CHAPTER 4

RESEARCH METHODOLOGY

Introduction

Research methodology is a way to systematically solve the research problems. It refers to controlled investigation of the way of obtaining, organizing and analyzing data. This chapter deals with the methodology used by the researcher to assess customer perception on the effect of delivery channel implementation on customer services of banks. The study also examines the staff perception of delivery channels. It also strives to find out the impact of delivery channels on profitability of sample banks in Pune city.

Research methodology includes the description of the research design, population, sampling technique, sample size, inclusion and exclusion criteria, pilot study, data gathering process and plan for data analysis adopted by the researcher.

The following objectives and hypotheses have been formulated for the current research.

4.1 Objectives of the Study

1. to examine and document the present status and prospects of services offered through delivery channels by sample banks,

2. to analyse the customers behaviour based on their needs and socio-economic-educational parameters towards services offered through delivery channels,

3. to evaluate impact of such services on customers from efficiency, accuracy, cost effectiveness, user friendly nature point of view, and on profitability of Banks.
4. to analyse the factors responsible for success/failures across selected banks in the implementation of services through delivery channels.

4.2 Hypotheses

1. Banks prefer to offer services through different delivery channels over traditional methods in order to cope up with the pace of modernization.
2. Customers with better socio-economic and educational backgrounds prefer to utilize services offered by Banks through different delivery channels.
3. The services offered through new delivery channels are helpful in achieving accuracy, and saving in money, time, and efforts.

4.3 Scope of the Study

The study is restricted to the technology-enabled (electronic) banking Channels such as Automated Teller Machine (ATM), Internet banking, and Mobile banking. The services offered through these channels are deemed to be self services as customers themselves produce the service without the direct involvement of bank employees. These electronic delivery channels provided by banks are considered in this study. Cross comparison has also been done to study the impact of electronic delivery channels on customer services and profitability of sample banks. The study is confined to retail banking customers of selected Public Sector Bank, Private sector bank and Co-operative bank. The geographical area of the study is confined to Pune city. The study will also throw light on usage patterns, customer and staff perceptions of electronic delivery channels, problems faced by staff and customers while using electronic delivery channels. The suggestions of customers and staff will also help to formulate better strategies for bankers.
4.4 **Significance of the study**

Banking worldwide is undergoing transformation due to adoption of new technology, especially IT which has not remained an option but a matter of survival. Banks now look at IT as an enabler and a force-multiplier for business, acting as a springboard to quickly launch new products and services. In the era of modernization the banking and financial services industry was redefined as “trading on information related to customer, money, market and risk” in 1990s and this led to the symbiotic relationship between the financial sector and Information Technology. Emergence of new products and services of IT such as data warehousing, business intelligence, and customer relationship management aided financial institutions to innovate new products and services in financial sector with in-built risk analysis capabilities. Provisions of multi-channel capabilities enabled IT such as core banking, internet banking, telephone banking, ATMs network, mobile banking, e-commerce made financial sector more competitive. Costs of transactions reduced, positioning themselves in market for new and small sized institutions became feasible. Security and safety started receiving due recognition from both vendors of IT on one hand and banks on the other addressing concerns of end-users.

Indian banking landscape (comprising nationalized, private and co-operative banks) is also experiencing the same phenomenon. However, rate of adoption of new technologies among different players of Indian Banking varies greatly owing to number of reasons. Obviously banks from private sector are doing excellent while co-operative banks still remained as laggards.

This is one side of the coin of Indian banking transition, while the other side is customer’s requirement which in fact transformed the banking business scenario from market-driven entity to a customer driven one. Educated upper-class citizens, who enjoy a higher standard of living, with increased
earning power and disposable savings, neo-upper middle class, and young technology-savvy generation with higher income profile will further drive demand for outstanding customer service an integral part of any product to be purchased. The features of “good customer service” for customers would include no long waits in lines, a friendly attitude of bank employees, quick services, fast attention to customers, new suggestion from the bank to serve customers to name a few. Thus, a good service paradigm for banks is to create a swift and enjoyable experience for customers. Besides efficient and satisfactory services to customers, increased competition, product standardization, pressure to cut costs and avoid hi-tech fraud are the common agendas for the successful management of banks.

At a given scenario, banking services offered through new delivery channels by various banks depends on number of factors. Customer base and their needs, cost effectiveness, efficiency with accuracy, additional cost and returns, security, need for transformation in global demands, etc. are few factors to list. While on the other hand from customer’s point of view, factors like need for such services, convenience, savings in time, money and energy, customer-friendly utilities, education, income level, etc. determines their performance for a specific bank as well as such services.

