

CHAPTER -III

Research Design

Banking system remains focal point in the financial set up of any developing country. Banks are regarded as special in view of the specialised functions in the financial inter-mediations and payment system. In India, too, economic development has evolved around the banking system. Indian banking has made tremendous progress after independence. In 1969, when the 14 banks were nationalised which brought about paradigm change in the priorities of the banking sectors. The thrust of these banks was on the social aspect and to make banking services reach the masses that can be attributed as first banking revolution. Again in 1980 six more commercial banks were nationalised, further widening the sphere of operation of the PSB's. The period between 1985-90 was the phase of consolidation which marked slowed down branch expansion, special thrust on internal control and profitability through newer activities.

3.1 Need of the Study

Indian banking system has been subject to widespread structural reforms initiated since June 1991. This phase can be regarded as secondary banking regulation. In recent years the banking industry has been undergoing rapid changes, reflecting a number of underlining developments. The most significant has been the advances in communication and information technology, which has accelerated and broadened the dissemination of financial information, while lowering down the cost of many financial activities. A second key impetus for change has been the increasing competition among the broad range of domestic and foreign institutions in providing banking and related financial services. Third, financial activity has become larger, relative to overall economic activities. In most countries these developments have manifold consequences for the institutional and systematic structure of the financial sector in general and banking in particular. Directly issued securities are replacing bank's deposits as a vehicle for saving. Markets for risks have emerged in which exposure to specific market or credit risks can be bought and sold separately from the underlying financial assets. The service traditionally associated with banking is being offered by institutions normally characterized as banks. While banks have gradually made forays into nonbanking activities, merger and takeover of the smaller institution have led to the emergence of transactional conglomerates offering services ranging from traditional commercial banking to investment banking and insurance sector

Globalisation has brought in convergence of different activities and business in the banking sector. It has introduced newer technologies and techniques in areas like fund management and security creation. Innovative products are also resorted to in order to cater to the changing needs of the markets. New frontiers in the activities of the bank call for understanding and upgradation of skills in areas like risk management. In the absence of relevant laws to govern innovative products and activities the contracts between parties will play a vital role which calls for skills in the development of proper documentation.

21st century banking is going to be highly competitive and information technology driven networking of banks, remote access, ATM facilities etc., would transform the face of banking. Tele-banking and anytime, anywhere banking would no longer remain the monopoly of foreign and private sector banks. The security measures will have to be improved and changes in certain laws would become necessary. This would reduce the manpower and physical infrastructure requirements of the banks and they would be able to handle large volume of business with less manpower. The public sector banks have already operated for more than 32 years and seek appraisal of the commercial banks performance since nationalization. Because globalization liberalization and privatization, banking industry has gone in for many changes in the working operations. It is pertinent therefore to make a appraisal public sector banks both at micro and macro levels in the light of rapid changes in the banking sector.

In the review of literature it has been noted that there is a gap in reviewing the public sector banks particularly after the liberalization period, that is, from the year 1991-92 onwards. In addition, no serious research efforts have been made to examine critically the growth of various operational areas of banking and to review the relative performance of public sector banks. Taking into consideration all these aspects, a need has been felt for a systematic study to evaluate the performance of public sector banks in India specially in the post-liberalization period in terms of various performance indicators.

3.2 Scope of the Study

The present study is an attempt to analyse the performance of public sector banks in India in consonance with the objective of the present study. The performance evaluation of an organisation depends upon many factors such as nature of the problem, the type of an organisation and its objectives. The criteria of evaluation vary from one organisation to another. The performance evaluation criteria for a commercial undertaking with a profit motive cannot be applied to other service-rendering undertakings or public utilities, namely, public financial institutions, research institutions, educational institutions and banking industry, etc. In commercial banks, especially the public sector banks in India, for a variety of reasons profit cannot be the only indicator of performance evaluation. The banks have to perform according to the guidelines issued by the Reserve Bank of India from time to time. The banks also have to fulfil the other social obligations as per the policies of the Government regarding financial reforms as laid down in their budgets.

In recent years the banking industry has been undergoing rapid changes, reflecting a number of underlying developments. The monetary and credit policy statement of April 2001 focus on strengthening the financial system and improving the functioning of the various segment of the financial market. In April 2000, the Reserve Bank of India announced a transition to a full-fledged Liquidity Adjustment transfer? Facility (LAF) in three progressive stages. All these changes are to be implemented by the banks.

Keeping in view the role of the commercial banks in the new banking scenario, in line with the expectations of controlling and regulatory authorities of the country and to meet the social objectives specially by the public sector banks, profits or profitability cannot be considered as the sole criteria for measuring the performance of commercial banks.

