CHAPTER VI

FACTORS RESPONSIBLE FOR OVERDUES

6.1 INTRODUCTION

There are many characteristics like consumption, expenditure, repaying capacity, family size, dependency ratio, occupational status, intensity of cropping, amount of loan borrowed from the financial institutions and annual income from farming which influence the repayment performance of loans taken by farmers. In this study, characteristics responsible for overdues are taken into account. The selected socio-economic characteristics are total land holdings in acres, operational size of land holdings in acres, level of education, caste, borrowers' age in years, percentage of area under High Yielding Varieties (HYV), cropping intensity in percentage, percentage of income from farming, annual per capita family consumption expenditure per acre, fertilizers used in rupees, amount of loan borrowed from bank, and working capital used.

Some of these characteristics are qualitative and some others are quantitative in nature. Qualitative characteristics are quantifiable for calculation in this study. Some selected characteristics are more important in determining the repayment capacity and some others are not like that. In this chapter,
identification of characteristics, which are having more power to decide the overdues is analysed.

6.2 ANALYTICAL FRAME WORK

The information collected from bank and the borrowers indicates the reasons and effects of overdues.

Deciding factors of repayment capacity of default borrowers was determined by

\[ R = Y - [C + L + K] \]

Where,

\( R \) = Repayment capacity of the borrower (in Rs.)

\( Y \) = Total income from farming and other source (in Rs.)

\( C \) = Total farm and off farm expenses (in Rs.)

\( L \) = Pre-existing liabilities to be met within a year (in Rs.) and

\( K \) = Risk taking allowance to the farmer borrowers (in Rs.)

(15 percent of total income)

Linear Discriminant Function Analysis

On the basis of difference in the socio-economic characteristics of the borrowers, linear discriminant analysis was used to classify the borrowers into defaulters and non defaulters and again the defaulters are classified into willful
defaulters and non-willful defaulters. The distance between two group of borrowers was calculated by Mahalanobis $D^2$ test. Socio-economic characteristics and their significance were tested as a first step of analysis to make sure whether these groups of borrowers (defaulters and non defaulters or willful defaulters and non-willful defaulters) are significantly different from each other as regards the means of the characters under study.

Discriminant function is stated here

$$Z = \sum_{i=1}^{12} l_i . x_i$$

$$Z = l_1 x_1 + l_2 x_2 \ldots + l_n x_n$$

$x_i$ (i = 1,2,3, ...,12)

d_i (i = 1,2,3,....12)

where,

$Z$ = Total sum of discriminant score (it may be the score for non-defaulters and defaulters or willful defaulters and non-willful defaulters)

$x_i$ = The value of $i^{th}$ characteristics

$l_i$ = Total land holdings in acres (in own land, leased in, leased out land are taken into account)

$x_2$ = Operational size of holdings in acres (cultivable land alone)
\( x_3 = \) Level of education
\[ \text{Score for illiterate} = 1, \]
\[ \text{Primary education} = 2, \]
\[ \text{High/Higher Secondary education} = 3, \]
\[ \text{Technical education} = 4, \]
\[ \text{Graduation and above} = 5 \]

\( x_4 = \) Caste
\[ \text{Score for SC} = 1, \text{Other than SC} = 0 \]

\( x_5 = \) Borrowers’ age in years

\( x_6 = \) Percentage of area under High Yielding Varieties (HYV)
\[ = \frac{\text{Total operated area under HYV’s}}{\text{Total operated area}} \times 100 \]

\( x_7 = \) Intensity of cropping in percentage
\[ = \frac{\text{Total annual cropped area in acres}}{\text{Total land holdings in acres}} \times 100 \]

\( x_8 = \) Percentage of income from agriculture
\[ = \frac{\text{Net income from agriculture}}{\text{Total income}} \times 100 \]

\( x_9 = \) Annual per capita family consumption expenditure (in Rs.)
\[ = \frac{\text{Total consumption expenditure}}{\text{Family Size}} \times 100 \]

\( x_{10} = \) Per acre fertilizers used (in Rs.)

\( x_{11} = \) Amount of loan borrowed from the bank, and
\( x_{12} = \) Working capital used (in Rs.) per acre  
(Seeds, weedicides, fungicides and pesticides are included)

185 defaulters and 115 non-defaulters were selected for the study. Among 185 defaulters, there were 73 willful defaulters and 112 non-willful defaulters.

