CHAPTER – 3
RESEARCH METHODOLOGY

This chapter discusses the need, scope, objectives, chapter scheme and limitations of the current study. It further, explains the way in which the research work has been executed. The tools and methods used for data collection and analysis for obtaining the results have also been described.

3.1 NEED FOR THE STUDY

Commercial banking is a multi-product industry as it provides a variety of services. In the case of commercial banks, the measurement of performance is relatively more complex because of the increasing complexity of modern banking operations and growing involvement of banks in various types of specialized fields of lending and services. Periodical monitoring of the performance, both at micro and macro levels, which provides necessary feedback and triggers the process of corrective actions, is essential not only to ensure a steady progress towards the achievement of social objectives, but also to improve the operational efficiency and health of commercial banks. The evaluation of performance is an integral part of the planning and control system. Shareholders of a bank and bank management are particularly interested in the evaluation of the performance of a bank. Regulators are concerned about the safety and soundness of the banks and preservation of public confidence. Depositors, business community and the tax payers are all concerned about a banks’ performance since their prosperity as well as tax burden to finance, write offs and restructuring is linked to the success or sickness of their bank. Performance of a bank affects its standing among the banks and ability to access funds to meet its requirement at a reasonable cost. An investigation into the performance of commercial banks is likely to generate the necessary data in a desired form and quantity that may not only be useful to policy-makers and bank management alike, but also help in developing an integrated system of performance evaluation itself. For this purpose, banks are monitored through offsite as well as onsite inspections. Even though banking industry is under a strict control, there are lots of cases of bank failures worldwide.
The failure of Global Trust Bank is the latest example of mismanagement of Indian Banking. Therefore, different aspects of banks’ performance need to be studied deeply so as to enable the regulators, customers and stakeholders to improve the productivity and efficiency of the banks.

3.2 OBJECTIVES OF THE STUDY

The specific objectives of the study are as follows:
1. To analyze the evolution and growth of public and private sector banks in India.
2. To evaluate the overall performance of public and private sector banks with regard to branch expansion, deposits, credit, income and expenditure in banks.
3. To identify the emerging trends in profitability of public and private sector banks.
4. To analyze the productivity and efficiency of public and private sector banks on the basis of various productivity indicators.
5. To study the perception of bank officials regarding performance of banks.

3.3 CHAPTER SCHEME

The study has been organized into the following chapters:

1. Introduction
2. Review of Literature
3. Research Methodology
4. Operational Performance of Public and Private Sector Banks
5. Profitability of Public and Private Sector Banks
6. Productivity and Efficiency of Public and Private Sector Banks
7. Perception of Bank Officials Regarding Performance of Banks
8. Summary and Suggestions.

3.4 SCOPE OF THE STUDY

The present study attempts to evaluate the performance of public and private sector banks in India. It examines and compares the various aspects of performance of public and private sectors banks in India. Both primary and secondary data has been used for the purpose of this study. A time period of 19 years, i.e., 1992-2010 has been selected for
evaluating the operational and financial performance of public and private sector banks in India.

3.5 SAMPLE AND SOURCES OF SECONDARY DATA

There are 26 public sector banks (7 banks of State Bank of India group and 19 Nationalized banks) and 19 private sector banks (5 new private sector banks and 14 old private sector banks). New private sector banks include those which came into existence after liberalization reforms. Old private sector banks are those which were operating in the given sector before liberalization. The secondary data has been collected from various sources such as Statistical Tables relating to Banks on India, Trends and Progress of Banks in India, RBI Monthly Bulletin published by RBI, IBA Bulletins published by IBA, and annual reports of banks.

3.6 SAMPLE AND SOURCES OF PRIMARY DATA

The primary data, collected through a well-structured and pre-tested questionnaire, forms the basis to know the perception of 100 employees from both the public and private sector banks about the performance of these banks. The questionnaire has been developed after reviewing the existing literature. The preliminary draft of the questionnaire was pre-tested on 10 employees. This helped in improving the questionnaire and also gave an indication as to the kind of responses that would be forthcoming. With some deletions and additions, the final questionnaire was developed.