In the present study, eight variables have been selected to assess the overall performance of banks which are: Deposits, Advances, Total Income, Total Profit, Working Fund, Net Interest Margin, Establishment Expenses, Total Expenditure. These variables are converted into indicators on the basis of Total number of Branches, and the Total number of Employees of a Bank. The ratio of

these performance indications are calculated over a time period for each bank along with two categories i.e. SBI Group and Nationalized Banks

- i) **Deposits:** Deposits are the lifeblood of banking industry accounting for about 98 per cent of bank liabilities. There are various factors which influence the mobilization and growth of deposits. The other activities of the banks are mainly dependent upon deposits and the growth of deposits. This is an indication of the confidence by depositors reposed in the banking sector.
- ii) **Advances:** The level of deposit is directly a function of the amount of credit intending by banks in the form of loans and investments. The efficiency of deposit mobilization should be matched with the corresponding efficiency in credit disbursement so that the resources for banks may not be unutilized. Hence, the assessment of advances is an important indicator for measuring the performance of banks.
- iii) **Income:** The main sources of income of a commercial banks are interest and discount on loan, dividend on investments, service charges on deposit accounts, service charges and fees on bank and other service charges. Hence Income is also an important indicator for measuring the performance of banks.
- iv) **Profit:** Profit is considered as one of the criteria for the measurement of performance of the business undertaking. After nationalization of banks in 1969 there has been a change in the objectives of banks. Commercial banks have to meet social obligations in terms of priority sector financing and DRI advances. The commercial banks specially the public sector banks are not run only for maximizing profits in the changed circumstances to accomplish social obligation objective. This does not however mean that there should not be profit motive at all. The commercial banks should earn sufficient profit for their growth, expansion and survival. Hence, there is a need to evaluate the performance of banks on the basis of profits.

- v) **Networking Fund:** The measurement of networking fund of commercial bank is vital to evaluate the performance of commercial banks. The net operating income is the excess of operating revenue over the expenditure incurred in connection with the bank's operation.
- vi) **Total Expenditure:** The component of bank's expenditure can be grouped into (i) Interest on deposits, (ii) Salaries, allowances, provident fund, bonus etc; and (iii) other expenses including stationery, depreciation and repairs and other overheads. Since, banking is a highly personalized service industry, the expenses of commercial banks are, to a large extent, fixed, particularly in a short period. Commercial banks need to reduce expenses in the long run by improving organizational structure, by departmentalization and by the introduction of data processing equipment to increase profitability.
- vii) **Establishment Expenses:** Establishment expenses in a commercial bank consist of salaries and allowances of officers and employees. The expenditure also includes other benefits, such as provident funds, bonus etc. The importance of this category of expenditure to banking industry depends upon the number of persons a bank employs for the efficient operation and the wage rate. Since banking is a service industry it is obvious that expenses item would increase because most of the services offered by it are of personal nature.
- viii) **Credit Deposit Ratio:** Credit deposit ratio is an important performance indicator to measure the efficiency of banks with regard to investing their funds. The ratio establishes the relationship between credit and deposit of commercial bank. It is the proportion of credit sanction by a bank to the aggregate deposit of that bank.
- ix) **Number of Branches:** The number of branches has been taken into consideration for measuring the operational efficiency of public sector banks in relation to the eight performance indicators discussed above. In the new banking policy, the Government and the Reserve Bank of India furnished

broad guidelines within which the banks were asked for branch expansion, deposit mobilization and credit dispensation. In 1969 a directive according to which a bank having 60 per cent or more of its offices in rural / semi-urban areas was eligible for opening one branch in the urban and metropolitan town for every two offices in rural / semi-urban areas. The total number of branches of public sector banks at the end of 2000-2001 was 48284.

- x) **Number of Employees:** Since, the working of the banks industry is to provide services to the public for their banking function, the employees of the bank play an important role in the performance of a bankwise performing their duties efficiently for providing the services to the customers. The efficient workers will naturally increase the efficiency in banking work. The number of employees in case of public sector banks at the end of year 2000-2001 was 7,97,811.

3.2.1 Objectives of the Study

The main objective of the present study is to evaluate the performance of the public sector banks in India. As has been felt in the need of the study, the performance of public sector banks is evaluated specially in the post-liberalization period of economic reforms in India. The broad objective has been further broken down into the following detailed objectives:

- (i) To study the operation efficiency of public sector banks in India in each year as well as over the time period of twelve years. The operational efficiency is measured with the performance indicators of banks selected for the study.
- (ii) To study the emerging trends in income expenditure and profitability pattern of public sector banks.
- (iii) To study the comparison between SBI group of banks and nationalized group of bank, the two constituent parts of public sector banks, in their operational efficiency and trends in income, expenditure and profitability pattern.

- (iv) To classify the banks on the basis of performance indicators over the time period of study
- (v) To find out the discriminant scores and cut of points for excellent, very good, poor and very poor category.

3.3 Sources of Data for the Present Study

The present study is mainly based on the secondary data which have been collected from different sources of the banks and the sources of information of data is as follows. -

- i) I.B A. Bulletin, Mumbai, March 2000, 2001, 2002
- ii) I.B A Bulletin, Mumbai, Monthly Journal, different issues.
- iii) Report on Trend and Progress of Banking in India, Reserve Bank of India, Mumbai 1999-2000 and 2000-02.
- iv) Report on Currency and Finance, Reserve Bank of India, Mumbai, different issues.
- v) Reports of Different Committees.
- vi) Economic Survey. Government of India, 1987 onwards

The data used in the analysis has been incorporated mainly from the IBA publications, different issues, to maintain consistency in the data.

