0.00**	3.16	**0.00**	0.10	0.03	0.04	0.16
	Not Equal			3.25	**0.00**	0.10	0.03	0.04	0.16
MC10	Equal	2.95	0.09	-0.86	0.39	-0.02	0.02	-0.07	0.03
	Not Equal			-0.85	0.40	-0.02	0.03	-0.07	0.03
MC11	Equal	3.51	0.06	-0.94	0.35	-0.02	0.03	-0.08	0.03
	Not Equal			-0.93	0.35	-0.02	0.03	-0.08	0.03
MC12	Equal	0.11	0.74	-0.16	0.87	0.00	0.03	-0.06	0.05
	Not Equal			-0.16	0.87	0.00	0.03	-0.06	0.05

Problems in Availing Micro Savings Service – MS Variables

The Table – 4.87shows group statistics for gender grouping (male v/s female) for MS variables the average values of all the 3 variables for male are more than mean values of female.

Table – 4.87 Group Statistics (Gender)				
Var.	**Gender**	**Mean**	**Std. Dev.**	**SE Mean**
MS1	Male	0.59	0.49	0.02
	Female	0.51	0.50	0.05
MS2	Male	0.58	0.49	0.02
	Female	0.54	0.50	0.05
MS3	Male	0.57	0.50	0.02
	Female	0.56	0.50	0.05

The assumptions of equal variances for all MS variables under gender grouping are tabulated in Table – 4.88; the F-statistic for all variables having p<0.05 hence it can be concluded that the null hypothesis is rejected when it was assumed variances are equal. Such situations allows us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{male} = mean_{female}$; whereas again the p values for variables are >0.05 confirms that there is no significance difference and hence accept our null hypothesis.

Table – 4.88 Independent Group Test (Gender)

Var.	Comparing Variances assumed	Levene's Test (Equality of Variances)		t-test (Equality of Means)					
		F cal	p cal	t cal	p cal	Mean Difference	SE Difference	95% CL of the Difference	
								Lower	Upper
MS1	Equal	3.57	0.06	1.55	0.12	0.08	0.05	-0.02	0.18
	Not Equal			1.53	0.13	0.08	0.05	-0.02	0.18
MS2	Equal	1.85	0.17	0.87	0.39	0.05	0.05	-0.06	0.15
	Not Equal			0.86	0.39	0.05	0.05	-0.06	0.15
MS3	Equal	0.05	0.83	0.11	0.91	0.01	0.05	-0.10	0.11
	Not Equal			0.11	0.91	0.01	0.05	-0.10	0.11

The Table – 4.89 gives group statistics for family type grouping (joint v/s nuclear) for all MS variables having the average values for joint family type are more than mean values of nuclear.

Table 4.89 Group Statistics (Family Type)

Var.	Family	Mean	Std. Dev.	SE Mean
MS1	Joint type	0.62	0.49	0.03
	Nuclear type	0.52	0.50	0.03
MS2	Joint type	0.62	0.49	0.03
	Nuclear type	0.51	0.50	0.03
MS3	Joint type	0.62	0.49	0.03
	Nuclear type	0.50	0.50	0.03

The assumptions of equal variances for all MS variables under family type grouping are tabulated in Table – 4.90; the F-statistic all MS variables having p<0.05 (shown bold) hence it can be concluded that the null hypothesis is accepted, where it was assumed that variances are equal; while. t-table for equality of mean i.e. $mean_{joint} = mean_{nuclear}$;

whereas again the p values for all three variables is <0.05 confirms the significance and hence we accept our alternate hypothesis.

Table – 4.90 Independent Group Test (Family type)									
Var.	**Comparing Variances assumed**	**Levene's Test (Equality of Variances)**		**t-test (Equality of Means)**					
		F cal	**p cal**	**t cal**	**p cal**	**Mean Difference**	**SE Difference**	**95% CL of the Difference**	
								Lower	**Upper**
MS1	Equal	13.43	**0.00**	2.30	**0.02**	0.09	0.04	0.01	0.17
	Not Equal			2.29	**0.02**	0.09	0.04	0.01	0.17
MS2	Equal	16.26	**0.00**	2.73	**0.01**	0.11	0.04	0.03	0.19
	Not Equal			2.72	**0.01**	0.11	0.04	0.03	0.19
MS3	Equal	16.66	**0.00**	3.01	**0.00**	0.12	0.04	0.04	0.20
	Not Equal			3.00	**0.00**	0.12	0.04	0.04	0.20

Problems in Availing Micro Insurance Service – MI Variables

The Table – 4.91shows group statistics for gender grouping (male v/s female) MI variables having the average values for 2 variables (MI3 and MI4) for male are more than mean values of female and 2 variables (MI1 and MI2) the mean values for female is more than male.

Table – 4.91 Group Statistics (Gender)				
Var.	**Gender**	**Mean**	**Std. Dev.**	**SE Mean**
MI1	Male	0.28	0.45	0.02
	Female	0.29	0.46	0.04
MI2	Male	0.28	0.45	0.02
	Female	0.29	0.46	0.04
MI3	Male	0.25	0.44	0.02
	Female	0.23	0.42	0.04
MI4	Male	0.15	0.35	0.02
	Female	0.10	0.30	0.03

The assumptions of equal variances for all MI variables under gender grouping are tabulated in Table – 4.92; the F-statistic for variable MI4 having p<0.05 hence it can be concluded that the null hypothesis is partially rejected when it was assumed variances are equal but in other MI variables the p>0.05 the null hypothesis is partially fail to reject. Such situations allows us to check other columns of the table i.e. t-table for equality of mean i.e.

mean $_{male}$= *mean* $_{female}$; whereas again the p values for variables are >0.05 confirms that there is no significance difference and hence accept our null hypothesis.

Table – 4.92 Independent Group Test (Gender)									
Var.	**Comparing Variances assumed**	**Levene's Test (Equality of Variances)**		**t-test (Equality of Means)**					
		F cal	**p cal**	**t cal**	**p cal**	**Mean Difference**	**SE Difference**	**95% CL of the Difference**	
								Lower	**Upper**
MI1	Equal	0.09	0.76	-0.15	0.88	-0.01	0.05	-0.10	0.09
	Not Equal			-0.15	0.88	-0.01	0.05	-0.10	0.09
MI2	Equal	0.15	0.70	-0.19	0.85	-0.01	0.05	-0.10	0.08
	Not Equal			-0.19	0.85	-0.01	0.05	-0.10	0.09
MI3	Equal	1.36	0.24	0.56	0.57	0.03	0.05	-0.06	0.12
	Not Equal			0.58	0.56	0.03	0.04	-0.06	0.11
MI4	Equal	7.26	**0.01**	1.29	0.20	0.05	0.04	-0.02	0.12
	Not Equal			1.43	0.16	0.05	0.03	-0.02	0.11

The Table – 4.93 gives group statistics for Family Type grouping(joint v/s nuclear) all MI variables the average values for all 4 variables for joint family type are more than mean values of nuclear family type.

Table – 4.93 Group Statistics (Family Type)				
Var.	**Family**	**Mean**	**Std. Dev.**	**SE Mean**
MI1	Joint type	0.31	0.46	0.03
	Nuclear type	0.25	0.44	0.03
MI2	Joint type	0.31	0.46	0.03
	Nuclear type	0.25	0.44	0.03
MI3	Joint type	0.26	0.44	0.02
	Nuclear type	0.23	0.42	0.03
MI4	Joint type	0.15	0.36	0.02
	Nuclear type	0.13	0.33	0.02

The assumptions of equal variances for all MI variables under family type grouping are tabulated in Table – 4.94; the F-statistic for some of variables MI1 thru MI3 having p<0.05 (shown in bold) hence it can be concluded that the null hypothesis is partially rejected when it was assumed that variances are equal; while for other variable MI4 the p>0.05 which shows that the variances are not equal to conclude the null hypothesis is

partially fail to reject. Such situations allow us to check other columns of the table i.e. t-table for equality of mean i.e. $mean_{joint} = mean_{nuclear}$; whereas again the p values for all variables are >0.05 and hence we accept our alternate hypothesis.

Table – 4.94 Independent Group Test (Family Type)

Var.	Comparing Variances assumed	Levene's Test (Equality of Variances)		t-test (Equality of Means)					
		F cal	p cal	t cal	p cal	Mean Difference	SE Difference	95% CL of the Difference	
								Lower	Upper
MI1	Equal	9.29	**0.00**	1.50	0.13	0.06	0.04	-0.02	0.13
	Not Equal			1.51	0.13	0.06	0.04	-0.02	0.13
MI2	Equal	8.34	**0.00**	1.42	0.16	0.05	0.04	-0.02	0.13
	Not Equal			1.43	0.15	0.05	0.04	-0.02	0.13
MI3	Equal	4.56	**0.03**	1.06	0.29	0.04	0.04	-0.03	0.11
	Not Equal			1.06	0.29	0.04	0.04	-0.03	0.11
MI4	Equal	2.84	0.09	0.84	0.40	0.02	0.03	-0.03	0.08
	Not Equal			0.84	0.40	0.02	0.03	-0.03	0.08

4.5 Factor Analysis

H.17o There shall be no correlation between factors of economic impact and factors of socio benefits responsible to beneficiaries of Dang District of Gujarat State.

H.17a There shall be correlation between factors of economic impact and factors of socio benefits responsible to beneficiaries of Dang District of Gujarat State.

The **Factor Analysis** is anuseful tool for finding variable relationships for complex concepts such as socio economic status or psychological scales. It allows investigating concept that is not easily measured directly by collapsing a large number of variables into a few interpretable underlying factors. The key concept of **factor analysis** is that multiple observed variables have similar patterns of responses because they are all associated with a latent variable (i.e. not directly measured).

The **Factor analysis** is a technique that is used to reduce a large number of variables into fewer numbers of factors. This technique extracts maximum common variance from all variables and puts them into a common score that is more manageable and understandable it's a way to find hidden patterns, show how those patterns overlap and show

what characteristics are seen in multiple patterns. It is also used to create set of variables for similar items in the set.

The concept of **factor analysis** involves the study of order and structure in multivariate data. This concept includes both theory about the underlying constructs and dynamics which give rise to observed phenomena and methodology for attempting to reveal those constructs and dynamics from observed data. The broad purpose of factor analysis is to summarize data so that relationships and patterns can be easily interpreted and understood. Factor analysis is a technique that is used to reduce large number of variables into fewer numbers of factors. This technique extracts maximum number of common variance from all variables and puts them into common score. Factors are listed as per factor loadings i.e. how much variation in the data they can explain (or it is a correlation coefficient for the variable and factor). Exploratory factor analysis method is used for this research study reason there is no idea about what structure of data is or how many dimension in a set of variables.

The **Factor analysis** is what every business needs to get the most from their operation. By breaking down the key factors, it can tweak processes to create the most effective channels and strategies i.e. factor analysis takes the guesswork and a practical tool created through successful market research and analysis.

Such as *insurance* e.g. Insurance companies rely on actuarial tables and statistics to create policies the only way insurance companies can make decisions regarding deductibles, rates and available plans. A single measure describes overall sets of data with many variables.

4.5.1 Principle Component Analysis (PCA)

William of Ockham (c.1285-1349) who was an English philosopher and monk has mentioned about a principle of ontological economy, principle of parsimony, or principle of simplicity which were termed as Ockham's Razor i.e. *Pluralitas non estponenda sine necessitate*, which means *as entities should not be multiplied unnecessarily*. This explains when a new set of facts requires for defining a new theory; the process is totally different as often presented in books. Many hypotheses and assumptions are proposed, studied, explained and rejected. Researchers discuss the validity and strongly performing studies and practical approaches which will determine the validity of one or the other, identifying flaws in their

least favourite ones etc. Even, when the rejected hypotheses are discarded, several other options are also available in making the exact same predictions with other types of underlying approaches. A very useful tool known as Ockham's *razor* applied to choose from these possible approaches. It is basic requirement that all assumptions should be reduced to less in number so that equally valid and simpler one selected.

Principal Component Analysis (PCA) is only correct measures for several observed variables and which develops a smaller number of artificial variables (termed as principal components). The principal components may be used as a predictor or criterion variables for subsequent analyses with the observed variables.

4.5.2 A Variable Reduction Procedure

The Principal component analysis is basically Variable Reduction Technique and it is being used when variables were highly correlated. By this technique the number of observed variables reduces to a optimized number of principle components which accounts maximum variability of observed variables. This technique also reduces the redundancy among all these variables. The redundancy means all those variables which are correlated with one another may possibly measure the same construct and concept.

The variable reduction procedure is known as VARIMAX rotation; which is similar to *exploratory factor analysis* in many respects. Basically these steps are virtually similar as followed in conducting *principal component analysis* only significant conceptual differences between both the procedures.

The PCA analyzes the overall amount of variance equals to the sum variances of all observed variables. This analysis gives the number of components extracted which are also equal to the number of observed variables. The first principal component always accounts with highest variance in the data and then subsequently second component accounts for the second largest amount of variance in the data. The second component also uncorrelated with the first principal component and so on. All those components accounting for maximum variance are retained while other components accounting for a minimum amount of variance are not retained. This retention of components is decided by Eigenvalues (which should be >= 1) indicate the amount of variance explained by every component. Every Eigen vector is the weightage used to calculate components scores.

4.5.3 Assumptions

The starting point for factor analysis techniques is the correlation matrix. The factor analysis techniques try to clump subgroups of variables together based upon their correlations which also gives the feel for what factors are going to be between groups of variables. Norman and Strainer (p 197) quote Tabachnick & Fidell (2001) saying that if there are few correlations above 0.3 then it is waste of time carrying on with the analysis. According to authors *the factor analysis is designed for interval data, although it can also be used for ordinal data (e.g. scores assigned to Likert scales). The variables used in factor analysis should be linearly related to each other.* This means the variables must also be at least moderately correlated to each other; otherwise the number of factors will be almost the same as the number of original variables. The factor analysis has three main bases:

- To understand the structure of a group of variables
- To design and develop questionnaire to measure an underlying variable
- To reduce a large number of groups to a more manageable size.

For this research study, there are eight variables named as **SV variable**, five variables named as **IN variables**, twelve as **MC variables**, three as **MS variables** and four as **MI variables** having 2-point *Likert Scale* and there are seven variables as **SE variables** and twelve variables as **SS variables** with 5-point *Likert Scale* for all 600 participants (say cases).

The principal component analysis conducted on all valid cases which are converted through codes (1 to 5 or 1 and 2) as used in *Likert Scale*. The ratio of cases to every variable is very large (compared to 1:5) in this research study (Table – 4.95). The analysis carried out with a common assumption that overall 600 participants irrespective of their classifications such as gender, age, family type, borrower and residence area etc.

Table – 4.95 Ratios of cases with variable for PCA and FA (Cases = 600)

Variables	No of Variables	Cases per variable
SV Variables	8	75
IN Variables	5	120
SE variables	7	94
SS Variables	12	50
MC Variables	12	50
MS Variables	3	200
MI Variables	4	150

4.5.4 Factor Analysis (SV Variables)

Correlation Matrix

The Table – 4.96shows the correlation matrix having 19 correlations other than self-values are greater than 0.3, this is required for PCA before calculating Factor Analysis.

