Chapter -3

Research Methodology

3.1 Introduction

Research refers to a search for knowledge. Research can also be defined as a scientific and systematic search for pertinent information of a topic. Research is a part of scientific investigation. Redman and Mory defined research as a “systemized effort to gain new knowledge”. According to Clifford Woody research comprises defining and redefining problems, formulating hypothesis or suggested solutions; collecting, organizing and evaluating data; making deductions and reaching conclusions; and at last carefully testing the conclusions and determine whether they fit the formulating hypothesis.

There are many types of research. The major types are descriptive, analytical, fundamental, applied, quantitative, qualitative, conceptual, empirical research.

There are many techniques of data collection. Primary and secondary source of data are important tools of collecting data.

Primary data are those which are collected afresh and for the first time. It is original and care need to be taken while collecting the data keeping in mind the objective of the research.

Secondary data means data that are already being collected. When the secondary data is collected one has to look in to various sources from where the data can be obtained.

3.2 Research Problem

The commercial banks in India play a vital role in economic development. The business cycles have an impact on the macro economy and all sectors within it including banks. The impact of recent economic downturn reduced GDP growth from 9% to less than 5%

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in last couple of years. This study is an attempt to understand the performance of commercial banks during high growth years and low growth years. The importance of management decision making during different economic environment is of paramount importance. It is worth studying various ratios related to management efficiency, productivity and profitability during the high and low growth years. Indian economy grew at 8.7% per annum during 2004-08 along with high growth in saving and investment. The global financial crisis of October 2008 created down word pressure on the growth rate of Indian economy. The growth rate continued in 2010 and 2011 largely because of huge fiscal stimulus given by Indian government. In the last two years growth rate has substantially decelerated. Indian financial sector is dominated by banking industry which account for almost 60% of the total, the system which comprises of banks, insurance companies, mutual funds, non-banking financial companies, cooperatives, and other smaller financial entities. Bank assets as a percentage of GDP rose from 60% in 2001 to 93% by 2008-09, but after that it has averaged. Bank credit to GDP ratio rose from 24% to 52% during the same period, but in last 4 years it has stagnated. Banking sector in last 12 years has largely being dependent on the growth rate of GDP. The financial expansion has slowed down after financial crisis, but banking sector has shown resilience. There is some concern about the progress in banking such as NPAs, which declined from 12% in 2001 to 2.4% in 2007-08 it has again increased to 3.7% by 2012. The Net Interest Margin (NIM) has gone up showing deterioration in allocative efficiency. Bank’s credit composition has changed in recent years to more long term finances of infrastructure and housing. All these developments indicate that banking sector in recent years have faced daunting task of maintaining the high growth trajectory of 2004-08. The study will concentrate on major financial parameters commonly used by all banks to declare their performance year on year. The study will also have comparative analysis of performance of banks during these two periods i.e. 2002 to 2008 and 2009 to 2013.

3.3 Objectives of the study

1. To study the productivity, profitability, and readiness for the competition of commercial banks in India.
2. To examine the financial performance of selected banks during 2002-13
3. To assess major factor that impact the profitability of banks.

Considering the GDP growth rate, Credit off take, IIP numbers, Global GDP numbers, Export –Import data, the period between 2002 to 2013 can be broadly classified in two sections. The high growth years of 2002 to 2008 & recessionary phase from 2009 to 2013.

3.4 Hypothesis

The hypothesis is made on the basis of two distinct time periods of

1. High growth years: Prosperity Phase : 2002-2008
2. Low growth years: Recessionary Phase : 2009-2013

Group Level comparative study

1. H0: There is no significant difference in the performance of commercial banks on major parameters during the two phases of business cycle.

   H1: There is a significant difference in the performance of commercial banks on major parameters during the two phases of business cycle.

2. H0: There is no significant difference in the performance of commercial banks on CAMEL parameters during the two phases of business cycle.

   H1: There is a significant difference in the performance of commercial banks on CAMEL parameters during the two phases of business cycle.