A sample of 10 banks, five each from public and private sector banks on the basis of their maximum amount in deposits and loans, has been selected. The banks from public sector include State Bank of India, Bank of Baroda, Punjab National Bank, Canara Bank and Bank of India. However, ICICI Bank, HDFC Bank, Axis Bank, Jammu & Kashmir Bank and IndusInd Bank represent the private sector. The study covered bank officials of various bank branches from districts of Amritsar, Bathinda, Jalandhar, Ludhiana and Patiala. The banks under study have maximum number of branches in these districts of Punjab. The study undertakes 25 branches each from both the public and private sector banks. Out of the total 50 bank branches, two employees from each branch were selected as respondents. The respondents were selected among the people working at different levels like branch managers, deputy managers, assistant managers and executives.
3.7 QUANTITATIVE TECHNIQUES USED FOR THE STUDY

Various statistical tools have been applied to analyse the secondary data. Mean, standard deviation, coefficient of variation, coefficient of concentration and exponential growth rate have been applied for assessing operational performance and profit performance. Regression analysis has been applied to study the effect of different variables on the profitability of the banks. Data Envelopment Analysis (DEA) has been used for measuring productivity of the banks.

Primary data collected through a questionnaire has been analysed with the help of various tools including simple percentages, cross tabulation, chi-square test, Kendall’s coefficient of concordance and Average Weighted Score. All statistical calculations have been made by the use of Microsoft Excel and Statistical Package for Social Science (SPSS) version 16. A brief description of all the tools used and the formulas is given as under:

1. **Descriptive Analysis**

   Measures of central tendency such as mean, standard deviation, coefficient of variation were worked out to study the nature and distribution of different variables. These are:

   (a) **Mean**

   Mean has been used to find the average of various items. The following formula has been used to calculate the arithmetic mean:

   $$\bar{X} = \frac{\sum X}{N}$$

   Where $\sum X = \text{Sum of all the values of the variable } X$, and

   $N = \text{Number of observations}$

   $$\bar{X} = \frac{\sum X}{N}$$

   (b) **Standard Deviation**

   Standard deviation measures the absolute dispersion or variability from the mean values. A small standard deviation implies a high degree of uniformity or homogeneity in the distribution or vice versa. The equation for the standard deviation is:
\[ \sigma = \sqrt{\frac{\sum x^2}{N}} \]

\[ x = (X - \bar{X}) \]

Where \( \sigma \) = standard deviation
\( \bar{X} \) = Actual Mean of Series
\( (X - \bar{X}) \) = Deviations of the Items from the Mean

\( N \) = Sample Size

(c) Coefficient of Variation

It is a relative measure of dispersion based on standard deviation. Coefficient of variation was used to test the consistency. There is inverse relationship between the coefficient of variation and consistency. More the value of coefficient of variation lesser is the consistency and vice versa. It is ascertained as follows:

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

Where \( C.V. \) = Coefficient of Variation
\( \sigma \) = Value of Standard Deviation, and
\( \bar{X} \) = Value of Mean

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

2. Exponential Growth Rate

Exponential growth rate reflects the strength of movement of any variable over the entire period covered by the study. The exponential function fits in as follows:

\[ Y = a b^x \]

This function when translated into logarithmic form, gives a log-linearity function:

\[ \log Y = \log a + x \log b \]
To obtain the value of constants ‘a’, ‘b’ the two normal equations to be solved are:

\[ \sum \log Y = N \log a + \log b \sum X \]  
\[ \sum (X \log Y) = \log a \sum X + \log b \sum X^2 \]  

Where, 
- \(a\) = y-intercept
- \(b\) = slope of the curve

When deviations are taken from the middle year then
\[ \sum x = 0 \]

The above equation takes the following form:

\[ \sum \log Y = N \log a \quad \text{and} \quad \sum (x \log Y) = \log b \sum x^2 \]

Therefore, 
\[ \log a = \frac{\sum \log Y}{N} \quad \text{and} \quad \log b = \frac{\sum (x \log Y)}{\sum x^2} \]

Antilog of \(\log b\) gives the value of \(b\). Growth rate is derived from this equation using the following association:

\[ b = 1 + r \]

Where, ‘\(r\)’ is the exponential growth rate.