Table – 4.96 Correlation Matrix (8 variables) Cases = 600

Variables	SV1	SV2	SV3	SV4	SV5	SV6	SV7	SV8
SV1	1.00							
SV2	**0.53**	1.00						
SV3	**0.47**	**0.47**	1.00					
SV4	**0.30**	**0.38**	**0.43**	1.00				
SV5	**0.32**	**0.38**	**0.44**	**0.45**	1.00			
SV6	**0.35**	0.29	**0.37**	**0.39**	**0.40**	1.00		
SV7	**0.54**	**0.49**	**0.43**	0.29	**0.30**	**0.31**	1.00	
SV8	0.07	0.06	0.06	0.12	0.02	0.21	-0.14	1.00

KMO and Bartlett's Test

The other condition for PCA / FA analysis is value of Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy (MSA); the value should be >0.5 for every individual variable and overall set of variables. The KMO measure is defined as the ratio of the squared correlation of variables to the squared of partial correlation of variables. This ratio (MSA) value ranges from 0 to 1.

The Ratio (MSA) of KMO	Interpretation
0.9 - 1.0	marvellous
0.8 - 0.9	meritorious
0.7 - 0.8	middling
0.6 – 0.7	mediocre
0.5 – 0.6	miserable
Under 0.5	unacceptable

T

The below Table – 4.97 of KMO and Bartlett’s Test shows the first calculation for factor analysis.

Table – 4.97 KMO and Bartlett's Test		
Kaiser-Meyer-Olkin MSA		**0.832**
Bartlett's Test of Sphericity	Chi Square (approx)	1299.85
	Degrees of freedom	28
	Sig.	0.00

- **Kaiser-Meyer-Olkin Measure of Sampling Adequacy** - It is undesirable to have two variables which share variance with each other but not with other variables. The measure value was **0.832** which is meritorious and suggests a factor analysis.
- **Bartlett's Test of Sphericity** - This tests the null hypothesis for the correlation matrix is an identity matrix. An identity matrix is a matrix in which all of the diagonal elements are 1 and all off-diagonal elements are 0 (Table – 4.98). The assumption for null hypothesis is that correlation matrix is an identity matrix (i.e. matrix having only 1's in the diagonal and remaining elements 0's) is rejected. But essentially correlated variables are wanted, so the off-diagonal elements should contain values. These tests provide a minimum standard require for further factor analysis.

Table – 4.98 Anti-image Correlation (MSA)			
Variable	**Correlation**	**Variable**	**Correlation**
SV1	0.83	**SV5**	0.85
SV2	0.86	**SV6**	0.84
SV3	0.89	**SV7**	0.79
SV4	0.86	**SV8**	**0.39**

There is no definitive simple way to determine the number of factors. The number of factors is a subjective decision made by researcher. Some of the considerations are important in deciding the number of factors.

Eigen Values – Kaiser's Criterion: How many components having Eigen-values more than 1?

Scree Plot: Plot of Eigen-values and look for elbow minus 1 (i.e. where there is a notable drop. Extract the number of factors that make up the cliff (i.e. which explain most of the variance).

Total Variance explained: Ideally try to explain approximately 50 to 75% of the variance using the least number of factors.

Anti-image correlation matrix diagonals should be more than equal to 0.5.

Communality: The proportion of a variable's variance explained by the extracted factor structure. Final communality estimates are the sum of squared loadings for a variable in an orthogonal factor matrix.

Factor: Linear combination of the original variables. Factors represent the underlying dimensions (constructs) that summaries or account for the original set of observed variables.

Factor Analysis: A statistical technique used to estimate factors and/or reduce the dimensionality of a large number of variables to a fewer number of factors.

Principal Component Analysis (PCA)

With reference to above calculations for factor analysis using principal component analysis the KMO value (Table- 4.97) is more than 0.50 but Anti image correlation shows that one of the variable **SV8** (Table- 4.98) will be dropped from the further calculation as the value is less than 0.5. The **Figure – 4.3** is a Scree plot for principal component analysis show that there are possible two components may have highest variability in SV variables; the table is not considered to put here as one of the variable to be drop.

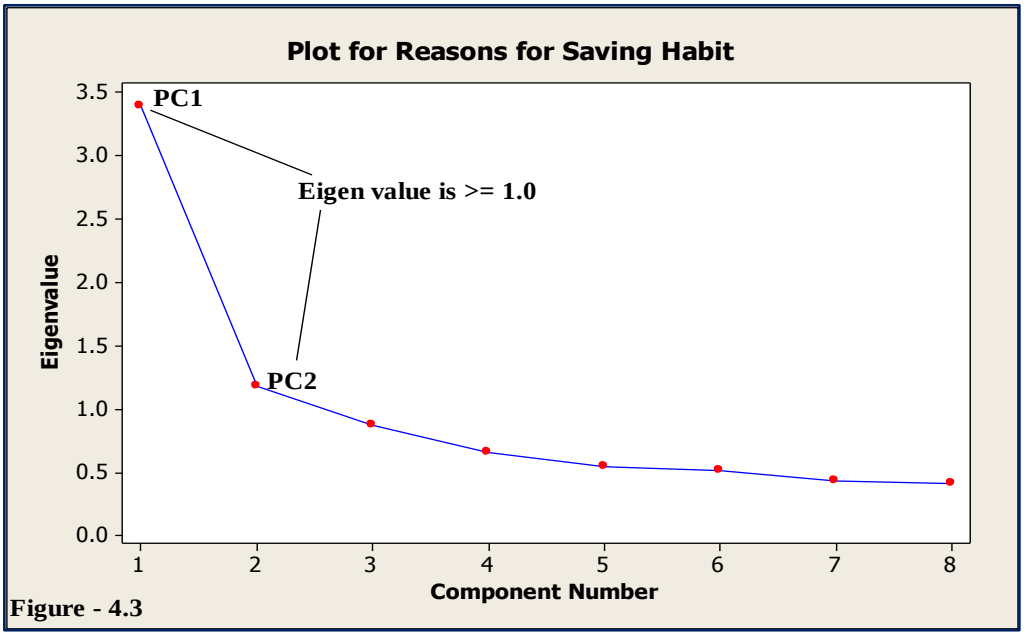


Figure - 4.3

The final factor analysis calculation of SV variables is shown as below with new KMO values 0.791.The Anti-image correlation table (Table – 4.100a) is the final version of calculation.

Table – 4.99 KMO and Bartlett's Test		
Kaiser-Meyer-Olkin MSA		**0.791**
Bartlett's Test of Sphericity	Chi-Square (Approx)	679.27
	Degrees of freedom	6
	Sig.	0.00

Table – 4.100a Anti-image Correlation (MSA)			
Variable	**Correlation**	**Variable**	**Correlation**
SV1	0.77	**SV3**	0.82
SV2	0.79	**SV7**	0.79

Factor Analysis Outcome

The probability associated with Bartlett's Test of Sphericity should be less than (i.e. p values) <=0.05 for performing Principal component analysis and should satisfies this condition. The subsequent step was to perform factor analysis to determine the number of factors of the solution. There should be at least one Eigen value (>= 1) gives a partitioning of the total variation accounted for each principal component as given in Table – 4.100b. The latent root criterion used for number of factors to derived (for SV variable) in the table indicated by only one component to be extracted for these variables.

Table – 4.100b Overall Variance Explained						
Obtained Component	**The Eigen values**			**Extraction (Sums of Squared Loadings)**		
	Total	**% of Var.**	**Cumu. %**	**Total**	**% of Var.**	**Cumu. %**
1	**2.47**	**61.76**	**61.76**	**2.47**	**61.76**	**61.76**
2	0.58	14.53	76.29			
3	0.50	12.49	88.78			
4	0.45	11.22	100.00			
Extraction Method: PCA						

The cumulative proportion of variance criteria satisfies with current analysis where only one component showing 62% of the total variance. The SPSS software calculates by default and extracts the number of components which are indicated by the latent root criterion, the earlier factor solution was based on the extraction of 2 components.

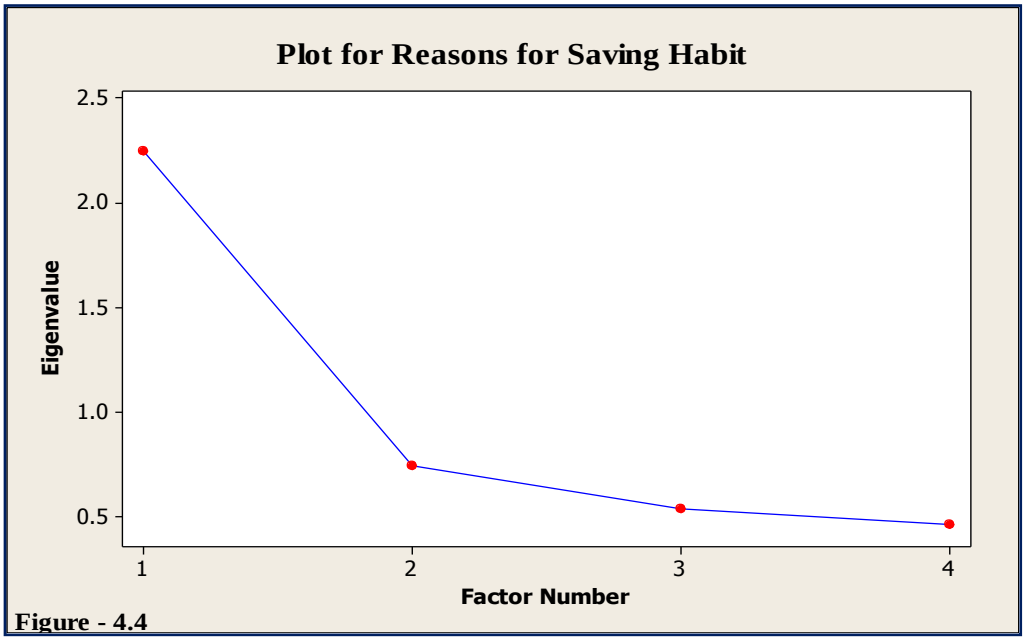


Figure - 4.4

The visual graphical chart Scree Plot **Figure – 4.4** is a useful in determining an appropriate number of principal components. As PCA works with initial assumption that all variance is common and hence before extraction the every communality were equal to 1. The Table – 4.101 labelled *Extraction* reflects the common variance in the data structure of every variable. The 66% of the variance associated with question 1 was common, or shared, variance in the table. The *Communalities* are the proportion of the variance in the original variables which is accounted for the factor analysis. The factor analysis solution should provide at least half of each original variable's variance, so the communality value for each variable should be 0.50 or higher.

Table – 4.101 Commonalities

Variable	Initial	Extraction
SV1	1.00	0.66
SV2	1.00	0.63
SV3	1.00	0.56
SV7	1.00	0.62
Extraction Method: PCA		

The commonality for all SV variables is greater than 0.5 in this iteration and the cumulative proportion of variance criteria would require only 1 component to satisfy the criterion with 62% (Table – 4.100b). The factor analysis had more than one variable i.e. from all eight variables only selected four variables loading on each of them are tabulated in Table – 4.102 as follows:

Table – 4.102 Rotated Component Matrix(SV Variables)		
Variables	**Element of**	**loadings**
SV1	To face uncertainties relating to employment	**0.66**
SV2	To face uncertainties relating to health	**0.63**
SV3	For children education	**0.56**
SV7	To maintain social status	**0.62**
Extraction Method: PCA. Rotation Method: Varimax rotation.		

The only component mapped with the variables namely SV1 (uncertainty during job), SV2 (future health needs), SV3 (for children education) and SV7 (for social requirement) respectively. These variables are part of the component can be named as a factor in combinations which shows how participants feel about the saving concept. This factor may be named as:

Table – 4.103 Nomenclature of Factor (SV Variables)								
Factor No.	**Name of Factor**	**Variables included**	**Descriptive Statistics**					
			items	**Av.**	**Sd.**	**Skw.**	**Kurt**	**Cron. α**
1	Saving Factor	SV1, SV2, SV3, SV7	4	0.39	0.49	0.45	-1.80	**0.793**

A factor (Table – 4.103) combining 4 items with value of Cronbach's alpha **0.793** was evident, based on principal components exploratory factor analysis with varimax rotation. However this factor could probably be strengthened through revision items with loadings and possibly adding new items. The positive responses from participants (ref.: Table – 4.30) for variables SV1 (40.2%), SV2 (40.2%), SV3 (36.0%) and SV7 (40.2%) respectively.

4.5.5 Factor Analysis (IN Variables)

Correlation Matrix

Table – 4.104 shows the correlation matrix having 10 correlations other than self-values are greater than 0.3, this is required for PCA before calculating Factor Analysis.

Table – 4.104 Correlation Matrix (5 variables) Cases = 600					
Variables	**IN1**	**IN2**	**IN3**	**IN4**	**IN5**
IN1	1.00				
IN2	**0.84**	1.00			
IN3	**0.64**	**0.60**	1.00		
IN4	**0.78**	**0.80**	**0.65**	1.00	
IN5	**0.45**	**0.42**	**0.41**	**0.45**	1.00

The statistical software SPSS gives a complete output for PCA / FA which provides every stage of calculation but every result received has to follow the rules as govern in PCA / FA in deciding the final outcome.

KMO and Bartlett's Test

In this case, also the value of Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy (MSA) was **0.850** (*meritorious*) which is greater than 0.5 and following calculation in Table – 4.105 gives Anti-Image Correlation (MSA).

Table – 4.105 Anti-image Correlation (MSA)

Variable	Correlation	Variable	Correlation
IN1	0.82	**IN4**	0.86
IN2	0.79	**IN5**	0.95
IN3	0.91		

Table – 4.106 Commonalities

Variable	Initial	Extraction
IN1	1.00	0.83
IN2	1.00	0.82
IN3	1.00	0.63
IN4	1.00	0.81
IN5	1.00	**0.38**
Extraction Method: Principal Component Analysis.		

The first iteration of FA gives only one component with 69.4% of total variability with *communality* tabulated (Table – 4.106) as below where as the variable IN5 variable required to remove as its value is <= 0.5 (required condition).

After dropping the variable IN5 the further calculation for principal component analysis gives the new value of KMO as **0.822**(*meritorious*)which is greater than 0.5 and the probability associated with Bartlett's Test of Sphericity is less than the level of significance which is <0.05 and satisfies this requirement (Table – 4.107).

Table – 4.107 KMO and Bartlett's Test

Kaiser-Meyer-Olkin MSA		**0.822**
Bartlett's Test of Sphericity	Chi-Square (Approx)	1796.91
	Degrees of freedom	6
	Sig.	0.00

The next step in factor analysis calculation to determine Anti-image correlation for remaining IN variables (Table – 4.108):

Table – 4.108 Anti-image Correlation (MSA)			
Variable	**Correlation**	**Variable**	**Correlation**
IN1	0.80	**IN3**	0.90
IN2	0.78	**IN4**	0.85

Factor Analysis Outcome

The calculation gives only one factor as derived from the solution having Eigen values greater than 1.0 which represents a partitioning of the total variation (i.e. 79.1%) accounted by each principal component in Table – 4.109.

Table – 4.109 Overall Variance Explained						
Obtained Component	**The Eigen values**			**Extraction (Sums of Squared Loadings)**		
	Total	**% of Var.**	**Cumu. %**	**Total**	**% of Var.**	**Cumu. %**
1	**3.16**	**79.08**	**79.08**	**3.16**	**79.08**	**79.08**
2	0.46	11.51	90.59			
3	0.23	5.70	96.29			
4	0.15	3.71	100.00			
Extraction Method: PCA						

To derive number of factors the latent root criterion indicates that only one component could be extracted for these IN variables. The cumulative proportion of variance having only one component which satisfies the criteria is 79.1% of the total variance. The second iteration of FA gives total variability with *communality* tabulated (Table – 4.110) for all IN variables are greater than 0.5.

Table – 4.110 Communalities		
Variable	**Initial**	**Extraction**
IN1	1.00	0.85
IN2	1.00	0.85
IN3	1.00	0.64
IN4	1.00	0.83
Extraction Method: PCA.		

