Financial Innovations in Indian Banking Industry: An Evaluation of Innovativeness and Financial Performance of Selected Banks

Thesis submitted to the University of Calicut
for the award of the degree of
Doctor of Philosophy in Commerce

By

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Under the guidance of

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2018

To one of the greatest women I've ever known

"My grandmother"

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Declaration

I, Amritha. N.P, hereby declare that this thesis, titled "Financial Innovations in Indian Banking Industry: An Evaluation of Innovativeness and Financial Performance of Selected Banks" submitted to the University of Calicut in partial fulfilment of the requirements for the award of the Degree of Doctor of Philosophy in Commerce is a record of original and independent research work done by me under the supervision and guidance of Dr. P. Mohan, Pro-Vice Chancellor, University of Calicut, and it has not formed the basis for award of any degree /diploma / associateship /fellowship or other similar title to any candidate in any University before.

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Certificate

Certified that the thesis titled "Financial Innovations in Indian Banking Industry: An Evaluation of Innovativeness and Financial Performance of Selected Banks" submitted to the University of Calicut in partial fulfilment of the requirements for the award of the Degree of Doctor of Philosophy in Commerce, is a record of original work done by Ms. Amritha. N. P under my supervision and guidance and the thesis has not formed the basis for the award of any degree, diploma, associateship, fellowship or other similar title to any candidate in any university.

Place: University of Calicut **Dr. P. Mohan**

Date:

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Amritha. N.P

Contents

List of Abbreviations

ACSI	The American Customer Satisfaction Index
ADV	Advances
AI	Artificial Intelligence
AIC	Akaike Information Criterion
AR	Augmented Reality
ATM	Automated Teller Machine
BNA	Bulk Note Acceptors
BSBDA	Basic Savings Bank Deposit Account
CA	Current Account
CBS	Core Banking Solutions
CD	Credit- Deposit
CD	Current Deposit
CDM	Cash Deposit Machine
CFA	Confirmatory Factor Analysis
CFI	Comparative Fix Index
CMIE	Centre for Monitoring Indian Economy
CRM	Customer Relationship Management
CTS	Cheque Truncation System
DD	Demand Draft

DEA	Data Envelopment Analysis
DEP	Deposits
DTH	Direct- to- Home
ECS	Electronic Clearing Service
EDP	Expectancy- Disconfirmation Paradigm
EEFC	Exchange Earners Foreign Currency
EFA	Exploratory Factor Analysis
ETF	Exchange Traded Fund
FII	Financial Innovation Index
FISA	Federal Institutional Savings Account
FNB	First National Bank
GCC	Green Channel Counter
GDP	Gross Domestic Product
GFI	Goodness of Fit Index
HDFC	The Housing Development Finance Corporation
ICICI	Industrial Credit and Investment Corporation of India
ICP	Innovativeness, Capabilities and Potential
ICT	Information and Communication Technologies
IFI	Incremental Fit Index
IMPS	Immediate Payment Service
IMPS	Inter-mobile Mobile Payment System
IT	Information Technology
KMO	Kaiser-Meyer Olkin

NEFT	National Electronic Fund Transfer
PCA	Principal Component Analysis
PIN	Personal Identification Number
POS	Point of Sale
PSI	Policy Studies Institute
R & D	Research and Development
RBI	Reserve Bank of India
ROA	Return on Assets
ROE	Return on Equity
RTGS	Real Time Gross Settlement
SEM	Structural Equation Modeling
SBI	State Bank of India
ULIP	Unit Linked Insurance Plan
VAR	Vector Auto Regression
VECM	Vector Error Correction Model

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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 store house 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