In the context of these limitations and future scope for offering services through delivery channels in Indian Banking, in depth/critical analytical study is to be carried out.

4.5 **Methodology**

4.5.1 **Research Approach**

The choice of research approach constitutes one of the major decisions which should be taken in conducting a research study. Research approach is a systemic, objective method of discovery with empirical evidence and
rigorous control. The control is achieved by holding conditions constant and varying only the phenomenon under study.

4.5.2 Research Design

The research design is the backbone or the structure of the study. It provides a framework that supports the study and holds it together. The research design helps the researcher in the selection of subjects for observation, and determines the type of analysis to be used to interpret the data. The selection of the research design depends upon the purpose of the study and the conditions under which the study is conducted.

4.5.3 Research Process

An introductory letter addressed to the Managing Directors/General Managers of all Public Sector banks and New Private Sector Banks in the country and Co-operative banks having delivery channels operating in Pune was prepared and sent to avail permission so that their bank could be considered as a sample bank for this research study. Personal visit was made to banks located in Pune for the same purpose. Despite all these efforts only Bank of Baroda which is a PSB, Axis Bank which is a New Private Sector Bank and Thane Janata Sahakari Bank Ltd., Thane which is a Co-operative Bank gave their consent. All three sample banks were requested to provide copies of Annual Reports for five years i.e. from 2006-07 to 2010-11. A request was also made to the banks to indicate names of few branches in Pune city to enable collection of primary data from customers and officers and to discuss any other information required for the purpose of this research study. An assurance was also given in the letter that the information provided would be used for academic purposes. Profitability ratios are downloaded from Axis Bank and Bank of Baroda website, while they were provided by the Thane Janata Sahakari Bank Ltd. Some ratios were calculated based on data from the Annual Reports. Secondary data pertaining to implementation
of delivery channels and other relevant information was taken from the Annual Reports FY 2006-07 to 2010-11 of all three sample banks.

4.5.4 Sample design

Study area [1]

Pune has strong and diversified economic structure, which centers on auto industry, agro-based industry, education (Oxford of east), and emerging and growing IT sector. Being one of the largest cities in India, and as a result of many colleges and universities, Pune is a prominent location for IT and manufacturing companies. Pune has the seventh largest metropolitan economy and the sixth highest per capita income in the country.

Pune is socio-economically and industrially the most progressive city, not only in Maharashtra but also in India. Pune has all types of banks operating viz. PSBs, Old and New Private sector banks, Co-operative banks. For the purpose of this study, Pune city covers PMC and PCMC areas.

Sample size determination of selected banks [2] [3]

Sample size refers to the number of data to be gathered for the research study from the given population. This research study strives to find out the impact of delivery channels on customer services and profitability across selected sample banks. Misra (2011), analyses the performance of NPBs which has been useful for the purpose of this research work in considering New Private Bank as a part of the comparative study. New Private Banks (NPBs) were given licenses in mid-1990’s with a pre-condition that all their operations will be fully automated at inception. These are known as “New Generation tech-savvy banks”. Old Private Banks (OPBs) were encouraged by technology driven operations of NPBs. OPBs moved to CBS and internet banking in due course of time. NPBs have a pan India presence and overseas presence hence they operate in India and Overseas. NPBs derive 2.4 percent deposits and have 3.6 percent investments and 12.5 percent advances outside
India. Whereas OPBs have a small scale and limited geographical spread of their operations and cover only few states in India. Therefore, new private banks were selected for the purpose of this study.

There were 28 PSU Banks, 8 New Private Sector banks as on March 2008 which form population of the study. The list of all these banks is available on the RBI website. In the same year there were 1770 Urban Co-operative Banks. Koundal (2012), in his research paper confirms the same statistics.

UCBs occupy an important role in Indian financial system and play a very important role in the sustainable development of India. UCBs have helped to develop various sectors like education, health, agriculture and rural development, Small Scale Industries, retail business etc. UCBs account for the total banking business (deposit plus advances) of Rs. 1,35,104 crores in 2011. UCBs are functioning in urban and semi-urban areas. Therefore, the researcher feels that a comparison of Private, PSB and Co-operative banks, being major players in the Indian banking sector will bear fruitful results.

