Chapter 1
Introduction

- Introduction
- Statement of the Research Problem
- Objectives of the Study
- Scope of the Study
- Significance of the Study
- Conceptual Model of the Study
- Variable List of the Study
- Operational Definition of the Terms
- Hypotheses
- Research Methodology
- Tools Used for Data Analysis
- Organisation of Thesis
- Limitations of the Study
- Conclusion
Chapter 1

Introduction

“Innovation is everyone’s responsibility, not just R&Ds”
- Albert Einstein

1.1 Introduction

The Indian banking sector has emerged as one of the strongest drivers of India’s economic growth. Banks are not just the storehouse of the country’s wealth, but are reservoirs of resources necessary for economic development. The financial development in Indian banking industry occurred after the nationalisation of fourteen major scheduled banks in July, 1969 and another six in April, 1980. With the nationalisation of banks, the focus changed from class banking to mass banking and wholesale banking to retail banking. This also enabled balanced geographical growth of banks, especially in rural areas and small towns, which accounted for the majority of the population.

In the 1990s, the banking sector in India placed greater emphasis on technology and innovation. Ever since, financial innovation has become the driver of the Indian banking business. The revolutionary impact brought in Indian banking sector through financial innovation is irresistible. Financial innovation enhances choices to the customers and creates new markets for banks. It has enabled banks to conceive, deliver, manage and integrate their products in line with the customers’ need. The effective use of technology has a multiplier effect on growth and development. Financial innovations helped banks to reach the doorsteps of the customer by overcoming the limitations on geographical reach in branch banking.

Indian banks deployed technology based solutions to raise revenue, enhance customer experience, optimise cost structure and manage organisation risk. In future, innovations will make the banks more multi-dimensional and continue to develop and expand banking services. Experts view on Indian banking is that this sector could become the fifth largest banking system in the world by 2020 and the third largest by 2025.
1.1.1 Concept of Financial Innovation

The word “Innovate” is defined in *Webster’s Collegiate Dictionary* as “to introduce as or as if new, with the root of the word deriving from the Latin word “Novus” or new. Broadly speaking, financial innovation is “the act of creating and then popularizing new financial instruments as well as new financial technologies, institutions and markets” (Reuben, 2012). Financial innovation promotes the efficiency of financial intermediation by reducing transaction cost and risks, and as such brings about widening, deepening and integration of the financial sector (Bhatt, 1989). Innovation includes the act of invention and diffusion although in point of fact these two are related as most financial innovations are evolutionary adaptation of prior products. Financial Innovation means to exploit new ideas which will lead to the creation of new product, process and technology. It is not just the creation of a new idea that is important, but it is actually bringing it to market, putting into practice and exploiting it in a manner that leads to new products, process or technology that add value or improve quality. Innovation also means exploiting new technology and employing out of the box thinking to generate new value and to bring about significant changes in society.

1.1.2 Innovations in Banking

Innovation in banking is said to be a process, hence banks focus should be on output of the whole process involved in innovation. It is appropriate for banks to know the ways to create something different and capture value from bringing those ideas to customers, existing and potential. Organizations in the service industry have to focus on ways of spotting where and how new products can be created and offered to customers (Reuben, 2012). Product, Process, Market, Technology and Organisation are the five dimensions of financial innovations in the service industry. Banking industry should focus on the dimensions which can explore opportunities for innovations. Banking innovations should be capable of improving the performance of banks and the satisfaction of customers.

As innovation in banking is a continuous process and is focused on the needs of the customers, some major principles should be considered that will enhance the process of innovation. The basic one is to know the needs and wants of customers.
Any new and improved product the banks offer should be based on the needs of customers. At the same time, innovation should be unique and based on a strategy that will help the banks to attain competitive advantage. Radical and Incremental factors should also be considered in the innovation process. Radical factors involve the factors which help the banks in doing something different from what customers are used to and Incremental factors are the factors that aid the bank in offering already existing services to customers in better ways.

1.2 Statement of the Research Problem

In customizing the transactions for their customers, banking companies spend a lot of resources in terms of time, money and efforts in bringing out a new financial product or innovation. In the present day economic scenario, financial innovations have become a major factor in influencing customers. Banking companies focuses mainly on technological innovations which will offer better banking products and processes. To restore customer confidence banks will need to focus on products, process and technology most relevant to current customer needs. Now the banks are being challenged to provide innovations which are creative and cost effective. Banks should not only concentrate on spending money to develop new products, but also must spend the time to redesign existing products which can satisfy customer’s basic financial needs.

Innovation helps the banks to achieve competitive advantage. Banks approach innovation in its broadest sense, including new products, technologies and new ways or process of doing things. Financial innovations involve large spending, time, treasure and talent. Does it generate value for customers and create competitive advantage for the banking company is a problem to be explored. Hopefully, the study will provide in depth knowledge about financial innovations and their effect on customers and the selected firm.
The study specifically tries to answer the research questions like

1. What is the status of financial innovations taking place in the banking sector?
2. What impact innovations have made in the banking sector?
3. What is the attitude of customers towards financial innovations in the banking sector?
4. What are the effects these innovations have produced for these firms’ financial health?
5. What is the effect of financial innovation on customer satisfaction?