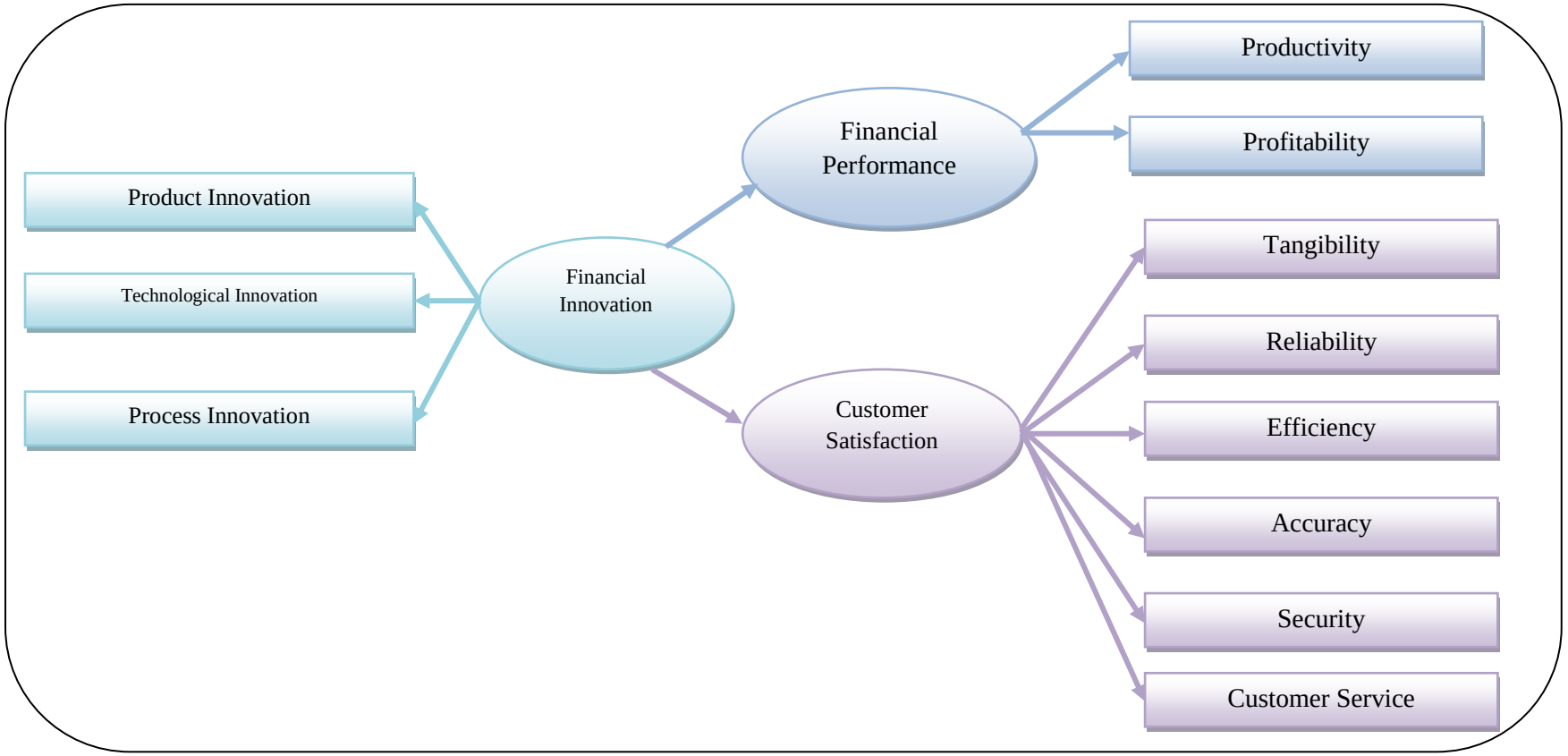

Fig 1.1: Conceptual Model of the Study

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

Dependent Variables	Independent Variables
Product Innovation	Innovative deposit schemes
	Innovative loan schemes
	Credit cards
	Debit cards
	Smart cards
	Bancassurance
	Wealth management services
	Mobile Banking Apps
Technological Innovation	Automated Teller Machine
	Cash Deposit Machine
	Passbook printing machine
	Point of Sale machine
Process Innovation	Simplified authorization procedure
	Internet banking
	Mobile banking
	Real Time Gross Settlement
	National Electronic Fund Transfer
	Immediate Payment Service
	Core Banking Solutions

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

Dependent Variables	Independent Variables
	Latest equipment and technology
	Access to the bank branch
	Sufficient number of ATMs
	Cash counting machines