The Indian banking landscape consists of three sectors viz. Private sector, public sector and Co-operative sector. To make the sample representative, all three sectors were chosen by selecting one bank form each sector. For the present study foreign banks were not considered as they do not do mass banking and have their presence in metros and semi-metros, unlike the PSBs, NPBs and Co-operative banks.

To represent each sector, convenience sampling was used to select one bank, sector wise. Hence, the study considers three sample banks viz. Bank of Baroda representing the PSB banks, Axis Bank representing the new private banks and Thane Janata Sahakari Bank Ltd., Thane, representing the Urban Co-operative Banks (UCBs).
The sample banks were selected based on the fact that all three sample banks had implemented delivery channels like ATM, Internet banking, Mobile Banking etc. Bank managements of all three sample banks were kind enough to permit the researcher to undertake the study and showed their willingness to share data where ever possible. Further, the corporate offices of all new private sector banks were located out of Pune city; hence it was decided to select sample banks having branches operating in Pune city. In sum, banks having branches operating in Pune city within PMC and PCMC limits and having implemented electronic delivery channels like ATM, Internet Banking etc. were selected as sample banks.

The branches were allotted by the sample banks for data collection. Table 4.1 shows the bank wise branches considered for this research study:

<table>
<thead>
<tr>
<th>SN</th>
<th>Bank</th>
<th>Branch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Axis Bank (Private Bank)</td>
<td>Bund Garden</td>
</tr>
<tr>
<td>2</td>
<td>Bank of Baroda (PSB Bank)</td>
<td>SB Road, Baner Road, Kothrud</td>
</tr>
<tr>
<td>3</td>
<td>Thane Janata Sahakari Bank Ltd. (Co-operative Bank)</td>
<td>Deccan Gymkhana, Chinchwad, Dehu Road</td>
</tr>
</tbody>
</table>

Source : Field work

Sample size determination for collection of primary data from customers and bank staff

Selecting an appropriate sample size is critical aspect in research with particular reference to this study. Since the customers are so many, a uniform group of 225 bank customers (respondents) for each sample bank is convincing enough as a true representative and this was considered for the purpose of the study. Sample size of 225 customers and 30 staff is in conformity with Roscoe’s (1975) rule of thumb, sample size between 30 and 500 being sufficient and for the purpose of a sample for this study. This has
been confirmed in another study by Moya (2010). Sample size is also in conformity with Sekaran (1975) that sample sizes larger than 30 and less than 500 are appropriate for most research.

Thus, the research takes 675 customers who are uniformly divided between three sample banks to understand the customer views / perceptions. The research studies the views of the bank staff with respect to the impact of delivery channels on customer services. Table 4.2 shows the details of sample selected with respect to customers and staff.

Table 4.2: Sample size for research study

<table>
<thead>
<tr>
<th>SN</th>
<th>Bank</th>
<th>No. of customers</th>
<th>No. of staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Axis - Bund Garden Branch</td>
<td>225</td>
<td>30</td>
</tr>
<tr>
<td>2</td>
<td>Bank of Baroda</td>
<td>225</td>
<td>08</td>
</tr>
<tr>
<td></td>
<td>SB Road</td>
<td></td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>Baner Road</td>
<td></td>
<td>05</td>
</tr>
<tr>
<td></td>
<td>Kothrud</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Thane Janata Sahakari Bank</td>
<td>225</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Ltd.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deccan Gymkhana</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Chinchwad</td>
<td></td>
<td>07</td>
</tr>
<tr>
<td></td>
<td>Dehu Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>675</td>
<td>90</td>
</tr>
</tbody>
</table>

Source: Field work

30 staff across rank and file per selected bank were selected for the purpose of this study. 30 staff were selected as samples from Axis Bank, Bund Garden Road Branch, 8 staff from Bank of Baroda Aundh branch, 17 staff from SB Road branch and 5 staff from Kothrud branch. Similarly, 12 staff were selected from Deccan Gymkhana branch, 11 staff from Chinchwad branch and 7 staff from Dehu Road Branch of TJSB. Thus, 90 staff were selected as samples across three sample banks. Hence, the final sample of the proposed study was 765 (675 customers + 90 staff). While, sample size for selection of sample banks was based on convenience sampling, the sample branches were allotted by the sample banks for collection of data.

Customers from branches of sample banks in Pune city were selected on simple random basis on the basis of utilization of services offered through
delivery channels like ATM, Internet Banking, Mobile Banking etc. while staff from branches having implemented delivery channels were selected purposively.

