CHAPTER-IV
RESEARCH METHODOLOGY
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This chapter deals with the research methodology adopted in the present study with respect to study area, selection of landing institutions and defaulter cultivators, sampling techniques adopted, collection of data and analytical techniques.

4.1 Selection of study area

Chhattisgarh comprised of 16 districts, out of which, Raipur has been selected purposively because it is the capital place and has the benefits of high order officials who can deliver their best in managing any organization/institution. Moreover, in Raipur maximum amount of agricultural loan is disbursed through cooperative banks as compared to other districts. There are 15 blocks in Raipur district, out of which, Dharsiwa and Arang block have been selected as large number of Primary Agricultural Cooperative Societies (PACSs) branches are functioning here. Moreover, these blocks are most nearest to the main city having best administrative control of the Government.
4.2 Selection of lending institution and defaulter cultivators

In Raipur district, 56 Primary Agricultural Cooperative Societies (PACSs) branches are working under the control of District Central Cooperative Bank (DCCB), Raipur. Out of the total PACSs branches in Raipur, three PACSs branches i.e. Mandir hasaud, Arang and Dharsiwa branch were considered for this study. A total of 4, 7 and 5 PACSs sub branches are working at Mandir hasaud, Arang and Dharsiwa, respectively and for collection of data, 2 sub branches of PACSs from each branch of Mandir hasaud, Arang and Dharsiwa have been taken.

In all the six selected sub branches of PACSs, a total of 910, 325 and 147 defaulters in small, medium and large categories of farmers, respectively have been identified. For the collection of data, a total of 200 defaulters i.e. 12, 15 and 30 per cent from small, medium and large categories, respectively were considered in this study.

4.3 Sampling technique adopted in selection of lending institution and defaulter cultivators

In this study a multistage sampling technique has been adopted. In the first stage of sampling, the selection of bank and its branches were done. In the second stage of sampling the selection of Primary Agricultural Cooperative Credit Societies were done, whereas, in third stage of
sampling, number of defaulter borrowers have been considered for agricultural loans (Fig. 4.1). The sampling procedure has been described under the following sub-heads.

4.3.1 First stage sampling

The maximum amount of agricultural loan is disbursed through Cooperative Banks in Raipur than that of other districts of Chhattisgarh state. Therefore, the study is confined to Raipur district only. More than 92, 87.5 and 79.3 per cent short, medium and long-term loans have been disbursed through Cooperative Bank during the year 2001-2002 and remaining percentage of amount is disbursed by Commercial Banks and Regional Rural Banks. Hence, District Central Cooperative Bank, Raipur (DCCB) has been taken for the study (Table 4.1).

Table 4.1: Amount of short, medium and long-term loan disbursement by banks in Raipur

<table>
<thead>
<tr>
<th>Name of Banks</th>
<th>Short term loan</th>
<th>Medium term loan</th>
<th>Long term loan</th>
</tr>
</thead>
<tbody>
<tr>
<td>District Central Cooperative Banks</td>
<td>7240.74</td>
<td>1322.19</td>
<td>86.74</td>
</tr>
<tr>
<td></td>
<td>(92.13)</td>
<td>(82.52)</td>
<td>(79.33)</td>
</tr>
<tr>
<td>Commercial Banks</td>
<td>333.05</td>
<td>155.09</td>
<td>13.62</td>
</tr>
<tr>
<td></td>
<td>(4.24)</td>
<td>(9.68)</td>
<td>(12.46)</td>
</tr>
<tr>
<td>Regional Rural Bank</td>
<td>285.55</td>
<td>125.06</td>
<td>8.98</td>
</tr>
<tr>
<td></td>
<td>(3.63)</td>
<td>(7.80)</td>
<td>(8.21)</td>
</tr>
<tr>
<td>Total Amount disbursed (Rs.)</td>
<td>7859.14</td>
<td>1602.34</td>
<td>109.34</td>
</tr>
<tr>
<td></td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
</tr>
</tbody>
</table>

Source: Apex bulletin 2001-02

Note: Figures in parenthesis indicate percent of the total amount of loan disbursed
Fig. 4.1: Selection of lending institutions and defaulter cultivators
Fifty six Primary Agricultural Cooperative Credit Societies (PACSs) branches are working under DCCB, Raipur. Among these branches, Mandir hasaud, Arang and Dharsiwa PACSs branches have maximum number of defaulters. Hence, these three PACSs branches have been selected for the study.

4.3.2 Second stage sampling

In total, 16 sub-branches of Primary Agricultural Cooperative Societies are working under Mandir hasaud, Arang and Dharsiwa branches of PACSs. Among these 16 PACSs sub-branches 4, 7, and 5 are working under PACSs Arang, Mandir hasaud and Dharsiwa, respectively. Two sub-branches from each selected branches have been considered on the basis of maximum amount of overdues (Table 4.2).