Tangibility	Number of service counters
	Visual appeal of information materials (Pamphlets, danglers, brochures at the branch)
	Guide signs indicating as to which counters offer which services
Reliability	The site does not hang or malfunction before the transaction is put through
	Information provided at the bank's website
	Up to date content
	Process of transactions
	Range of products and services provided
Efficiency	Prompt response to the request of customers
	Faster log in facility
	Performance of Plastic cards(ATM, Debit/Credit)
	Transfer of Funds(NEFT, RTGS, Quick Transfer,IMPS)
	Clearing Services(ECS-Credit/Debit)
Accuracy	Problem solving through instant information
	Bank insists on error-free transaction records
	Electronic Bill payments
	Fairness of service charges
	Accurate promises about the services delivered
	Confirmation of services ordered
Security	Security for ATMs
	Online filling of personal or transaction data
	Protection of banking transactions
	Privacy / Confidentiality of the bank.
	Care in collection and maintenance of personal information
	Instructions on the website
	Customer friendly environment at Bank

Customer Service	Customer feedback services
	Capable of solving complaints adequately
	Brochures to educate new users
	Special services for the elders and disabled
	Convenient hours of operation (24 X7)

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:

$$\text{Financial Innovation Index} = \frac{\text{Current period innovative transactions}}{\text{Base period innovative transactions}} * 100$$

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:

$$\text{ROA} = \frac{\text{Net Income}}{\text{Total Assets}} * 100$$

Return on Equity is concerned about how much the bank is earning on their equity investment. The formula for calculating ROE is:

$$ROE = \frac{\text{Net Income}}{\text{Equity}} * 100$$

3. Productivity

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

Table 1.3

Variables of Performance Measurement

Financial Innovation Index	**Transaction through NEFT, RTGS, Debit cards (ATM &POS), Credit cards (ATM &POS), Mobile banking**
Profitability	Return on Assets(ROA)
	Return on Equity(ROE)
Productivity	Total Deposits
	Loans and Advances

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 1.4

Banks Selected for Study

Type of Bank	Bank Selected
Public sector banks	State Bank of India
	Canara Bank
Private sector banks	The Federal Bank
	HDFC Bank

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.

$$S= Z^2* P (1-P)/(M)^2$$

S = Required Sample Size for infinite/ unknown population

Z= Z score

P= Population Proportion

M= Margin of error

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.

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

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.

$$S = (1.96)^2*0.5(1-0.5) / (.05)^2$$
$$= 3.8416*0.25/0.0025$$
$$= 384.16$$

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

Sector of the Bank	Name of the Bank	Number of Customers
Public Sector	State Bank of India	120
	Canara Bank	120
Private Sector	The Federal Bank	120
	HDFC Bank	120
Total		480

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

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

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

Sector of the Bank	**Name of the Bank**	**Number of Customers**
Public Sector	State Bank of India	112
	Canara Bank	103
Total		215
Private Sector	The Federal Bank	98
	HDFC Bank	87
Total		185
Total		**400**

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

$$\Delta yt=\beta 1+\beta 2t+\gamma yt-1+\sum_{i=1}^{p} \alpha i\, \Delta y_{t-i} + \varepsilon t \qquad (1)$$

Where the test statistic is known as the τ statistic based on γ 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^{th} order VAR in k variables.

$Y_t = \pi 1 Y_{t-1} + \pi 2 Y_{t-2} + \ldots\ldots\ldots\ldots \pi p Y_{t-p} + \varepsilon t \qquad (2)$

where Y_t is a (kx1) vector of nonstationary I (1) variables, πi is an (nxn) matrix of parameters and εt is an (nx1) vector of innovations.