**3. Step-wise Multiple Regression**

Regression analysis has been applied to study the relationship of independent variable with dependent variable. If there is only one dependent variable and one independent variable used to explain the variation in a dependent variable, then the model is known as simple regression. If multiple independent variables are used to explain the variation in a dependent variable, it is called multiple regression model. The following regression equation has been used for this purpose:

\[ Y = a + b_1x_1 + b_2x_2 + \ldots + b_nx_n + \epsilon \]

- \(Y\) = Dependent variable
- \(a\) = constant
- \(x_1, x_2, \ldots, x_n\) are independent variables
- \(b_1, b_2, \ldots, b_n\) are the coefficients of independent variables.
- \(\epsilon\) = error term

When all the independent variables are not of equal importance and the correlation among the independent variables is strong then step-wise multiple regression method has been frequently used. The method begins by entering into the model the variable that has the strongest positive or
negative correlation with the dependent variable and at each subsequent step at the variable with the strongest correlation are entered. In step-wise, at each step the variables are tested for removal.

4. Data Envelopment Analysis (DEA)

DEA is a multi-factor productivity analysis model for measuring the relative efficiencies of a homogeneous set of decision-making units (DMUs). The efficiency scores in the presence of multiple input and output factors are defined as:

\[
\text{Efficiency} = \frac{\text{Weighted sum of outputs}}{\text{Weighted sum of inputs}}
\]

The Data Envelopment Analysis (DEA) is widely used to measure the relative productivity of various financial institutions like banks, insurance companies, mutual funds, etc. The DEA is a non-parametric analysis, which optimizes each individual observation rather than optimizing a single equation. The DEA calculates the maximal performance measure for each unit relative to all other units in the observed population. It uses fractional linear programming to check out the hidden inefficient units that are otherwise invisible and that cannot be identified by traditional approaches. The DEA has a capacity to consider multiple inputs and outputs, and is a better measure to benchmark efficiency. It is particularly effective in analyzing the performance data of homogeneous units, customarily called the Decision Making Units (DMUs), which use multiple inputs to produce multiple outputs. In addition to measuring efficiency, it identifies reference units that can help to find out causes and remedies for inefficiency, which has a major advantage in managerial applications. In the case of banking industry, the DEA computes the productivity of a bank in relation to its peer group. It identifies the most efficient banks in a population and provides a measure of inefficiency for all others. Though DEA does not give a measure of optimal efficiency, yet it differentiates the least efficient banks from the set of all banks.

The resources used by a unit are called inputs, and the products or services produced are called outputs. In the present study, the following inputs and outputs are used.
Here, the input-oriented (CCR) DEA model to measure the productivity of banks was applied. Input-oriented method identifies the input reduction, which is necessary for efficiency, holding the output constant. It is assumed that the banks are operating at constant returns to scale. Here, the Efficiency Measurement System (EMS) software developed by Holger Scheel has been used for calculations.

\[
\begin{align*}
\text{Min } & \quad \theta, \lambda, s^+, s^- \quad Z_0 = \theta - \varepsilon \cdot 1 s^+ - \varepsilon \cdot 1 s^- \\
\text{s.t } & \quad Y \lambda - s^+ = Y_0 \\
& \quad \theta X_0 - X \lambda - s^- = 0 \\
& \quad \lambda, s^+, s^- \geq 0
\end{align*}
\]

The scalar variable is the proportional reduction applied to all inputs of the unit to improve efficiency. This reduction is applied simultaneously to all inputs and results in a radial movement towards the envelopment surface. The presence of Non-Archimedean \( \varepsilon \) in the primal objective function allows the minimization over \( \theta \) to pre-empt the optimization involving slacks. Thus, optimization can be computed in the two stage process with maximal reduction of inputs achieved. First via the optimal \( \theta^* \) then the second stage, movement onto the efficient frontier is achieved via the slack variables \( (s^+ \text{ and } s^-) \).