The visual graphical chart Scree Plot (**Figure – 4.5**) is a useful in determining appropriate number of factors.

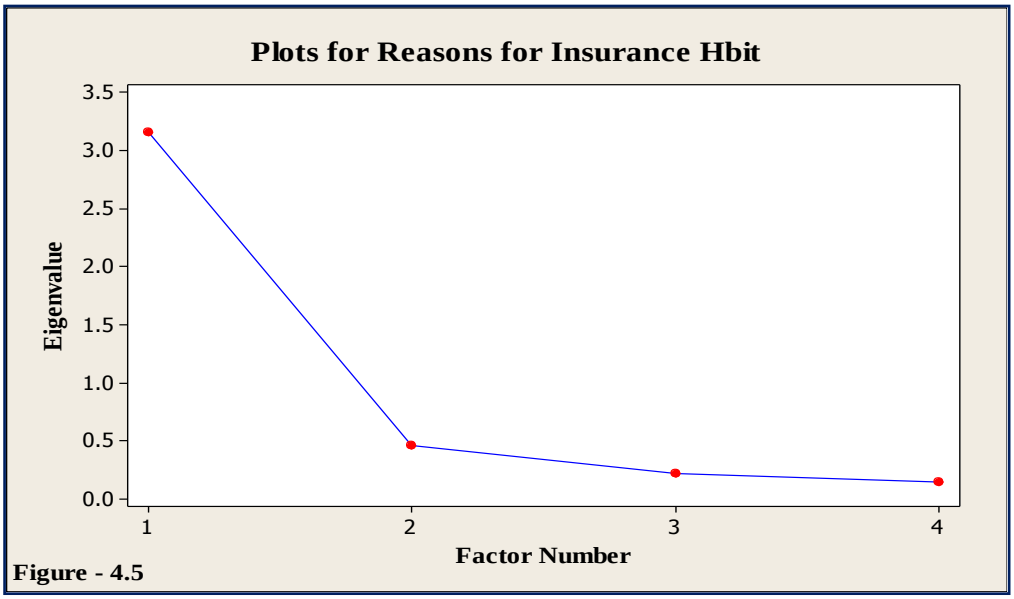


Figure - 4.5

The analysis had more than one variable i.e. all five variables loading on each of them are tabulated in Table – 4.111 as follows:

Table – 4.111 Rotated Component Matrix(IN Variables)		
Variables	**Elements of**	**Loadings**
IN1	Increase in financial security	**0.85**
IN2	Increase in security against accident and death	**0.85**
IN3	Increase in Peace of mind and feeling of protection	**0.64**
IN4	Increase in risk bearing capacity	**0.83**
Extraction Method: PCA Rotation Method: Varimax rotation		

,

The component includes the variables namely IN1 (financial security), IN2 (accident or death security), IN3 (future risks and safety) and IN4 (risk capacity) respectively. These variables are part of the component can be named as a factor in combinations which shows how participant are feel about the saving concept. These factors may be named as:

Table – 4.112 Nomenclature of Factor (IN Variables)								
Factor No.	**Name of Factor**	**Variables included**	**Descriptive Statistics**					
			items	**Av.**	**Sd.**	**Skw.**	**Kurt**	**Cron. α**
1	Insurance Factor	IN1, IN2, IN3, IN4	4	0.16	0.37	1.82	1.32	0.911

A factor (Table – 4.112) on combining 4 items with value of Cronbach's alpha 0.911 was evident, based on principal components exploratory factor analysis with varimax rotation. However, this factor could probably be strengthened through revision of items with loadings and possibly adding new items. The positive responses of participants for variables IN1 (19.5%), IN2 (21.7%), IN3 (9.0%) and IN4 (15.2%) respectively are in Table – 4.31.

4.5.6 Factor Analysis (SE variables)

In the survey instrument questions were included to measure socio-economic impact on participants for the services provided by the financial organizations in two-fold viz. one of the parts includes economic impact having variables as ***SEVariables***and other parts include social impact having variables as SS ***Variables*** (both are at 5-point scale).

Correlation Matrix

Table – 4.113 shows the correlation matrix for SE variables having 19 correlations other than self-values are greater than 0.3, this is required for PCA before calculating Factor Analysis.

Table – 4.113 Correlation Matrix (7 variables) Cases = 600

Variables	SE1	SE2	SE3	SE4	SE5	SE6	SE7
SE1	1.00						
SE2	**0.65**	1.00					
SE3	**0.57**	**0.54**	1.00				
SE4	**0.51**	**0.56**	**0.64**	1.00			
SE5	**0.50**	**0.48**	**0.71**	**0.70**	1.00		
SE6	**0.39**	**0.52**	**0.55**	**0.66**	**0.68**	1.00	
SE7	**0.29**	**0.36**	**0.44**	**0.51**	**0.55**	**0.49**	1.00

KMO and Bartlett's Test

The other condition for PCA / FA analysis is value of Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy (MSA) which is **0.884** (*meritorious*)in the Table – 4.114 is for KMO and Bartlett's Test shows the first calculation for factor analysis.

Table – 4.114 KMO and Bartlett's Test

Kaiser-Meyer-Olkin MSA		**0.884**
Bartlett's Test of Sphericity	Chi-Square (Approx)	2860.27
	Degrees of Freedom	21
	Sig.	0.00

The next calculation in Table – 4.115 gives Anti-image Correlation (MSA) where the values of every variable must be greater than 0.5.

Table – 4.115Anti-image Matrices (MSA)			
Variable	**Correlation**	**Variable**	**Correlation**
SE1	0.85	**SE5**	0.85
SE2	0.84	**SE6**	0.90
SE3	0.91	**SE7**	0.95
SE4	0.93		

Table – 4.116 Communalities					
Variable	**Initial**	**Extraction**	**Variable**	**Initial**	**Extraction**
SE1	1.00	0.63	**SE5**	1.00	0.77
SE2	1.00	0.63	**SE6**	1.00	0.65
SE3	1.00	0.76	**SE7**	1.00	**0.42**
SE4	1.00	0.76			

The commonality for SE1 thru SE6 variables is greater than 0.5 in this iteration (Table – 4.116). The factor analysis calculation explains at least half of each original variable's variance; hence the communality value for SE7 variable is less than 0.50 will be dropped from further iteration.

After dropping the variable SE7 the new calculation of principal component analysis gives the value for KMO as **0.864** (*meritorious*) which is greater than 0.5 and the probability associated with Bartlett's Test of Sphericity i.e. p values<0.05 whic satisfies this requirement (Table – 4.117).

Table – 4.117 KMO and Bartlett's Test		
Kaiser-Meyer-Olkin MSA.		**0.864**
Bartlett's Test of Sphericity	Chi-Square (Approx.)	2598.15
	Degree of Freedom	15
	Sig.	0.00

Factor Analysis outcome

The communality value for each variable is 0.50 or higher in Table – 4.118 allows for factor analysis:

Table – 4.118 Communalities					
Variable	**Initial**	**Extraction**	**Variable**	**Initial**	**Extraction**
SE1	1.00	0.66	**SE4**	1.00	0.76
SE2	1.00	0.67	**SE5**	1.00	0.76
SE3	1.00	0.77	**SE6**	1.00	0.65

Table – 4.119 Overall Variance Explained						
Obtained Component	**The Eigen values**			**Extraction (Sums of Squared Loadings)**		
	Total	**% of Var.**	**Cumu. %**	**Total**	**% of Var.**	**Cumu. %**
1	**4.26**	**71.00**	**71.00**	**4.26**	**71.00**	**71.00**
2	0.66	10.93	81.93			
3	0.39	6.47	88.40			
4	0.28	4.61	93.01			
5	0.25	4.09	97.11			
6	0.17	2.89	100.00			
Extraction Method: PCA.						

There was only one Eigen value which represents a partitioning of the total variation accounted for the principal components greater than 1.0 in Table – 4.119. The main criteria for deriving the number of factors indicate that only one component to be extracted from these variables.

The cumulative proportions of variance criteria also provide only one component to satisfy this and explaining 71% of the total variance which the SPSS also calculates by default to extract the exact number of components as indicated by the latent root criterion.

The visual graphical chart Scree Plot **Figure – 4.6** is a useful in determining an appropriate number of factors.

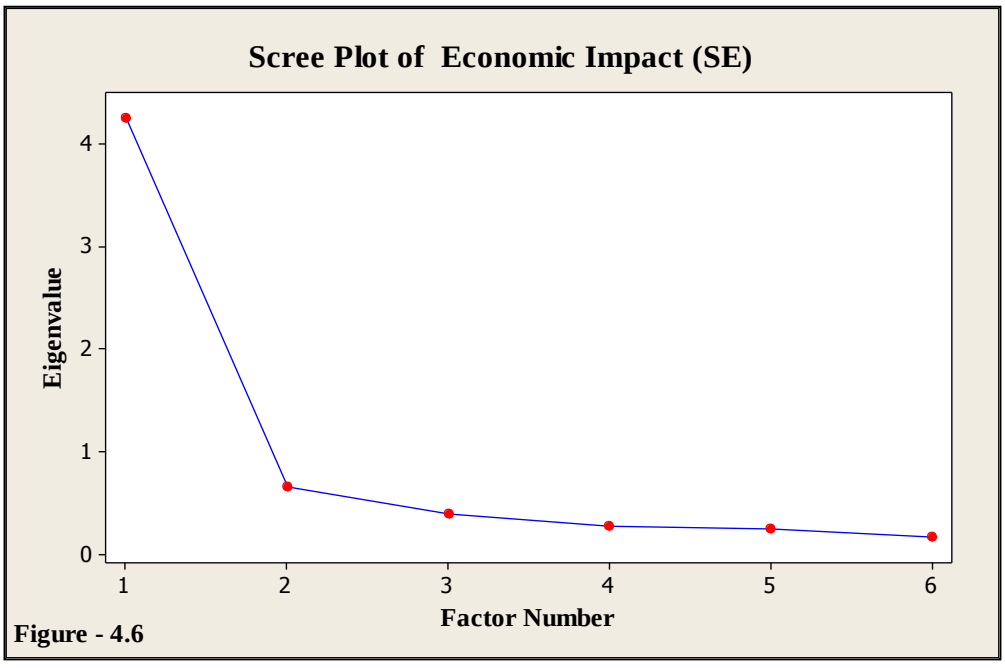


Figure - 4.6

The analysis had selected six variables for one component with loading on each of them tabulated in Table – 4.120 as follows:

Table – 4.120 Rotated Component Matrix(SE Variables)		
Variables	**Element of**	**loadings**
SE1	Improvement in Income level	0.81
SE2	Enhanced asset position	0.82
SE3	Increased Savings	**0.88**
SE4	Increased business expense on purchase of inputs	0.87
SE5	Increased domestic expense	0.87
SE6	Increased employment opportunity	0.80
Extraction Method: PCA Rotation Method: Varimax rotation		

The component includes the variables namely SE1 thru SE6 respectively. These variables are part of the component can be named as a factor in combinations which shows how participants are feel about the economic impact. This factor may be named as:

Table – 4.121 Nomenclature of Factor (SE Variables)								
Factor No.	**Name of Factor**	**Variables included**	**Descriptive Statistics**					
			items	**Av.**	**Sd.**	**Skw.**	**Kurt**	**Cron.α**
1	Economic Impact	SE1, SE2, SE3, SE4, SE5, SE6	6	2.85	1.21	0.30	-0.73	0.917

A factor (Table – 4.121) for combining 6 items with value of Cronbach's alpha 0.917 was evident, based on principal components exploratory factor analysis with Varimax rotation. However, this factor could probably be strengthened through revision items with loadings and possibly adding new items. The Top Box analysis (Table – 4.32) reflects these variables how the participants responded.

4.5.7 Factor Analysis (SS variables)

Correlation Matrix

The Table – 4.122 shows the correlation matrix having 63 correlations other than self-values are greater than 0.3, this is required for PCA before calculating Factor Analysis.

Table – 4.122 Correlation Matrix (12 variables) Cases = 600

Variable	SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS8	SS9	SS10	SS11	SS12
SS1	1.00											
SS2	**0.53**	1.00										
SS3	**0.44**	**0.68**	1.00									
SS4	**0.36**	**0.71**	**0.67**	1.00								
SS5	0.27	**0.64**	**0.64**	**0.78**	1.00							
SS6	**0.37**	**0.55**	**0.64**	**0.65**	**0.64**	1.00						
SS7	**0.38**	**0.50**	**0.59**	**0.50**	**0.52**	**0.68**	1.00					
SS8	**0.33**	**0.66**	**0.60**	**0.72**	**0.74**	**0.64**	**0.57**	1.00				
SS9	**0.37**	**0.60**	**0.64**	**0.67**	**0.67**	**0.69**	**0.61**	**0.76**	1.00			
SS10	0.30	**0.62**	**0.60**	**0.71**	**0.68**	**0.68**	**0.61**	**0.76**	**0.79**	1.00		
SS11	0.27	**0.59**	**0.55**	**0.75**	**0.76**	**0.66**	**0.54**	**0.80**	**0.77**	**0.86**	1.00	
SS12	**0.35**	**0.45**	**0.56**	**0.59**	**0.59**	**0.75**	**0.66**	**0.62**	**0.73**	**0.74**	**0.73**	1.00

KMO and Bartlett's Test

The calculation of principal component analysis gives the value for KMO as **0.937** (*marvellous*)which is greater than 0.5 and the probability associated with Bartlett's Test of Sphericity is less than 0.05 (i.e. $p<0.05$) and satisfies this requirement (Table – 4.123).

Table – 4.123 KMO and Bartlett's Test

Kaiser-Meyer-Olkin MSA		**0.937**
Bartlett's Test of Sphericity	Chi-Square (Approx.)	6801.26
	Degrees of freedom	66
	Sig.	0.00

In next step to determine Anti-image correlation of remaining SS variables in the given (Table –4.124):

Table – 4.124 Anti-image Correlation (MSA)

Variable	Correlation	Variable	Correlation
SS1	0.86	**SS7**	0.94
SS2	0.91	**SS8**	0.96
SS3	0.95	**SS9**	0.96
SS4	0.95	**SS10**	0.93
SS5	0.94	**SS11**	0.92
SS6	0.96	**SS12**	0.93
Measures of Sampling Adequacy(MSA)			

Factor Analysis Outcome

The numbers of factors derived from the factor analysis solution are two having Eigen value greater than 1.0 which represents a partitioning of the total variation (i.e. 74.7%) accounted for each principal component in Table – 4.125.

Table – 4.125 Overall Variance Explained

Obtained Component	The Eigen values			Extraction (Sums of Squared Loadings)			Rotation (Sums of Squared Loadings)		
	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %
1	7.96	66.31	66.31	7.96	66.31	66.31	6.55	54.60	54.60
2	**1.01**	**8.42**	**74.73**	**1.01**	**8.42**	**74.73**	**2.42**	**20.13**	**74.73**
3	0.74	6.15	80.89						
4	0.53	4.38	85.27						
5	0.35	2.90	88.18						
6	0.32	2.64	90.82						
7	0.25	2.07	92.89						
8	0.23	1.94	94.83						
9	0.18	1.48	96.31						
10	0.17	1.43	97.74						
11	0.16	1.37	99.11						
12	0.11	0.89	100.00						
Extraction Method: PCA									

The iteration of FA gives two components with 74.7% of total variability with *communality* tabulated (Table – 4.126) for all SS variables are greater than 0.5.