The socio economic characteristics which are considered here are shown in the matrix notation.

where,

\[
S_1 = \mathbf{d}
\]

\[
\begin{bmatrix}
S_{11} & S_{12} & \ldots & S_{1K} \\
S_{21} & S_{22} & \ldots & S_{2K} \\
S_{K1} & S_{K2} & \ldots & S_{KK}
\end{bmatrix}^{12 \times 12}
\]

\[
l = \begin{bmatrix}
l_1 \\
l_2 \\
l_3 \\
l_4
\end{bmatrix}^{12 \times 1}
\]

\[
d = \begin{bmatrix}
d_1 \\
d_2 \\
. \\
. \\
d_K
\end{bmatrix}^{12 \times 1}
\]

where,

\( l_k \) = Discriminant function’s co-efficient vector

\( S_{k \times k} \) = Pooled dispersion matrix, and

\( d_k \) = Vector of difference in group means
The variable considered is sufficiently discriminating between the groups of defaulters and non-defaulters or willful defaulters and non-willful defaulters is tested for its significance. Distance between two groups are measured with the help of Mahalanobis $D^2$ statistics. After transformation this $D^2$ statistic becomes an F statistic which is then used to see whether the two groups are different from each other. In the present analysis.

$$S_{1,1} = \frac{1}{N_a + N_b - 2} \left( \frac{\sum X_1^2}{N_a} + \frac{\sum X_1^2}{N_b} - \frac{(\sum X_1)^2}{N_a} - \frac{(\sum X_1)^2}{N_b} \right)$$

$$S_{1,2} = \frac{1}{N_a + N_b - 2} \left( \frac{\sum X_1 X_2}{N_a} + \frac{\sum X_1 X_2}{N_b} - \frac{(\sum X_1) (\sum X_2)}{N_a} - \frac{(\sum X_1) (\sum X_2)}{N_b} \right)$$

where,

$N_a$ = Number of non-defaulters or non-willful defaulters, and

$N_b$ = Number of defaulters or willful defaulters

To work out the contribution of each character to the distance created ($Z_a - Z_b$) by the two population of the defaulter and non-defaulter or willful defaulter and non-willful defaulter, Mahalanobis $D^2$ was worked out as under and various steps involved in this analysis.
Step 1

All possible combinations of the twelve socio-economic characteristics pooled covariance matrix were obtained as follows:

\[
\frac{\sum (x_i x_k)_a + \sum (x_i x_k)_b}{N_a + N_b - 2}
\]

where,

\[\sum ((x_i x_k)_a\] is the sum of products between any two characteristics (i and k) in non-defaulters or non-willful defaulters groups.

\[\sum ((x_i x_k)_b\] is the sum of products between any two characteristics (i and k) in defaulters or willful defaulters groups.

Step 2

The value of the diagonal cells (pooled sum of squares) were:

\[
\frac{\sum (x_i^2)_a + \sum (x_i^2)_b}{N_a + N_b - 2}
\]

where,

\[(x_i^2)_a\] is the sum of squares of any particular characteristic (i) in the non defaulters or non-willful defaulters groups.
\((x_1^2)_b\) is the sum of squares of any particular characteristics (i) the defaulter or willful defaulter groups.

**Step 3**

The inverted matrix \((c_{ik})\) was obtained.

**Step 4**

The difference between means of the two samples for variables \(x_1, x_2, \ldots, x_{12}\) called \(d_1, d_2, d_3, \ldots, d_{12}\) was obtained by unidimensional subtraction of mean score of non-defaulter or non-willful defaulter group.

\[ [\bar{x}_1]_x \] from the mean score of defaulter or willful defaulter groups \((x_2)_b\) on the same dimension. From these values, a matrix for the product of mean difference \((d_1,d_2)\) was obtained.

Now with the help of \(c_{ik}\) and \(d_i\) \(d_k\) matrices, the value of \(D^2\) based on all the twelve characteristics was obtained.

\[
D^2 = \sum_{i=1}^{12} \sum_{k=1}^{12} c_{ik} d_i d_k
\]

**Step 6**

\(D^2\) was transformed into \(F^*\) statistics and \(D^2\) significance was tested with the help of \(F^*\) statistics.
\[ F^* = \frac{N_a N_b (N_a + N_b - p - 1)}{p(N_a + N_b) (N_a + N_b - 2)} \]

where,

\( P \) is the number of characteristics. \( F^* \) was tested for the significance with (\( P \)) and ((\( N_a + N_b - p - 1 \)) degrees of freedom.