A unit is efficient if and only if the following two conditions are satisfied:

(a) \( \theta^* = 1 \)
(b) all slacks are zero

The non-zero slacks and the value of $\theta^* \leq 1$ identify the sources and the amount of inefficiencies that may be present.

5. **Average Weighted Score**

Average Weighted Score has been used to study the beneficiaries and employees preferences and views expressed in terms of ranks of preferences for different attributes relating to functioning of public and private sector banks in Punjab according to their degree of importance. Five-point Likert Scale has been selected to measure the extent of agreement, importance or degree of satisfaction. The range of scale is $-2$ to $+2$. Positive scores indicate agreement or satisfaction and negative scores indicate disagreement or dissatisfaction. The weighted average score has been calculated by assigning weights like $+2$ to highly satisfied, $+1$ to satisfied, 0 for neither satisfied nor dissatisfied, $-1$ to dissatisfied and $-2$ to highly dissatisfied. On the basis of frequency of ratings for each attribute, average weighted scores have been calculated with the help of the following formula:

$$W = \frac{\sum wfw}{\sum fw}$$

$W$ = Average weighted score  
$w$ = Weight given to the attribute  
$f$ = Number of respondents who attached weight to the attribute.

6. **Cross Tabulation**

It can be done by combining any of the two questions and tabulating the data together. It was carried to understand relationship between demographic variables of the respondents like age/sex, education/occupation, type of account/occupation, etc., and their perception regarding different attributes.

$$U = n_1 - n_2 + \frac{n_1 (n_1+1)-R_1}{2}$$

Where, $n_1$ and $n_2$ are the sample size; and $R_1$ is the sum of ranks assigned to the values of the first sample (In practice, whichever rank sum can be conveniently obtained is taken as $R_1$, since it is immaterial which sample is called the first sample.)
7. **T-test**

In order to measure the distinctiveness between two constructs, t-test has been carried out. The test statistics, ‘t’, is calculated from the sample data and then compared with its probable value based on t-distribution at a specified level of significance for concerning degrees of freedom for accepting or rejecting the null hypothesis.

\[
t = \frac{x_1 - x_2}{\sqrt{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}} \sqrt{\frac{n_1 + n_2 - 2}{n_1 n_2}} \cdot X \left( \frac{1}{n_1} + \frac{1}{n_2} \right)
\]

With d.f. = (n_1+n_2-2)

### 3.8 LIMITATIONS OF THE STUDY

Every research has certain limitations and this study is no exception. Sincere efforts have been made to make the present study as representative in its related area but still some limitations have been encountered which are as follows:

1. The responses for the study have been solicited from the state of Punjab only, which may vary from those of the rest of India.

2. The primary data in the study has been collected through a pre-designed questionnaire which carries all the limitations inherent with the primary data as perceptions of the respondents in the selected sample may be influenced by the knowledge, experience and attitude of individuals.

3. The basic limitation of possibility of difference between what is recorded and what is truth, no matter how carefully the interview has been conducted. The present study may also suffer from this limitation because the people might not have deliberately reported their true opinion due to some biasness as one of its objective is based upon primary data, perception of bank officials’ on performance of banks.
4. As the size of the population is very large, therefore, the sample has been drawn on convenience and judgement basis. So, the shortcomings inherent in this method of sampling may creep into the sample used in the study.

5. The secondary data based information collected for this study carries all the limitations inherent in such data.

6. The beneficiaries of only five districts were selected for the present study. As a result, the generalizations of the findings of the present research should be considered carefully.

7. Many structural changes have taken place in the Indian banking sector since 1992. Mergers and acquisitions held during the study period have been considered.