3.4 Methodology

In the present study an attempt has been made to study the aforementioned objectives in the twenty-seven public sector banks. A research design is a plan according to which observations are made and data is assembled. For accomplishing the objectives of the study secondary data has been used which is collected from IBA publications. Mumbai.

The various statistical techniques have been used in the present study in order to provide more analytical results of the comparative data. The methods used to analyse the data are as follows:

- i) Mean average
- ii) Standard deviation and Co-efficient of variance
- iii) Exponential growth rate

- iv) Ratio analysis
- v) Rank Method
- vi) Normal distribution and Quartiles Method
- vii) Discriminant function

(i) Mean Average

The mean average of each series of different ratios has been obtained by adding together all the observations and dividing the total by the number of observations.

$$\bar{X} = \frac{\sum X_i = x_1 + x_2 + x_3 + \dots + x_n}{n}$$

where \bar{x} = mean value of variable

$\sum x_i$ = Summation of value of the i th item $x_i = 1, 2, 3, \dots, n$

n = total number of items

(ii) Standard Deviation and Co-efficient of Variance

Standard deviation measures the absolute dispersions or variability from the mean values. A small standard deviation implies a high degree of informality or homogeneity of the observation in the distribution or vice versa. Thus, if two or more than two comparable series have identical or nearly identical observations, the distribution is most representative of its mean value with its smallest value of standard deviation. The standard deviation is calculated as:

$$\sigma = \sqrt{\frac{\sum dx^2}{n}}$$

where σ = standard deviation

$\sum dx^2$ = square root of average of square of deviations from arithmetic means

n = number of observations

Co-efficient of variation has been used to measure the relative variation. It is used in such problems where variability of two or more than two series are compared. The series (or group) is said to be more variable or conversely less consistent, less uniform, less stable, less homogenous for which the co-efficient of variation is greater. On the other hand, the series of which co-efficient of variation

is less, is said to be less variable, or more consistent, more uniform, more stable or more homogenous. Co-efficient of variation is denoted by C.V. and is calculated as follows:

$$\text{C.V.} = \frac{\sigma_i}{\bar{x}_i}$$

Where \bar{x}_i is the mean value of i th indicator, and σ is the standard deviation of i th indicator and CV. stands for co-efficient of variation.

(iii) Exponential Growth Rate

For calculating the annual growth rate of above variables, the following equation is used:

$$Y = ab^t$$

$$\text{Log } Y = \text{Log } A + t \text{ Log } B$$

where Y	=	Indicator
A	=	Intercept on Y axis
B	=	Regression Co-efficient
G	=	B-1

(iv) Ratio Analysis

Ratio analysis is an important tool available to measure the performance of commercial banks. It is the process of determining and presenting in arithmetical terms the relationship between figures and groups of figures in financial statements. The financial ratios become meaningful in an assessment of the financial strength and other related aspects of the bank, when specially the trends in performance indicators are to be seen and analyzed.

In consonance to the objectives of present study the different ratios have been computed and interpreted mainly in two parts:-

1) Ratios to Measure the Operational Efficiency of Banks.

To measure the operational efficiency of banks seventeen ratios have been calculated on the basis of selected performance indicators of banking operation. The selected indicators for the study are Deposits, Advances, Income, Profits, Net Working Fund, Total Expenditure and Establishment Expenses. The ratios of these

indicators are calculated on the basis of number of branches and number of employees of the bank for the period under study. Credit deposit ratio has also been calculated for measuring the operational efficiency of banks. The measurement of these ratios with hypothesis are given as below:-

- i) **Deposit Per Branch (DPB):** Deposit per branch measures the efficiency of branch in relation to the deposits of the bank. The higher is the ratio the better is the performance of the banks in a year or over the years. The ratio is calculated as :

$$\text{DPB} = \frac{\text{Total deposits of the bank}}{\text{Total number of branches of the bank}}$$

- ii) **Advances Per Branch (APB):** The efficiency of deposit mobilization should be matched with the corresponding efficiency in credit disbursement so that the resource of the bank may not remain un-utilized. The efficiency of the bank can be judged with the advance per branch. The more is the ratio the better is the performance of the bank. It is calculated as:

$$\text{APB} = \frac{\text{Advance / Credit of the bank}}{\text{Number of branches of the bank}}$$

- iii) **Income Per Branch (IPB):** Income is an important indicator of the commercial banks. The total income of the bank is derived from the service rendered by it. The main sources of income are interest and discount on loans, dividend on investments and the other income components such as service charges on deposit accounts and fees in bank and other service charges. It is an important performance indicator. Income per branch measures the efficiency of a bank. It is measured as:

$$\text{IPB} = \frac{\text{Income of the bank}}{\text{Number of the branches of the bank}}$$

- iv) **Profit Per Branch (PPB):** Profit per branch is the ratio of total profits of a bank to total number of branches of the same bank. It is calculated as:

$$\text{PPB} = \frac{\text{Total profits of the banks}}{\text{Total number of branches of the bank}}$$

- v) **Net Working Fund Per Branch (NWFPB):** The measurement of net working fund of a commercial bank is vital by important to measure the performance of commercial banks. The net operating income is the excess of operating revenue over the expenditure incurred in connection with the bank's operation. It is measured as:

$$\text{NWFPB} = \frac{\text{Net Working Fund per branch of the Bank}}{\text{Number of the branches of the Banks}}$$

The higher the ratio the better would be the performance of Bank.