1.3 Objectives of the Study

The main objectives of the study are:
1. To identify the status of financial innovation in the Indian banking sector.
2. To analyse the effect of financial innovations on the financial performance of banks.
3. To examine the customer’s perception on financial innovation in terms of awareness, usage and satisfaction.
4. To assess the dimensions of the customer satisfaction in the banking sector.
5. To measure the effect of financial innovation on customer satisfaction.

1.4 Scope of the Study

The scope of the study is confined to the financial innovations in selected banks, two each from public and private sector. State Bank of India and Canara bank are the banks selected from public sector and the federal bank and HDFC bank are the private sector banks selected for the study. The respondents of the study are limited to the customers of the State of Kerala. Only individual customers having frequent banking transactions were considered. The study focused on the dimensions of financial innovations and dimensions of customer satisfaction. A model is proposed to analyse the effect of financial innovation on customer satisfaction. The study attempts to analyse the effect of financial innovation on financial performance. Only two demographic variables which are important in the context of the study were used for the analysis.
1.5 **Significance of the Study**

Commercial banks have played an important role in giving direction to economic development by serving the financial needs of the trade and industry in the country. By encouraging thrift among the people, commercial banks have fastened the process of capital formation. Banks draw the community savings into the organized sector which can then be allotted among the different economic activities according to the priorities laid down by planning authorities in the country. The banks are not only the safe deposit vaults for these savings, but taking the banking system as a whole; they also create deposits in the process of their lending operations. However, the important function of a banker is the provision of convenient machinery by which people can make payments to each other without having to walk round each other’s house with bags of coins. Since 1992-93, the structure of the Indian banking system has undergone several changes in terms of scope, opportunities and operational buoyancy etc. The commercial banks have been facing much competition in the intermediation process from term lending institutions, non-banking intermediaries, chit funds and the capital market. To compete with them efficiently, the commercial banks have been permitted to undertake new activities like investment banking, securities trading, insurance business etc, on a selective basis at par with the competitors. Besides, various new banking services like ATM and internet banking have been emerged due to the advancement of computers and information technology.

The success of economic growth of a country mainly depends on the effective performance of banks. Indian capital market is highly dependent on the growth and prosperity of banking sector. Therefore, it is high time to evaluate the effect of financial innovation on the financial performance of Indian banking companies and on the customers. In view of this, the subject of the study is gaining more importance and the outcome of the study will be useful to the policy makers, banks, customers and other stakeholders.
1.6 Conceptual Model of the Study

Fig 1.1: Conceptual Model of the Study
1.7 Variable List of the Study

1.7.1 Dimensions of Financial Innovation

1. Product Innovation

Product Innovation is defined as “the development of new products, changes in design of established products, or use of new materials or components in the manufacture of established products” ("PSI: Policy Studies Institute", 2018). Product innovations are new products or services created to meet market needs, thus constituting a client-focused kind of financial innovation. Product innovations help the intermediaries to differentiate themselves from their competitors, by providing solutions to unattended needs of the customers. Product innovation is the changes in the products and services that organisations offer to customers.

2. Technological Innovation

Technological innovation is a part of the total innovation discipline. It focuses specifically on technology and how to embody it successfully in products and processes. Technology as a body of knowledge might thus be seen as a building block for technological innovation.

3. Process Innovation

Process Innovation is defined as “a change in the way a product or service is manufactured, created, or distributed” (Reuben, 2012). Process innovation refers to new production processes that allow the provision of new or existing financial products and services. It involves the changes in the ways in which the products and services are created and delivered to the customers. Process innovation is usually aimed at increasing the efficiency in the production process, and it is often associated with technological change.
Table 1.1

Variables of Financial Innovation

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Independent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Innovation</strong></td>
<td>Innovative deposit schemes</td>
</tr>
<tr>
<td></td>
<td>Innovative loan schemes</td>
</tr>
<tr>
<td></td>
<td>Credit cards</td>
</tr>
<tr>
<td></td>
<td>Debit cards</td>
</tr>
<tr>
<td></td>
<td>Smart cards</td>
</tr>
<tr>
<td></td>
<td>Bancassurance</td>
</tr>
<tr>
<td></td>
<td>Wealth management services</td>
</tr>
<tr>
<td></td>
<td>Mobile Banking Apps</td>
</tr>
<tr>
<td><strong>Technological Innovation</strong></td>
<td>Automated Teller Machine</td>
</tr>
<tr>
<td></td>
<td>Cash Deposit Machine</td>
</tr>
<tr>
<td></td>
<td>Passbook printing machine</td>
</tr>
<tr>
<td></td>
<td>Point of Sale machine</td>
</tr>
<tr>
<td><strong>Process Innovation</strong></td>
<td>Simplified authorization procedure</td>
</tr>
<tr>
<td></td>
<td>Internet banking</td>
</tr>
<tr>
<td></td>
<td>Mobile banking</td>
</tr>
<tr>
<td></td>
<td>Real Time Gross Settlement</td>
</tr>
<tr>
<td></td>
<td>National Electronic Fund Transfer</td>
</tr>
<tr>
<td></td>
<td>Immediate Payment Service</td>
</tr>
<tr>
<td></td>
<td>Core Banking Solutions</td>
</tr>
</tbody>
</table>
1.7.2 Dimensions of Customer Satisfaction

1. Tangibility
   Tangibility dimension in the measurement of Customer Satisfaction means the appearance and accessibility of physical facilities, technology, equipment, personnel and communication materials which will aid to increase the satisfaction of customers.