**Step 7**

The individual characteristics percentage contribution to the total distance was measured and it was calculated as follows:

(i) For each socio-economic variables \( x_1, x_2, \ldots, x_{12} \) the difference between means of the two samples are called \( d_1, d_2, \ldots, d_{12} \). It was derived from the mean score of non-defaulters or non-willful defaulters groups \((x_1)_a\) minus the mean score of defaulters or willful defaulters groups \((x_1)_b\).

(ii) Co-efficients and the difference between the means of two samples were multiplied and

(iii) The products of co-efficients and difference between means of two samples were multiplied by hundred and then divided by \( D^2 \) values. It gives the percentage contribution of individual characteristics to the total distance.
6.3 SOCIO ECONOMIC CHARACTERISTICS

Table 6.1 presents the selected socio-economic characteristics along with their mean values and their differences both for defaulters and non-defaulter groups.

**TABLE 6.1**

**MEAN VALUES AND THEIR DIFFERENCES WITH REGARD TO THE SOCIO-ECONOMIC CHARACTERISTICS OF THE BORROWERS, DEFAULTERS**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Socio Economic Characteristics of the Borrowers</th>
<th>Mean</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Non-defaulters</td>
<td>Defaulters</td>
</tr>
<tr>
<td>1.</td>
<td>Size of holding in acres (X₁)</td>
<td>3.1216</td>
<td>3.1816</td>
</tr>
<tr>
<td>2.</td>
<td>Operational size in acres (X₂)</td>
<td>2.9516</td>
<td>3.1922</td>
</tr>
<tr>
<td>3.</td>
<td>Literacy (X₃)</td>
<td>1.4469</td>
<td>1.1762</td>
</tr>
<tr>
<td>4.</td>
<td>Caste (X₄)</td>
<td>0.9961</td>
<td>0.8461</td>
</tr>
<tr>
<td>5.</td>
<td>Age of the farmer (X₅)</td>
<td>39.1561</td>
<td>39.4616</td>
</tr>
<tr>
<td>6.</td>
<td>Percentage of area under HYV’s to the total operated area (X₆)</td>
<td>25.6961</td>
<td>23.3911</td>
</tr>
<tr>
<td>7.</td>
<td>Cropping intensity in percentage (X₇)</td>
<td>141.2411</td>
<td>127.6141</td>
</tr>
<tr>
<td>8.</td>
<td>Percentage of income from farming to the total income (X₈)</td>
<td>70.7716</td>
<td>59.2415</td>
</tr>
<tr>
<td>9.</td>
<td>Per capita annual consumption expenditure in rupees (X₉)</td>
<td>2941.4213</td>
<td>2566.1125</td>
</tr>
<tr>
<td>10.</td>
<td>Per hectare fertilizer used in rupees (X₁₀)</td>
<td>833.6211</td>
<td>907.1416</td>
</tr>
<tr>
<td>11.</td>
<td>Size of the loan (X₁₁)</td>
<td>8185.16</td>
<td>8169.2114</td>
</tr>
<tr>
<td>12.</td>
<td>Working capital in rupees per hectare (X₁₂)</td>
<td>431.2413</td>
<td>466.2010</td>
</tr>
</tbody>
</table>
The recovery of advances by banks has assumed greater importance in view of alarming increase in overdues. The management of the banks is interested in keeping the overdues at the minimum possible level. The problem of non-repayment of the bank loan leads to mounting overdues which is a serious problem. Proper identification of a borrower as good or bad is made according to his resources and his repaying capacity. Therefore, the present study has been conducted to provide such guideline that help to identify the perspective borrower into good or bad borrower with the help of selected socio-economic characteristics.

6.3.1 Identification of Characteristics and Results of Discriminant Analysis

The aim of the discriminant function analysis used here is to classify the borrowers into defaulters and non-defaulters and further defaulters are subdivided into willful defaulters and non-willful defaulters by a set of independent variables.