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

$\Delta Yt = \pi Y_{t-1} + \Gamma 1 \Delta Y_{t-1} + \Gamma 2 \Delta Y_{t-2} + \ldots\ldots\ldots + \Gamma p\text{-}1\ \Delta Y t_{-(p-1)} + \varepsilon t \qquad (3)$

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

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

$$\lambda_{trace\ (r)} = -T \sum_{i=r+1}^{k} l_n \left(1 - \hat{\lambda}_i\right) \qquad (4)$$

$$\lambda_{max\ (r,r+1)} = -T\, l_n \left(1 - \hat{\lambda}_{r+1}\right) \qquad (5)$$

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:

$$(T - 3P - 1)(\log/ \Sigma re/ - \log/ \Sigma un/) \sim \chi^2(2P) \qquad (6)$$

Where T is the number of observations; Σun is variance/covariance matrices of the unrestricted VAR system; Σre 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 Casualty test consider a bivariate VAR model in X_t and Y_t with p lags in both variables:

$$Y_t = \sum_{i=1}^{p} \propto_i Y_{t-1} + \sum_{i=1}^{p} \beta_i X_{t-i} + \varepsilon_{1t} \quad (7)$$

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

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 δ_i in equation (8) are statistically different from zero as a group and the set of estimated β_i coefficients in (7) is not different from zero. Unidirectional causality from X_t to Y_t if the set of β_i coefficients in (7) is statistically different from zero and the set of δ_i is not statistically different from

zero. 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:

$$F = \frac{(RSS_r - RSS_{ur})/m}{RSS_{ur}/(n-K)} \quad (9)$$

It is straight forward 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 in to 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 meaning 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.

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Chapter 2

Review of Literature

- ***Introduction***
- ***Studies on Financial Innovation***
- ***Studies on Banking Industry***
- ***Studies on Performance Measurement***
- ***Studies on Customer Satisfaction***
- ***Research Gap***

Chapter 2

Review of Literature

2.1 Introduction

An extensive literature survey has been conducted by the researcher to know the type and extend of empirical research work done on the topic and to identify the research gap. This chapter presents the review of existing literature in the area of research which is classified into four sections. The sections are:

I. Studies on Financial Innovation
II. Studies on Banking Industry
III. Studies on Performance Measurement
IV. Studies on Customer Satisfaction

I. Studies on Financial Innovation:

Allen (2011) assesses the evidence for negative and positive contributions for financial innovation to economic welfare and they conclude with the statement that it seems likely its effects have been positive rather than negative.

Beck, Chen, Lin, & Song (2012) in their study measures the relationship between financial innovation and economic growth and volatility. The study also attempts to measure the relationship between financial innovation and banks' risk-taking and fragility. To systematically explore the consequences of financial innovation in a consistent cross-country setting the study used three levels of data of 32 countries, i.e. bank, industry and country level data. The study identified both the bright and dark sides of financial innovation. The result of the study shows that financial innovation encourages banks to take on more risks, which helps in the provision of valuable credit and risk diversification services to firms and households. This will enhance capital allocation efficiency and economic growth.

Berk(2002) reviewed the literature regarding the impact of financial innovation on the monetary transmission mechanism and on the way the central bank can achieve its ultimate goal, which is to control the price level. They argued that, although the form of central bank instruments and current methods for implementing monetary policy may change, the goals that the policy makers try to achieve by employing these instruments remain valid and achievable.

Bhatt (1987) examines the nature and characteristics of financial innovations and evolution of credit markets. The author discusses the role of policy intervention in quickening the pace of financial development. A case study of an innovative bank is used to illustrate innovations essential for financing small farm and non-farm enterprises and mobilising resources from middle and low-income groups in developing countries. The main focus of this paper is the historical background of various steps taken by the Syndicate Bank, including innovative deposit schemes such as pigmy deposits with a low transaction-cost.

Boot & Thakor(1997) explored the implication of financial system design for financial innovation. They begin with assumptions about the investment opportunities of firms, their observable attributes, and the roles of commercial banks, investment banks and financial market. They examine the borrower's choice between the bank and financial market funding, the commercial bank's choice of monitoring capacity, & the investment bank's choice of whether or not to invest in financial innovation. Their main result is that financial innovation in a universal banking system is stochastically lower than innovation in a financial system in which commercial & investment bank is functionally separated.