2. Reliability
   Reliability is the ability to perform the promised service dependably and accurately (Tweneboah-Koduah & Yuty Duweh Farley, 2015).

3. Efficiency
   Efficiency is the state of being efficient.

4. Accuracy
   Accuracy is the quality or state of being correct. It is the ability to provide accurate and dependable services consistently.

5. Security
   Security is the state of being free from danger or threat.

6. Customer Service
   Customer service is the provision of adequate services and the speed with which the product is put into service.

Table 1.2
Variables of Customer Satisfaction

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Independent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Latest equipment and technology</td>
</tr>
<tr>
<td></td>
<td>Access to the bank branch</td>
</tr>
<tr>
<td></td>
<td>Sufficient number of ATMs</td>
</tr>
<tr>
<td></td>
<td>Cash counting machines</td>
</tr>
<tr>
<td>Tangibility</td>
<td>Number of service counters</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td></td>
<td>Visual appeal of information materials (Pamphlets, danglers, brochures at the branch)</td>
</tr>
<tr>
<td></td>
<td>Guide signs indicating as to which counters offer which services</td>
</tr>
<tr>
<td>Reliability</td>
<td>The site does not hang or malfunction before the transaction is put through</td>
</tr>
<tr>
<td></td>
<td>Information provided at the bank’s website</td>
</tr>
<tr>
<td></td>
<td>Up to date content</td>
</tr>
<tr>
<td></td>
<td>Process of transactions</td>
</tr>
<tr>
<td></td>
<td>Range of products and services provided</td>
</tr>
<tr>
<td>Efficiency</td>
<td>Prompt response to the request of customers</td>
</tr>
<tr>
<td></td>
<td>Faster log in facility</td>
</tr>
<tr>
<td></td>
<td>Performance of Plastic cards (ATM, Debit/Credit)</td>
</tr>
<tr>
<td></td>
<td>Transfer of Funds (NEFT, RTGS, Quick Transfer, IMPS)</td>
</tr>
<tr>
<td></td>
<td>Clearing Services (ECS-Credit/Debit)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Problem solving through instant information</td>
</tr>
<tr>
<td></td>
<td>Bank insists on error-free transaction records</td>
</tr>
<tr>
<td></td>
<td>Electronic Bill payments</td>
</tr>
<tr>
<td></td>
<td>Fairness of service charges</td>
</tr>
<tr>
<td></td>
<td>Accurate promises about the services delivered</td>
</tr>
<tr>
<td></td>
<td>Confirmation of services ordered</td>
</tr>
<tr>
<td>Security</td>
<td>Security for ATMs</td>
</tr>
<tr>
<td></td>
<td>Online filling of personal or transaction data</td>
</tr>
<tr>
<td></td>
<td>Protection of banking transactions</td>
</tr>
<tr>
<td></td>
<td>Privacy / Confidentiality of the bank.</td>
</tr>
<tr>
<td></td>
<td>Care in collection and maintenance of personal information</td>
</tr>
<tr>
<td></td>
<td>Instructions on the website</td>
</tr>
<tr>
<td></td>
<td>Customer friendly environment at Bank</td>
</tr>
<tr>
<td>Customer Service</td>
<td>Customer feedback services</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Capable of solving complaints adequately</td>
</tr>
<tr>
<td></td>
<td>Brochures to educate new users</td>
</tr>
<tr>
<td></td>
<td>Special services for the elders and disabled</td>
</tr>
<tr>
<td></td>
<td>Convenient hours of operation (24 X7)</td>
</tr>
</tbody>
</table>

### 1.7.3 Performance Measurement

#### 1. Financial Innovation Index

The index namely ‘Financial Innovation Index’ (FII) is a combination of transactions done through innovative banking like NEFT, RTGS, Mobile banking, Debit card(ATM & POS) and Credit card (ATM & POS). The formula used for calculating the index is:

\[
\text{Financial Innovation Index} = \frac{\text{Current period innovative transactions}}{\text{Base period innovative transactions}} \times 100
\]

#### 2. Profitability

To determine the profitability of banks two measures are used in the study, Return on Assets and Return on Equity. A basic measure of bank profitability that corrects for the size of the bank is the Return on Assets (ROA), which divides the net income of the bank by the amount of its assets. ROA indicates how well a bank’s assets are being used to generate profits.

