CHAPTER - 3

RESEARCH METHODOLOGY
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This chapter presents the need, objectives, sampling, sources and instruments of data collection and limitations of the study. Research design stands for advance planning of the methods to be adopted for collecting relevant data and the techniques to be used for data analysis, keeping in view the objectives of research. It has a great bearing on the reliability of results arrived at and as such constitutes a firm foundation for the entire edifice of research work.

3.1 NEED OF THE STUDY

Though many agencies have sprung up to herald the dawn of multi-agency approach in respect of rural credit, role of cooperative banks continues to be significant, especially for the needy and weaker sections. Cooperative banks have admittedly been accorded a position of cardinal importance in the rural economy of India. An in-depth study of the resources of rural credit indicates that despite best intentions of the government, commercial banks have exhibited little enthusiasm in rural credit dispensation. Commercial banks are slowly withdrawing their participation in financing agricultural sector and cannot fulfill the government’s priority sector target of direct financing in agriculture and allied activities fixed at 18 per cent of their net lending (Patel, 2004). Regional rural banks, which were organized to fill the credit gap have also not performed up to the mark and are now trying to get merged with their parent commercial banks.

In the new economic scenario, where profitability and viability are the main concerns of commercial organizations, the rural system has to depend upon the cooperatives for all their problems. Promotion of credit cooperatives in the later part of the 19th century was a pioneering effort among many measures taken by the government in institutionalizing provision of credit in
rural areas. Cooperatives have a long history of providing financial services to poor and low income groups. To begin with, it was essentially to solve the problem of indebtedness, usury and a stagnant rural economy with large peasantry (paragraph 5.01 of Khusro Committee Report, 1986). Cooperatives continue to serve this mission today, often by providing affordable and equitable access to microfinance services. Provision of improved access to credit, safe and secure savings as well as insurance and other such services can help the poor to boost their incomes, protect their assets and reduce their vulnerability to crisis. All expert committees without any exception have recognized the important role played by cooperative banks in the rural credit delivery system and have opined that from the point of view of structural appropriateness, there is no alternative to cooperatives for the provision of agricultural credit.

Agriculture cooperative credit structure in Punjab consists of long term and short term credit cooperatives. Long term system provides long term loans for infrastructural development in rural areas whereas short term system provides working capital finance to farmers i.e. crop loans for purchase of agricultural inputs. The Punjab State Agriculture Development Bank Limited, Chandigarh is the apex institution at the state level to control and guide base level primary banks. Primary agriculture development banks provide long term finance directly to the farmers. These banks are not banks in the true sense as Banking Regulation Act is not applicable fully to these organizations and they do not conduct any other banking operations.

Short term cooperative credit structure is managed through a three tier system in the state. At the base level, primary agriculture cooperative societies (PACSs) work as village level units. The PACSs mainly get refinance from district central cooperative banks and distribute this credit to farmers after adding a fixed percentage of interest themselves. Banking Regulation Act is not applicable to these organizations also. At the apex level, Punjab State Cooperative Bank Limited, Chandigarh works as a balancing centre for the DCCBs. State cooperative banks mainly act as a channel to raise finances from
various agencies like National Bank for Agriculture and Rural Development, Reserve Bank of India, State Government, World Bank etc. and disburse these funds through district central cooperative banks amongst village level primary cooperative societies.

Central cooperative banks are district level banks which provide short term credit to farmers (through PACSs as well as directly). Only CCBs are actually engaged in banking operations and provisions of Banking (Regulation) Act, 1949, Negotiable Instruments Act, 1881 and other banking legislations are also applicable only to the central cooperative banks. So, CCBs can be called the nucleus of cooperative movement in the state. It is only the district central cooperative bank that uses its influence and expertise to mobilise deposits, assess credit demand, ensure supervision over the end use of credit and prompt recovery of dues (Satyasai and Badataya, 2000). Therefore, the present study is confined only to the central cooperative banks of Punjab.