- vi) **Net Interest Margin Per Branch (NIMPB):** Higher ratio signifies good results. It is calculated as:

$$\text{NIMPB} = \frac{\text{Net Interest Margin per Branch of the Bank}}{\text{Number of branches of the bank}}$$

- vii) **Expenditure Per Branch (EPB):** Less ratio of expenditure per branch is always better performance indicator for a bank. The lesser is the ratio the better is the performance of bank. The expenditure per branch is calculated as:

$$\text{EPB} = \frac{\text{Expenditure of the Bank}}{\text{Number of branches of the Bank}}$$

- viii) **Establishment Expenses Per Branch (EPPB):** Establishment expenses per branch gives the ratio of establishment expenses to the number of branches. The lesser ratio for a bank is always preferable. The less ratio indicates the efficiency of a bank. The ratio is calculated as :

$$\text{EPPB} = \frac{\text{Establishment expenses per Branch of the Bank}}{\text{Number of branches of the Bank}}$$

- ix) **Credit Deposit Ratio (CDR):** Since this ratio depicts the efficiency of a bank, higher credit deposit ratio signifies better employment of resources of banks and vice-versa. The ratio is measured as:

$$\text{CDR} = \frac{\text{Credit of the Bank}}{\text{Deposit of the Bank}}$$

- x) **Deposit Per Employee (DPE):** The higher is the deposit per employee the better is the performance of a bank. It is calculated as:

$$\text{DPE} = \frac{\text{Deposits of the Bank}}{\text{Number of Employee of the Bank}}$$

- xi) **Advance Per Employee (APE):-** The ratio shows the relation between advance dispersed by the bank to and per employee of the bank. It is measured as:

$$\text{APE} = \frac{\text{Advance of the Bank}}{\text{Number of Employee of the Bank}}$$

- xii) **Income Per Employee (IPE) :** Higher income signifies better result. The higher is the income per employee the better it is. The ratio is calculated as:

$$\text{IPE} = \frac{\text{Income of the Bank}}{\text{Number of Employee of the Bank}}$$

- xiii) **Profit Per Employee (PPE):** It shows profit earned by per employee of the bank. The ratio measures the efficiency of employees. It is measured as:

$$\text{PPE} = \frac{\text{Profit of the Bank}}{\text{Number of Employee of the Bank}}$$

- xiv) **Net Working Fund Per Employee (NWFPE):** It shows the relationship between working fund loan employee of a bank showing the efficiency. It is calculated as:

$$\text{NWFPE} = \frac{\text{Net Working Fund of the Bank}}{\text{Number of Employee of the Bank}}$$

- xv) **Net Interest Margin Per Employee (NIMPE):** Higher net interest margin signifies better result of a bank. The higher is the net interest margin the better is the performance of a bank. It is measured as follows

$$\text{NIMPE} = \frac{\text{Net Interest Margin of the Bank}}{\text{Number of Employee of the Bank}}$$

- xvi) **Expenditure Per Employee (EPE):** It shows the relationship between expenditure and an employee of the bank. The lower is the ratio the better is the performance. It is calculated as:

$$\text{EPE} = \frac{\text{Expenditure of the Bank}}{\text{Number of Employee of the Bank}}$$

- xvii) **Establishment Expenses Per Employee (EEPE):** Lower ratio signifies better results of a bank. It is measured as:

$$\text{EEPE} = \frac{\text{Establishment Expenses of the Bank}}{\text{Number of Employee of the Bank}}$$

2) Ratios to measure the trend on Income, Expenditure and Profitability of Banks.

To measure the trend of the public sector banks under study for the period of twelve years, thirty one ratios are calculated on the three performance indicators viz, Income, Expenditure and Profits of public sector banks. The measurement of these ratios with hypothesis are as below:-

(A) Income Ratios:

- i. **Income to Total Advance:** Income is good indicator for the judging performance of public sector banks. The ratio measures the income of the bank in relation to total advances. Higher is the ratio better it would be performance of a bank:

$$\text{Income to Total Advance} = \frac{\text{Income of the Bank}}{\text{Total Advance of the Bank}}$$

- ii. **Income to Total Deposits:** Higher the deposits better is the performance. It is measured:

$$\text{Income to Total Deposit} = \frac{\text{Income of the Bank}}{\text{Total Deposits of the Bank}}$$

- iii. **Income to Establishment Expenses:** Since income is a good indicator for performance of the bank. The establishment expenses reduces the income. The ratio measures the proportion of income to establishment expenses. It is calculated as:

$$\text{Income to Establishment Expenses} = \frac{\text{Income of the Bank}}{\text{Establishment Expenses of the Bank}}$$