Calvet, Gonzalez-Eiras, & Sodini (2004) investigates the pricing effects of financial innovation in an economy. The introduction of non-redundant assets endogenously modifies the participation set, reduces the covariance between dividends and participants' consumption and thus leads to lower risk premia. In multisector economies, financial innovation spreads across markets through the diversified portfolio of new entrants and has rich effects on the cross-section of expected returns. The price changes can also lead some investors to leave the markets and give rise to non-degenerate forms of participation turnover. The model is consistent with several features of financial

markets over the past few decades: substantial innovation, higher participation, significant turnover in investor composition, improved risk management practices, a slight increase in real interest rates, and a reduction in risk premia.

Chavan & Somanath (2011) enquire about the financial innovations in the capital market, insurance industry and the mutual fund industry. In the insurance sector, new innovative products provide the features of guaranteed return, safety against inflation, social security, reimbursement of medical and hospitalization expenses. The capital market innovations have the feature of investor protection, transparency, enhanced liquidity, reduced cost and mitigation of risk. The mutual fund innovations have the feature of diversification, risk reduction and superior return in the volatile market. They concluded that existing innovative financially engineered products lack the protection against inflation and here remains a scope for development of insurance exchanges, credit reinsurance market, carbon market, property future, weather derivatives, freight derivatives and inflation derivatives.

Cristian (2012) has made an attempt to give a conceptual clarity about financial innovation and so it is important to give the definition of financial innovation. It is also relevant to provide the classification and functions of financial innovation. The study has also concentrated on giving the linkage between financial innovations, markets and agents. The innovations were classified as Type A, Type C, Type B, D and E and Type F innovations. The impact of these different type of innovations, with repercussions on economic policy related to them, was also analysed and their importance is correlated with financial instability.

Crockett (1995) in third LK Jha memorial lecture has said that the innovations in the capital market have posed new challenges to economics & financial stability. The theme of the lecture was that seizing the opportunities by capital market innovation while avoiding the risk of instability, is one of the greatest challenges facing central banks & supervisory authorities in both the developed and developing world. He has reviewed deregulation, uncertainty, increase in data processing power, globalisation and securitisation etc as the important key developments and driving forces behind them.

Damanpour & Gopalakrishnan (2001) focused on exploring the pattern of adoption of product and process innovations at firm level by examining the relationship

between product and process innovations. The study concentrates on 101 commercial banks in the United States. The innovation introduced between 1982 and 1993 were taken for the study and it was divided into 2 periods of six years. Return on Equity, Return on Assets and Executing rating were the performance measures used. The study comes to the conclusion that high-performance banks adopt product and process innovations more than low-performance banks and the product- process pattern of adoption is more likely than the process-product pattern.

Guidotti (1993) presented a framework in which the domestic effects and the international transmission of financial innovation in the presence of currency substitution can be examined. In this study, Financial Innovation is explained as the technological change which affects the way individuals carry out their transactions. The analysis provides a number of insights; one is that financial innovation leads to a negative co-movement between the real and nominal exchange rates. Another one is that the international transmission and domestic effects of financial innovation depend on how it affects the cross-border transfer of seigniorage.

Harsha (2011) attempts to conceptualise the term financial engineering, its motivating factors, need for product innovations through financial engineering and suggest the strategies for the same.

Ibraheem(2013) in his study has investigated the different mechanism that are used to solve various problems in finance. i.e. about the financial engineering instruments. He also seeks to find out whether there is any impact of financial engineering on the financial system. In this study, financial engineering activities are classified into three steps (1) Designing innovative financial instrument, (2) implementation of innovative financial instruments, (3) The development of financial instruments.

Joshi(2009) lays focus on credit derivatives. The growth of the global credit derivatives market is explained in the study. After describing the benefit and demerits of credit derivatives the author explains that there is a need to introduce credit derivatives in India. The study states that the banks are the major players in the credit market and are therefore exposed to credit risk. As the credit risk grew year by year, there is a need for

some financial product which offers security to the financial institutions. The article was concluded with the expectation of the launching of the credit derivatives in the near future.