**Inclusion criteria of respondent**

- Customers who are using atleast one delivery channel.
- Customers who are transacting banking business through branches of selected banks operating in Pune city.
- Staff working in the branches allotted by sample banks.

**Exclusion criteria of respondents**

- Customers and staff who are not willing to participate in the study

4.5.5 **Sources of data**

This research study is based on primary as well as secondary data. The primary data are sourced in form of questionnaires, interviews of the bank customers and branch staff. Data are gathered by researcher using the structured questionnaire and by interviewing branch staff belonging to sample banks. This direct input in form of customer and bank staff voice brings in conceptual clarity.

As regards the secondary data source, bank profiles, implementation of IT and delivery channels, profitability ratios are extracted from Annual Reports and other relevant documents as well as from the internet. To make the information more meaningful, data is collected for the Financial years 2006-07, 2007-08, 2008-09, 2009-10, 2010-11 (five years). More weightage was allocated to the implementation of delivery channels like ATM, Internet Banking and Mobile Banking and its impact on customer services. Secondary data are sourced from comprehensive study of magazines, journals, newspapers, periodicals, articles, websites etc. For the purpose, many libraries of reputed institutions such as Jayakar Library in University
of Poona, Vaikunth Mehta National Institute of Co-operative Management (VAMNICOM), Pune, College of Agricultural Banking (CAB), Pune, National Institute of Bank Management (NIBM), Pune etc. have been consulted. Further, publications and press notes were collected from the web site of Reserve Bank of India, National Payments Corporation of India (NCPI), National Federation of Urban Banks, Indian Bankers Association, etc. Various thesis, research papers, books, articles etc. on the subject of e-delivery channels, customer services in banks, profitability of Indian banks etc. have also been referred from different sites.

4.5.6 **Research Instrument**

**Questionnaire design**

“Questionnaire enlists questions, which translate the research objectives into specific questions. The major issues on which questions may be concerned are facts, opinions, attitudes, respondent’s motivation and their level of acquaintance with a research problem. By and large, questions can be classified into two general categories namely, a. factual questions and b. opinion and attitude questions”. [6]

‘Specially structured schedules (SSS)’ specifically designed for data collection have been utilized to collect the required primary data from the selected respondents.

The research study group includes:

- All customers of sample banks in Pune city using atleast one delivery channel.
- Branch staff from sample banks operating in Pune city to understand their views and impact of delivery channels on their workload, efficiency etc.
The researcher interviewed customers and branch staff individually and questionnaires were filled.

**Customer Questionnaire**

Customer questionnaire was prepared to collect information in three parts. In the first part, demographic details such as name of bank for which respondent is customer and factual details of respondent such as age, sex, social category, education, annual income, occupation was collected. In the second part, opinion and attitude questions were framed. Some questions were closed ended questions, some were open ended questions and rating questions. In the third part, customers views/suggestions/opinion or relevant information regarding the delivery channel used with respect to operational aspects, financial aspects, technical aspects was collected.

**Branch staff Questionnaire**

The branch staff questionnaire was prepared to collect the views of branch staff with respect to their views on implementation of delivery channels on customer services and impact on their workload, efficiency etc. The questionnaire was divided into three parts to collect relevant information from branch staff. The first part contained factual questions to ascertain details of respondents such as designation, age, sex, education etc. The second part contained opinion and attitude questions some of which were close ended and some were multiple choice questions. The last part of the questionnaire contained open ended type of question for respondent to give his/her views/suggestions/opinion or relevant information regarding the impact of implementation of delivery channel, adding value to this research study by making known views of the bank staff.

**Testing of questionnaire**

The draft questionnaire was prepared after detailed discussions with bankers from nationalized, private and co-operative banks. It was also discussed with
research guide and colleagues. Their valuable views and suggestions were incorporated in the questionnaires to make it more meaningful. To determine the effectiveness of the questionnaire, pilot testing was felt necessary to help determine the strengths and weaknesses of the questionnaire. A sample of 100 responses were obtained, coded, and analyzed. After pilot testing, questions that did not provide useful data were discarded, and the final revisions of the questionnaire were made. Samples were gathered by filling the questionnaires from bank customers and bank staff during February 2010 to July 2011. The researcher considered all customers of sample banks operating in Pune city using at least one delivery channel like ATM, Mobile Banking, Internet banking etc.

The finalized questionnaire for bank customers and bank officers is enclosed in Annexure 1.1 & 1.2.