The formula for calculating ROA is:

\[
\text{ROA} = \frac{\text{Net Income}}{\text{Total Assets}} \times 100
\]
Return on Equity is concerned about how much the bank is earning on their equity investment. The formula for calculating ROE is:

\[
\text{ROE} = \frac{\text{Net Income}}{\text{Equity}} \times 100
\]

3. Productivity

Productivity of the banks is measured in terms of total deposits and loans and advances.

**Table 1.3**

**Variables of Performance Measurement**

<table>
<thead>
<tr>
<th>Financial Innovation Index</th>
<th>Transaction through NEFT, RTGS, Debit cards (ATM &amp;POS), Credit cards (ATM &amp;POS), Mobile banking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profitability</td>
<td>Return on Assets (ROA)</td>
</tr>
<tr>
<td></td>
<td>Return on Equity (ROE)</td>
</tr>
<tr>
<td>Productivity</td>
<td>Total Deposits</td>
</tr>
<tr>
<td></td>
<td>Loans and Advances</td>
</tr>
</tbody>
</table>

1.8 Operational Definitions of the Terms

1. **Financial Innovation**: Financial Innovation is the act of innovating new or improved financial product, process and technology that will satisfy the customers and will there by lead to a better financial performance of the firm.

2. **Innovativeness**: Innovativeness is how receptive the customers are to the innovations introduced. It includes their awareness, usage and satisfaction about the innovations.

3. **Financial Performance**: Financial Performance is the process of measuring the productivity and profitability of a firm. It may be in terms of advances, deposits, Return on Assets and Return on Equity.
4. Customer: Any individual who has a transactional relationship with a bank is a customer of the bank.

5. Customer Satisfaction: Customer Satisfaction is a response based on the experience of a customer.

6. Product Innovation: Product Innovation is the introduction of new or improved banking product.

7. Process Innovation: Process Innovation is the implementation of new or improved banking process.

8. Technological Innovation: Technological Innovation is the set of innovative and interconnected components or machines which aids the implementation of process and product innovation.

1.9 Hypotheses

To fulfil the objectives of the study, the following hypotheses were formulated and tested using econometrics procedure and statistical tools.

a) Banks

1. $H_0$: There is no significant relationship between financial innovation and productivity of banks.

2. $H_0$: There is no significant relationship between financial innovation and profitability of banks.
b) Customers

1. $H_0$: There is no significant difference between the awareness of public and private sector respondents regarding dimensions of financial innovations.

2. $H_0$: There is no significant difference between the usage of public and private sector respondents regarding dimensions of financial innovations.

3. $H_0$: There is no significant difference between the satisfaction of public and private sector respondents regarding dimensions of financial innovations.

4. $H_0$: There is no significant difference in the perception of financial innovation among different age groups in the public sector.

5. $H_0$: There is no significant difference in the perception of financial innovation among different age groups in the private sector.

6. $H_0$: There is no significant difference in the perception of financial innovation among public sector respondents of different residential area.

7. $H_0$: There is no significant difference in the perception of financial innovation among private sector respondents of different residential area.

8. $H_0$: There is no significant difference between respondents of public and private sector banks with regard to the dimensions of customer satisfaction.

9. $H_0$: There is no significant difference in the perception towards the dimensions of customer satisfaction among public sector respondents of different age groups.

10. $H_0$: There is no significant difference in the perception towards the dimensions of customer satisfaction among private sector respondents of different age groups.

11. $H_0$: There is no significant difference in the perception towards the dimensions of customer satisfaction among public sector respondents of different residential area.

12. $H_0$: There is no significant difference in the perception towards the dimensions of customer satisfaction among private sector respondents of different residential area.

13. $H_0$: There is no significant relationship between financial innovation and customer satisfaction.
1.10 Research Methodology

This section explains the methodological framework used for collecting and analysing data in order to solve the research problem and to answer the research questions.

1.10.1 Research Design

The study is designed as a descriptive one as the purpose of the research is to describe systematically and accurately the facts gathered about the research problem and to discover associations or relationship between or among selected variables.

1.10.2 Sources of Data

The study used both secondary and primary sources for collection of data.

A. Secondary Data

Secondary data was collected from the following sources.

- Reserve Bank of India website
- Websites of banks
- Annual reports of banks and RBI
- CMIE Prowess Database
- Banking statistics
- RBI Bulletins
- Reports on trends and progress of banks in India
- Reports of Indian Banking Association
- Reports of State Level Banker’s Committee
- Research Dissertations and Theses
- Books, Journals, Articles, Periodicals, Working papers and Newspaper reports and other publications
- Other websites and Blogs

CMIE Prowess Database was accessed from IIMK library and the researcher has visited Local Head Offices, Zonal Offices, Regional Offices, Circle offices and other branches of the selected banks, and the Regional Office of Reserve Bank of India and State Level Banker’s Committee cell to collect relevant information.
B. Primary Data

Primary data were collected from the customers of selected private and public sector banking companies in the State of Kerala using Structured Questionnaire.

1.10.3 Sample Design

This section deals with the technique and procedure adopted by the researcher in selecting items for the sample.

A. Population

Population of the study consists of public sector and private sector banks in India and the customers of public and private sector banks in the State of Kerala which is unknown as the banks were reluctant to provide the list of customers due to their confidentiality clause.