- iv. **Income to Net Interest Margin:** The ratio measures the income to net interest margin. It is measured as

$$\text{Income to Net Interest Margin} = \frac{\text{Income of the Bank}}{\text{Net Interest Margin of the Bank}}$$

- v. **Income to Net Interest Received:** The ratio shows the relation between income and net interest received. Higher is the ratio better is the performance of the bank. It is calculated as:

$$\text{Income to Net Interest Received} = \frac{\text{Income of the Bank}}{\text{Net Interest Received by the Bank}}$$

- vi. **Income to working fund:** The ratio indicates the proportion of Income to working fund. Higher is the ratio better it would be. It is measured as :

$$\text{Income to Working Fund} = \frac{\text{Income of the Bank}}{\text{Working Fund of the Bank}}$$

- vii. **Income to Total Assets:** The ratio expresses the relationship between the Income earned and the amount invested in the assets. It indicates the efficiency which the assets are used. Higher ratio signifies the better performance of the bank. It is calculated as:

$$\text{Income to Total Assets} = \frac{\text{Income of the Bank}}{\text{Total Asset of the Bank}}$$

- viii. **Income to Equity :** The ratio measures the relationship between income earned to the equity of a bank. Higher is the ratio better is the performance of a bank. Income is a good indicator. Income to equity ratio is calculated as:

$$\text{Income to equity} = \frac{\text{Income of the Bank}}{\text{Equity of the Bank}}$$

- ix. **Income to Total Advance:** Bank lending for medium and long term periods earns interest income. The ratio of income to total advance signifies the relationship between income to total advance. It is measured as:

$$\text{Income to Total Advance} = \frac{\text{Income of the Bank}}{\text{Total Advance of the Bank}}$$

- x. **Income to Total Deposits:** The ratio expresses the relationship between income to total deposits. Higher ratio signifies better results. It is measured as follows:

$$\text{Income to Total Deposits} = \frac{\text{Income of the Bank}}{\text{Total Deposit of the Bank}}$$

(B) Expenditure Ratios

- i. **Expenses to Total Advance:** Low expenses ratio is good indicator for judging the performance of a bank. Lower is the ratio, better it would be. It is calculated as:

$$\text{Expenses to Total Advance} = \frac{\text{Expenses of the Bank}}{\text{Total Advance of the Bank}}$$

- ii. **Expenses to Total Deposits:** The ratio of expenses to total deposits signifies that less is the ratio, better is the performance of a bank. It is calculated as:

$$\text{Expenses to Total Deposits} = \frac{\text{Expenses of the Bank}}{\text{Total Deposit of the Bank}}$$

- iii. **Expenses to Establishment Expenses:** Lower is the ratio, better is the performance of a bank. The ratio is expressed as:

$$\text{Expenses to Establishment Expenses} = \frac{\text{Expenses of the Bank}}{\text{Establishment Expenses of the Bank}}$$

- iv. **Expenses to Total Income:** This ratio gives the relationship between expenses to total income. It is calculated as:

$$\text{Expense to total income} = \frac{\text{Expenses of the Bank}}{\text{Total Income of the Bank}}$$

- v. **Expenses to Net Interest Margin:** It is the relationship between expenses to net interest margin. It is followed:

$$\text{Expenses to Net Interest Margin} = \frac{\text{Expenses of the Bank}}{\text{Net Interest Margin of the Bank}}$$

- vi. **Expenses to Interest Received:** The ratio shows that lower is the expenses of a bank better is its performance. It is calculated as.

$$\text{Expenses to Interest Received} = \frac{\text{Expenses of the Bank}}{\text{Net Interest Received of the Bank}}$$

- vii. **Expenses to Interest Paid:** The ratio shows the relationship between expenses and interest paid. It is measured as.

$$\text{Expenses to Interest Paid} = \frac{\text{Expenses of Bank}}{\text{Interest Paid of Bank}}$$

- viii. **Expenses to Working Fund:** Low expenses is a good indicator. The ratio is calculated as expenses to Working Fund of the Bank:

$$\text{Expenses to Working Fund} = \frac{\text{Expenses of the Bank}}{\text{Working Fund of the Bank}}$$

- ix. **Expenses to Total Assets:** The ratio measured the result of expenses to total asset lower is the ratio better is the performance of a bank It is calculated as

$$\text{Expenses to Total Asset} = \frac{\text{Expenses of the Bank}}{\text{Total Asset of the Bank}}$$

- x. **Expenses to Equity :** Low expenses is a good indicator for judging the performance of the bank. Lower ratio indicates better performance of a bank. It is measured as:

$$\text{Expenses to Equity} = \frac{\text{Expenses of the Bank}}{\text{Total Equity of the Bank}}$$

(C) ✓ **Profit Ratio**

- i. **Profit to Total Advances:** Higher profit is a good indicator in relation to advances The ratio of profit to total advance is calculated as:

$$\text{Profit to total advance} = \frac{\text{Profit of the Bank}}{\text{Total Advance of the Bank}}$$