One area of neglect in cooperative banks is the deterioration in the quality of loan portfolios which has in turn directly affected income generation and enhancement of capital funds of the cooperative banking system. Poor loan portfolio leads to deterioration of business performance which can directly or indirectly be felt by cooperative banking institutions. It leads to increasing quantum of non performing advances which ultimately affect the financial health of the banks. Financial authorities of India had made several attempts from time to time to make cooperative banks strong, viable and vibrant institutions. Implementation of prudential norms in cooperative banks is another attempt of the RBI and Government of India in professionalizing these banks. Capital Adequacy and Asset Liability Management Norms were not made mandatory for these banks but NPA norms were introduced in these banks from 1996-97. It was the right step taken by RBI, at the right time, to protect and develop these banks.

An analytical review of existing literature has brought to light the distressing proportion of NPAs in cooperative banks. Besides the magnitude, various studies have also pointed out the causative factors of NPAs. But not
much work has been done to evaluate the advancements by these banks in various loan schemes, especially after the diversification of their business and the contribution of these loan schemes to the excessive NPAs in these banks. What do the borrowers of cooperative banks perceive about the attitude of bank management with the launch of NPA norms? What is the opinion of bank management regarding the practical relevance of NPA norms? What is the effect of NPA norms on the financial viability of DCCBs of Punjab? These are some of the questions, which are yet to be addressed and which merit immediate attention. Now is the right time i.e. almost a decade after the implementation of NPA norms, that the position and impact of these norms on the financial viability of cooperative banks be analysed and judged.

Keeping in view the hitherto unanswered questions, there is a need to undertake a study which could critically evaluate the management of non performing advances in district central cooperative banks of Punjab.

3.2 OBJECTIVES OF THE STUDY

The proposed study endeavours to undertake a comprehensive investigation of the inter sector status of NPAs in the selected DCCBs of Punjab, along with a study of perceptions of borrowers and bank management about the impact of NPA norms. The main objectives of this study are:

(1) To assess the scenario of cooperative credit institutions in the state of Punjab.

(2) To study the pattern of advancement in various loan schemes of district central cooperative banks of Punjab.

(3) To evaluate the extent of NPAs in different loan schemes and make a comparative analysis of their status in the selected district central cooperative banks of Punjab.

(4) To analyse the effect of NPA norms on the financial viability of the DCCBs selected for the study.

(5) To trace out the factors responsible for NPAs and examine the perceptions of borrowers regarding the change in attitude of bank officials with the launch of NPA norms.
To examine the opinion of bank management about the practical relevance of NPA norms in terms of improvement in the operational and financial performance of the selected DCCBs.

To identify the problems experienced at different stages and advance suggestions to make the study more result oriented and further to explore areas for prospective research.

3.3 SELECTION OF SAMPLE

Ten banks were selected out of the 19 district central cooperative banks in Punjab. Ratios of average NPAs to average advances outstanding were used as a criterion for the selection of these banks. Averages were calculated for NPAs and advances outstanding for a period of five years i.e. from 2001-02 to 2005-06, to work out the ratios of NPAs to advances outstanding. Cumulative square root method was applied to classify the banks into two categories i.e. banks with high NPAs and banks with comparatively low NPAs. Five banks were randomly selected from each category for the study. The details of DCCBs of Punjab, advances outstanding and NPAs with ratios of NPAs to advances outstanding are indicated in table 3.1 and 3.2.

Figure 3.1 indicates the banks selected for the study.

Figure 3.1: Banks Selected for the Study

Banks Having High NPAs

- The Gurdaspur Central Cooperative Bank Limited, Gurdaspur.
- The Amritsar Central Cooperative Bank Limited, Amritsar.
- The Tarn Taran Central Cooperative Bank Limited, Tarn Taran.
- The Mansa Central Cooperative Bank Limited, Mansa.
- The Ludhiana Central Cooperative Bank Limited, Ludhiana.