Lewrick (2008) developed a model which can be used to audit the management's capability to innovate and to monitor the relationship between innovativeness and the increase in the sales. It was named as ICP model, i.e the Innovativeness, Capabilities and Potential model and was found predicting the result of innovation strategy adopted by the company. The model was developed as the outcome of a study of companies in the high technology cluster around Munich.

Moos, Beimborn, Wagner, & Weitzel (2010) derives suggestions for the measurement of organisational innovativeness. They assert that innovation is an important measure of organisational performance. After reviewing various articles which provide measurement model of innovation, they categorised the models based on three different perspectives i.e (1) Innovation adoption vs creation,(2) Innovation type: product vs process and (3) Input oriented and output oriented. The study was concluded by proposing models for both inputs oriented and output-oriented measurement.

Necrep (2013) examined the innovativeness of banks and insurance companies in the developing financial market of Slovenia. The study focused on the impact of three core factors on the financial services development process. The difference in the way banks and insurance companies responded to the increased competition was also analysed by the researcher. Data was collected from managers of marketing and development departments of banks and insurance companies. Sales profit was taken as the financial indicator and domestic market share, sales growth and profitability of new services was used to measure market success. The stages of the new service development process were identified as:

i. Idea generation and screening
ii. Business analysis and marketing planning
iii. Service development and testing
iv. Service launch

The study was concluded with the statement that without improving the existing processes and developing innovative processes, it will be difficult for any bank or insurance company to achieve successful business performance.

Philipass(2011) studies the influence of diffusion of financial innovation to market participants frictions and their values through a mathematical, theoretical and empirical framework. They derived a novel measure of the influence of financial innovation to the market participants based on their correlation friction patterns. The main objective was to highlight a number of aspects and dimensions of this field. They aimed to present (i) The theoretical framework on the role of financial innovation at the financial structure (the fundamental generating root causes and the effects on the function of financial markets etc) and (ii) the parameterisation of the influence of financial innovation to market participants through a mathematical and econometric framework based on the participants minimum need for the change, the diffusion rate and the time parameter. They concluded that the parametric function, which is followed in order to show the influence of financial innovation, has a statistically significant impact on returns and volatility of financial and economic indices.

Rangarajan (2012) referred the relationship between innovation and regulation. He states that banking sector has taken big strides in the last two decades and it would be inappropriate in his view to classify all of or even most of financial innovations introduced in the last few decades as socially unproductive. The financial system must be able to meet the diversifying needs of a growing economy. In this context financial innovations needs to be encouraged. In the Indian context, there is a need to encourage the emergence of a vibrant corporate debt market. Efficient debt market will not only help larger industries but also small and medium enterprises. He also feels that we also need institutions which will serve as market makers offering the two-way course. This will provide liquidity to the markets and make it attractive to the investors. Innovative ways of financing infrastructure should be explored. Too little regulation may encourage financial instability but too much of it can impede financial innovations which are badly needed. Regulatory oversight of innovation is necessary but the regulatory perspective on innovation must not become too restrictive. In short, the policymakers must strike an

appropriate balance between the need for financial innovation to sustain growth and the need for regulation to ensure stability.

Silber (1983) pointed out that profit maximization of financial institution is the key reason for financial innovation. There are some restrictions in achieving profit maximisation such as policies and organisational management. Though these restrictions not only guarantee the stability of management, they reduce the efficiency of financial institution, so financial institutions strive toward casting them off. Constraint-induced innovation theory discussed the financial innovation from microeconomics, so it is originated and representative. But it emphasized "innovation in adversity" excessively.

Verghese(1990) takes a close look at the main features of the financial innovation and evaluated objectively what it has achieved and at what cost. The regulatory environment, financial instability, changes in lending capacity and profit margins of banks, the revolution of IT etc are identified as the complex factors contributed to initiate and accelerate the process of financial innovation.

Verma (2015) investigated the impact of liberalisation on the growth of business in the life insurance sector. For this, a comparison of the rate of growth of business during two decades is done. It is found that apart from the liberalisation, factors like increase in the number of companies, distribution network and increased manpower also influence the growth of insurance business. But a significant contribution is given by the innovation and creativity. The role of product innovations like ULIP and bancassurance was also discussed in the study. After evaluating the adverse effect of liberalisation the author had concluded the study by mentioning about the possible future innovations in the sector.