B. Sample of Institutions:

The sample for the study comprises banking companies, which were divided into public sector and private sector banks. The banks with sound footings in the country and also with highest number of branches operating in the state of Kerala were selected. The list of banks selected for the study is given below.

<table>
<thead>
<tr>
<th>Type of Bank</th>
<th>Bank Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public sector banks</td>
<td>State Bank of India</td>
</tr>
<tr>
<td></td>
<td>Canara Bank</td>
</tr>
<tr>
<td>Private sector banks</td>
<td>The Federal Bank</td>
</tr>
<tr>
<td></td>
<td>HDFC Bank</td>
</tr>
</tbody>
</table>

C. Sample of Customers:

The sample of customers comprised of the customers of selected banks from the state of Kerala.
D. Sampling Technique and Sample Size:

‘Purposive Sampling’ was used as the sampling technique to select the sample respondents for the study and the following statistical equation was used to determine the sample size.

\[ S = Z^2 \times P(1-P)/(M)^2 \]

where:
- \( S \) = Required Sample Size for infinite/unknown population
- \( Z \) = Z score
- \( P \) = Population Proportion
- \( M \) = Margin of error

The **Z score** is determined on the basis of confidence level. Confidence level is the probability that the value of parameter falls within a specified range of values. Here we consider 95% confidence level and the Z score is 1.96.

The **Population proportion** is assumed to be 50%, i.e., 0.5.

The **Margin of error** is a small amount that is allowed for in case of miscalculation or change of circumstances. Here we take 5%, i.e., 0.05.

\[
S = (1.96)^2 \times 0.5(1-0.5) / (0.05)^2 \\
= 3.8416 \times 0.25 / 0.0025 \\
= 384.16
\]

To ensure a large representation from the four selected banks 480 questionnaires were distributed to the customers of selected banks in the State of Kerala.

**Table 1.5**

**Sample Size**

<table>
<thead>
<tr>
<th>Sector of the Bank</th>
<th>Name of the Bank</th>
<th>Number of Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Sector</td>
<td>State Bank of India</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Canara Bank</td>
<td>120</td>
</tr>
<tr>
<td>Private Sector</td>
<td>The Federal Bank</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>HDFC Bank</td>
<td>120</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>480</td>
</tr>
</tbody>
</table>
1.10.4 Tools for Data Collection

In view of seeking the response of the customers of the selected banks in the State of Kerala, a ‘Structured Questionnaire’ was used. It served the purpose of ‘Primary Data’ which was the major source of information to arrive at meaningful conclusion. Questionnaire was primarily used for testing the validity and needed refinement was made before final data collection. ‘Secondary Data’ which was used to measure the effect of financial innovation on the performance of selected banks was compiled from various reports.

1.10.5 Scale Evaluation and Validation

A. Pilot Study

The objective of the pilot study was to obtain additional information so that the researcher can further improve the survey questionnaire before the actual study. A pilot study was done before the actual study to obtain feedback from a small number of respondents in terms of understanding the questionnaire's wording & measurement, evaluate any ambiguity in the questions and the questionnaire’s reliability. The study was done among 100 customers, 50 from the public sector banks and 50 from private sector. Suitable modification was made to the questionnaire after the pilot study and final data was collected. Primary data was collected from July 2016 to May 2017. Secondary data during the period April 2011 to March 2017 was used for the study.

B. Test of Reliability

Reliability concerns the extent to which a measurement of a phenomenon provides stable and consistent results (Carmines & Zeller, 2005). Reliability is also concerned with repeatability i.e. a scale is said to be reliable if repeat measurements made by it under constant conditions will give the same result (Moser & Kalton, 1989). Cronbach’s alpha reliability coefficient was used to measure reliability of the scale in the study. An alpha value of 0.70 or above is considered to be a criterion for demonstrating strong internal consistency and alpha value of 0.60 or above is considered to be significant (Cronbach &
Meehl, 1955). The result of reliability test of the measurement scale using Cronbach’s Alpha Reliability Coefficient is shown in the table 1.6.