Table – 4.126 Communalities

Variable	Initial	Extraction	Variable	Initial	Extraction
SS1	1.00	0.83	SS7	1.00	0.55
SS2	1.00	0.77	SS8	1.00	0.78
SS3	1.00	0.69	SS9	1.00	0.79
SS4	1.00	0.75	SS10	1.00	0.83
SS5	1.00	0.74	SS11	1.00	0.83
SS6	1.00	0.70	SS12	1.00	0.70
Extraction Method: PCA.					

The analysis had more than one variable i.e. all 12 variables with loading more than 0.5 on each of them are tabulated in Table – 4.127 but loading of two variables SS2 and SS3 are appearing in both the components hence these two variables needs to be dropped from the calculation and redo the analysis.

Table – 4.127 Rotated Component Matrix (IN Variables)		
Variable	**Component**	
	1	**2**
SS1	0.08	**0.91**
SS2	**0.53**	**0.70**
SS3	**0.62**	**0.56**
SS4	**0.76**	0.43
SS5	**0.80**	0.31
SS6	**0.77**	0.32
SS7	**0.63**	0.38
SS8	**0.82**	0.32
SS9	**0.85**	0.27
SS10	**0.89**	0.21
SS11	**0.90**	0.15
SS12	**0.82**	0.17
Extraction Method: PCA Rotation Method: Varimax Rotation.		

After dropping the variables; the new calculation of principal component analysis gives the different value for KMO as **0.930** (*marvellous*) which is also greater than 0.5 and with Bartlett's Test of Sphericity the probability is also <0.05 satisfies this requirement (Table – 4.128).

Table – 4.128 KMO and Bartlett's Test		
Kaiser-Meyer-Olkin MSA.		**0.930**
Bartlett's Test of Sphericity	Chi-Square (Approx.)	5330.35
	Degrees of freedom	36
	Sig.	0.00

The Anti-image correlation table (Table – 4.129) of the final version of calculation is as follows:

Table – 4.129 Anti-image Correlation (MSA)			
Variable	**Correlation**	**Variable**	**Correlation**
SS4	0.94	**SS9**	0.95
SS5	0.92	**SS10**	0.92
SS6	0.94	**SS11**	0.91
SS7	0.92	**SS12**	0.92
SS8	0.94		

The further step was to calculate the number of factors required for solution. There was only one Eigen value greater than 1.0 which represents a partitioning of the total

variation accounted for every principal component (Table – 4.130). This latent root criterion derives only one component to be extracted for these variables.

Table – 4.130 Overall Variance Explained

Obtained Component	The Eigen values			Extraction (Sums of Squared Loadings)		
	Total	% of Var.	Cumu. %	Total	% of Var.	Cumu. %
1	**6.60**	**73.38**	**73.38**	**6.60**	**73.38**	**73.38**
2	0.68	7.51	80.89			
3	0.45	5.00	85.90			
4	0.33	3.71	89.61			
5	0.25	2.77	92.38			
6	0.21	2.30	94.68			
7	0.19	2.14	96.82			
8	0.18	1.97	98.79			
9	0.11	1.21	100.00			
Extraction Method: PCA.						

The cumulative proportion of variance criteria decides only one component to satisfy in explaining 73% or more of the total variance; as the SPSS software calculates and by default to extract the number of components as indicated in latent root criterion, the initial factor solution having extraction of 2 components.

The visual graphical chart Scree Plot **Figure – 4.7** is a useful in determining an appropriate number of factors.

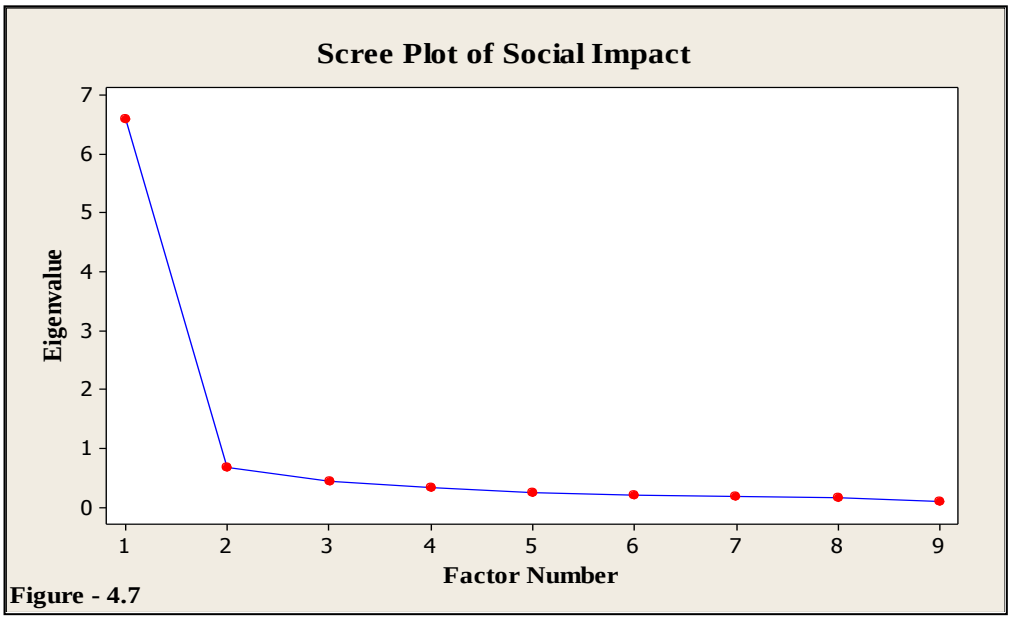


Figure - 4.7

The commonality for all SS variables (Table – 4.131) for some variables is greater than 0.5 in this iteration and the cumulative proportion of variance criteria would require only 1 component to satisfy the criterion with 73% (Table – 4.130). The factor analysis had more than one variable i.e. from all twelve variables only selected nine variables loading on each of them are tabulated in Table – 4.132 as follows:

Table – 4.131 Communalities

Variable	Initial	Extraction	Variable	Initial	Extraction
SS4	1.00	0.72	**SS9**	1.00	0.79
SS5	1.00	0.74	**SS10**	1.00	0.82
SS6	1.00	0.70	**SS11**	1.00	0.81
SS7	1.00	0.54	**SS12**	1.00	0.70
SS8	1.00	0.78			
Extraction Method: PCA					

The component includes the variables namely SS4 thru SS12 (Table – 4.132) respectively with loadings.

Table – 4.132 Rotated Component Matrix (SS Variables)

Variables	Element of	loadings
SS4	Role in decision making process has increased	**0.85**
SS5	Improved household quality of life	**0.86**
SS6	Better utilization of available resources	**0.84**
SS7	Increase in capacity building through training	**0.73**
SS8	Increase in source of Income contributed by Women family members	**0.89**
SS9	Contributed to Women family members Education	**0.89**
SS10	Contributed to Women family members Heath awareness	**0.90**
SS11	Increase in involvement of women participation in Social Activities	**0.90**
SS12	Improved women participation in local Panchayat	**0.84**
Extraction Method: PCA. Rotation Method: Varimax rotation		

These variables are part of the component which can be named as a factor in combinations which shows how participant are feel about the saving concept. This factor may be named as:

Table – 4.133 Nomenclature of Factor (SS Variables)

Factor No.	Name of Factor	Variables included	Descriptive Statistics					
			items	Av.	Sd.	Skw.	Kurt	Cron. α
1	Social Impact	SS4, SS5, SS6, SS7, SS8, SS9, SS10, SS11, SS12	9	3.13	1.23	0.09	-0.99	0.954

A factor (Table - 4.133) for combining 9 items with value of Cronbach's alpha 0.954 was evident, based on principal components exploratory factor analysis with Varimax rotation. However, this factor could probably be strengthened through revision items with loadings and possibly adding new items.

4.5.8 Factor Analysis (MC variables)

Correlation Matrix

Micro finance is to supply micro credit (MC) to people living in utter poverty and has no reach to the conservative and formal financial products. It is an aid to engage them in productive activities and grow their tiny businesses. Micro finance focused on availing the credit in a standard manner. Micro financial schemes play vital role in increasing women's participation in economic activities and decision making. The questionnaires to participant were developed with reference to the Micro Finance Institutions (Development and Regulation) Bill currently prevailing in India. Table – 4.134 shows the correlation matrix having all correlations other than self-values are greater than 0.3, this is required for PCA before calculating Factor Analysis.

Table – 4.134 Correlation Matrix (12 variables) Cases = 600

Variables	MC1	MC2	MC3	MC4	MC5	MC6	MC7	MC8	MC9	MC10	MC11	MC12
MC1	1.00											
MC2	**0.76**	1.00										
MC3	**0.72**	**0.85**	1.00									
MC4	**0.70**	**0.85**	**0.86**	1.00								
MC5	**0.71**	**0.83**	**0.82**	**0.83**	1.00							
MC6	**0.72**	**0.77**	**0.79**	**0.81**	**0.89**	1.00						
MC7	**0.65**	**0.69**	**0.62**	**0.71**	**0.66**	**0.64**	1.00					
MC8	**0.61**	**0.72**	**0.71**	**0.69**	**0.81**	**0.75**	**0.68**	1.00				
MC9	**0.52**	**0.60**	**0.62**	**0.64**	**0.58**	**0.57**	**0.72**	**0.72**	1.00			
MC10	**0.65**	**0.56**	**0.56**	**0.60**	**0.54**	**0.60**	**0.58**	**0.46**	**0.52**	1.00		
MC11	**0.67**	**0.59**	**0.51**	**0.60**	**0.58**	**0.55**	**0.64**	**0.47**	**0.51**	**0.83**	1.00	
MC12	**0.59**	**0.50**	**0.51**	**0.54**	**0.47**	**0.51**	**0.53**	**0.37**	**0.46**	**0.86**	**0.80**	1.00

KMO and Bartlett's Test

The probability associated with Bartlett's Test of Sphericity should be less than (i.e. p values) <=0.05 for performing Principal component analysis and should satisfies this condition. The subsequent step was to perform factor analysis to determine the number of

factors of the solution. The Kaiser-Meyer-Olkin MSA (Table – 4.135) value for MC variables is **0.917** which suggests *marvellous* and perform a factor analysis.

Table – 4.135 KMO and Bartlett's Test		
Kaiser-Meyer-Olkin MSA.		**0.917**
Bartlett's Test of Sphericity	Chi-Square (Approx.)	8171.87
	Degrees of freedom	66
	Sig.	0.00

In the Anti-image correlation table (Table – 4.136) none of the correlation is less than 0.3 hence all variables are the final version of calculation in factor analysis:

Table – 4.136 Anti-image Correlation (MSA)			
Variable	**Correlation**	**Variable**	**Correlation**
MC1	0.96	**MC7**	0.95
MC2	0.95	**MC8**	0.91
MC3	0.92	**MC9**	0.89
MC4	0.94	**MC10**	0.88
MC5	0.89	**MC11**	0.88
MC6	0.92	**MC12**	0.90
a. Measures of Sampling Adequacy(MSA)			

Factor Analysis Outcome

In very first iteration of FA gives two components with 79.4% of total variability with *commonality* tabulated (Table – 4.137) for all MC variables are greater than 0.5.

Table – 4.137 Commonalities					
Variable	**Initial**	**Extraction**	**Variable**	**Initial**	**Extraction**
MC1	1.00	0.71	**MC7**	1.00	0.67
MC2	1.00	0.83	**MC8**	1.00	0.78
MC3	1.00	0.82	**MC9**	1.00	0.57
MC4	1.00	0.83	**MC10**	1.00	0.90
MC5	1.00	0.86	**MC11**	1.00	0.86
MC6	1.00	0.81	**MC12**	1.00	0.89
Extraction Method: PCA					

The principal component analysis requires that the probability associated with Bartlett's Test of Sphericity be less than 0.05 (Table – 4.135) which satisfies this requirement. The next step was to determine the number of factors that should be included in the factor

solution where only two Eigen values which represent a partitioning of the total variation greater than 1.0 in Table – 4.138

Table – 4.138 Overall Variance Explained

Component	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var.	Cumu. %	Total	% of Var.	Cumu. %	Total	% of Var.	Cumu. %
1	**8.20**	**68.33**	**68.33**	**8.20**	**68.33**	**68.33**	**6.03**	**50.28**	**50.28**
2	**1.33**	**11.08**	**79.41**	**1.33**	**11.08**	**79.41**	**3.50**	**29.13**	**79.41**
3	0.68	5.67	85.08						
4	0.36	3.03	88.11						
5	0.35	2.91	91.02						
6	0.28	2.30	93.32						
7	0.21	1.74	95.06						
8	0.17	1.39	96.45						
9	0.13	1.06	97.52						
10	0.12	0.99	98.50						
11	0.11	0.89	99.40						
12	0.07	0.60	100.00						

Extraction Method: PCA

The visual graphical chart Scree Plot **Figure – 4.9** is a useful in determining an appropriate number of factors.

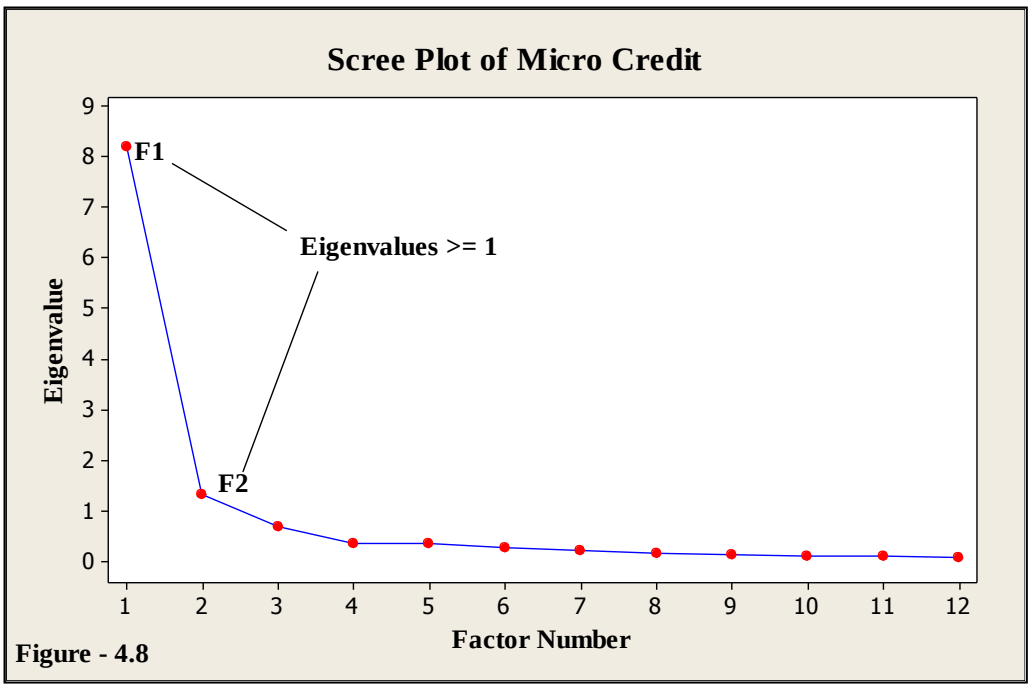


Figure - 4.8

The analysis had more than one variable i.e. all twelve variables loading on each of them for both the components are tabulated in Table – 4.139 as follows:

Table – 4.139 Rotated Component Matrix (MC Variables)

Variables	Statements	Component	
		1	2
MC1	Adequate Loan amount	**0.66**	0.53
MC2	Simple procedure in availing loan	**0.85**	0.33
MC3	Reasonable Rate of interest on Loans	**0.85**	0.29
MC4	Loan timely sanctioned	**0.84**	0.36
MC5	Loan utilization check was done	**0.89**	0.27
MC6	Easy Repayment policy	**0.84**	0.32
MC7	Bank branch nearby	**0.68**	0.45
MC8	Interaction with the bank staff is comfortable	**0.87**	0.17
MC9	Waiting period is less	**0.68**	0.34
MC10	Credit linkage with Marketing	0.33	**0.89**
MC11	Credit linkage with Insurance	0.35	**0.86**
MC12	Received training related to micro-credit	0.24	**0.91**

Extraction Method: PCA
Rotation Method: Varimax rotation.