- ii. **Profit to Total Deposits:** The ratio depicts the result of profit to total deposits. Higher is the ratio better is the performance of a bank. It is calculated as:

$$\text{Profit to total deposit} = \frac{\text{Profit of the Bank}}{\text{Total Deposit of the Bank}}$$

- iii. **Profit to Establishment Expenses:** The ratio of profit to establishment expenses measures how much amount is spent in establishment expenses which affects the profits. It is measured as:

$$\text{Profit to Establishment Expenses} = \frac{\text{Profit of the Bank}}{\text{Establishment Expenses of the Bank}}$$

- iv) **Profit to Total Income:** The ratio of profit to total income measures the relationship of profits to total income. It is calculated as follows:

$$\text{Profit to Total Income} = \frac{\text{Profit of the Bank}}{\text{Total Income of the Bank}}$$

- v. **Profit to Total Expenses:** This ratio signifies the result of profit to total expenses. Higher is the ratio better it would be. It is measured as:

$$\text{Profit to Total Expenses} = \frac{\text{Profit of the Bank}}{\text{Total Expenses of the Bank}}$$

- vi. **Profit to Interest Margin:** Higher profit is a good indicator. The ratio of profit to Interest Margin is calculated as follows:

$$\text{Profit to Interest Margin} = \frac{\text{Profit of the Bank}}{\text{Interest Margin of the Bank}}$$

- viii. **Profit to Interest Received:** Higher the ratio measures the proportion of interest received to the profits of a bank. Higher is the profit interest ratio better it is. It is measured as:

$$\text{Profit to Interest Received} = \frac{\text{Profit of the Bank}}{\text{Interest Received by the Bank}}$$

- ix. **Profit to Interest Paid:** It signifies the relationship between profit and interest paid. Higher profit is a good indicator. It is calculated as

$$\text{Profit to Interest Paid} = \frac{\text{Profit of the Bank}}{\text{Interest Paid of the Bank}}$$

- x. **Profit to Working Fund:** Higher profit is a good indicator. The higher ratio of profit to Working Fund measures good performance of a bank. It is calculated as:

$$\text{Profit to Working Fund} = \frac{\text{Profit of the Bank}}{\text{Working Fund of the Bank}}$$

- xi. **Profit to Total Assets:** It shows the relationship between profit to total asset. It is calculated as:

$$\text{Profit to Total Asset} = \frac{\text{Profit of the Bank}}{\text{Total Assets of the Bank}}$$

- xii. **Profit to Equity:** The ratio measures the relationship of profits to equity of a bank. Higher is the profit better is the performance of a bank. The ratio is measured as:

$$\text{Profit to Equity} = \frac{\text{Profit of the Bank}}{\text{Equity of the Bank}}$$

(v) Rank Method

The rank method has been used for the performance indicators (ratios) to analyse the operational efficiency and trend of scheduled commercial banks under study.

The ranks have been assigned from 1 to 27 for the ratios calculated for selected performance indicator with branches and employees to measure the operational efficiency of banks, the ranks have been assigned in the ascending order i.e. rank-1 is given to the highest value of the ratio and rank-27 is given to the lowest value of the ratio. The ratios calculated for Income, Expenditure and Profitability with other performance indicators, the ranks have also been assigned. The ranks in case of Income and Profitability ratios have been assigned in the ascending order. In case of expenditure ratios the ranks for 1 to 27 have been assigned in the descending order i.e. rank 27 is given to the highest value and rank-1 is assigned to the lowest value.

The bank wise mean ranks are computed for each ratio over a span of twelve years. Similarly bank wise mean ranks are also computed depicting overall performance of bank year wise.

(vi) Normal Distribution Curve

The absolute values of ratios of performance indicators does not give the proper indication to judge the trend and performance of banks over the time period of study 12 years and also between the banks in a year. Keeping this factor in view the ranks method has been used. The ranks are assigned to the twenty seven ratios calculated ranging from 1 to 27. The income and profitability ratios have been assigned rank in the descending order and the expenditure ratio has been assigned rank in the ascending order. The mean values and standard deviations of the ranks among of the study period of 12 years and among the banks year wise have been calculated. In order to find-out the performance of a bank in twelve years period of the study the normal distribution method has been applied to group the banks into four categories viz. excellent performed banks, above average performed banks, average performed banks and poor performed banks.

Quartiles Method

The year-wise performance of the banks has been analysed and interpreted as per the performance of predictor variables in the twelve year period of study with quartile values. The first quartile value (Q_1), mean value (\bar{x}) and third quartile (Q_3) are computed from the data. These values are calculated as:

$$Q_1 = \frac{n}{4}, \quad \bar{x} = \frac{\sum x}{n}, \quad Q_3 = \frac{3(n)}{4}$$

The year-wise performance of the bank as per the performance of predictor variables has been judged on quartile values. These values categorize the banks into excellent performed banks, above average performed banks, average performed banks and below performed banks. Where the ratio ranks score of the variable of the bank is above or equal to Q_3 , the performance of the bank is depicted excellent. The value of the variable if lies between \bar{x} and Q_3 the bank performed above average and the average banks performances evaluated when the rank value lies between Q_1 and \bar{x} and the poor performance of banks is judged, when the rank value is below Q_1 .