6.3.2 Discriminant Function for Defaulters and Non-Defaulters

For defaulters and non-defaulters, the selected twelve characteristics data are fitted in discriminant equation. This is equation 6.1.

\[ Z = -0.1213 X_1 + 3.1991 X_2 + 0.0136 X_3 \\
\quad -1.0026 X_4 - 0.0299 X_5 + 0.2514 X_6 \\
\quad + 0.0143 X_7 - 0.0028 X_8 + 0.0081 X_9 \\
\quad + 0.0135 X_{10} - 0.0016 X_{11} + 0.0018 X_{12} \]

\[ \ldots \ldots (6.1) \]
Discriminant function is applied to the twelve characteristics to see whether these characteristics discriminate the two groups significantly or not. The difference in the mean value of two groups for most of the characteristics turned out to be significant implying that these characteristics are important variables that influence the repayment of loans. $D^2$ and variance ratio are worked out to be 1.147156 and 1.579161 respectively. So the discriminant function has significantly differentiated the borrowers, that is the selected twelve characteristics considered together are useful in classifying the borrowers into defaulters and non-defaulters.

Percentage contribution of individual characteristics to the total distance of the two groups of borrowers by discriminant function is calculated in Table 6.2 below:
**TABLE 6.2**

BORROWERS' PERCENTAGE CONTRIBUTION OF INDIVIDUAL CHARACTERISTICS TO THE TOTAL DISTANCE MEASURED

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Socio-economic Characteristics</th>
<th>Co-efficient (lk)</th>
<th>Mean Differences (dl)</th>
<th>Coefficient x Mean Differences (lk x dl)</th>
<th>Percentage t-Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$X_1$</td>
<td>-0.1213</td>
<td>-0.060</td>
<td>0.0073</td>
<td>0.4094</td>
</tr>
<tr>
<td>2.</td>
<td>$X_2$</td>
<td>3.1991</td>
<td>-0.2406</td>
<td>-0.7697</td>
<td>-43.1688</td>
</tr>
<tr>
<td>3.</td>
<td>$X_3$</td>
<td>0.0136</td>
<td>0.2707</td>
<td>0.0037</td>
<td>0.2075</td>
</tr>
<tr>
<td>4.</td>
<td>$X_4$</td>
<td>-1.0026</td>
<td>0.1500</td>
<td>-0.1539</td>
<td>-8.4347</td>
</tr>
<tr>
<td>5.</td>
<td>$X_5$</td>
<td>0.0299</td>
<td>-0.3055</td>
<td>-0.0091</td>
<td>-0.5104</td>
</tr>
<tr>
<td>6.</td>
<td>$X_6$</td>
<td>0.2514</td>
<td>2.3050</td>
<td>0.5795</td>
<td>32.5014</td>
</tr>
<tr>
<td>7.</td>
<td>$X_7$</td>
<td>0.0143</td>
<td>13.627</td>
<td>0.1949</td>
<td>10.9310</td>
</tr>
<tr>
<td>8.</td>
<td>$X_8$</td>
<td>-0.0028</td>
<td>11.5301</td>
<td>-0.0323</td>
<td>-1.8116</td>
</tr>
<tr>
<td>9.</td>
<td>$X_9$</td>
<td>0.0081</td>
<td>375.3088</td>
<td>3.0400</td>
<td>170.4992</td>
</tr>
<tr>
<td>10.</td>
<td>$X_{10}$</td>
<td>0.0135</td>
<td>-73.5205</td>
<td>-0.9925</td>
<td>-55.6646</td>
</tr>
<tr>
<td>11.</td>
<td>$X_{11}$</td>
<td>-0.0016</td>
<td>15.9486</td>
<td>-0.0255</td>
<td>-1.4307</td>
</tr>
<tr>
<td>12.</td>
<td>$X_{12}$</td>
<td>0.0018</td>
<td>-34.9597</td>
<td>-0.0629</td>
<td>-3.5278</td>
</tr>
</tbody>
</table>

|                  |                  |                   |                      | 1.783                                    | 100.000             |

*Indicates the difference is significant at 5 per cent level.