The component one includes the variables namely MC1 thru MC9 and component two includes variables MC10 thru MC12 respectively. These variables are part of these components can be named as a factor to each of combinations. These factors are named as: Loan related problem and Capacity Building related problems.

Table – 4.140 Nomenclature of Factor (MC Variables)

Factor No.	Name of Factor	Variables included	Descriptive Statistics					
			items	Av.	Sd.	Skw.	Kurt	Cron. α
1	Micro Credit Factor 1 Loan related Problem	MC1 thru MC9	9	1.77	0.42	-1.30	-0.32	0.958
2	Micro Credit Factor 2 Capacity Building Problem	MC10 thru MC12	3	1.89	0.31	-2.49	4.18	0.937

The two factors (Table – 4.140) above for 12 items having different Cronbach's alpha **0.958** and **0.937** respectively evident, based on principal components exploratory factor analysis with Varimax rotation. However these factors could probably be strengthened through revision of items with loadings and possibly adding new items. The overall aggregate positive responses from participants (Table – 4.37) for all 12 variables are only 20%.

4.5.9 Factor Analysis (MS variables)

Correlation Matrix

Micro finance is to provide micro savings (MS) to people living in utter poverty and has no reach to the conservative and formal financial products. It is an aid to engage them in productive activities and grow their tiny businesses. Micro finance focused on availing the savings in a standard manner. Micro financial schemes plays vital role in increasing women's participation in economic activities and decision making. The questionnaires to participant were developed with reference to the Micro Finance Institutions (Development and Regulation) Bill currently prevailing in India.Table – 4.141 shows the correlation matrix having all correlations other than self-values are greater than 0.3, this is required for PCA before calculating Factor Analysis.

Table – 4.141 Correlation Matrix (3 variables) Cases = 600

Variable	MS1	MS2	MS3
MS1	1.00		
MS2	**0.98**	1.00	
MS3	**0.91**	**0.93**	1.00

KMO and Bartlett's Test

The Kaiser-Meyer-Olkin MSA (Table – 4.142) value for MS variable is **0.728** suggests *middling* and can perform factor analysis. The Bartlett's Test of Sphericity tests confirms the null hypothesis about the correlation matrix is an identity matrix.

Table – 4.142 KMO and Bartlett's Test

Kaiser-Meyer-Olkin MSA		**0.728**
Bartlett's Test of Sphericity	Chi-Square (Approx.)	3008.54
	Degrees of freedom	3
	Sig.	0.000

In the Anti-image correlation table (Table – 4.143) none of the correlation is less than 0.3 hence all variables are the final version of calculation in factor analysis

Table – 4.143 Anti-image Correlation (MSA)

Variable	Correlation
MS1	0.71
MS2	0.65
MS3	0.87
a. Measures of Sampling Adequacy(MSA)	

Factor Analysis Outcome

In very first iteration of FA gives only component with 95.8% of total variability with *communality* tabulated (Table – 4.144) for all MS variables are greater than 0.5.

Table – 4.144 Commonalities		
Variable	**Initial**	**Extraction**
MS1	1.00	0.96
MS2	1.00	0.98
MS3	1.00	0.93
Extraction Method: Principal Component Analysis.		

The probability associated with Bartlett's Test of Sphericity be less than the <0.05 (Table – 4.142) and satisfies this requirement for performing Principal component analysis. The number of factors that required should be included in the solution decided by Eigen values which are greater than 1.0 represents a partitioning of the total variation accounted for every principal component (Table – 4.145).

Table – 4.145 Overall Variance Explained						
Obtained Component	**The Eigen values**			**Extraction (Sums of Squared Loadings)**		
	Total	**% of Var.**	**Cumu. %**	**Total**	**% of Var.**	**Cumu. %**
1	**2.87**	**95.78**	**95.78**	**2.87**	**95.78**	**95.78**
2	0.11	3.51	99.28			
3	0.02	0.72	100.00			
Extraction Method: PCA						

The analysis had more than one variable i.e. all three variables loading on each of them are tabulated in Table – 4.146 as follows:

Table – 4.146 Rotated Component Matrix(MS Variables)		
Variables	**Elements of**	**Loadings**
MS1	Ease in process of opening saving account	**0.98**
MS2	Reasonable return on savings	**0.99**
MS3	Easy in withdrawing	**0.96**
Extraction Method: PCA Rotation Method: Varimax rotation		

The visual graphical chart Scree Plot (**Figure – 4.9**) is a useful in determining appropriate number of factors for MS Variables.

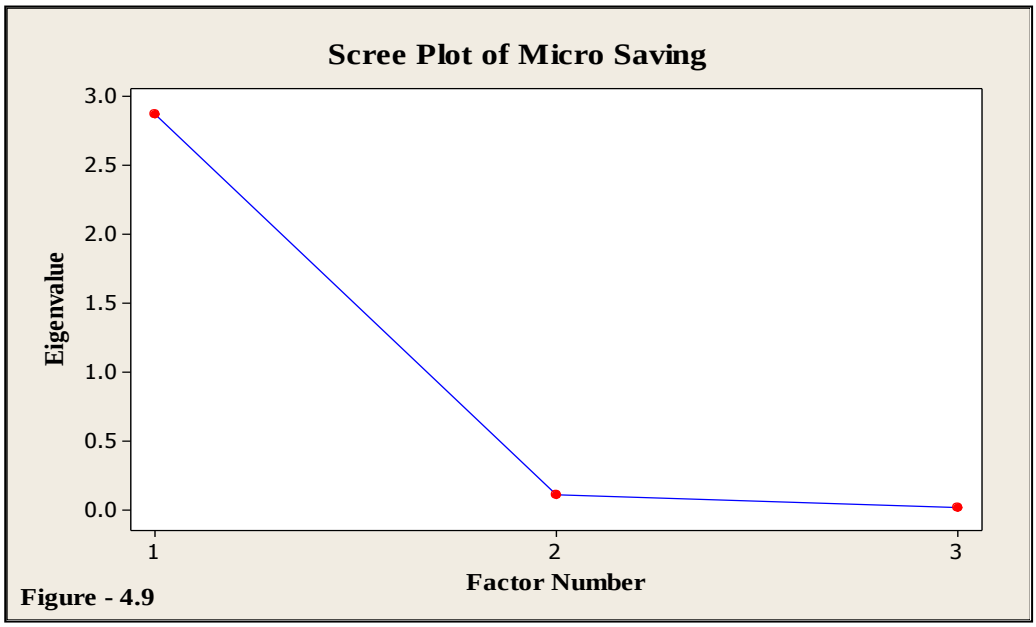


Figure - 4.9

The only one component includes the variables namely MS1, MS2 and MS3 respectively. These variables are part of this component can be named as a factor in combination.

Table – 4.147 Nomenclature of Factor (MS Variables)

Factor No.	Name of Factor	Variables included	Descriptive Statistics					
			items	Av.	Sd.	Skw.	Kurt	Cron. α
1	Micro Saving Factor	MS1, MS2, MS3	3	1.43	0.49	0.29	-1.92	0.937

The two factors (Table – 4.147) above for 3 items having Cronbach's alpha **0.937** which is evident, based on principal components exploratory factor analysis with Varimax rotation. However, these factors could probably be strengthened through revision of items with loadings and possibly adding new items. The overall aggregate positive responses from participants (Table – 4.38) for all 3 variables are only 57%.

4.5.10 Factor Analysis (MI variables)

Correlation Matrix

Micro finance is to provide micro insurance (MI) to people living in utter poverty and has no reach to the conservative and formal financial products. The definition of micro insurance in India is primarily a product-based, monetary one because of competitive

and open environment leads to neglect the rural and weaker sections. India is one of the first countries to adopt micro insurance formerly though the Micro Insurance Regulation Act in 2005. The regulation sets boundaries for the cost and coverage of the product and provides clarity about distribution mechanisms. The questionnaires to participant were developed with reference to the Micro Finance Institutions (Development and Regulation) Bill currently prevailing in India.Micro finance focused on availing the insurance in a standard manner. Micro financial schemes plays vital role in increasing women's participation in economic activities and decision making. The Table – 4.148 shows the correlation matrix having all correlations other than self-values are greater than 0.3, this is required for PCA before calculating Factor Analysis.

Table – 4.148 Correlation Matrix (4 variables)

Variable	MI1	MI2	MI3	MI4
MI1	1.00			
MI2	**0.99**	1.00		
MI3	**0.91**	**0.91**	1.00	
MI4	**0.64**	**0.64**	**0.69**	1.00

KMO and Bartlett's Test

The main important condition for PCA / FA analysis is value of Kaiser-Mayer-Olkin (KMO) measure of sampling adequacy (MSA) which is **0.782** suggests *mediocre* in the Table – 4.149 for KMO and Bartlett's Test shows the calculation for factor analysis.

Table – 4.149 KMO and Bartlett's Test

Kaiser-Meyer-Olkin MSA.		**0.782**
Bartlett's Test of Sphericity	Chi-Square (Approx.)	4327.83
	Degrees of freedom	6
	Sig.	0.00

The Anti-image correlation table (Table – 4.150) shows diagonal values of variables are more than 0.5 as follows:

Table – 4.150 Anti-image Correlation (MSA)

Variable	Correlation	Variable	Correlation
MI1	0.70	**MI3**	0.94
MI2	0.69	**MI4**	0.92

Factor Analysis Outcome

The probability associated with Bartlett's Test of Sphericity is less than or equal to 0.05 (Table – 4.149) satisfies requirement for factor analysis. The number of factors that included in the factor solution depends on Eigen value which represents a partitioning of the total variation accounted greater than 1.0 in Table – 4.151. The latent root criterion for number of factors to derive indicates that only one component is extracted for these variables.

Table – 4.151 Overall Variance Explained

Obtained Component	The Eigen values			Extraction (Sums of Squared Loadings)		
	Total	% of Var.	Cumu. %	Total	% of Var.	Cumu. %
1	**3.41**	**85.26**	**85.26**	**3.41**	**85.26**	**85.26**
2	0.48	11.95	97.21			
3	0.11	2.69	99.90			
4	0.00	0.10	100.00			
Extraction Method: PCA.						

The cumulative proportion of variance criteria decides only one component to satisfy in explaining 85% or more of the total variance; as SPSS software calculates by default to extract the number of components indicated by the latent root criterion, the initial factor solution was based on only one component.

The visual graphical chart Scree Plot **Figure – 4.10** is a useful in determining an appropriate number of factors for MI Variables.

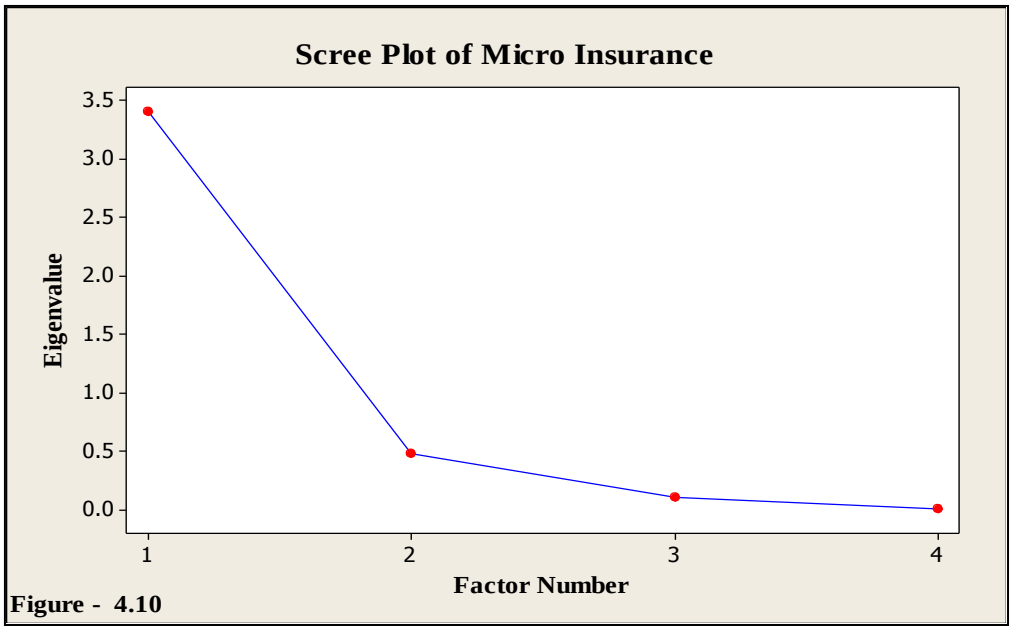


Figure - 4.10

In very first iteration of FA gives only one component with 85.3% of total variability (Table – 4.151) with *communality* tabulated (Table – 4.152) for all MI variables are greater than 0.5.

Table – 4.152 Commonalities					
Variable	**Initial**	**Extraction**	**Variable**	**Initial**	**Extraction**
MI1	1.00	0.94	**MI3**	1.00	0.92
MI2	1.00	0.94	**MI4**	1.00	0.61
Extraction Method: Principal Component Analysis.					

The component analysis had all four variables loading on each of them are tabulated in Table – 4.153 as follows:

Table – 4.153 Rotated Component Matrix(MI Variables)		
Variables	**Elements of**	**Loadings**
MI1	Ease in taking micro insurance policy	**0.97**
MI2	Ease in payment of premium	**0.97**
MI3	Ease in claim settlement	**0.96**
MI4	Complains and grievances are well handled	**0.78**
Extraction Method: PCA Rotation Method: Varimax rotation		

The only one component includes the variables namely MI1, MI2, MI3 and MI4 respectively. These variables are part of this component can be named as a factor in combination.

Table – 4.154 Nomenclature of Factor (MI Variables)								
Factor No.	**Name of Factor**	**Variables included**	**Descriptive Statistics**					
			items	**Av.**	**Sd.**	**Skw.**	**Kurt**	**Cron. α**
1	Micro Insurance Factor	MI1, MI2, MI3, MI4	4	1.76	0.43	-1.23	-0.50	0.782

The only factor (Table – 4.154) above for 4 items having Cronbach's alpha **0.782** which is evident, based on principal components exploratory factor analysis with Varimax rotation. However, these factors could probably be strengthened through revision of items with loadings and possibly adding new items. The overall aggregate positive responses from participants (Table – 4.39) for all 4 variables are only 24%.

4.6 Relationship Analysis (Factors of SV, IN, SE, SS and other Variables)

Social Impact Assessment includes the processes of analyzing, monitoring and managing the intended and unintended social consequences, either positive or negative, of planned interventions and any social change processes invoked by those interventions (Vanclay, 1999).

Social Impact Assessment assumes that social, economic and biophysical impacts are interconnected. This analysis includes the use of assets (land, livestock etc.) culture, the main economic activities e.g. tourism, agriculture, employment levels and impact on service provision e.g. education, water use, traffic, energy use etc. Its primary purpose is to ensure that there is no mismatch between the development and socio-cultural and economic of the project area.

Factor analysis is a collection of methods used to examine how underlying constructs influence the responses on a number of measured variables. There are basically two types of factor analysis viz. exploratory and confirmatory. Both types of factor analyses are based on the Common Factor Model. The strength of the link between each factor and each measure varies, such that a given factor influences some measures more than others. Factor analyses are performed by examining the pattern of correlations (or co-variances) between the observed measures. Measures that are highly correlated (either positively or negatively) are likely influenced by the same factors, while those that are relatively uncorrelated are likely influenced by different factors.