Banks Having Comparatively Low NPAs

- The Ferozepur Central Cooperative Bank Limited, Ferozepur.
- The Muktsar Central Cooperative Bank Limited, Muktsar.
- The Bathinda Central Cooperative Bank Limited, Bathinda.
- The Nawan Shahar Central Cooperative Bank Limited, Nawan Shahar.
- The Jalandhar Central Cooperative Bank Limited, Jalandhar.
### Table 3.1: PROFILE OF DISTRICT CENTRAL COOPERATIVE BANKS OF PUNJAB

(as on March 31, 2007)

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of the DCCB</th>
<th>Year of Establishment</th>
<th>No. of Branches</th>
<th>Profit/ Loss (Rs. in Lacs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The Amritsar Central Cooperative Bank Limited, Amritsar</td>
<td>1922</td>
<td>57</td>
<td>-195.99</td>
</tr>
<tr>
<td>2.</td>
<td>The Bathinda Central Cooperative Bank Limited, Bathinda</td>
<td>1949</td>
<td>40</td>
<td>133.85</td>
</tr>
<tr>
<td>3.</td>
<td>The Fatehgarh Sahib Central Cooperative Bank Limited, Fatehgarh Sahib</td>
<td>1993</td>
<td>24</td>
<td>288.74</td>
</tr>
<tr>
<td>4.</td>
<td>The Fazilka Central Cooperative Bank Limited, Fazilka</td>
<td>1915</td>
<td>30</td>
<td>106.76</td>
</tr>
<tr>
<td>5.</td>
<td>The Ferozepur Central Cooperative Bank Limited, Ferozepur</td>
<td>1924</td>
<td>23</td>
<td>-99.72</td>
</tr>
<tr>
<td>6.</td>
<td>The Faridkot Central Cooperative Bank Limited, Faridkot</td>
<td>1922</td>
<td>24</td>
<td>-52.62</td>
</tr>
<tr>
<td>7.</td>
<td>The Gurdaspur Central Cooperative Bank Limited, Gurdaspur</td>
<td>1909</td>
<td>44</td>
<td>18.82</td>
</tr>
<tr>
<td>8.</td>
<td>The Hoshiarpur Central Cooperative Bank Limited, Hoshiarpur</td>
<td>1910</td>
<td>63</td>
<td>270.40</td>
</tr>
<tr>
<td>9.</td>
<td>The Jalandhar Central Cooperative Bank Limited, Jalandhar</td>
<td>1909</td>
<td>72</td>
<td>675.55</td>
</tr>
<tr>
<td>10.</td>
<td>The Kapurthala Central Cooperative Bank Limited, Kapurthala</td>
<td>1920</td>
<td>39</td>
<td>258.83</td>
</tr>
<tr>
<td>11.</td>
<td>The Ludhiana Central Cooperative Bank Limited, Ludhiana</td>
<td>1916</td>
<td>54</td>
<td>444.45</td>
</tr>
<tr>
<td>13.</td>
<td>The Moga Central Cooperative Bank Limited, Moga</td>
<td>1922</td>
<td>47</td>
<td>62.96</td>
</tr>
<tr>
<td>15.</td>
<td>The Nawan Shahar Central Cooperative Bank Limited, Nawan Shahar</td>
<td>1934</td>
<td>47</td>
<td>741.75</td>
</tr>
<tr>
<td>16.</td>
<td>The Patiala Central Cooperative Bank Limited, Patiala</td>
<td>1949</td>
<td>43</td>
<td>323.92</td>
</tr>
<tr>
<td>17.</td>
<td>The Ropar Central Cooperative Bank Limited, Ropar</td>
<td>1927</td>
<td>26</td>
<td>724.75</td>
</tr>
<tr>
<td>18.</td>
<td>The Sangrur Central Cooperative Bank Limited, Sangrur</td>
<td>1952</td>
<td>63</td>
<td>299.52</td>
</tr>
<tr>
<td>19.</td>
<td>The Tarn Taran Central Cooperative Bank Limited, Tarn Taran</td>
<td>1919</td>
<td>40</td>
<td>22.30</td>
</tr>
</tbody>
</table>