4.5.7 Time period of study

For analyzing the performance of sample banks selected for the purpose of this study, the time period from 2006-07 to 2010-11 was fixed.

4.5.8 Statistical Tools for data analysis

To complete the research process the use of statistical tools and techniques are required. Statistical tools help in analyzing the data and in drawing conclusions and findings from the gathered data. The large volume of data requires to be coded accurately and can be analysed effectively. Researcher has used MS-Excel software for cross-tabulations, correlation analysis, Chi-square testing, Weighted Average Score, Garret Ranking etc. Bar charts, column charts, pie charts etc. have been prepared using MS-Excel. Line charts along with exponential trend line was prepared using MS-Excel. Researcher has used several statistical tools during data analysis each of which is discussed below:
i. **Percentage**
Ratios are very often expressed as percentages. In the calculation of percentages also, one figure is taken as a base and is represented by 100. A percentage is a part of a whole. It can take on values between 0 (none of the whole) and 100 (all of the whole).

ii. **Valid Percent**
Data can be invalid for different reasons. The valid percent is the proportion of sample that is valid. Valid percent is a variation of the percentage column, it recalculates without including the missing cases.

iii. **Cumulative Percentage**
Cumulative percent is calculated by adding the percentage of any data that comes before the current data. Cumulative percent cannot be greater than 100 percent. Cumulative percent considers only current data but not any outside data set.

iv. **Coefficient of Correlation**[^7]
The correlation coefficient is a numerical measure of the strength of the relationship between two random variables. The value of the correlation coefficient varies from -1 to 1. A positive value means that the two variables under consideration have a positive linear relationship (i.e., an increase in one corresponds to an increase in the other) and are said to be positively correlated. A negative value indicates that the variables considered have a negative linear relationship (i.e. an increase in one corresponds to a decrease in the other) and are said to be negatively correlated. The closer the value is to +1 or -1, the stronger the degree of linear dependence.

v. **Growth rates**[^8]
A special form of central tendency presentation is growth rates.
A growth rate shows the percentage change from one period to another / the next or the average change over number of periods.

- **One period growth rate**

For calculation of the growth rate for one period a simple percentage methodology is appropriate. One period growth rate is also known as simple growth or percentage change.

To calculate one period growth rate, starting number is subtracted from the final number and result is divided by the starting number. Result is then multiplied by 100 to show percentage as shown in equation:

\[
Pct change = \frac{(Ending Value - Beginning Value)}{Beginning Value} \times 100
\]

One period growth rate is used on all kinds of data to measure growth in economic indicators like GDP, population growth etc.

- **Compound average growth rate**

A compounding growth rate derives the average growth over a period. To compute the average growth, the values at the start (0) and at the end (t) are the only values used. The compounding growth is generalization of the one period growth rate. A word compound means that growth accumulates like interest every year while calculating compound average growth rate (CAGR). It is calculated by dividing ending value by beginning value. Result is raised to the power one upon number of years and value is subtracted and multiplied with 100 to show CAGR percentage as shown in the equation

\[
(\frac{Ending Value}{Beginning Value})^{\frac{1}{NumberOfYears}} - 1
\]

The compounding growth rate is used when averaging growth, interest and rate of return over the discrete periods. Most economic phenomena are measured only at the intervals (month, quarter or year) for which compounding growth rate is appropriate. Compounding growth rates do not take into account intermediate values of the series.
• **Exponential Growth Rate**

If the frequency of compounding is considered to be continuous, the growth is called exponential. Exponential growth rate is calculated as shown in equation

\[ r = \frac{\ln(X_t) - \ln(X_i)}{(t-i)} \]

While compounding growth rates are used to measure average growth for discrete data/periods, the exponential growth rate is used for continuous data.

vi. **Trend Analysis**

Trend analysis finds out and examines systematic historical patterns in quantitative data like financial statements. Trend analysis indicates the magnitude and direction of operations over a period of time. It highlights the trend pattern to identify the historical developments and helps to identify organizations in respect of their level of efficiency in operations. Trends analysis usually involves choosing on fiscal period as a base period and then expressing subsequent quantities as a percentage of the data associated with the base period. In case of an income statement, changes in all items could be assessed in relation to the base period. Significant changes can then be investigated further. Trend analysis can be performed to determine changes in the number of physical units as well as amounts. Trend analysis is widely used for financial analysis as it is easily understood and it helps to detect significant variations over time. However, trend analysis does not provide too much information on causes for variations and is influenced by the choice of the base fiscal year.