### Table 1.6
Reliability Statistics

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Variables</th>
<th>Number of Items</th>
<th>Alpha Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Dimensions of Financial Innovations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Awareness</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Product Innovations</td>
<td>8</td>
<td>.769</td>
</tr>
<tr>
<td>2</td>
<td>Technological Innovations</td>
<td>4</td>
<td>.704</td>
</tr>
<tr>
<td>2</td>
<td>Process innovations</td>
<td>7</td>
<td>.764</td>
</tr>
<tr>
<td></td>
<td><strong>Usage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Product Innovations</td>
<td>8</td>
<td>.729</td>
</tr>
<tr>
<td>2</td>
<td>Technological Innovations</td>
<td>4</td>
<td>.720</td>
</tr>
<tr>
<td>3</td>
<td>Process innovations</td>
<td>7</td>
<td>.840</td>
</tr>
<tr>
<td></td>
<td><strong>Satisfaction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Product Innovations</td>
<td>8</td>
<td>.832</td>
</tr>
<tr>
<td>2</td>
<td>Technological Innovations</td>
<td>4</td>
<td>.760</td>
</tr>
<tr>
<td>3</td>
<td>Process innovations</td>
<td>7</td>
<td>.822</td>
</tr>
<tr>
<td></td>
<td><strong>Dimensions of Customer Satisfaction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Tangibility</td>
<td>7</td>
<td>.913</td>
</tr>
<tr>
<td>2</td>
<td>Reliability</td>
<td>5</td>
<td>.906</td>
</tr>
<tr>
<td>3</td>
<td>Efficiency</td>
<td>5</td>
<td>.836</td>
</tr>
<tr>
<td>4</td>
<td>Accuracy</td>
<td>6</td>
<td>.861</td>
</tr>
<tr>
<td>5</td>
<td>Security</td>
<td>6</td>
<td>.870</td>
</tr>
<tr>
<td>6</td>
<td>Customer Service</td>
<td>6</td>
<td>.885</td>
</tr>
</tbody>
</table>

Table 1.6 shows that alpha values of all the items which are above 0.7, hence strong internal consistency of the scale was assured. Although reliability is very
important, it is not sufficient unless combined with validity. For a scale to be reliable, it also needs to be valid.

C. Tests of Validity

Frankfort-Nachmias & Nachmias (1996) defined validity as, ‘Is one measuring what one intends to measure?’ Validity refers to the relationship between a construct and its indicators. “Validity is the most critical criterion and indicates the degree to which an instrument measures what it is supposed to measure. Validity can also be thought of as utility. In other words, validity is the extent to which differences found with a measuring instrument reflect true differences among those being tested” (Kothari, 2004). The degree of validity of an instrument is determined through the application of logic and statistical procedures. Content validity and Construct validity are the two types of validity tested in the study.

1. Content Validity

There is no numerical way to express content validity. It can be determined by receiving opinion from experts, who can judge how well the measuring instrument meets the standards. The researcher ensured content validity by consulting various experts in the area of research, banking professionals and academicians to evaluate the objectives, concepts and the questionnaire.

2. Construct Validity

“A measure is said to possess construct validity to the degree that it confirms to predicted correlations with other theoretical propositions” (Kothari, 2004). Convergent validity and discriminant validity are the two types of construct validity which is tested using Confirmatory Factor Analysis. The present study satisfies the conditions of convergent validity, i.e. the Average Variance Extracted and Composite Reliability of all the components in the study are greater than 0.5 and 0.7 respectively. Square root of Average Variance Extracted of all the components in the study is greater than the inter construct correlation. Hence discriminant validity is ensured.
D. Data Cleaning

Data cleaning is the process of removing the outliers and the questionnaires with missing data. A total of 480 questionnaires were collected from customers of two public and two private sector banks. Before the data analysis these collected questionnaires were scrutinised for checking the completeness and quality of the data. 27 questionnaires were rejected due to missing values and invalid responses and 53 questionnaires were removed by the researcher due to outliers. Details of the 400 questionnaires which was used for the final analysis is shown in the table 1.7.

Table 1.7

Sample Size Used for Data Analysis

<table>
<thead>
<tr>
<th>Sector of the Bank</th>
<th>Name of the Bank</th>
<th>Number of Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Sector</td>
<td>State Bank of India</td>
<td>112</td>
</tr>
<tr>
<td></td>
<td>Canara Bank</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>215</td>
</tr>
<tr>
<td>Private Sector</td>
<td>The Federal Bank</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>HDFC Bank</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>400</td>
</tr>
</tbody>
</table>

E. Test for Normality

Result of the Kolmogorov- Smirnov test indicates that the data is not normal as all the p values are less than 0.05. So the limit of skewness and kurtosis values are examined. “Absolute values of univariate skewness indices greater than 3.0 seem to describe extremely skewed data sets and, kurtosis greater than 10.0 may suggest a problem” (Chou and Bentler 1995). Here, Skewness and kurtosis is in limits, so univariate normality can be assumed. Hence can proceed the analysis with parametric test assuming normal distribution.
F. Test for Randomness

Result of run test shows that for all the variables, the p values are above 0.05. Therefore the randomness of the data is assumed.

G. Data Independence

Result of the Durbin- Watson statistic is between the limits 1.5 to 2.5. Hence the Data Independence is present.

1.11 Tools Used for Data Analysis

The tools used for the analysis of secondary and primary data are given below.