Source: Compiled from the Published Accounts of District Central Cooperative Banks of Punjab, Published by PUNCOFED, Chandigarh
<table>
<thead>
<tr>
<th>S. No.</th>
<th>DCCBs</th>
<th>Total Advances Outstanding</th>
<th>Total NPAs</th>
<th>Average Advances Outstanding</th>
<th>Average NPAs</th>
<th>% of NPAs to Advances Outstanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Amritsar</td>
<td>121274.14</td>
<td>15867.97</td>
<td>24254.83</td>
<td>3173.59</td>
<td>13.08</td>
</tr>
<tr>
<td>2.</td>
<td>Bathinda</td>
<td>114476.52</td>
<td>3997.36</td>
<td>22895.30</td>
<td>799.47</td>
<td>3.49</td>
</tr>
<tr>
<td>3.</td>
<td>F'sahib</td>
<td>80675.82</td>
<td>6154.18</td>
<td>16135.16</td>
<td>1230.84</td>
<td>7.63</td>
</tr>
<tr>
<td>4.</td>
<td>Fazilka</td>
<td>85001.93</td>
<td>4679.66</td>
<td>17000.39</td>
<td>935.93</td>
<td>5.505</td>
</tr>
<tr>
<td>5.</td>
<td>Ferozepur</td>
<td>72813.68</td>
<td>4844.63</td>
<td>14562.74</td>
<td>968.93</td>
<td>6.65</td>
</tr>
<tr>
<td>6.</td>
<td>Faridkot</td>
<td>74142.51</td>
<td>2928.36</td>
<td>14828.5</td>
<td>585.67</td>
<td>3.95</td>
</tr>
<tr>
<td>7.</td>
<td>Gurdaspur</td>
<td>143290.56</td>
<td>23303.87</td>
<td>28658.11</td>
<td>4660.77</td>
<td>16.26</td>
</tr>
<tr>
<td>8.</td>
<td>Hoshiarpur</td>
<td>129560.47</td>
<td>10414.42</td>
<td>25912.09</td>
<td>2082.88</td>
<td>8.038</td>
</tr>
<tr>
<td>9.</td>
<td>Jalandhar</td>
<td>157808.28</td>
<td>4102.2</td>
<td>31561.66</td>
<td>820.44</td>
<td>2.60</td>
</tr>
<tr>
<td>10.</td>
<td>Kapurthala</td>
<td>99949.44</td>
<td>4471.49</td>
<td>19989.89</td>
<td>894.30</td>
<td>4.47</td>
</tr>
<tr>
<td>11.</td>
<td>Ludhiana</td>
<td>150774.71</td>
<td>12783.27</td>
<td>30154.94</td>
<td>2556.65</td>
<td>8.48</td>
</tr>
<tr>
<td>12.</td>
<td>Mansa</td>
<td>68127.96</td>
<td>6180.88</td>
<td>13625.59</td>
<td>1236.18</td>
<td>9.07</td>
</tr>
<tr>
<td>13.</td>
<td>Moga</td>
<td>82831.86</td>
<td>4461.19</td>
<td>16566.37</td>
<td>892.24</td>
<td>5.39</td>
</tr>
<tr>
<td>14.</td>
<td>Muktsar</td>
<td>80325.27</td>
<td>3002.43</td>
<td>16065.05</td>
<td>600.49</td>
<td>3.74</td>
</tr>
<tr>
<td>15.</td>
<td>Nawan Shahar</td>
<td>106111.47</td>
<td>3294.17</td>
<td>21222.29</td>
<td>658.83</td>
<td>3.10</td>
</tr>
<tr>
<td>16.</td>
<td>Patiala</td>
<td>187359.43</td>
<td>13365.21</td>
<td>37471.89</td>
<td>2673.04</td>
<td>7.13</td>
</tr>
<tr>
<td>17.</td>
<td>Ropar</td>
<td>102830.48</td>
<td>7305.87</td>
<td>20566.096</td>
<td>1461.17</td>
<td>7.10</td>
</tr>
<tr>
<td>18.</td>
<td>Sangrur</td>
<td>186942.58</td>
<td>8782.07</td>
<td>37388.52</td>
<td>1756.41</td>
<td>4.70</td>
</tr>
<tr>
<td>19.</td>
<td>Tarn Taran</td>
<td>103044.25</td>
<td>11730.9</td>
<td>20608.85</td>
<td>2346.18</td>
<td>11.38</td>
</tr>
</tbody>
</table>