The excellent performed banks are those whose average mean score of the bank lies in the twenty five per cent extreme right side of the normal distribution curve. The calculated value of $z = \bar{X} \pm 0.6745\sigma$. The poor performed banks are those whose average mean score value lies in the twenty five per cent extreme left side of the normal distribution curve. It is based upon the value calculated as $z = \bar{x} - 0.6745\sigma$. The above average banks are grouped where their average mean score lies between \bar{x} and $\bar{x} + 0.6745\sigma$. The average category of the banks grouped under the category where the average mean score is below \bar{x} and above $\bar{x} - 0.6745\sigma$.

(vii) Discriminant Analysis

Discriminant analysis, first introduced by 'Ronald Fisher' is a statistical technique most commonly used to managerial sets of problems. The concept underlying discriminant analysis is fairly simple. Linear combination of independents also called predictor variables are formed and serve as the basis for classifying cases into one of the group. The discriminant function has been used in the present study to categorize the banks according to their performance of the predictor variables of the banks in each year. In this regard the mean ranks of a predictor variables of a banks has been classified as per normal distribution value 'z' i.e. $Z = \bar{x} \pm 0.6745\sigma$. The banks on the basis of 'z' score classify the banks into four categories i.e. excellent performed banks, above average performance banks, Average performance banks, and poor performance banks. From the linear discriminant function to be 'optimal' that is, to provide a classification rule that minimise the probability of misclassification, certain assumption above the data must be met. The discriminant function has been used to interpret the analysis as follows

i) Group Statistics:

Under the group statistics mean scores and standard deviation is determined for each variable within each group and in pooled data. The group is general trend to have different scores in each scale so that these variables have at least some ability to discriminate among the functions.

ii) **Pooled within-Group Canonical Correlation Matrix:**

Canonical correlation is a the measure of the degree of association between the discriminant scores and the groups. It is equal to eta from one-way analysis of the variance, in which the discriminant score is a dependent variable and group is the independent variables. The pooled within -group canonical correlation is a weighted average of the group covariance matrices. Eta is the ratio of the between groups sum of square to the total sum of squares.

iii) **Eigen values**

A 'good' discriminant function is one that has much between groups variability when compared to within groups variability. In fact, the co-efficients of the discriminant function are chosen so that the ratio of the between-groups sum of squares to the within group sum of squares is as large as possible is known as eigen values. The eigen value is calculated as:

$$\text{Eigen Value} = \frac{\text{Between groups sum of square}}{\text{Within group sum of square}}$$

iv) **Wilks's Lambda**

It is multivariate measure of group differences over reversal variables (the discriminating variables). Lambda is the ratio of within-groups sum of squares to the total sum of squares.

$$A = \frac{\text{Within groups sum of squares}}{\text{Total sum of square}}$$

Or

$$A = \prod_{i=k+1}^q \frac{1}{1+\lambda_i}$$

where k denotes the number of functions already derived, and the symbol \prod means that the individual terms are to be multiplied to yield the final product:

v) **Discriminant Scores**

The standardized and un-standardized discriminant function coefficients for the three function shall be derived from the predicted variables. All the variables passing the tolerance criteria are entered simultaneously. While the un-standardized coefficients.

The standardized co-efficient are used because we can use them to determine which variables contribute most in determining scores on the function. This is done by examining the magnitude of the standardized co-efficient (ignoring the sign). The larger the magnitude the greater is the variable contribution. The unstandardized coefficients we not used for interpretation since they provide misleading information when the meaning of unit change in the value of one unit do not the same from the variable to another.

The standardized coefficients are calculated as:

$$C_i = U_i \sqrt{\frac{W_{ii}}{n-g}}$$

C_i	=	Standardized co-efficient
U_i	=	Unstandardized co-efficients
W_{ii}	=	Sum of square of variables
n	=	Total number of cases
g	=	Number of groups

vi) Structure Coefficients

The structure coefficients can be calculated based on (i) total correlation, which is known as total structure coefficient (ii) pooled within groups correlation between discriminating variables and standardized canonical discriminant function. In the present analysis structure coefficient for pooled within group correlation has been interpreted. It is calculated as follows:

S_{ij}	=	$\frac{P}{k-1} \sum r'_{ik} c_{kj}$
S_{ij}	=	within groups structure co-efficient for variables i and function j
r'_{uk}	=	pooled within-groups correlation coefficient between variable i and k .
c_{kj}	=	standardized canonical discriminant function coefficient for variable k on function j

vi) **Mahalanobis Distance:**

Mahalanobis' distance, D^2 measures the statistical significance of difference between the two group (i.e. the highest group and the second highest group) Mahalanobis has given idea of separation based on predictor variables, assuming that the variable / covariance structure is identical for all the groups. The distance between of two groups is defined as:

$$D_{ij}^2 = (n-g) \sum_{i=1}^P \sum_{j=1}^P w_{ij} * (\bar{x}_i - \bar{x}_j) (\bar{x}_i - \bar{x}_j)$$