The calculated ‘t’ values given in Table 6.2 indicates that mean differences of variables $X_3$, $X_7$, $X_9$ and $X_{12}$ of the two groups of borrowers are significantly different. Other characteristics $X_1$, $X_2$, $X_4$, $X_5$, $X_6$, $X_8$, $X_{10}$ and $X_{11}$ contribution to
the distance is very minimum. So the characteristics $X_3$, $X_7$, $X_9$ and $X_{12}$ are the major ones and these characteristics discriminate borrowers into defaulters and non-defaulters. These characteristics alone can discriminate when the borrower is tested through the equation. Other characteristics $X_1$, $X_2$, $X_4$, $X_5$, $X_6$, $X_8$, $X_{10}$ and $X_{11}$ have therefore, been excluded in the new equation for further analysis.

The discriminant function is then applied to the remaining four characteristics to see whether these characteristics discriminate the two groups or not. The new discriminant equation is given below:

$$
Z = + 0.5537 \ X_3 + 0.6348 \ X_7
+ 0.0044 \ X_9 + 0.0524 \ X_{12} \ \ ........... \ (6.2)
$$

From the new discriminant function the major characteristics considered together are sufficiently discriminating borrowers into two groups. This implied that the level of education ($X_3$), intensity of cropping in percentage ($X_7$), annual per capita family consumption expenditure ($X_9$) and working capital used in rupees per acre ($X_{12}$) of defaulters borrower are significantly different from non-defaulters' borrowers. The defaulters' major characteristics do not resemble the non-defaulters' major characteristics.

The four sufficient characteristics percentage contribution to the total distance measured is calculated and has been given in Table 6.3.
TABLE 6.3
PERCENTAGE CONTRIBUTION OF INDIVIDUAL CHARACTERISTICS TO THE TOTAL DISTANCE MEASURED

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Socio-Economic Characteristics</th>
<th>Co-efficient (lk)</th>
<th>Mean Differences (d1)</th>
<th>Co-efficient X Mean Differences (lk X d1)</th>
<th>Percentage</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>$X_3$</td>
<td>0.5537</td>
<td>0.2707</td>
<td>0.1499</td>
<td>1.7352</td>
<td>2.7814*</td>
</tr>
<tr>
<td>2.</td>
<td>$X_7$</td>
<td>0.6348</td>
<td>13.627</td>
<td>8.6504</td>
<td>100.1366</td>
<td>2.8216*</td>
</tr>
<tr>
<td>3.</td>
<td>$X_9$</td>
<td>0.0044</td>
<td>375.3088</td>
<td>1.6702</td>
<td>19.3342</td>
<td>2.8488*</td>
</tr>
<tr>
<td>4.</td>
<td>$X_{12}$</td>
<td>0.0524</td>
<td>-34.9597</td>
<td>-1.8319</td>
<td>-21.2060</td>
<td>2.4731*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.5725</td>
<td>100.000</td>
</tr>
</tbody>
</table>

*Significant at 5 per cent level.

From the Table 6.3 it has been revealed that intensity of cropping in percentage ($X_7$) is the characteristic in top most level in discriminating the defaulters from non defaulters. This characteristic contribution to the total distance is 88.91 per cent, and other followed characteristics are annual per capita family consumption expenditure in rupees ($X_9$) and level of education ($X_3$) and their percentage contributions to the total distance are 23.29 and 1.51 respectively. The relative importance of each characteristic is determined by its percentage contribution to total distance.
6.3 Discriminant function for Willful and Non-Willful Defaulters

Table 6.4 shows the mean and their difference with regard to the socio-economic characteristics of the willful defaulters and non willful defaulters.