Source: Compiled from the Published Accounts of District Central Cooperative Banks of Punjab, Published by PUNCOFED, Chandigarh
3.4 SCOPE AND COVERAGE OF THE STUDY

Despite the fact that much work has been done to evaluate the performance of banks in India, it is difficult to find any comprehensive study on the performance of banks in terms of their NPA status. Several studies have been conducted on overdues of rural financial institutions (i.e. both long term and short term credit institutions) but no research has so far been undertaken to study the impact of NPAs and NPA norms on the financial performance of banks. For the purpose of the present study, performance measurement of the DCCBs in terms of their loans outstanding and non performing advances has been confined to the following four major areas:
1. Composition of advances outstanding
2. Extent of non performing advances
3. Perceptions of borrowers and bank officials regarding NPA norms
4. Impact of NPA norms on the financial viability of DCCBs of Punjab.

Given below are the performance parameters under the above mentioned areas of study and it is worth mentioning here that these parameters are only illustrative in nature:

3.4.1 COMPOSITION OF ADVANCES

The following are the broad indicators which have been studied under this variable:

a) Trends in absolute advances outstanding and future projections
b) Proportionate share of advances in total advancement in the selected banks.

3.4.2 NON PERFORMING ADVANCES

Some of the parameters chosen for evaluating the position of NPAs in the selected DCCBs are:

a) Trends of NPAs in various loan schemes
b) Proportionate share of NPAs in total NPAs and
c) Scheme-wise trend of NPAs in percentage terms.

3.4.3 IMPACT OF NPA NORMS ON FINANCIAL VIABILITY OF THE DCCBs OF PUNJAB

Financial impact of NPA norms on the selected DCCBs has been assumed to be reflected in the following parameters:

a) Absolute impact of NPA norms on profitability of district central cooperative banks of Punjab.
b) Product-wise average loss due to NPA norms in district central cooperative banks of Punjab.
3.4.4 PERCEPTIONS OF BORROWERS AND BANK OFFICIALS REGARDING NPA NORMS

The data about the perceptions of the borrowers and bank officials regarding NPA norms was collected by administering structured schedules of questions to the borrowers and bank officials of the selected DCCBs.

a) Schedule for Borrowers: A structured schedule of questions was developed and pre-tested. It consisted of different types of questions for the borrowers. The following are the major sections of this schedule:

i) Background and general information
ii) Details of annual income
iii) Details of borrowings
iv) Perceptions of the loanees regarding terms of disbursement and repayment of loan
v) Utilization of loan
vi) Benefits derived from the utilization of the loan
vii) Repayment of loan
viii) Factors affecting the repayment performance of borrowers
ix) Perceptions of borrowers about the attitude of bank management after the launch of NPA norms.

b) Opinion Survey administered to Bank Officials: Following are the major sections of this schedule:

i) Background and general information
ii) Awareness about NPA norms
iii) Causes of NPAs
iv) Effect of NPA norms
v) Prevention of NPAs
vi) Adverse effects of unsatisfactory performance of the bank due to NPAs
vii) Adequacy of NPA norms for the effective management of NPAs.
3.5 RESEARCH DESIGN

For achieving the objectives of the study, both primary and secondary data was collected and analysed.

3.5.1 SECONDARY DATA

To evaluate the overall composition of advances outstanding and status of non performing advances in the selected DCCBs, secondary data was collected from the following sources:

a) Comparative Statements of State and Central Cooperative Banks of Punjab, published by PUNCOFED, Chandigarh.
b) Cooperative Movement in Punjab, Figures Speak, published by PUNCOFED, Chandigarh.
c) The Development Action Plans prepared by the district central cooperative banks in consultation with NABARD.
d) Reports of annual conferences on performance of district central cooperative banks in Punjab prepared by the Agriculture Cooperative Staff Training Institute, Punjab.
e) Website of National Bank for Agriculture and Rural Development.