3.5 Methodology- Sampling Technique and Data collection

The commercial banking in India has a history of more than 200 years. There are 173 banks reporting to RBI as on 31st March 2012. The analysis of performance of commercial banks is possible when selected on the basis of certain purpose. This study
is aimed at analyzing performance of banks on the backdrop of phase’s business cycle. To analyze performance of banks on the basis of business cycles’ impact, it is necessary to select pan India basis banks. The purposive sampling method is used and the fifteen banks have been selected on the basis of their national level presence. In order to have representation from all major types of banks the data collection is done for the selected five major banks each from, Nationalized Banks, New Private Sector Banks, and Foreign Sector banks. The banks are selected as top five banks from each type of banks on the basis of total assets of the banks. The data published by RBI has different unit of value during different time periods. The data is published in the unit of (Rs in Lacs till 2009, Rs in Cr from 2009 to 2012, and Rs in Million from 2013). The data is reworked as (Rs in Cr) for the entire time period of 2002 to 2013 to maintain parity in the analysis. These banks are as follows:

a) Nationalized Banks
   1. State Bank of India
   2. Punjab National Bank
   3. Bank of Baroda
   4. Bank of India
   5. Canara Bank

b) Private Sector Banks
   1. ICICI Bank
   2. HDFC Bank
   3. AXIS Bank
   4. Development Credit Bank
   5. IndusInd Bank

c) Foreign Sector Banks
   1. CITI Bank
   2. Standard Chartered Bank
   3. HSBC Bank
   4. Deutsche Bank
   5. DBS
Table No 4: Relative position of selected banks to total banking business in India. (Rs in Cr)

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Parameters</th>
<th>All banks aggregates 2011-12</th>
<th>Aggregate of 15 Banks</th>
<th>% of All Banks Aggregates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Deposits</td>
<td>6453664</td>
<td>3483226</td>
<td>53.97</td>
</tr>
<tr>
<td>2</td>
<td>Advances</td>
<td>5074579</td>
<td>2789607</td>
<td>54.97</td>
</tr>
<tr>
<td>3</td>
<td>No of Offices</td>
<td>83229</td>
<td>39256</td>
<td>47.16</td>
</tr>
<tr>
<td>4</td>
<td>No of Employees</td>
<td>1013390</td>
<td>560469</td>
<td>55.3</td>
</tr>
</tbody>
</table>

*Source: RBI, Profile of Banks.*

These banks together have more than 53% of Deposits and almost 55% Advances collected by all the banks in the year 2012, which are reporting to RBI. The conclusions made on the basis of this study can be applied to other banks as well.

The selected banks are analyzed on following parameters

1. Deposits generated
2. Advances disbursed
3. Total Income
4. Interest Income
5. Non-Interest Income
6. Profits earned
7. Cash Deposit ratio
8. Credit Deposit ratio
9. Business per employee
10. Profit per employee
11. CASA percentage year on year
12. Return on assets
13. Cost of deposits
14. Return on advances
15. Capital adequacy ratio  
16. CAR- Tier I  
17. CAR – Tier II  
18. Ratio of net NPA to net advances  
19. Ratio of term deposits to total deposits  
20. Ratio of secured advances to total advances  
21. Ratio of net interest margin to total assets  
22. Ratio of operating profits to total assets  
23. Return on equity  

The analysis will be done for 12 years i.e. 2002 to 2013 the period which has witnessed two major phases of business cycle. The secondary data has been compiled from statistical tables relating to banks, RBI bulletins, and CMIE reports, economic surveys of various years, IBA Bulletins, reports on currency and finance, Prajnan, abhigyan, agenda and proceeding of state level bankers committees, and other published resources.  

**Factor analysis- Trend Analysis:**  
Trend analysis becomes imperative to evaluate the overall profits and profitability performance of commercial banks. It clearly indicates the magnitude and direction of operations observe a period of time; it also helps to identify certain banks in respect of their level of efficiency in operations. It shows the trend pattern in order to identify the historical development. The study attempts to assess the profits and profitability of banks, through trend analysis of the following parameters:  
1. Advances  
2. Deposits  
3. Total Assets  
4. Expenditure  
5. Spread  
6. Burden  
7. Income  
8. Net Profit
3.6 Statistical Techniques

The statistical techniques are used to analyze the data. Arithmetic Mean, standard deviation, coefficient of variation is applied to find out financial performance of banks. The Microsoft Excel and SPSS tools are used for the analysis.

Arithmetic mean

\[ X = \frac{\text{Sum } X}{N} \]

Where \( X \) = sum of all the values of the variable X and,

\( N \) = Number of observations

Standard deviation

Standard deviation calculates the absolute dispersion or variability from the mean values. When mean deviation is divided by the average used in finding out the mean deviation itself, the resulting quantity is described as the coefficient of mean deviation. Coefficient of mean deviation is a relative measure of dispersion and is comparable to similar measure of other series.\(^2\)

Standard deviation (\( \sigma \)):

\[
\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^{N} (x_i - \mu)^2 }
\]  

...(1)

The data is calculated in two parts

1. Absolute values (in lacs and cr)
2. Ratios are calculated wherever needed

The data is analyzed on the basis of two time periods, each consisting of five years. The arithmetic mean is calculated for each time period and the two mean values are compared with a standard two sample T test.