Table 4.2: Amount of overdues in selected PACSs/DCCB, Raipur

<table>
<thead>
<tr>
<th>Name of PACSs branches</th>
<th>Amount of overdues (Rs.)</th>
<th>Number of defaulters</th>
<th>Number of defaulter borrowers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Short term loans</td>
<td>Medium/ long term loans</td>
<td></td>
</tr>
<tr>
<td>Arang PACS</td>
<td>320.11</td>
<td>8243</td>
<td>2541</td>
</tr>
<tr>
<td>Mandir hasaud PACS</td>
<td>343.36</td>
<td>2045</td>
<td>1847</td>
</tr>
<tr>
<td>Dharsiwa PACS</td>
<td>355.87</td>
<td>2234</td>
<td>1247</td>
</tr>
</tbody>
</table>

Source: District Central Cooperative Bank, Raipur (2001-02)

4.3.3 Third stage sampling

In the third stage of sampling, selection of borrowers is essential committed to non-repayment of loans brought into defaulter category. Hence, a list of defaulter borrowers of six
sampled PACSs sub-branches was taken and grouped into small farmers (1-2 ha), medium farmers (2-4 ha) and large farmers (above 4 ha) categories. Overall 15 per cent of defaulter borrowers were considered irrespective of the farm size categories. The percentage proportion was dissimilar according to the farm size categories, it was due to more number of defaulters noticed into small farm size categories. More defaulters have been selected from the small size farmers because it has maximum members. Hence, we have selected 106, 50 and 44 samples borrowed farmers out of total 910, 325 and 147 defaulters in small, medium and large categories, respectively. In this way 12, 15 and 30 per cent defaulters from small, medium and large categories of farmers, respectively were considered for this study.

4.4 Method of enquiry and collection of data

The present study is based on primary and secondary both type of data. Primary data are collected through personal interview with the help of the pre-tested questionnaires from sampled defaulter borrowers on different aspects like type of family, family size, annual income from agriculture, income from non-agricultural sources, level of education of family members, expenditure on food and non-food items, investment on land, farm implement and equipments, cropping pattern, crop supplies, credit requirement and sanctioned and causes of non-repayment of
loans overdues. The primary data is pertaining to the year of 2001-02.

The time series secondary data for the period of 1990-91 to 2001-02 are collected on various parameter like amount of cooperative credit granted, distributed, repayment and overdues by PACSs/DCCB to the succeeding financial bodies to assess the performance of selected PACSs and DCCB, Raipur.

4.5 Analytical tools/Method of analysis

To estimate the extent of agricultural cooperative credit granted and distributed, repayment of agricultural cooperative credit and extent of overdues in DCCB, Raipur and selected PACSs, simple arithmetic mean, percentage, standard deviation and coefficient of variation (Gupta and Kapoor, 2002) during the period of 1990-91 to 2001-02 were used. To estimate the overall performance of DCCB, Raipur and PACS Mandir hasaud, Arang and Dharsiwa branches, a trend is estimated by applying the linear regression model (Acharya and Madnani, 1998) for cooperative credit granted, distributed, repayment and overdues during the years 1990-91 to 2001-02 period. The specifications of statistical tools used in this study are given below.

4.5.1 Arithmetic mean

\[ \bar{X} = \frac{\sum X}{n} \]
Where,

\[ \bar{X} = \text{Arithmetic Mean} \]
\[ N = \text{Number of observations} \]
\[ X = \text{Variables (}X_1, X_2, X_3, X_4, X_5, X_6, \ldots \ldots \ldots X_n) \]

4.5.2 **Standard deviation**

\[ \sigma = \sqrt{\frac{1}{n} \sum_{i=1}^{n} (X_i - \bar{X})^2} \]

Where,

\[ \sigma = \text{Standard deviation} \]
\[ \bar{X} = \text{Arithmetic mean of the variables} \]
\[ X_i = \text{Variables (amount of loan granted, recovery and overdues)} \]
\[ i = 1, 2, 3, \ldots \ldots , n \]

4.5.3 **Co-efficient of variation**

\[ C.V. = \frac{\sigma}{\bar{X}} \times 100 \]

Where,

\[ C.V. = \text{Co-efficient of variation} \]
\[ \sigma = \text{Standard deviation} \]
\[ \bar{X} = \text{Arithmetic mean of amount of loan granted, distributed, credit gap, repayment and overdues} \]

4.5.4 **Linear regression model**

A linear growth rate is estimated by application of linear regression model on cooperative credit granted to PACSs/DCCB and their repayment as well as amount of loan overdues over the period of study 1990-91 to 2001-02. The linear regression model has been estimated through using ordinary least square (OLS) method. The specification of the model is as follows:
\[ Y = a + b^t \]

**Linear growth rate**
\[
\frac{b}{Y} \times 100
\]

Where,

- \( Y \) = Dependent variables (Cooperative credit granted, distributed, repayment and overdues)
- \( a \) = Constant or intercept
- \( b \) = Coefficient (linear trend value)
- \( t \) = Time (from base year 1990-91 to 2001-02)
- \( \bar{Y} \) = Mean value of Cooperative credit granted, distributed, repayment and overdues