A. Tools Used for Analysis of Secondary Data

Econometrics

Econometrics is an integration of economics, mathematical economics and statistics with an objective to provide numerical values to the parameters of economic relationships. The study uses econometrics procedures to analyse the secondary data. The major econometrics tools used in the study are:

1. Testing for Unit Roots

A number of issues should be addressed when using time series data for regression analysis. One important issue is the phenomenon of nonstationarity. If the time series variables used in the regression analysis are nonstationary, regressing one time series on another using ordinary least squares will give rise to the problem of spurious regression; that is, absence of any meaningful relation between variables. Therefore, it is necessary to examine stationarity of the time series variables before using them in regression analysis. A number of testing procedures known as Unit Root Tests are available in the literature to determine stationarity of time series variables. The present study utilizes the most popular test for unit roots known as Dickey Fuller tests. The test is available in different forms depending on whether the variable under consideration has no intercept, intercept
and intercept and trend. We use the most general form of the test namely Augmented Dickey Fuller test. The form of the test is given as

$$\Delta y_t = \beta_1 + \beta_2 t + \gamma y_t - 1 + \sum_{i=1}^{p} \alpha_i \Delta y_{t-i} + \varepsilon_t$$

(1)

Where the test statistic is known as the $\tau$ statistic based on $\gamma$ from equation (1).

2. Johansen Cointegration Test

Given a group of nonstationary time series, it is necessary to determine whether the series are cointegrated, and if they are, in identifying the cointegrating (long run equilibrium) relationships. In other words, cointegration analysis is used to assess whether there exists a long run or equilibrium relationship between nonstationary time series variables. The widely used procedure for determining the existence of cointegration among a set of nonstationary I (1) variables is the Johansen procedure. In the Johansen framework the first step is the estimation of a $p^{\text{th}}$ order VAR in $k$ variables.

$$Y_t = \pi_1 Y_{t-1} + \pi_2 Y_{t-2} + \ldots \ldots \ldots \pi_p Y_{t-p} + \varepsilon_t$$

(2)

where $Y_t$ is a $(k \times 1)$ vector of nonstationary I (1) variables, $\pi_i$ is an $(n \times n)$ matrix of parameters and $\varepsilon_t$ is an $(n \times 1)$ vector of innovations.

Equation (2) can be reparameterized in to a VECM form as

$$\Delta Y_t = \pi Y_{t-1} + \Gamma_1 \Delta Y_{t-1} + \Gamma_2 \Delta Y_{t-2} + \ldots \ldots + \Gamma_{p-1} \Delta Y_{t-(p-1)} + \varepsilon_t$$

(3)

where $\pi = \pi_1 + \pi_2 + \ldots \ldots \ldots \pi_{p-1}$, and $\Gamma_i = - (\pi_{i+1} + \pi_{i+2} + \ldots \ldots \ldots \pi_p)$

Johansen suggests two test statistics namely $\lambda_{\text{max}}$ statistics and $\lambda_{\text{trace}}$ statistics to determine the cointegrating rank (number of cointegrating relationships). Both test statistics establishes the rank of the $\pi$ matrix based on its Eigen values (and hence the number of cointegrating relationships)

$$\lambda_{\text{trace}} (r) = -T \sum_{i=r+1}^{k} l_n \left( 1 - \hat{\lambda}_i \right)$$

(4)

$$\lambda_{\text{max}} (r, r+1) = -T l_n \left( 1 - \hat{\lambda}_{r+1} \right)$$

(5)

A decision regarding the existence of a long run relationship is based on the value of the test statistic obtained from sample.
3. Vector Error Correction Model (VECM)

The VAR model is used to implement Granger Causality test provided that the variables are stationary. If the variables are nonstationary, but not cointegrated, the entire model is reformulated in first differences. However, if the variables are nonstationary but cointegrated, there must be a short-run and long-run causality which cannot be captured by the standard first difference VAR model. In this case, one can implement the Granger causality test in the VECM framework by reparameterizing the VAR model as VECM.

When more than two variables are involved, Granger causality/ Block Exogeneity Wald test is useful for detecting whether to incorporate additional variables in to the VAR/VECM. In this case the test statistics is given as:

\[(T-3P-1)(\log/ \Sigma re/-\log/\Sigma un/)^\sim \chi^2(2P)\]

Where T is the number of observations; \(\Sigma un\) is variance/covariance matrices of the unrestricted VAR system; \(\Sigma re\) is variance/covariance matrices of the restricted system where the lag of a variable is excluded from the VAR system; and P is the number of lags of the variable that is excluded from the VAR system.

4. Granger Causality Test

Granger causality test seeks to determine whether past values of a variable helps to predict changes in another variable. To implement Granger Causality test consider a bivariate VAR model in \(X_t\) and \(Y_t\) with p lags in both variables:

\[Y_t = \sum_{i=1}^{p} \alpha_i Y_{t-i} + \sum_{i=1}^{p} \beta_i X_{t-i} + \varepsilon_{1t}\] (7)

\[X_t = \sum_{i=1}^{p} \lambda_i X_{t-i} + \sum_{i=1}^{p} \delta_i Y_{t-i} + \varepsilon_{2t}\] (8)

There are four possibilities in the system of equations (7) and (8) given above. Unidirectional causality from \(Y_t\) to \(X_t\) if the estimated \(\delta_i\) in equation (8) are statistically different from zero as a group and the set of estimated \(\beta_i\) coefficients in (7) is not different from zero. Unidirectional causality from \(X_t\) to \(Y_t\) if the set of \(\beta_i\) coefficients in (7) is statistically different from zero and the set of \(\delta_i\) is not statistically different from
Bidirectional causality is indicated when the sets of $X_{t,i}$ and $Y_{t,i}$ coefficients are statistically different from zero in both equations. There is no causality when $X_{t,i}$ and $Y_{t,i}$ coefficients are not statistically different from zero. If all the variables in the VAR are stationary a direct way to test Granger Causality is to use a standard F test given as:

$$F = \frac{(RSS_r - RSS_{ur})/m}{RSS_{ur}/(n-K)}$$

It is straightforward to generalize this notion to k variable case described earlier (equation 2)