vii. **Ratios**

In financial analysis, ratios are used as an index or yardstick for evaluating the financial position or performance of an entity. The easiest way to evaluate the performance of an entity is to compare its current ratios with past ratios. Another way for comparison is to compare ratios of two entities.
viii. Average Working Funds (AWF)

The funds at the beginning and at the close of an accounting year or at times worked out as fortnight or monthly average. It is sum total of Balance Sheet items minus contra items. Generally, monthly average figures of balance sheet items are considered. However, outstanding figures at the end of the year is not taken for calculation.

ix. Operating Profit

The profit earned from a firm's normal core business operations. This value does not include any profit earned from the firm's investments (such as earnings from firms in which the company has partial interest) and the effects of interest and taxes. Also known as "earnings before interest and tax" (EBIT).

Formula to calculate Operating Profit is

\[ \text{Operating Revenue} - \text{Operating Expenses} \]

x. Net Profit \[^9\]

Often referred to as the bottom line, net profit is calculated by subtracting a firm’s total expenses from total revenue, thus showing what the company has earned (or lost) in a given period of time (usually one year). Also called net income or net earnings. An increasing or higher trend in Net Profit is desirable.

Formula for calculation of Net profit is

\[ \text{Net Profit} = \text{Total revenue} - \text{Total expenses} \]

xi. Interest Spread

It is the difference between the interest income and interest expended as a percentage of total assets. This is also called Net Interest Margin which
decides the profitability of the organization. Increase in net interest margin is always good for the bank.

xii. Profitability Ratios \[^{10}\]

The profitability ratios are used to measure how well a business is performing in terms of profit. The profitability ratios are considered to be the basic bank financial ratios. In other words, the profitability ratios give the various scales to measure the success of the firm. The profitability ratios can also be defined as the financial measurement that evaluates the capacity of a business to produce yield against the expenses and costs of business over a particular time period.

➢ Interest Income / Average Working Funds Ratio

Interest income is the sum total of discount, interest from loans, advances and investment and from balance with the RBI and other interest flows. This ratio is expressed as a percentage and it shows a bank’s ability to leverage its average total resources in enhancing its main stream of operational interest income.

Formula to calculate Interest Income/AWF is

\[
\frac{Total\ Interest\ income}{Average\ Working\ Funds} \times 100
\]

➢ Interest Expenses / Average Working Funds Ratio

The Interest-Expense ratio intimates the amount of gross income that is being spent to pay the interest on borrowed money. Interest-Expense ratio is measured as a percentage, the lower the percentage the stronger the ratio.

Formula for calculating Interest Expenses/AWF is

\[
\frac{Total\ interest\ expenses}{Average\ Working\ Funds} \times 100
\]
Non-interest income / Average Working Funds Ratio \(^{[11]}\)

Non-interest income is other income of a bank. It includes items such as exchange commission, brokerage, gains on sale and revaluation of investments and fixed assets and profits from exchange transactions.

This ratio denotes a bank’s ability to earn from non-conventional sources. In a liberalized environment, this ratio assumes significance. For, it mirrors a bank’s ability to take full advantage of its operational freedom.

Formula to calculate Non – Interest Income is

\[
\frac{\text{Non – Interest Income}}{\text{Average Working Funds}} \times 100
\]

Net Interest Margin / Average Working Funds Ratio \(^{[12]} [13] [14]\)

Net interest margins (NIMs) is the difference between interest income and interest expense is known as net interest income. It is the income, which the bank earns from its core business of lending. As such, NIM is the net margin earned by the bank on its average earning assets. These assets comprises of advances, investments, balance with the RBI and money at call.

The proportion of low costs deposits (on which the bank pays interest) has a lot to do with this ratio. Particularly because banks that have been able to sustain or improve the proportion of low costs deposits would be able to garner higher NIMs. Low costs deposits are deposits in the form of current accounts and savings accounts (CASA).

Formula to calculate Net Interest Margin / Average Working Funds is

\[
\frac{\text{Total interest earned} - \text{total interest paid}}{\text{Average Interest Earning Assets}} \times 100
\]
Cost to Income Ratio

The cost/income ratio is an efficiency measure similar to operating margin. Unlike the operating margin, lower is better. The cost income ratio is most commonly used in the financial sector.

It is useful to measure how costs are changing compared to income - for example, if a bank's interest income is rising but costs are rising at a higher rate looking at changes in this ratio will highlight the fact.