It is very important to understand relationship between variables to draw the right conclusion from a statistical analysis. The relationship between variables determines how the right conclusions are reached. Correlation between variables can be positive or negative. Positive correlation implies an increase of one quantity causes an increase in the other whereas in negative correlation, an increase in one variable will cause a decrease in the other.

We have analyzed two different groups of survey and received final factors economic impact and social impact this brings to test following hypothesis.

H.17o There shall be no correlation between factors of economic impact and factors of socio benefits responsible to beneficiaries of Dang District of Gujarat State.

H.17a There shall be correlation between factors of economic impact and factors of socio benefits responsible to beneficiaries of Dang District of Gujarat State.

4.6.1 Relationship (correlation Coefficients Spearman's rho)

Relationship between variables drawn after factor analysis performed for savings, insurance, socio economic impact (i.e. to test relationship between variables) and micro credit respectively tested by using bivariate *correlation coefficient*.

- **Correlation** is a bivariate analysis. This measures the strengths of association between two independent variables. This is termed as value of the correlation coefficient in statistics and it varies from +1 to -1. If any value lies as ± 1, then it is said to be a perfect degree of association between the two variables and if this value goes nearer to $\pm$ 0, then relationship between these two variables will be weaker. Through different methods calculating *correlation* is possible.
- **Pearson *r* correlation*:*** Pearson r correlation is commonly used to measure the degree of the linear relationship between two variables in statistics; for example the stock market index depends on the values on commodities. Pearson *r* correlation basically measures the degree of relationship between the two commodities. In Pearson correlation (*r*), both variables should be normally distributed and should be linearity and homoscedasticity
- **Spearman rank correlation:** Spearman rank correlation test is commonly used for non-parametric data and also measures the degree of association between two independent variables. The names of test Spearman rank correlation because it was developed by Spearman. This test does not require any assumptions for the distribution of the data and when the variables are measured on ordinal scale.

To study the relationships between different variables of (various) factors received as per the above referred sections such as **SV variables (i.e. 4.5.4), IN variables (i.e. 4.5.5), SE variables (i.e. 4.5.6), SS variables (i.e. 4.5.7), MC variables (i.e. 4.5.8), MS variables (i.e. 4.5.9) and MI variables (i.e. 4.5.10)** respectively.

This study is depended on survey of data collection through replies from participants of three different blocks of Dang district and their perception for microfinance intervene (more in rural areas). It could possibly these replies may not be their own independently but may be collectively (as it happens in villages). Microcredit is one aspect of microfinance and it is designed to provide credit to poorer which could be used as capital for a small business so that they become self-sufficient and earn them an income. Microfinance was developed for people to provide financial assistance with other services such as insurance and savings to underprivileged people. *Microcredit is a component of microfinance. Microcredit includes credit activites only, but microfinance includes credit as well as non credit activites like savings, insurance, etc.* The relationships between factors of micro credit, micro savings and micro insurance were calculated to test hypotheses designed for this.

As per various literatures both savings and insurance services are complement to microcredit; since they satisfy various needs in routine and also in long-term development strategy. Microcredit provides support to a professional in business creation and growth to create a favorable environment while insurance, on the other hand; covers micro-borrowers from risks together with savings which enable them to build up a financial safety. There is a need of risk management strategies (Table – 4.155) with respect to these products.

Table – 4.155 Risk Management Strategies

Sr. No.	Product	Credit	Savings	Insurance
1	**Cost**	Principal Amount + Interest on Loan	Principal Amount – Interest earned	Low as cost recovered from large number of people
2	**Leverage**	1:1 (less interest)	1:1 (less interest)	None
3	**Risk Sharing**	None	None	Widespread
4	**Investment Recovery**	Full	Full	None
5	**Best Use**	Protection for smaller, more certain risks	Protection for smaller, more certain risks	Protection against larger, uncertain risks
6	**Limiting Factors**	Risk coverage limited to loan amount	Risk coverage limited to saved amount	Most certain events and mass / covariant risks are uninsurable

Source: Author

4.6.1.1 Relationship with SV variables

IN Variables and MI Variables (insurance related)

Low income households are more prone to certain risks in life such as death, injury, or illness of an income earner; natural disasters; and theft etc. These risks affect every family in two ways. *Firstly,* households affected by a risky event incur a potentially substantial monetary loss due to these risks. *Secondly,* households exposed to a risk suffer on-going uncertainty about any loss that might occur. Saving habits may help to recover from these risks and hence it is assumed that; there must be relation between factors of saving and insurance.

Table – 4.156 Relationship between Savings and Insurance

Factors	Variables	Saving Factor			
		SV1	SV2	SV3	SV7
Insurance Factor	IN1	**0.40**	**0.43**	**0.41**	**0.40**
	IN2	**0.42**	**0.44**	**0.43**	**0.42**
	IN3	**0.36**	**0.31**	**0.35**	**0.32**
	IN4	**0.38**	**0.44**	**0.34**	**0.43**
Micro Insurance Factor	MI1	**0.36**	**0.44**	**0.47**	**0.41**
	MI2	**0.35**	**0.44**	**0.47**	**0.41**
	MI3	**0.30**	**0.40**	**0.42**	**0.39**
	MI4	**0.31**	**0.36**	0.29	**0.38**

All bold numbers significant at $p<0.05$

Significant relationship between (**correlated values are >= 0.3**) as tabulated above in Table – 4.156 from the factors of Saving Variables (SV's from Table – 4.102) and Insurance Variables (IN's from Table – 4.111 and Table – 4.152 respectively) reflects impact of savings with insurance (which is also an alternate saving) coverage to useful in future requirements to householders; hence the null hypothesis **(i.e. H.17.1o**) is rejected, as there is correlation between SV variable with IN Variables and MI Variables responsible to beneficiaries of Dang District of Gujarat State.

Variables Related to Micro-Credit and Micro-Savings

There are three financial interventions Micro-insurance, micro-credit and micro-savings which have the potential to transform the lives of poorer and having limited access to financial services. In theory, they have the potential to enable investment in income generating activities, consumption smoothing and financial planning. United Nations Capital

Development Fund (UNCDF) had explored in 2011 through a working group of the microfinance as a tool for social protection through savings.

Table – 4.157 Relationship between Saving Habit & Socio Economic Impact

Factors	Variables	Saving Factor			
		SV1	SV2	SV3	SV7
Micro Credit Factor	MC1	0.18	0.24	**0.31**	0.21
	MC2	0.13	0.27	**0.33**	0.17
	MC3	0.11	0.29	**0.35**	0.16
	MC4	0.14	0.26	0.29	0.18
	MC5	0.07	0.25	**0.34**	0.20
	MC6	0.07	0.23	0.28	0.16
	MC7	0.18	0.21	0.21	0.19
	MC8	0.06	0.22	0.28	0.21
	MC9	0.06	0.14	0.19	0.11
	MC10	0.23	0.25	0.25	0.21
	MC11	0.23	0.24	0.25	0.22
	MC12	0.17	0.22	0.23	0.14
Micro Saving Factor	MS1	**0.35**	**0.44**	**0.42**	**0.30**
	MS2	**0.37**	**0.43**	**0.42**	**0.30**
	MS3	**0.40**	**0.43**	**0.43**	0.29

All bold numbers significant at $p<0.05$

Significant relationship between (correlated values are < 0.3) the factors obtained for Saving Variables (referred Table – 4.102) and from problem faced by beneficiary Table – 4.157 (referred Table – 4.139 and Table – 4.144 respectively) reflects impact of savings itself are much helpful to households. Hence the null hypothesis**(i.e. H.20o)** is rejected i.e**.** There is no correlation between SV variable with MC Variables, but there is positive correlation between (correlated values are > 0.3) saving habit variables (SV) with low barriers in acquiring saving service (MS Variables) responsible to beneficiaries of Dang District of Gujarat State.

Variables of Socio-Economic Impact Factor (SE & SS)

Savings always been considered as an instrument for economic growth of self, society and country. A study has been conducted in China (Chow, 1993) evidenced that countries that had made sustained accumulation of fixed capital have been able to achieve higher and sustained economic growth and development than other countries. The accumulation of fixed capital can only be possible through sufficient savings. In developing countries, main constraints are inadequate savings and investment. This is one of the reasons behind Africa is still known as 'the world's poorest continent' (Gimbari, 2002). Savings

creates capital formation which leads to technical innovation and progress and economies of large-scale production, increases specialization to accelerate the productivity of labor in resulting increased GDP.

Socio economic factors affecting savings because savings accumulation is a sacrificial task which is affected by many factors such as individual, family environment, occupation, spouse spending habit, income (individual or family income), number of members in family (earner and dependent) and credit facilities available

Table – 4.158 Relationship between Saving Habit & Socio Economic Impact

Factors	Variables	Saving Factor			
		SV1	SV2	SV3	SV7
Economic factor	**SE1**	-0.29	**-0.32**	-0.26	-0.26
	SE2	-0.11	-0.24	-0.13	-0.19
	SE3	**-0.43**	**-0.36**	-0.27	**-0.40**
	SE4	-0.23	**-0.32**	-0.23	**-0.40**
	SE5	**-0.43**	**-0.40**	**-0.36**	**-0.50**
	SE6	-0.29	**-0.35**	-0.24	**-0.38**
Social factor	**SS4**	**-0.41**	**-0.37**	**-0.32**	**-0.39**
	SS5	**-0.42**	**-0.40**	-0.29	**-0.41**
	SS6	-0.28	**-0.35**	-0.26	**-0.37**
	SS7	-0.17	-0.25	-0.18	**-0.33**
	SS8	**-0.43**	**-0.36**	-0.28	**-0.40**
	SS9	**-0.34**	**-0.33**	-0.27	**-0.48**
	SS10	**-0.39**	**-0.39**	-0.28	**-0.49**
	SS11	**-0.48**	**-0.40**	**-0.32**	**-0.49**
	SS12	-0.25	**-0.35**	-0.24	**-0.41**

All bold numbers significant at $p<0.05$

Significant relationship (negative) between (correlated values are < 0.3) the factors of Saving Variables (SV's from Table – 4.102) and socio-economic improvement Table – 4.158 (variables drawn from Table – 4.120 and Table – 4.132 respectively) *reflects impact of savings itself are not much helpful to households.* Hence, we reject null hypothesis (**i.e.H.17.3o)** that There is no correlation between SV variable with SE Variables and SS Variables responsible to beneficiaries of Dang District of Gujarat State.

This leads to a serious outcome with respect to micro credit program which may have shortcomings because of high interest rates, a requirement of repayment by households. A proper educative training program required for everyone about savings and its benefit, otherwise no one saved even US consumer spending more until 2008 growing household debt and a falling savings rate.

4.6.1.2 Relationship with IN variables

Variables Related to Problems in Availing Microcredit, Microwaving and Micro Insurance Services

Table – 4.159 Relationship between Insurance & Socio Economic Impact					
Factors	**Variables**	**Insurance Habit Factor**			
		IN1	**IN2**	**IN3**	**IN4**
Micro Credit Factor	**MC1**	**0.30**	**0.31**	0.29	0.24
	MC2	0.29	**0.31**	0.24	0.26
	MC3	**0.32**	**0.34**	0.26	0.29
	MC4	**0.34**	**0.34**	0.28	**0.32**
	MC5	**0.30**	**0.32**	0.24	0.26
	MC6	**0.30**	0.29	0.26	0.27
	MC7	**0.35**	0.28	0.27	0.27
	MC8	0.24	0.28	0.18	0.22
	MC9	0.21	0.19	0.21	0.21
	MC10	**0.41**	**0.39**	**0.49**	**0.43**
	MC11	**0.35**	**0.32**	**0.38**	**0.36**
	MC12	**0.32**	**0.31**	**0.40**	**0.36**
Micro Saving Factor	**MS1**	**0.41**	**0.44**	0.27	**0.36**
	MS2	**0.43**	**0.45**	0.27	**0.37**
	MS3	**0.42**	**0.46**	0.27	**0.37**
Micro Insurance Factor	**MI1**	**0.77**	**0.82**	**0.50**	**0.66**
	MI2	**0.77**	**0.82**	**0.50**	**0.66**
	MI3	**0.70**	**0.78**	**0.49**	**0.68**
	MI4	**0.60**	**0.69**	**0.38**	**0.65**
All bold numbers significant at $p<0.05$					

In human life risks and uncertainties are sure to everyone. Mostly people for such eventualities including the poor, use savings to meet with unexpected demands for resources caused by death, disability and illness. For poor people, it is more difficult in saving for the unexpected events because this includes going hungry, undernourishment for children, and pulling children out of school and putting them to work to conserve resources. But even then, meagre savings that the poor do manage to accumulate are rarely enough and there is a need for insurance against such unfortunate events.

The Table – 4.159 gives positive significant results of insurance factors with two micro credit factor (three variables relating) to Capacity building and strong positive correlation between insurance habit with low barriers to access insurance facilities and access to savings services. While some of the variables of insurance needs to be dealt in proper manner with credit related factor 1 i.e. Loan related barriers. Thus, we reject null hypothesis

(i.e. **H.17.4o)** that there is no correlation between IN variable with MC, MS and MI Variables responsible to beneficiaries of Dang District of Gujarat State.

Variables of Socio Economic factor (SE & SS)

The correlation between insurance habit and economic growth has been analyzed by many researchers and assess the causal relation between macroeconomic performance and the size of the insurance sector. The insurance becomes a major component in certain economies, consequently the weight of insurance to the GDP of any country.

Table – 4.160 Relationship between Insurance Habit & Socio Economic Impact

Factors	Variables	Insurance Factor			
		IN1	IN2	IN3	IN4
Economic factor	SE1	-0.26	-0.25	-0.25	-0.28
	SE2	-0.21	-0.22	-0.18	-0.24
	SE3	-0.23	-0.27	-0.06	-0.24
	SE4	-0.25	-0.28	-0.11	**-0.30**
	SE5	**-0.30**	**-0.34**	-0.15	**-0.35**
	SE6	**-0.34**	**-0.37**	-0.14	**-0.37**
Social factor	SS4	-0.23	-0.25	-0.04	-0.20
	SS5	-0.27	-0.28	-0.08	-0.25
	SS6	-0.28	**-0.35**	-0.20	**-0.35**
	SS7	-0.25	-0.27	-0.21	-0.27
	SS8	-0.25	-0.26	-0.14	-0.29
	SS9	-0.23	-0.28	-0.12	**-0.32**
	SS10	-0.22	-0.26	-0.06	-0.29
	SS11	-0.23	-0.25	-0.08	-0.28
	SS12	-0.19	-0.24	-0.14	-0.27
All bold numbers significant at $p<0.05$					

The Table – 4.160 reflects again significant negative correlations with economic and social factors their impact in different areas of insurance facilities. It reflects *impact of life micro insurance itself is not much helpful to households*. Also, it indicates that there is need for every household in understanding the importance of insurance with proper guidance. Thus, we reject null hypothesis **(i.e.H.17.5o)** that there is no correlation between IN variable with SE Variables and SS Variables responsible to beneficiaries of Dang District of Gujarat State.

4.6.1.3 Relationship between SE and SS variables

The Table – 4.161 explains a positive significant relationship between factors of economic impact and factors of socio benefits that shows the impact on households. Thus,

we reject null hypothesis **(i.e.H.17o).** But at microfinance level these variables are showing negative significant relationships.