3.5.2 PRIMARY DATA

Primary data for the analysis of demographic features, factors affecting the repayment performance of borrowers and perceptions of the bank officials about NPA norms, was collected from sample borrowers and bank officials.

a) INSTRUMENTS FOR DATA COLLECTION

i) Survey Schedules: After scanning the literature on cooperative banks as well as preliminary discussions with certain bank officials, two survey schedules were prepared. These were tested on few borrowers and bank officials and later revised as per the modifications suggested by them. The schedules so finalized for collecting data from the borrowers and bank officials are given in the Appendix. These schedules had open ended, dichotomous, multiple-choice questions and rating scales.

To ascertain the perceptions of borrowers and bank officials about NPA norms, a Five Point Likert Scale was used namely: Agreed to a great extent,
Agreed to a moderate extent, Agreed to some extent, Do not know and Not at all, with weightage of 5, 4, 3, 2 and 1 respectively. This scale was used to identify the causes of NPAs, effects of NPAs, prevention of NPAs and effects of unsatisfactory performance of banks due to NPAs on various aspects in the opinion survey of bank officials. In the survey schedule of the borrowers, Five Point Likert Scale was used to ascertain the details of borrowings, benefits derived from utilization of loan, factors affecting repayment performance of borrowers and perceptions of borrowers about the attitude of bank management. A Three Point Likert Scale i.e. to a great extent, to some extent and not at all satisfied with a weightage of 3, 2 and 1 respectively was used to ascertain the adequacy of loan amount for the stipulated purpose and to determine the extent of proper utilization of loan.

ii) Observation: Some information was gathered through personal observation and interaction with the officials of the selected DCCBs. This was very instrumental in enhancing knowledge about the relevant concepts of NPAs and in facilitating completion of this study.

b) SELECTION OF RESPONDENTS FOR PRIMARY DATA: Every borrower and bank official of the selected DCCBs was taken as a population element. A sample of 100 borrowers and 100 bank officials was selected for the collection of primary data.

i) Sample Description: Borrowers

1. Population All borrowers of the selected DCCBs of Punjab
2. Sampling Frame List of borrowers
3. Sample Size 100 Borrowers
4. Sampling Method i) Stratified random sampling for selecting 10 out of 19 DCCBs (On the basis of percentage of NPAs to advances outstanding)
   ii) Quota sampling was applied for selecting 100 borrowers at the rate of 10 borrowers from each of the selected DCCBs.
ii) Sample Description: Bank Officials

1. Population
   All bank officials of the selected DCCBs of Punjab

2. Sampling Frame
   List of bank officials

3. Sample Size
   100 Bank officials

4. Sampling Method
   i) Stratified random sampling for selecting 10 out of 19 DCCBs
      (On the basis of percentage of NPAs to advances outstanding)
   ii) Quota sampling was applied for selecting 100 bank officials at the rate of 10 officers from each of the selected DCCBs.

3.6 TOOLS OF ANALYSIS

Data collected from different sources have been presented in tables in one or more forms according to the requirements of the analysis. For the analysis of data, following statistical techniques have been applied:

3.6.1 SIMPLE STATISTICAL TECHNIQUES

Simple statistical techniques such as frequencies, percentages, averages and weighted averages have been used for the analysis of the collected data.

3.6.2 ADVANCED STATISTICAL TOOLS

Advanced statistical tools such as Analysis of Variance (ANOVA), Regression Analysis, Compound Growth Rates, Trend Equations and Students’ t-test were applied to analyze the data to arrive at meaningful conclusions.

a) Analysis of Variance (ANOVA)

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$F_1\ldots F_3$</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>...</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$(F_1)\ldots (F_n)$</td>
</tr>
</tbody>
</table>
**Steps of ANOVA**

1. **Correction Factor (C.F.)** = \( \frac{(GT)^2}{N} \left[ \frac{N = \text{No. of Factors}}{\text{X}} \right] \left[ \frac{\text{No. of Respondents}}{\text{N}} \right] \)

2. **Total Sum of Squares** = \( \sum X_{ij}^2 - \text{C.F.} \left( \sum X_{ij}^2 \text{ is the sum of squares of all the observations} \right) \)