**TABLE 6.4**

MEAN AND THEIR DIFFERENCES WITH REGARD TO THE SOCIO-ECONOMIC CHARACTERISTICS OF THE DEFAULTER BORROWERS FOR NON-WILLFUL DEFAULTERS AND WILLFUL DEFAULTERS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Socio Economic Characteristic of the Borrowers</th>
<th>Mean Value</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Non-willful Defaulters</td>
<td>Willful Defaulters</td>
</tr>
<tr>
<td>1.</td>
<td>X₁</td>
<td>2.8611</td>
<td>3.6011</td>
</tr>
<tr>
<td>2.</td>
<td>X₂</td>
<td>2.8611</td>
<td>8.6024</td>
</tr>
<tr>
<td>3.</td>
<td>X₃</td>
<td>0.9534</td>
<td>1.4621</td>
</tr>
<tr>
<td>4.</td>
<td>X₄</td>
<td>0.7345</td>
<td>0.9732</td>
</tr>
<tr>
<td>5.</td>
<td>X₅</td>
<td>41.2011</td>
<td>39.4314</td>
</tr>
<tr>
<td>6.</td>
<td>X₆</td>
<td>23.3141</td>
<td>25.1621</td>
</tr>
<tr>
<td>7.</td>
<td>X₇</td>
<td>131.4514</td>
<td>121.4911</td>
</tr>
<tr>
<td>8.</td>
<td>X₈</td>
<td>58.4314</td>
<td>64.211</td>
</tr>
<tr>
<td>9.</td>
<td>X₉</td>
<td>2462.9261</td>
<td>2399.2411</td>
</tr>
<tr>
<td>10.</td>
<td>X₁₀</td>
<td>839.2143</td>
<td>1003.2482</td>
</tr>
<tr>
<td>11.</td>
<td>X₁₁</td>
<td>8422.4121</td>
<td>7578.2161</td>
</tr>
<tr>
<td>12.</td>
<td>X₁₂</td>
<td>776.2243</td>
<td>513.2913</td>
</tr>
</tbody>
</table>
\[ Z = +1.6811 \times X_1 - 12.4125 \times X_2 + 0.44622 \times X_3 \]
\[ - 1.3624 \times X_4 + 0.00196 \times X_5 - 0.03453 \times X_6 \]
\[ + 0.01944 \times X_7 + 0.2162 \times X_8 + 0.6129 \times X_9 \]
\[ + 0.04693 \times X_{10} - 0.0074 \times X_{11} + 0.4122 \times X_{12} \]

\[ \text{……………. (6.3)} \]

From the equation (6.3) all the characteristics turned out to be significant in classifying the defaulters into willful defaulters and non-willful defaulters. Relative importance of the characteristics' percentage contribution to the total distance is measured and is given in Table 6.5. Important major characteristics which classified the defaulters into willful defaulters and non-willful defaulters are shown in Table 6.5.
TABLE 6.5
PERCENTAGE CONTRIBUTION OF INDIVIDUAL CHARACTERISTICS TO THE TOTAL DISTANCE MEASURED

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Socio-Economic characteristics Cs</th>
<th>Co-efficient (Ik)</th>
<th>Mean differences (dl)</th>
<th>Co-efficient x Mean differences (Ik x dl)</th>
<th>Percentage</th>
<th>t values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>X₁</td>
<td>1.6811</td>
<td>-0.740</td>
<td>-0.1244</td>
<td>-0.2033</td>
<td>0.87941</td>
</tr>
<tr>
<td>2.</td>
<td>X₂</td>
<td>-12.4125</td>
<td>-5.7413</td>
<td>-71.2639</td>
<td>-116.4646</td>
<td>5.19622*</td>
</tr>
<tr>
<td>3.</td>
<td>X₃</td>
<td>0.4462</td>
<td>-0.5087</td>
<td>-0.2270</td>
<td>-0.3709</td>
<td>3.71418*</td>
</tr>
<tr>
<td>4.</td>
<td>X₄</td>
<td>-1.3624</td>
<td>-0.2387</td>
<td>0.3252</td>
<td>0.5315</td>
<td>0.4979</td>
</tr>
<tr>
<td>5.</td>
<td>X₅</td>
<td>0.00196</td>
<td>1.7697</td>
<td>0.00351</td>
<td>0.0057</td>
<td>1.04614</td>
</tr>
<tr>
<td>6.</td>
<td>X₆</td>
<td>-0.03453</td>
<td>-1.8420</td>
<td>0.06360</td>
<td>0.1039</td>
<td>0.54762</td>
</tr>
<tr>
<td>7.</td>
<td>X₇</td>
<td>0.01944</td>
<td>9.9603</td>
<td>0.1936</td>
<td>0.3164</td>
<td>1.74022</td>
</tr>
<tr>
<td>8.</td>
<td>X₈</td>
<td>0.2162</td>
<td>-5.7796</td>
<td>-1.2495</td>
<td>-2.0420</td>
<td>2.30114*</td>
</tr>
<tr>
<td>9.</td>
<td>X₉</td>
<td>0.6129</td>
<td>63.6850</td>
<td>39.0325</td>
<td>63.7897</td>
<td>0.51623</td>
</tr>
<tr>
<td>10.</td>
<td>X₁₀</td>
<td>0.04693</td>
<td>-164.0339</td>
<td>-7.6981</td>
<td>-12.5808</td>
<td>2.08293*</td>
</tr>
<tr>
<td>11.</td>
<td>X₁₁</td>
<td>-0.0074</td>
<td>844.196</td>
<td>-6.3809</td>
<td>-10.2095</td>
<td>1.13491</td>
</tr>
<tr>
<td>12.</td>
<td>X₁₂</td>
<td>0.4122</td>
<td>262.983</td>
<td>108.3809</td>
<td>177.1239</td>
<td>1.04891</td>
</tr>
</tbody>
</table>