Table – 4.161 Relationship between factors of Socio Economic Impact							
Factor	**Variables**	**Factor Economic Impact**					
		SE1	**SE2**	**SE3**	**SE4**	**SE5**	**SE6**
Factor Social Impact	**SS4**	**0.48**	**0.47**	**0.76**	**0.60**	**0.77**	**0.58**
	SS5	**0.44**	**0.40**	**0.72**	**0.57**	**0.73**	**0.63**
	SS6	**0.38**	**0.47**	**0.57**	**0.65**	**0.65**	**0.65**
	SS7	**0.40**	**0.49**	**0.46**	**0.60**	**0.52**	**0.54**
	SS8	**0.53**	**0.48**	**0.72**	**0.61**	**0.71**	**0.58**
	SS9	**0.49**	**0.54**	**0.71**	**0.67**	**0.70**	**0.62**
	SS10	**0.52**	**0.43**	**0.69**	**0.68**	**0.76**	**0.60**
	SS11	**0.44**	**0.34**	**0.71**	**0.58**	**0.76**	**0.54**
	SS12	**0.34**	**0.38**	**0.52**	**0.63**	**0.65**	**0.58**
All bold numbers significant at p<0.05							

Variables Related to Micro-Credit, Micro-Savings and Micro-Insurance

The Table – 4.162 explains a negative significant relationship between economic factor that shows the impact on households with micro credit, micro savings and micro insurance variables (problem in availing services); the relationship address that either scheme are not properly implemented or householders are not able to understand their importance. Furthermore, it also shows that higher barriers in availing Microfinance trio services will result in low economic impact. Thus, we reject null hypothesis **(i.e.H.17.6o).**

Table – 4.162 Relationship between Factors of Economic Impact & Microfinance Services							
Factor	**Variables**	**Factor for Economic Impact**					
		SE1	**SE2**	**SE3**	**SE4**	**SE5**	**SE6**
Micro Credit Factor	**MC1**	-0.06	-0.13	-0.07	-0.12	-0.15	-0.15
	MC2	-0.07	-0.17	-0.06	-0.17	-0.17	-0.19
	MC3	-0.09	-0.22	-0.07	-0.18	-0.18	-0.25
	MC4	-0.08	-0.20	-0.04	-0.17	-0.15	-0.22
	MC5	-0.05	-0.22	-0.06	-0.19	-0.19	-0.22
	MC6	-0.04	-0.20	-0.03	-0.12	-0.14	-0.20
	MC7	-0.02	-0.19	-0.10	-0.18	-0.13	-0.15
	MC8	-0.01	-0.24	-0.12	-0.21	-0.17	-0.18
	MC9	0.01	-0.22	-0.08	-0.17	-0.10	-0.15
	MC10	-0.10	-0.10	-0.04	-0.05	-0.11	-0.12
	MC11	-0.13	-0.11	-0.07	-0.13	-0.15	-0.16
	MC12	-0.14	-0.05	-0.02	-0.07	-0.06	-0.08
Micro Saving Factor	**MS1**	-0.25	-0.23	-0.27	-0.18	**-0.31**	-0.26
	MS2	-0.28	-0.26	**-0.31**	-0.19	**-0.33**	-0.28
	MS3	-0.25	-0.28	**-0.31**	-0.19	**-0.36**	**-0.31**
Micro Insurance Factor	**MI1**	-0.25	-0.26	-0.24	-0.28	**-0.35**	**-0.37**
	MI2	-0.25	-0.26	-0.23	-0.28	**-0.35**	**-0.36**
	MI3	-0.24	-0.25	-0.22	-0.27	**-0.36**	**-0.36**
	MI4	-0.26	-0.20	**-0.34**	**-0.31**	**-0.40**	**-0.44**
All bold numbers significant at p<0.05							

Table – 4.163 Relationship between Factors of Social Impact& Microfinance										
Factor	**Variables**	**Factor for Social Impact**								
		SS4	**SS5**	**SS6**	**SS7**	**SS8**	**SS9**	**SS10**	**SS11**	**SS12**
Micro Credit Factor	**MC1**	-0.11	-0.15	-0.15	-0.11	-0.08	-0.09	-0.06	-0.09	-0.11
	MC2	-0.15	-0.17	-0.21	-0.19	-0.13	-0.15	-0.10	-0.12	-0.20
	MC3	-0.15	-0.19	-0.23	-0.22	-0.14	-0.15	-0.09	-0.12	-0.21
	MC4	-0.14	-0.18	-0.21	-0.21	-0.14	-0.13	-0.10	-0.11	-0.20
	MC5	-0.15	-0.18	-0.24	-0.22	-0.13	-0.14	-0.11	-0.11	-0.22
	MC6	-0.09	-0.15	-0.19	-0.18	-0.09	-0.10	-0.05	-0.06	-0.14
	MC7	-0.19	-0.17	-0.20	-0.19	-0.12	-0.12	-0.11	-0.11	-0.18
	MC8	-0.19	-0.18	-0.29	-0.25	-0.14	-0.19	-0.15	-0.13	-0.26
	MC9	-0.14	-0.11	-0.24	-0.21	-0.12	-0.13	-0.11	-0.10	-0.22
	MC10	-0.04	-0.07	-0.14	-0.14	-0.09	-0.08	-0.03	-0.05	-0.12
	MC11	-0.10	-0.12	-0.16	-0.11	-0.13	-0.12	-0.11	-0.11	-0.18
	MC12	-0.03	-0.03	-0.12	-0.12	-0.05	-0.05	-0.04	-0.02	-0.12
Micro Saving Factor	**MS1**	**-0.32**	**-0.36**	**-0.30**	-0.26	-0.26	-0.28	**-0.32**	**-0.33**	-0.25
	MS2	**-0.35**	**-0.38**	**-0.32**	-0.28	-0.29	-0.30	**-0.33**	**-0.36**	-0.26
	MS3	**-0.36**	**-0.42**	**-0.35**	-0.28	**-0.32**	**-0.33**	**-0.34**	**-0.39**	-0.29
Micro Insurance Factor	**MI1**	-0.27	-0.28	**-0.33**	**-0.31**	-0.27	-0.28	-0.26	-0.27	-0.25
	MI2	-0.27	-0.29	**-0.33**	**-0.31**	-0.27	-0.28	-0.26	-0.27	-0.24
	MI3	-0.24	-0.26	**-0.35**	-0.30	-0.25	**-0.31**	-0.28	-0.26	-0.26
	MI4	-0.29	**-0.33**	**-0.38**	-0.24	**-0.33**	**-0.38**	**-0.37**	**-0.35**	-0.30
All bold numbers significant at $p<0.05$										

The Table – 4.163 explains a negative significant relationship between social benefit factor that shows the impact on households with micro credit, micro savings and micro insurance variables (problem in availing services); the relationship address that either schemes are not properly implemented, or householders are not able to understand their importance. Thus, we reject null hypothesis **(i.e.H.17.7o)** that there is no correlation between SS variable with MC, MS and MI Variables responsible to beneficiaries of Dang District of Gujarat State.

4.6.1.4 Relationship between Micro Credit, Micro Savings and Micro insurance

The Table – 4.164 explains a positive significant relationship between factors of micro credit with micro savings and micro insurance (problem in availing services); respectively which encourages that if efforts increased in training and education of rural households than possibly the impact will be more. Thus, we reject null hypothesis **(i.e.H.17.8o)** that there is no correlation between MC variable with MS and MI Variables responsible to beneficiaries of Dang District of Gujarat State.

Table – 4.164 Relationship between Factors of Micro Credit & Micro saving and Micro Insurance Factor												
Factor	**Variables**	**Factors of Micro Credit**										
		MC1	**MC2**	**MC3**	**MC4**	**MC5**	**MC6**	**MC7**	**MC8**	**MC9**	**MC10**	**MC11**	**MC12**
Micro Saving Factor	**MS1**	**0.43**	**0.48**	**0.46**	**0.43**	**0.48**	**0.45**	**0.42**	**0.47**	**0.38**	0.28	0.29	0.29
	MS2	**0.41**	**0.46**	**0.46**	**0.43**	**0.48**	**0.46**	**0.43**	**0.47**	**0.37**	0.28	0.29	0.29
	MS3	**0.39**	**0.45**	**0.46**	**0.43**	**0.47**	**0.44**	**0.41**	**0.47**	**0.37**	0.27	0.27	0.20
Micro Insurance Factor	**MI1**	**0.35**	**0.40**	**0.44**	**0.42**	**0.47**	**0.44**	**0.34**	**0.40**	0.27	**0.36**	**0.34**	0.27
	MI2	**0.34**	**0.40**	**0.44**	**0.42**	**0.46**	**0.43**	**0.35**	**0.40**	0.26	**0.36**	**0.34**	0.27
	MI3	0.28	**0.35**	**0.38**	**0.39**	**0.42**	**0.38**	0.27	**0.36**	0.26	**0.34**	**0.35**	0.25
	MI4	0.24	0.18	0.19	0.20	0.19	0.16	0.15	0.13	0.16	**0.33**	**0.34**	0.28
All bold numbers significant at p<0.05													

Micro Savings and Micro insurance

The Table – 4.165 also explains a positive significant relationship between factors of micro savings with micro insurance respectively which encourages that if efforts increased in training and education of rural householders possibly the impact will be more. Thus, we reject null hypothesis **(i.e.H.17.9o)** that there is no correlation between challenges in availing savings service (MS variable) with challenges in availing insurance service (MI Variables) responsible to beneficiaries of Dang District of Gujarat State. Higher the barriers present in savings service, high barriers might be faced in availing insurance services too.

Table – 4.165 Relationship between Factors of Micro Savings & Micro Insurance				
Factor	**Variables**	**Micro Saving Factor**		
		MS1	**MS2**	**MS3**
Micro Insurance Factor	**MI1**	**0.53**	**0.55**	**0.54**
	MI2	**0.53**	**0.54**	**0.53**
	MI3	**0.49**	**0.50**	**0.49**
	MI4	**0.34**	**0.35**	**0.35**
All bold numbers significant at p<0.05				

4.6.1.5 Conclusion for hypothesis on relationship between various factors

Hypothesis was framed to test relation between variables for credit, saving and insurance. As a rule, credit with high risk tends to have high income and vice versa. The triad services of Microfinance have been designed to overcome the market failures. Also, *both savings and micro insurance services complements micro credit* (Table -4.164). All the three financial services of credit, savings and insurance are integral part of microfinance activities to make desired socio-economic impact among beneficiary households.

Regarding whether formal financial organizations had contributed economically to beneficiaries and empowering women, the study found that there was an improvement in savings than microcredit and micro insurance. Therefore, the formal financial organizations have somehow improved their services offered; and gradually expanding the spectrum of services they offer. But the organizations seem to stick much on the traditional services and not giving chance to the emerging need for additional services that may assist the rural beneficiaries get more empowered economically and socially than before. *The data indicated that there was increased self-employment and increase in savings.*

In above different sections various statistical tests show the impact of present Formal financial Sources and different services rendered by these institutions in Dang District. Different types of analysis such as Top Box Analysis thru various types of factor analysis done for all multiple observed data and variables having similar patterns of responses and all are associated to each other. Since this association cannot easily be measured known as the factor; because in study there are some unanswered questions such as:

- Are the groups different?
- Can one predict which group extensively belongs to using particular variable? (E.g. Borrower and Non-Borrowers, Saving Habit and No Saving Habit, Insurance Habit and No Insurance habit)

This could only possible through ***Discriminant function analysis*** to predict a categorical dependent variable by one or more continuous or binary variables (e.g. age, gender, etc.).

4.7 Discriminant Analysis

Discriminant analysis is a technique that is used by the researcher to analyze the research data when the criterion or the dependent variable is categorical and the predictor or the independent variable is interval in nature. The term categorical variable means that the

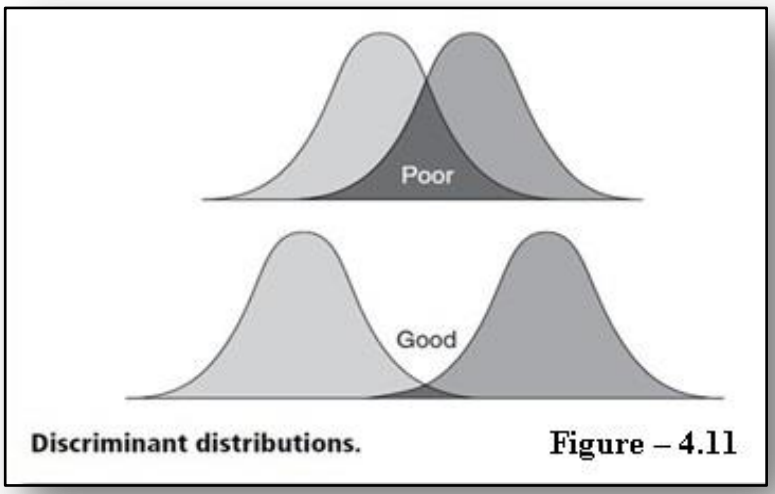
dependent variable is divided into several categories. For example, three brands of cars, Car A, Car B and Car C can be the categorical dependent variable such as brand, quality assurance, fuel efficiency, durability, type of facilities etc.

The objective of Discriminant analysis is to develop Discriminant functions that are nothing but the linear combination of independent variables that will discriminate between the categories of the dependent variable in a perfect manner. It enables the researcher to examine whether significant differences exist among the groups, in terms of the predictor variables. It also evaluates the accuracy of the classification. Discriminant analysis is described by the number of categories that is possessed by the dependent variable.

As in statistics, everything is assumed up until infinity, so in this case, when the dependent variable has two categories, and then the type used is two-group Discriminant analysis. If the dependent variable has three or more than three categories, then the type used is multiple Discriminant analysis. The major distinction to the types of Discriminant analysis is that for a two group, it is possible to derive only one Discriminant function. On the other hand, in the case of multiple Discriminant analysis, more than one Discriminant function can be computed.

There are many examples that can explain when Discriminant analysis fits. It can be used to know whether heavy, medium and light users of soft drinks are different in terms of their consumption of frozen foods. In the field of psychology, it can be used to differentiate between the price sensitive and non-price sensitive buyers of groceries in terms of their psychological attributes or characteristics. In the field of business, it can be used to understand the characteristics or the attributes of a customer possessing store loyalty and a customer who does not have store loyalty.

For a researcher, it is important to understand the relationship of **Discriminant analysis** with **Regression** and **Analysis of Variance** (ANOVA) which has many similarities and differences. Often, we can find similarities and differences with the people we come across. Similarly, there are some similarities and differences with Discriminant analysis along with two other procedures.



Discriminant distributions. **Figure – 4.11**

The similarity is that the number of dependent variables is one in Discriminant analysis and in the other two procedures; the number of independent variables are multiple in Discriminant analysis. The difference is categorical or binary in Discriminant analysis, but metric in the other two procedures. The nature of the independent variables is categorical in Analysis of Variance (ANOVA), but metric in regression and Discriminant analysis. The steps involved in conducting Discriminant analysis are as follows:

- The problem is formulated before conducting.
- The Discriminant function coefficients are estimated.
- The next step is the determination of the significance of these Discriminant functions.
- One must interpret the results obtained.
- The last and the most important step is to assess the validity.

4.7.1 Discriminant Analysis and Regression Analysis

To identify the factors that make a householder a borrower or non-borrower in these study two broad groups of characteristics or variables assumed such as the first group consists of *demographic* and *economic* respectively while the characteristics of other group includes *habits* such as *saving habit* and *insurance habit* respectively.