### 4.5.5 Compound growth rate model (CGR)

\[ Y_t = ab^t \]

or

\[ \log Y_t = \log a + t \log b \]

**CGR%** = [Anti log of \( b-1 \)] \times 100

Where,

- \( Y_t \) = Dependent variables (Cooperative credit granted, distributed, repayment and overdues)
- \( a \) = Intercept or, constant
- \( b \) = 1 + \( g \) (compound growth rate)
- \( g \) = \( b-1 \)
- \( t \) = Time (from 1990-91 to 2001-02)

### 4.5.6 "F" test

For the testing the hypothesis 'F' test was used (Gupta and Kapoor, 2002). The 'F' test formula is given below.

\[
F = \frac{Sx^2}{Sy^2}
\]
Followed by 'F' distribution with \((n_1-1, n_2-1)\) df

\[
S_x^2 = \frac{n_1}{n_1-1}
\]

\[
S_y^2 = \frac{n_2}{n_2-1}
\]

Where,

\[
S_x^2 = \frac{1}{n_1-1} \sum_{i=1}^{n_1} (X_i - \bar{X})^2
\]

\[
S_y^2 = \frac{1}{n_2-1} \sum_{j=1}^{n_2} (Y_j - \bar{Y})^2
\]

4.5.7 Coefficient of correlation

The degree of correlation of overdues among the borrowers with 14 variables (chosen for adversely or positively affecting the non-repayment of loans which caused overdues) was studied with mathematical method of measuring correlation i.e. Karl Pearson coefficient of correlation (Gupta and Kapoor, 2002). The Karl Pearson coefficient of correlation formula is given below.

\[
\rho = \frac{\sum dx \cdot dy}{\sqrt{\sum dx^2 \cdot dy^2}}
\]

"t" cal. = \(r \sqrt{n-2}/ \sqrt{1-r^2}\)
Where,

\[ r = \] Coefficient of correlation
\[ \sum dx \cdot dy = \] Total of product of corresponding deviation of \( x \) and \( y \) series
\[ d_x = X - X \] and \( d_y = Y - Y \)
\[ X = \] Mean value of dependent variables
\[ Y = \] Mean value of independent variables
\[ y = \] Dependent variables
\[ X_{14} = \] Amount of overdue in Rupee
\[ x = \] Independent variables
\[ X_1 = \] Family size (In numbers)
\[ X_2 = \] Dependency ratio
\[ X_3 = \] Total income from all sources
\[ X_4 = \] Type of family (Joint=0, Nuclear=1)
\[ X_5 = \] Education of head of family (Upto primary pass=0, above=1)
\[ X_6 = \] Food and non-food expenditure (Rs)
\[ X_7 = \] Land holding size (ha)
\[ X_8 = \] Un-irrigated area (ha)
\[ X_9 = \] Cropping intensity (%)
\[ X_{10} = \] Natural calamities (Severe attack=0, Normal attack=1)
\[ X_{11} = \] Caste (SC/ST=0, Others=1)
\[ X_{12} = \] Amount of loan borrowed (Rs)
\[ X_{13} = \] Amount of loan repaid (Rs)

4.5.8 Step down multiple regression analysis

In order to understand the relative importance of various quantitative and qualitative factors affecting to non-repayment of loans causing accumulation of overdue in selected PACSs step down multiple regression analysis was done. The primary data is collected from 200 defaulter members of PACSs of different categories. Selected PACSs on 13 different aspects were classified into quantitative and qualitative factors/variables.

The multiple regression analysis is used to estimate relative contribution of quantitative and qualitative factors/variables (Acharya and Madnani, 1988). The multiple
regression analysis gave an appropriate result with the incorporation of quantative and qualitative variables and their contribution to the dependent variables. The multiple regression model used in this study is given below:

\[ Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + \ldots \ldots + b_mX_m \]

Where,

- **Y** = Amount of overdue in Rupee
- **a** = Intercept (Constant)
- **b** = Co-efficient of variables
- **X_1** = Family size (In numbers)
- **X_2** = Dependency ratio
- **X_3** = Total income from all sources
- **X_4** = Type of family (Joint=0, Nuclear=1)
- **X_5** = Education of head of family (Upto primary pass=0, above=1)
- **X_6** = Food and non-food expenditure (Rs)
- **X_7** = Land holding size (ha)
- **X_8** = Un-irrigated area (ha)
- **X_9** = Cropping intensity (%) 
- **X_{10}** = Natural calamities (Severe attack=0, Normal attack=1)
- **X_{11}** = Caste (SC/ST=0, Others=1)
- **X_{12}** = Amount of loan borrowed (Rs)
- **X_{13}** = Amount of loan repaid (Rs)

The step down regression analysis was done to understand the important and unimportant factors causing the accumulation of amount of overdues. In first step of regression analysis all the thirteen independent variables were considered. Before analyzing the multiple regression the test of multi-collinearity was applied between different independent variables. Afterwards non-significant variables were dropped in regression model.
References