* Significant at 5 per cent level.

The ‘t’ value is calculated for all the selected characteristics and is found that X₂, X₃, X₈ and X₁₀ are significant. These characteristics are considered to be major characteristics for willful defaulters and non willful defaulters. These
characteristics discriminate one group of borrowers from other, by operational size of land holdings (X₂), level of education (X₃), percentage of income from agriculture (X₈) and per acre fertilizer used in Rs. (X₁₀) are the major and significant characteristics and other characteristics X₁, X₄, X₅, X₆, X₇, X₉, X₁₁ and X₁₂ are found to be insignificant and therefore excluded in the new equation for further analysis.

Discriminant function is returned by taking only these four major characteristics X₂, X₃, X₈ and X₁₀ in the equation to inquire whether these characteristics alone are able to discriminate non-wilful defaulters and willful defaulters in a significant manner. The new discriminant equation is given in equation (6.4).

\[
Z = -6.0114 \times X_2 + 0.73112 \times X_3 + 0.046691 \times X_8 - 0.00076 \times X_{10} \\
\text{................. (6.4)}
\]

From equation (6.4) the percentage contribution of major characteristics to the total distance and ordering of characteristics are easily found. Operational size of land holdings (X₂), level of education (X₃), percentage of income from agriculture (X₈) and per acre fertilizers used in Rs. (X₁₀) are high and would
contribute higher value of Z and thereby placing the borrowers into non-willful category and vice versa.

The new function is found to be significant. This means that the four characteristics considered are useful in classifying the borrowers into non-willful defaulters and willful defaulters. The percentage to the total distance is measured in order to know the relative importance of these characteristics. This calculation is presented in Table 6.6 below:

**TABLE 6.6**

**PERCENTAGE CONTRIBUTION OF INDIVIDUAL CHARACTERISTICS TO THE TOTAL DISTANCE MEASURED - JULY 2008-09**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Socio-Economic Characteristics Cs</th>
<th>Co-efficient (Ik)</th>
<th>Mean differences (dl)</th>
<th>Co-efficient X Mean differences (Ik x dl)</th>
<th>Percentage</th>
<th>t values</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>X2</td>
<td>-6.0114</td>
<td>-5.7413</td>
<td>34.5133</td>
<td>100.9660</td>
<td>0.19713*</td>
</tr>
<tr>
<td>2.</td>
<td>X3</td>
<td>0.73112</td>
<td>-0.5087</td>
<td>-0.3719</td>
<td>-1.0880</td>
<td>3.71421*</td>
</tr>
<tr>
<td>3.</td>
<td>X5</td>
<td>0.04691</td>
<td>-1.7697</td>
<td>-0.0830</td>
<td>-0.2428</td>
<td>2.01435</td>
</tr>
<tr>
<td>4.</td>
<td>X10</td>
<td>-0.00076</td>
<td>-164.0339</td>
<td>0.1247</td>
<td>0.3648</td>
<td>2.41621*</td>
</tr>
</tbody>
</table>

*Significant at 5 per cent level.
From the Table 6.6 it has been revealed that, the operational size of land holdings in acres ($X_2$) is the first major characteristic which discriminates one group from the other, level of education ($X_3$) and per acre fertilizers used in rupees ($X_{10}$) are getting second and third places in discriminating willful defaulters and non willful defaulters. These characteristics have their weights to the total distance measured as 100.96 and 0.36 per cent respectively.