3. **Factors Sum of Squares** = \( \left( \frac{(F_1)^2}{n_1} + \frac{(F_2)^2}{n_2} + \ldots + \frac{(F_n)^2}{n_n} \right) - \text{C.F.} \)
   
   \( (n_1, n_2, \ldots, n_n = \text{No. of Respondents}) \)

4. **Error sum of Squares** = \( \text{Total sum of squares - Factor sum of squares} \)

**ANOVA Table**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>d.f.</th>
<th>S.S.</th>
<th>M.S.S.</th>
<th>F-Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factors</td>
<td>No. of Factors -1</td>
<td>(3)</td>
<td>(3)/d.f.=A</td>
<td>A/B</td>
</tr>
<tr>
<td>Error</td>
<td>N-No. of Factors</td>
<td>(4)</td>
<td>(4)/d.f.=B</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>N-1</td>
<td>(2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Critical Difference (C.D.)** = \( \sqrt{\frac{2 \times B}{\text{xt}(\alpha, \text{d.f.})}} \) at Error d.f.

**b) Regression Analysis**

To identify the factors affecting repayment performance of the borrowers, a step down regression analysis was done by solving the following equation:

\( Y = a + b_1 X_1 + b_2 X_2 + \ldots + b_9 X_9 \)

Where

- \( Y = \text{Repayment Performance (Dependent Variable)} \)
- \( \text{Repayment Performance} \)
  - Regular = 1
  - Irregular = 0

\( a = \text{a constant term} \)
$X_1 \ldots X_9 = \text{Independent Variables}$

Where

$X_1$ stands for Sex
$X_2$ for Age
$X_3$ for Caste
$X_4$ for Educational Level
$X_5$ for Family Size
$X_6$ for Annual Income
$X_7$ for Borrowings
$X_8$ for Adequacy of Loan
$X_9$ for Extent of Utilization

$b_1 \ldots b_9 = \text{Regression coefficients of } X_1 \ldots X_9$

The significance of regression coefficients was tested through t-test. Initially nine factors were tested but in the final run equation only four factors were identified as significantly affecting the repayment performance. The variables with the lowest non-significant t-values were excluded one by one, till a combination of significant variables was got.

c) **Coefficient of Variation**

Coefficient of variation was computed by applying the following formula:

$$C.V = \frac{\text{S.D.}}{\overline{X}} \times 100$$

Standard Deviation (S.D.) = $\sqrt{\frac{\sum d^2}{N}}$

$d = (X - \overline{X})$

$\overline{X} = \text{Mean value of the variable}$

$N = \text{Number of observations (years)}$

d) **Compound Growth Rates**

To see the growth of different parameters, compound growth rates were worked out by the regression equation in its exponential form:

$Y = ab^t$
In log form: Log Y = Log a + t Log b

Where Y = parameter whose CGR is to be calculated
a = a constant term
t = time variable (No. of years under study)
b = regression coefficient of time variable

The value of (a) and (b) was calculated as under:

\[
\log b = \frac{n \sum \log y(t) - \sum \log y(\Sigma t)}{\sum t^2 - \frac{(\sum t)^2}{n}}
\]

b = antilog (log b)

\[
\log a = \frac{\sum \log y}{N}
\]

a = antilog (log a)

C.G.R. = (b-1) x 100

\[
t = \frac{C. G. R.}{S.E.(C. G. R.)}
\]

e) Trend Equation

In order to make future projections of different parameters, trend equations were worked out by using the following formula in its algebraic form:

\[Y = a + bt\]

Where Y = a parameter to be projected
a = constant term
t = time variable
b = regression coefficient of time.

f) Students’ t-test

Unpaired t-test was applied to compare different parameters of banks having high and comparatively low NPAs. The formula used is as under:

\[
t = \frac{\bar{X}_1 - \bar{X}_2}{S.E.(\bar{X}_1 - \bar{X}_2)}
\]
\[ S.E. (\bar{X}_1 - \bar{X}_2) = S \sqrt{\frac{1}{N_1} + \frac{1}{N_2}} \]

\[ S = \sqrt{\frac{S.D_1^2 (N_1 - 1) + S.D_2^2 (N_2 - 1)}{N_1 + N_2 - 2}} \]