**B. Tools Used for Analysis of Primary Data**

1. **Mean, Percentage, Standard deviation and Quartile Deviation**

   - Mean is the measure of central tendency and is used to describe a set of data by identifying the central position within the set of data.
   - Percentage analysis is applied to create a contingency table from the frequency distribution and represent the collected data for better understanding.
   - Standard deviation is a measure of variation that summarises the amount by which every value within a dataset varies from the mean.
   - Quartile Deviation is the measure of location which is used to divide a distribution into levels. ‘Low’, ‘Moderate’ and ‘High’ are the levels in which the dimensions used in the study are divided.

2. **One Sample t test**

   The one sample t test is used to determine whether the sample comes from a population with a specific mean. Population mean is not always known, but is sometimes hypothesized. Mean score value is compared with the test value to arrive at meaningful results.
3. Independent Sample t Test

Independent sample t test is an inferential statistical test that determines whether there is a statistically significant difference between the means in two unrelated groups. In the study a comparison between the public and private sector is carried out using the independent sample t test.

4. One way ANOVA

One way Analysis of Variance compares the means of more than two independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different. One way ANOVA is used in the study for analysing the difference in the perception of customers among the selected demographic variables.

5. Scheffe Post Hoc Test

When the result of one way ANOVA shows a significant difference among the sample means, post hoc tests are employed to get additional exploration of the differences among means. It is used to provide specific information on which means are significantly different from each other. Scheffe’s procedure is used in the study to make multiple comparisons as it is perhaps the most popular and flexible of the post hoc procedures. Scheffe’s procedure corrects alpha for all pair-wise or simple comparisons of means, but also for all complex comparisons of means as well.

6. Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) is a statistical technique that is used to reduce data to a smaller set of summary variables and to explore the underlying theoretical structure of the phenomena. It is used to identify the structure of the relationship between the variable and the respondent. EFA is used in the study to identify the dimension structure of the variable used to measure the constructs, ‘Financial Innovation’ and ‘Customer Satisfaction’.
7. Confirmatory Factor Analysis

Confirmatory Factor analysis (CFA) is a multivariate statistical procedure that is used to test how well the measured variables represent the number of constructs. It is a statistical procedure applied to determine the ability of a predefined factor model to fit an observed set of data. Here the Confirmatory Factor Analysis is used to validate the measurement models for the constructs, ‘Financial Innovation’ and ‘Customer Satisfaction’.

8. Structural Equation Modeling

Structural Equation Modeling (SEM) is a multivariate statistical analysis technique that is used to analyse structural relationships. SEM is the combination of factor analysis and multiple regression analysis, and it is used to analyse the structural relationship between measured variables and latent constructs. In the study, a structural model showing the effect of ‘Financial Innovation’ on ‘Customer Satisfaction’ is developed using SEM.

1.12 Organisation of Thesis

- The first chapter starts with an introduction to the study followed by statement of the research problem, objectives of the study, scope of the study, significance of the study, conceptual model, variables used in the study, operational definition of the terms, hypotheses, research methodology, organisation of the thesis and limitations of the study.
- Second chapter deals with literature review which is classified into four sections.
  - Studies on Financial Innovation
  - Studies on Banking Industry
  - Studies on Performance Measurement
  - Studies on Customer Satisfaction
The third chapter gives a detailed explanation about the concepts, financial innovation and customer satisfaction. Profile of the banks selected is also given in the third chapter.

Fourth chapter presents the analysis of the effect of financial innovation on financial performance of the banks using econometrics procedures.

Fifth chapter gives details of the analysis of the dimensions of financial innovation in the banking sector.

Sixth chapter give an account of the dimension of customer satisfaction and it also presents the model showing the effect of financial innovation on customer satisfaction.

Seventh chapter is the concluding chapter which presents a summary of the study, findings, suggestions, conclusion and area for further research.

1.13 Limitations of the Study

- The secondary data compiled for the measurement of financial innovation index is subject to the non availability of the data, i.e. only selected innovations like NEFT, RTGS, Mobile banking, Debit card (ATM & POS) and Credit card (ATM & POS) was used for calculating the index.
- The yearly data was converted into monthly data using the software Gretl.
- Respondents of the study were limited to the customers of the State of Kerala.

1.14 Conclusion

The present chapter of the thesis begins with the introduction to the study. A brief about the concept of financial innovation and innovations in banking is given in the chapter. The chapter also gives a clear idea about the research problem, scope and significance of the study, objectives of the study, methodology used for collecting data and the tools employed for analysing data. The introductory chapter comes to an end stating the limitations of the study.
References