The cost income ratio, defined by operating expenses divided by operating income, can be used for benchmarking by the bank when reviewing its operational efficiency.

Formula for calculating Cost Income Ratio is

\[ \frac{Operating\ expenses}{Total\ income\ generated} \times 100 \]

The lower the ratio, the better it is for a bank as it would help prop up its profit and return ratios.

Return on Net Worth

The net worth ratio states the return that shareholders could receive on their investment in a company, if all of the profit earned were to be passed through directly to them. Thus, the ratio is developed from the perspective of the shareholder, not the company, and is used to analyze investor returns. The ratio is useful as a measure of how well a company is utilizing the shareholder investment to create returns for them, and can be used for comparison purposes with competitors in the same industry.

Formula to calculate the Net Worth ratio is
Return on Assets ratio \textsuperscript{[16]}

The return on assets ratio provides a standard for evaluating how efficiently financial management employs the average funds invested in the bank’s assets, whether the funds came from investors or creditors.

Formula to calculate Return on Assets is

\[
\text{Return on Assets} = \frac{\text{Net Profit before taxes}}{\text{Total assets}} \times 100
\]

A low return on assets ratio indicates that the earnings are low for the amount of assets. The return on assets ratio measures how efficiently profits are being generated from the assets employed. A low return on assets ratio compared to industry averages indicates inefficient use of business assets.

Productivity Ratios

Business Per Employee

Business per employee shows the productivity of human force of bank. It is used as a tool to measure the efficiency of employees of a bank in generating business for the bank. Higher the ratio, the better it is for the bank.

Formula to calculate Business per Employee is

\[
\frac{\text{Total business}}{\text{Total number of employees}} \times 100
\]
Net Profit Per Employee

Net Profit per employee shows the productivity of human force of bank. It is used as a tool to measure the efficiency of employees of a bank in generating Net profit for the bank. Net Profit per employee shows the surplus earned per employee. Higher the ratio, the better it is for the bank

Formula to calculate Net Profit per employee is

\[
\frac{\text{Profit after tax}}{\text{Total number of employees}} \times 100
\]

Business Per Branch \[17\]

Business per Branch shows the productivity of human force of bank. It is used as a tool to measure the efficiency of employees of a bank in generating business per branch. Higher the ratio, the better it is for the bank.

Formula to calculate Business per branch is

\[
\frac{\text{Total Deposits + total advances}}{\text{Total number of employees}} \times 100
\]

xiv. Chi – Square test \[18\]

Karl Pearson in 1900 developed a non-parametric test for testing the significance of the discrepancy between experimental (observed) frequencies and the theoretical frequencies (expected) obtained under some theory or hypothesis. Chi-square is an important non-parametric test and as such no rigid assumptions are necessary in respect of the type of population. Only the degrees of freedom are required for using the test.

The formula to calculate the degree of freedom is

\[
d.f = (\text{No. of rows} – 1) (\text{No. of columns} – 1)
\]
As a non-parametric test, chi-square can be used as a test of goodness fit and as a test of independence.

In case the chi-square test is a test of goodness fit, the calculated value of \( X^2 \) is less than the table value at a certain level of significance, the fit is considered to be a good one which means that the divergence between the observed and expected frequencies is attributable to fluctuations of sampling. But if the calculated value \( X^2 \) is greater than its table value, the fit is not considered to be a good one.

In case the chi-square test is a test of independence, \( X^2 \) test enables us to explain whether or not two attributes are associated. If the calculated value of \( X^2 \) is less than the table value at a certain level of significance for given degrees of freedom, it is concluded that null hypothesis which means that two attributes are independent or not associated. But if the calculated value \( X^2 \) is greater than its table value, the inference then would be that null hypothesis does not hold good which means that two attributes are associated and that the association is not because of some chance factor but it exists in reality. \( X^2 \) is a technique of judging the significance of such association or relationship between two attributes.

\[
X^2 \text{ is calculated as } X^2 = \sum (O_{ij} - E_{ij})^2 / E_{ij}
\]

Where,
\( O_{ij} \) = observed frequency of the cell in the \( i \)th row and \( j \)th column
\( E_{ij} \) = observed frequency of the cell in the \( i \)th row and \( j \)th column

**Conditions for application of \( X^2 \) test**

The chi-square test can be validly applied if the following conditions are satisfied:

- The observations recorded are collected on a random basis.
- The sample observations should be independent, i.e., no individual item should be included twice or more in the samples.
The total number of observations should be reasonably large, say N > 50.
The data should be expressed in original units for convenience of comparison and the given distribution should never replaced by relative frequencies or proportions.
Small theoretical frequencies should be avoided while calculating $X^2$.

xv. **Weighted Average Score**

A weighted average is an average in which one element may contribute more heavily to the final result than another element. The numerical scores (5- SA to 1-SDS) as assigned are considered as weights of the satisfaction and a Weighted Average Score (WAS) for each aspect is calculated in order to know the aspects contributing towards satisfaction or dissatisfaction of customers (customer perception). To calculate the Weighted Average Score the following formula was used:

$$
Weighted \text{ Sum} = \sum [Weights \times Frequency]
$$

$$
Weighted \text{ Average Score} = Weighted \text{ Sum} \div N
$$

xvi. **Garrett’s ranking technique** [19]

To find out the most significant factor which influences the respondent, Garrett’s ranking technique was used. As per this method, respondents were asked to assign the rank for all factors and the outcome of such ranking were converted into score value with the help of the following formula:

$$
Percent \text{ Position} = 100 \left( \frac{R_{ij} - 0.5}{N_j} \right)
$$

Where,
$R_{ij} = $ Rank given for the $i$th variable by $j$th respondents
$N_j = $ Number of variable ranked by $j$th respondents

With the help of Garrett’s Table, the percent position estimated is converted into scores. For factor X the total score is calculated by multiplying the number of respondents ranking that factor as 1,2,3,..... by their respective
table values. Mean score is calculated by dividing the total score by the number of respondents. The factors having highest mean value is considered to be the most important factor.

**Likert Scale technique** [20]

Most frequently used summated scales in the study of social attitudes follow the pattern devised by Likert. For this reason they are often referred to as Likert-type scale. In a Likert scale, the respondent is asked to respond to each of the statements in terms of several degrees, usually five degrees (but at times 3 or 7 may also be used) of agreement or disagreement.

Likert scales are developed by utilizing the item analysis approach wherein a particular item is evaluated on the basis of how well it discriminates between those people whose total score is high and those whose score is low. Those items or statements that best meet this sort of discrimination test are included in the final instrument. Thus, summated scales consist of a number of statements which express either a favourable or unfavorable attitude towards the given object to which the respondent is asked to react. The respondent indicates his agreement or disagreement with each statement in the instrument. Each response is given a numerical score, indicating its favorableness or unfavourableness, and the scores are totalled to measure the respondent’s attitude. In other words, the overall score represents the respondent’s position on the continuum of favourable-unfavourableness towards an issue.

The Likert scale has several advantages.

- Relatively easy to construct the Likert-type scale in comparison to Thurstone-type scale.
- Likert scale is considered more reliable because under it respondents answer each statement included in the instrument.
- Each statement, included in the Likert scale, is given an empirical test for discriminating ability and as such Likert scale can easily be used in
respondent-centered and stimulus centered studies i.e., through it can be studied how responses differ between people and how responses differ between stimuli.

- Likert scale takes much less time to construct.

There are several limitations of Likert scale as follows:

- Simply we can examine whether respondents are more or less favourable to a topic, but it is not possible to tell how much more or less they are.
- There is no basis of belief that the five positions indicated on the scale are equally spaced. The interval between ‘strongly agree’ and ‘agree’ may not be equal to the interval between “agree” “and undecided”.
- The total score of an individual respondent has little clear meaning since a given total score can be secured by a variety of answer patterns.

Despite these limitations, the Likert-type summated scales are regarded as the most useful in a situation wherein it is possible to compare the respondent’s score with a distribution of scores from some well defined group.

4.6 **Limitations of the study**

1. Customer services refer to retail customer services only.
2. Banking delivery channels cover electronic channels such as ATM, Mobile banking and Internet Banking.
3. Mobile banking does not cover Mobile-Internet Banking.
4. Only quantitative aspects of profitability have been considered.
5. Despite best efforts the researcher could not collect data pertaining to cost aspects of delivery channels and number of transactions in the study period for sample banks.
6. It is assumed that respondents are true and honest in expressing their views and have filled the questionnaire honestly and without any bias.
Conclusion

In this chapter the methodology to carry out this research study has been discussed in detail. The research design and sample selection criteria which form the very basis of research methodology were discussed thread bare. The limitations have been listed out. Though this study deals with three sample banks, the findings will be useful to other banks as well to chalk out strategies to improve customer service and profitability.
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