Where \( \bar{X}_1 \) = Mean of 1\textsuperscript{st} category
\( \bar{X}_2 \) = Mean of 2\textsuperscript{nd} category
\( N_1 \) = No. in 1\textsuperscript{st} category
\( N_2 \) = No. in 2\textsuperscript{nd} category
\( S.D_1 \) = Standard Deviation in 1\textsuperscript{st} category
\( S.D_2 \) = Standard Deviation in 2\textsuperscript{nd} category
\( S \) = Common Standard Deviation
\( S.E. \) = Standard Error of Mean Difference

Thus, various statistical tools were used to analyse primary and secondary data collected for the evaluation of the status of selected DCCBs in terms of advances outstanding, non performing advances and perceptions of borrowers and bank officials about NPA norms. The Microsoft Office (Excel) along with the SPSS (version 10.0) statistical analysis software, has been used for various computations. MS Word and MS Excel have been used to bring the study in presentable form.

3.7 LIMITATIONS OF THE STUDY

The present research has been conducted under certain limitations generally found in the study of a topic of this nature, which is relatively volatile. Again, lack of comprehensive data as a result of a policy of secrecy adopted by banks has impaired the work to some extent. The main limitations faced while undertaking the analysis were:

1. Due to resource and time constraints as well as easy accessibility and convenience of the researcher, the study was confined to the state of Punjab only.
2. Secondary data for 8 years i.e. from 1999-2000 to 2006-07 has been used for the analysis of composition of advances in the selected DCCBs while the data used for the study of non performing advances in the selected DCCBs was for a period of 7 years i.e. from 2000-01 to 2006-07.

3. Financial sector reforms have not been implemented in the rural cooperative banking sector as they have been done in commercial banks. In the commercial banks, there is a clear cut period of pre 1991-92 and post 1991-92, which can be taken as pre-reforms and post-reforms period in commercial banks. A clear line of demarcation can not be drawn to separate pre-reforms and post-reforms period in central cooperative banks. Various reforms have been initiated at different times and that too, for only selected DCCBs as an experiment. The other DCCBs only followed these DCCBs at a later stage. Such heterogeneity in implementation of reforms in cooperative banks made it difficult to study the impact of overall reforms.

4. A sample of 100 borrowers may not be an adequate representative of the entire state of Punjab, especially when their number works out to be a small proportion of the total members brought under the cooperative fold. However, special care has been taken to overcome this deficiency by including respondents from different areas and by putting to them questions of diverse nature during the course of enquiry.

5. One of the important objectives of the present research was to study the perceptions of borrowers regarding the attitude of bank officials after the implementation of the NPA norms which mainly depended on primary data collected from members who are mostly illiterate and hence unaware of the practical relevance of NPA norms. So the precision of deductions is subject to the correct and reliable responses extended by the borrowers, which in turn depends on recapitulation of their memory. Hence, the study is not free from in-built biases. Though sufficient cross checks were incorporated in the survey schedules, even
then, chances of responses of the respondents based on their memory being correct and complete are very less.

6. The borrowers, especially irregular loanees were reluctant and hesitant in disclosing their actual repayment performance and factors responsible for their defaults during the course of opinion survey conducted by the researcher.

7. Due to non-availability of published data on NPAs in certain loan schemes, the data relevant for the present study has been collected personally from the selected banks through letters and circulars. Thus, the reliability of the collected data depends on the reliability of the source.

8. With the creation of Mohali as a separate district, The Ropar Central Cooperative Bank Limited has been bifurcated into two DCCBs i.e. DCCB Ropar and DCCB Mohali. As DCCB Mohali was carved out of The Ropar Central Cooperative Bank in the year 2007, this bank has not been considered for the present study.

9. The concept of NPAs (non performing assets) has been confined only to the study of non performing advances in the selected DCCBs due to resource and time constraints. However, the terms non performing assets and non performing advances have been used interchangeably in the present study.

10. The terms non-significant, insignificant and not significant used at different places in the present research work signify the same meaning.