Statistical Methods

Sample t-tests

One sample t-test:

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\(^2\) C R Kothari, "Research Methodology" (2009) New Age publication, New Delhi
It is used to make inferences about the population mean based on data from a random sample.

T-statistic is defined as:

\[
t = \frac{\bar{x} - \mu}{s} \times \sqrt{n}
\] ...(2)

Where

\(\bar{x}\) : The mean of the sample

\(\mu\) : The actual or hypothetical mean of the population

\(n\) : the sample size

\(s\) : the standard deviation of the sample calculated by the formula

\[
s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}
\] ...(3)

Two sample t-test:

It is used to make inferences about the difference between two population means based on data from two independent random samples.

T-statistic is defined as:

\[
t = \frac{\bar{x}_1 - \bar{x}_2}{s} \times \sqrt{\frac{n_1n_2}{n_1+n_2}}
\] ...(4)

Where

\(\bar{x}_1\) : The mean of the first sample

\(\bar{x}_2\) : The mean of the second sample

\(n_1\) : The number of observations in the first sample

\(n_2\) : The number of observations in the second sample
s: the combined standard deviation calculated by the formula

\[ s = \sqrt{\frac{\sum (x_1 - \bar{x}_1)^2 + \sum (x_2 - \bar{x}_2)^2}{n_1 + n_2 - 2}} \]  

...(5)

Factor Analysis

Factor analysis is used to identify underlying items or factors that explain the pattern of correlations and extent of variance explained within a set of observed variables. Here, all sets of interdependent relationships are examined without making the distinction between dependent and independent variables.

The factor analysis model in matrix notation is as below-

\[ X - \mu = L \times F + \epsilon \]

\[(p \times 1) \quad (p \times m) \quad (m \times 1) \quad (p \times 1) \]  

...(6)

Where \( X \) is the observable random vector with \( p \) components, mean vector \( \mu \) and covariance matrix \( \Sigma \).

\( X \) is linearly dependent upon a few unobservable random variables \( F_1, F_2, \ldots, F_m \) called common factors, and \( p \) additional sources of variation \( \epsilon_1, \epsilon_2, \ldots, \epsilon_p \) called uniqueness/specific factors or errors. \( F & \epsilon \) are independent. Matrix \( L \) is the matrix of factor loadings \( lij \) which is loading of the \( i \)th variable on \( j \)th factor.

KMO and Bartlett's tests-

The Kaiser-Meyer-Olkin measure of sampling adequacy, tests if the partial correlations among items are small; whereas Bartlett's test of sphericity tests whether the correlation matrix is an identity matrix. Both these tests help in checking the appropriateness of the factor model.

Principal components method of data reduction-
Principal component analysis is a method of factor extraction where linear combinations of variables are formed. The first principal component is the combination of variables or items that account for the largest amount of variance in the sample. The second principal component accounts for the next largest amount of variance in the sample and is not correlated with the first component; and so on.

Factor loadings-

Matrix of loadings represents the correlations between variables and factors.

Rotation-

Rotation is the transformation of the initial loadings matrix into one that can be interpreted. The most commonly used method is the varimax rotation.

Eigen value-It is a variance associated with a factor.

Uniqueness- It is specific variance of each variable.

Factor scores-These are the estimated values of the common factors for each item/observation.

Assumptions

For the F-test, we have assumed that the underlying variables follow a normal distribution under null hypothesis H0.

In case of t-test, in addition to normality assumption, an additional assumption made is that the two populations have equal variances.

Another assumption for both of these tests is that two samples are drawn from independent and identically distributed populations under H0.

For factor analysis it has been assumed that variables follow a multivariate normal distribution. Any variable with eigenvalue less than one is not considered as a unique factor. Hence factor analysis is limited to the extent of variation explained by these many unique factors.
Hypothesis testing
Mean of the population can be tested in different situations. Population normal, population finite, sample size small and variance of the population unknown, and hypothesis may be one sided or two sided

Two techniques are used in analyzing the performance of selected banks

1. CAMEL Method
2. Factor analysis- Principle Component Analysis

3.7 Chapter Scheme

The Thesis is divided in the following chapters

Chapter 1: Introduction to Banking Business in India

Chapter 2: Indian Economy: An Overview

Chapter 3: Research Methodology

Chapter 4: Review of Literature and Conceptual Framework

Chapter 5: Data Presentation – CAMEL

Chapter 6: Data Presentation II- Principle Component Analysis

Chapter 7: Interpretation of Financial Performance of Banks

Individual Banks

Banks on Group Level

Chapter 8: Finding & Hypothesis Testing & Conclusion