Discriminant Analysis has various practical applications and is often used in combination with cluster analysis e.g. the loans department of a formal financial institute wants to find out the creditworthiness of applicants before disbursing loans. It may use Discriminant Analysis to find out whether an applicant is a good credit risk or not. This would serve as method of screening applicants and preventing later bad debts. Discriminant

analysis is very near to graphical version of MANOVA and often used to complement the findings of Cluster Analysis and Principal Component Analysis. There are two types of Discriminant Analysis one if it is used for two separate groups it is called Discriminant Function Analysis (DFA) and for more than two groups it becomes the Canonical Varieties Analysis (CVA) method is used. RA Fisher, Hoteling and Mahalanobis (1930) developed three different approaches for solving the similar problem but later in RA Fisher's solution; Hotelling T2 test and Mahalanobis D2 distance were combined to device Discriminant Analysis. The Table – 4.166 defines the list of independent variables assumed.

Table –4.166: Independent Variables defined for Discriminant Analysis

Variable	Description	Value
Gender	Dummy variable (male & female)	Male = 1, Female = 2
Age	Quantitative Variable (21 to 85)	1 thru 8
Profession	Quantitative variable values depending on profession	1 thru 6
Income (own)	Qualitative variable status of income (low = 1, medium = 2 and high = 3)	1 thru 3 calculated
Block Code	Type of area belonging (Ahwa , Waghai, Subir)	1 thru 3
Family Type	Quantitative Value (joint & nuclear)	Joint = 1, Nuclear = 2
Qualification	Dummy Variable that takes the value	1 thru 6
Skill	Quantitative Value	1 thru 3
House owned	Quantitative Value	Owned = 1, other = 2
Type of House	Quantitative Value	Katcha = 1, Semi Pucca =2, Pucca = 3
Identity Card	Dummy Variables that takes the value	1 thru 4
Category	Dummy Variable	SC = 1, ST =2, OBC =3 and GEN = 4
Borrowers*	For Analysis Loan taker (Borrower)	Yes = 1, No = 0

*** Instead Borrowers may be started saving or started Insurance**

- **Variables for first group** – some of the important variables assumed (referenced to Kuppuswamy Scale) such as gender, family type, family income, age, education, house type, house ownership and residence area (rural, urban – for Dang District it is considered only rural so may not be considered) and so on…
- **Variables for second group** – some of the important variables for *habits* are considered with respect to saving, no saving, insurance and no insurance habits and so on.

In order to analyze the determinants of borrowers and non-borrowers the Discriminant analysis is used to predict group membership from a set of predictors

(independent variables). It involves deriving a variate, the linear combination of two or more independent variables that will discriminate between defined groups (Walde, 2014) and can be achieved by setting variate's weight for each variable to maximize the group variance relative to the within-group variance. The linear combination for a Discriminant analysis also known as Discriminant function and can written in the following format:

$$Z_{ik} = \beta_{0i} + \beta_{1i}X_{1k} + \beta_{2i}X_{2k} + \ldots\ldots + \beta_{ji}X_{jk} \ldots\ldots\ldots\ldots\ldots\ldots \textbf{(1)}$$

This includes Z_{ik} is the Discriminant Score of Discriminant function for *i*(where i = 1, 2, …. n-1) for object *k*, X_{jk} is the independent variable for *j* (where *j = 1,2, 3,…..J)* for object k and β_{ji} is the weight for independent *j and Discriminant function* i and β_{0i} is the constant. The **stepwise method** of variable selection was used to select independent variables into the model. It involves entering the independent variables into the Discriminant function at a time on the basic of their discriminating power.

The **Wilks' lambda (Λ) (1938)** is a test statistics that's reported in results from MANOVA, Discriminant Analysis and other multivariate procedure. In MANOVA; Λ tests if there are difference between group means for a particular combination of dependent variables while in ***Discriminant analysis this Λ tests*** how well each level of independent variable contributes to the model. The scale range from 0 to 1, where 0 means total discrimination and 1 means no discrimination. Each independent variable is tested by putting into the model and then taking it out - generating a Λ statistics. The significance of the change in Λ is measured with an F test; if the F-value is greater than critical value, the variable is kept in model.

The Wilks' lambda is appropriate for stepwise procedure and analysis is was conducted using IBM SPSS Statistics software. The assumptions of Discriminant function analysis include independence of the cases, multivariate normality of the predicator variables and equality of within-group variance-covariance matrices across groups whereas group membership is assumed to be mutually exclusive (Bian, 2012).

Borrower v/s Non-Borrowers

There are 264 (i.e. 44%) are borrowers and 336 (i.e.56%) are non-borrowers given in the following Table – 4.167 shows

Table – 4.167 Group Statistics

Status		Mean	Std. Dev.	Valid Cases(listwise)	
				Unweighted	Weighted
Non-Borrower	Block Code	1.86	0.78	336	336.00
	Gender	1.19	0.39	336	336.00
	Age Group	5.76	1.86	336	336.00
	Family Type	1.48	0.50	336	336.00
	Cast Category	1.99	0.09	336	336.00
	Qualification (K)	1.79	0.88	336	336.00
	Skill Status	1.17	0.43	336	336.00
	House Type	1.11	0.35	336	336.00
	Identity Card	1.02	0.19	336	336.00
	Occupation	1.46	0.81	336	336.00
	Owning House	1.00	0.05	336	336.00
	Own income category	2.43	0.61	336	336.00
Borrower	Block Code	1.95	0.84	264	264.00
	Gender	1.17	0.38	264	264.00
	Age Group	5.75	1.75	264	264.00
	Family Type	1.39	0.49	264	264.00
	Cast Category	2.00	0.06	264	264.00
	Qualification (K)	1.84	1.04	264	264.00
	Skill Status	1.10	0.32	264	264.00
	House Type	1.10	0.30	264	264.00
	Identity Card	1.01	0.12	264	264.00
	Occupation	1.43	1.04	264	264.00
	Owning House	1.00	0.00	264	264.00
	Own income category	2.47	0.61	264	264.00

In the above Table - 4.165 the group means for Borrower having slightly higher in terms of Block Code, Cast Category, Qualification (K) and Own Income category while means are slightly higher in case of Non-Borrower in terms of Skill Status, Home type, Owning House, Identity Card, Occupation and Owning House respectively.

The **stepwise method** in SPSS software automatically selects the best independent variables to be included in Discriminant function model. Table – 4.166 shows the results for test of homogeneity of covariance matrices and Box's M test which is very sensitive to meeting the assumption of multivariate normality (Bian, 2012).

The log determinant in the table suggests the covariance matrix for those who are Borrower differ more than the covariance matrix for those who are Non-Borrower. Also,

the significance (p value <= 0.05) of the Box's M test confirms that the two groups do differ in terms of their covariance matrices which violates the assumption of homogeneity. However, the Discriminant function analysis is still robust even with the violation of the homogeneity of the various assumptions since the data do not contain outliers (Bian, 2012).

The violation of the homogeneity of variance is an assumption of independent samples t-test and ANOVA stating that all comparison groups have the same variance. This test already being performed through Leven's Test in previous sections and hence a *p value* less than 0.05 indicates a violation of the assumption and hence the analysis is more appropriate.

Table – 4.168 Test of Equality of Covariance Matrices

Status	Rank	Log Determinant	Box's M	Approx. F	df1	df2	Sig.
Non-Borrower	2	-3.07	23.50	7.81	3.00	74699875.77	0.00
Borrower	2	-3.69					
Pooled within-groups	2	-3.31					

Table – 4.169 Tests of Equality of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
Block Code	1.00	1.87	1	598	0.17
Gender	1.00	0.26	1	598	0.61
Age Group	1.00	0.00	1	598	0.96
Family Type	**0.99**	**4.07**	**1**	**598**	**0.04**
Cast Category	1.00	0.59	1	598	0.44
Qualification (K)	1.00	0.57	1	598	0.45
Skill Status	**0.99**	**5.43**	**1**	**598**	**0.02**
House Type	1.00	0.03	1	598	0.86
Identity Card	1.00	0.59	1	598	0.44
Occupation	1.00	0.16	1	598	0.69
Owning House	1.00	0.79	1	598	0.38
Own income category	1.00	0.49	1	598	0.48

The test of equality of group means is tabulated in Table – 4.169 with Wilks' Lembda. The importance of the independent variable is indicated by the smaller value of Wilk's Lambda in the Discriminant Function. In the table below Family Type (Wilks' Lambda = 0.99 and *p value* =0.04) and Skill Status (Wilks' Lambda = 0.99 and *p value* =0.02) are most important independent variables and other variables are least important.

The Wilk's Lambda method used to select independent variables for entry in stepwise method at each step the variable with the largest *F to Enter* value that exceeds the entry criteria (by default 3.84 in SPSS) is added to the model.

Table – 4.170 Variables Entered/Removed[a,b,c,d]

Step	Entered	Wilks' Lambda							
		Statistic	df1	df2	df3	Exact F			
						Statistic	df1	df2	Sig.
1	Skill Status	0.991	1	1	598	5.43	1	598	0.02
2	Family Type	0.984	2	1	598	4.87	2	597	0.01

At each step, the variable that minimizes the overall Wilks' Lambda is entered.

a. Maximum number of steps is 24.

b. Maximum significance of F to enter is .05.

c. Minimum significance of F to remove is .10.

d. F level, tolerance, or VIN insufficient for further computation.

The Table – 4.171 gives the best independent variables that minimizes the overall Wilk's Lambda and were used in the analysis includes Skill Status and Family Type respectively other variables could not meet the entry requirement and therefore not used in the analysis.

Table – 4.171 Variables in the Analysis and not in the Analysis

Variables in the Analysis				Variables Not in the Analysis				
Variable	Tolerance	F to Remove	Wilks' Lambda	Variable	Tolerance	Min. Tolerance	F to Enter	Wilks' Lambda
Skill Status	0.999	0.018	0.993	Block Code	0.994	0.993	0.236	0.982
Family Type	0.999	0.039	0.991	Gender	0.948	0.947	0.967	0.984
				Age Group	0.944	0.944	0.642	0.984
				Cast Category	0.994	0.994	0.385	0.983
				Qualification (K)	0.971	0.971	0.617	0.984
				House Type	0.997	0.997	0.788	0.984
				Identity Card	0.993	0.993	0.320	0.982
				Occupation	0.940	0.940	0.838	0.984
				Owning House	0.998	0.998	0.316	0.982
				Own income category	0.865	0.865	0.539	0.983

4.7.2 Canonical Discriminant Functions

The significance of the estimated Discriminant function is given in Table – 4.172. The value of Wilks' Lambda in this table indicates how well the function separates participants into two groups (Borrower and Non-Borrower). Smaller values of Wilks' Lambda indicate greater discriminatory ability of the function (Uddin, Meah, & Hussain,

2013). It is observed from the table that estimating the Discriminant function is significant for Wilks' Lambda = 0.984 and *p value* =0.008.

Table – 4.172 Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	0.984	9.653	2	0.008

Table – 4.173 Structure Matrix

Variables	**Function**
	1
Skill Status	**0.747**
Family Type	**0.646**
Occupation[a]	0.193
Gender[a]	0.176
Cast Category[a]	0.035
House Type[a]	-0.030
Own income category[a]	-0.040
Owning House[a]	-0.040
Block Code [a]	-0.056
Identity Card[a]	-0.075
Qualification (K)[a]	-0.082
AgeGroup[a]	-0.129

- Pooled within-groups correlations between discriminating variables and standardized canonical Discriminant functions
- Variables ordered by absolute size of correlation within function.

a. This variable not used in the analysis.

The Table – 4.173 shows the correlations of independent variables with Discriminant function which are known as factor loadings. The variation in the dependent variable which the independent variable can explain is determined by squaring the factor loading. The factor loadings in the table are arranged in descending order where the most important variable is the largest loadings that are less than 0.30 may not be very important in this model and may be removed from the model (Bian, 2012).

The Table – 4.174 contains the un-standardized Discriminant Function coefficients which are used to construct the actual prediction equation used to classify new cases. Based on the coefficients in the table (to be substituted in equation 1 above), the model developed in this study is given in equation (2) as below:

Table – 4.174 Canonical Discriminant Function Coefficients	
Variables	**Function**
	1
Family Type	1.343
Skill Status	1.974
(Constant)	-4.184
Un-standardized coefficients	

$$Z = -4.184 + 1.343\textit{Family Type} + 1.974\textit{Skill Status} \ldots\ldots\ldots\ldots (2)$$

The Functions at Group Centroids (i.e. a further way of interpreting Discriminant Analysis results is to describe each group in terms as defined using group means of the predictor variables. These group means are called centroids) in Table – 4.175 are the mean Discriminant scores for each group which are used to establish the cut-off point for classifying cases those who are Borrower is -0.144 while that of those who are non-Borrower is 0.113. This means if the score for a new case based on equation (2) is negative such a case will be classified among those who are Borrower and if is positive it will be classified among those who are non-Borrower

Table – 4.175 Functions at Group Centroids	
Borrow Money (Yes / No)	**Function**
	1
Non-Borrower	0.113
Borrower	-0.144
Un-standardized Canonical Discriminant functions evaluated at group means	

4.7.3 Classification Statistics

The classification results show in the Table – 4.176 are used to assess how well the Discriminant function model works and if it works equally well for each group of the dependent variable. Here it correctly classifies less than 56.8% of the cases making about the same proportion of mistakes for both categories. Overall, 55.7% of the cases are correctly classified.

Table – 4.176 Classification Results[a,c]					
Borrow Money (Yes / No)			**Predicted Group Membership**		**Total**
			Non-Borrower	**Borrower**	
Original	**Count**	**Non-Borrower**	191	145	336
		Borrower	121	143	264
	%	**Non-Borrower**	**56.8**	43.2	100.0
		Borrower	45.8	**54.2**	100.0
Cross-validated[b]	**Count**	**Non-Borrower**	191	145	336
		Borrower	121	143	264
	%	**Non-Borrower**	**56.8**	43.2	100.0
		Borrower	45.8	**54.2**	100.0
a. **55.7%** of original grouped cases correctly classified.					
b. Cross validation is done only for those cases in the analysis. In cross validation, each case is classified by the functions derived from all cases other than that case.					
c. **55.7%** of cross-validated grouped cases correctly classified.					

4.7.4 Conclusion

H.18o Microfinance intervention has not discriminated between potential beneficiaries of Dang District of Gujarat State.

H.18a Microfinance intervention has discriminated between potential beneficiaries of Dang District of Gujarat State.

This analysis estimates a two-group discriminate function model in order to analyze the determinants of Borrowers in Dang District of Gujarat, which may provide a guide lines to boost economic growth on a macro scale. In the Table – 172 the calculated value of Wilk's Lambda is 0.984 is on higher side (i.e. when value of Wilks' Lambda is 1.00 than observed ***group means are equal***, while if this *value is small than the within-groups variability is small* as compared to the total variability which indicates that group means differ). In our case, we are not rejecting the null hypothesis though we have calculated the Standardized Canonical Discriminant function (Table – 171) which identifies which independent variable is more discriminating than the other variables. The higher the discriminating powers the higher Discriminant coefficient (in this case Skill Status). The equation is used to calculate the Discriminant score to predict value from regression equation (as given in (2)). The score is calculated and it also predicts the important variables (Table – 4.177)

Table – 4.177 Result of Regression Equation			
Family Type	**Skill Type**		
	Skilled	**Semi-Skilled**	**Unskilled**
Joint	-0.871	1.099	3.069
Nuclear	0.472	2.442	4.412

From the Table – 4.177 it can be concluded that variables namely ***Skill Type*** *and* ***Family Type*** has been found key drivers of the overall performance of formal financial institutions in Dang District. Microfinance has been an important tool in poverty alleviation, empowerment of women and in bringing about financial inclusion. The continuous efforts are required to diversify the concept of family and skill development. **Here, the null hypothesis (i.e. H.18o) is rejected.**