P = number of variables

x_a = is the mean for the i th variables in group a .

w_{ij} = is the element from the inverse of the within group covariance matrix

vi) **Case wise Statistics:**

To categorized individual banks into one of the predetermine groups on the basis of discriminant analysis, critical value (D_i) method has been used. For classification of banks to predetermined groups. The best discriminant function scores (D_i) for each item shall be computed with the discriminant function value which is calculated as:

$$D_i = b_1 x_1 + b_2 x_2 + \dots + b_k x_k$$

Where D_i is the discriminant score, $b_1 x_1$, $b_2 x_2$ and $b_k x_k$ are the discriminant values of predictor variables.

3.5 Limitation of the Study

Thus, the present study is confined to twelve years period, that is, from 1988-89 to 1999-2000, mainly the post-liberalization period in India. Taking into the consideration the objectives of the study and its coverage both in terms of time and span, the study is prone to certain limitations which have been discussed below:

- ❖ The present study evaluates the performance of the public sector banks taking into account seventeen performance indicators for measuring the performance of the banks under study. Although there are other numerous variables yet the researcher feels that these variables are the most appropriate for measuring the performance.

- ❖ The study concentrates only on analysis of quantitative financial data. The qualitative aspects of progress of banks in India have not been discussed. But while selecting the performance indicators, it has been kept in view to choose the indicators which directly or indirectly have the effect of qualitative aspects on quantitative performance indicators in measuring the performance of banks.
- ❖ The data used may be biased as it has been incorporated from the secondary source of information. The data used for calculating the ratios has been taken mainly from IBA bulletin published by Indian Bankers Association, Mumbai. Although there are other sources of information who report the data, yet from the point of view of consistency in the data the researcher has used IBA bulletin as the main source of information. The other journals have also been consulted and used for information purpose. The other journals like Report on Trends and Progress on Banking in India, Report on Currency and Finance and Statistical Data Relating to Banks, all published by Reserve Bank of India, Bombay, have also been referred to.
- ❖ There has been a lot of window-dressing in presenting the final accounts by the commercial banks. The data relating to various performance indicators, viz deposits and advances shoot up at the end of accounting year, because of the unscrupulous practices followed by the bank managers. The data as reported in the journals have been incorporated for analysis, which may not assess the proper performance of banks.

3.6 Format of Reporting

The format of reporting adopted for the present study consists of seven chapters. The first chapter discusses the banking business and its origin in India, growth of public sector banks, role of commercial banks in economic development and the banking sector reforms in the new millennium. The review of literature of the studies conducted in India and in west countries are reported in second chapter. Chapter third deals with the explanatory phase of the study, which carries out the need of the study, scope and objectives of the study and the methodology used to analyze and interpret the performance of public sector banks. Chapter fourth

measures the operational efficiency of public sector banks on the basis of seventeen ratios on the selected performance indicators. Trend in income, expenditure and profitability of public sector banks are analyzed in chapter five. The detailed discussion has been carried out in this part of the chapter and the classification of these banks have also been made on the basis of the overall performance of banks as per the performance indicators. Classification of banks using a discriminant analysis has been discussed in chapter sixth. Discriminant scores categorize the banks into different groups and on the basis of discriminant scores the banks are classified into different groups in the twelve years period using cut off points. Last chapter of the study i.e. Chapter-Seven depicts the findings and conclusions of the study.

Notes and References

1. A E. Beaton, *Statistical Methods for Computers for Social Sciences*, Reading, Pa; Addison –Wasley, 1968.
2. Amandeep , *Profit and profitability of India, Nationalized Banks*, Ph.D. Thesis, Punjab University, Chandigarh, 1990.
3. C.R. Kothari, *Research and Methodology*, Wishwa Prakashan, New Delhi, 1985.
4. D.F. Morrison, *Multivariate Statistical Methods*, New York: McGraw Hill 1967.
5. D J Kanvinde and S.G. Madman, *Definition of Deposits : Some Problems*, SBI Monthly Review, Vol 4. No. 4, April, 1966, p.136
6. M Y.Khand and B.K. Jain, *Management Accounts and Financial Management*, Tata Mcgraw Hill Publishing Company Ltd., New Delhi, 1998.
7. Norusis Marija, J. *SPSS / PC + Advanced Statistics* Michigan Avenue, Chicago, 1990.
8. Report on trend and Progress of Banking in India, RBI Publication, New Delhi, 1999-2000
9. Report on trend and progress of Banking in India, RBI Publication, New Delhi, 2000-2001.
10. Richard I Levin and David S Rubin, *Statistics for Management*, Prentice Hall of India, New Delhi, 1998
11. S R Bajpai, *Social Survey and Research*, Kitab Ghar, Acharyanagar Kanpur, 1993.
12. Van de Geer, *Introduction to Multivariate Analysis for Social Science*, W H. Freeman and Company, San Francisco, 1971.