Wang & Ahmed (2004) depicts an organisation's overall ability to produce innovative outcomes. They contend that innovation is considered as an important factor for an organisations success. But a low attention has been paid to develop a measurement construct of organisational innovativeness and they have identified five dimensions which form the component factors of organisational innovativeness. Conformatory factor analysis was used for validating the measuement constructs. The study was concluded by recommending the further studies to include more items to the constructs and to test the

discriminant validity and predictive validity apart from the convergent validity which was tested in this study.

II. Studies on Banking Industry

Achimba, Ongonga, Nyarondia, Amos, & Okwara (2014) in their article 'Innovation in Banking Industry: Achieving Customer Satisfaction' tries to find out the effect of technology in the banking industry. They also examined the role of technology in the customer relationship management process and implementation. Self-appraisal reports for the banks and customers were used to collect data and the result of the study shows that technology has a major role in the customer relationship management process and if the bank has to operate effectively in the implementation of the CRM process it is necessary to adopt technology as a supportive tool.

Ansong (2012) looks into how innovative banking products are accepted by the customers. A questionnaire was employed by the university students to gather data and purposive sampling technique was used for selecting samples. The students were used as samples because according to Schiffman and Kanuk(2009) young and educated people are normally the first to adopt new products. The study revealed that there is a general awareness of innovative products among university students and ATM and E- Zwich are the most popular innovative products. Convenience, reliability, security and ease of use are stated as the drivers of innovation in this study. The study is concluded by stating that though the banks in Ghana can continue with the innovative banking activities that aim at young generation, intensive public education will be needed to inform the public about the innovative banking products.

Chavda & Solanki (2014) in their conceptual paper "Innovative banking products: Win-Win situation for customers and banks" has reviewed various articles relating to the topic. After systematic screening and processing of the gathered literature review, they have tried to give a detailed explanation about the various types of innovation, different factors affecting innovative banking, theoretical models, methodologies adopted and the types of sampling used. The article was concluded by stating the important findings of the articles reviewed.

Eisawi, Sekhon, & Tanna (2012) focused on examining how banks can improve the service excellence i.e. what banks can do to provide superior services to the customers. Purposive sampling was used for selecting the samples and questionnaire were distributed among 260 banking customers of UK. Questions were related to innovations, service excellence and other determinants of service excellence like rates, reputation, technology and excellent employees. The result of the Structural Equation Modelling shows that innovations is a determinant of service excellence and the study suggests that banks should be continually updated, reliable and should provide flexible products and all this will help the bank to be innovative.

Gopalakrishnan, Mishra, & Gupta (2015) studied the technological innovations in India's largest bank, State Bank of India. This case study aims at analysing how many technological innovations lead to customer satisfaction in the Indian banking sector. The study reviewed various models for measuring customer satisfaction like the model developed by Berry (Bart Allen) and Brodeur between 1990 and 1998, work done by Parasuraman, Zeithaml and Berry (Leonard L) between 1985 and 1988 and the work done by Cronin and Taylor. The study result shows that SBI has succeeded in introducing various technological innovations which improve service quality and thereby leads to increased customer satisfaction and also the retention. From the viewpoint of banks, they are able to perform more efficiently with less capacity and leads to cost reduction. The study was concluded by suggesting other banks to adapt the success model of State Bank of India.

Ilo, Ani, & Chioke (2014) conducted a study to analyse the relationship between technological innovations and the performance of banks in Nigeria. The research was also focused on the relationship between ICT adoption and customer satisfaction. Automated Teller Machines, Electronic Fund Transfer, smart cards, telephone banking, computerized credit rating, point of sales system, electronic home and office banking and electronic data exchange were the ICT products identified in the study. ICT applications identified were treasury operations, human resources, bank master, reconciliation, loan and deposit, money market, asset management, fund transfer and general ledger. The study used random sampling method and the data was collected from the employees and

customers of fifteen major Nigerian banks with their headquarters in Lagos. The findings of the study demonstrate that technological innovations have a positive relationship with the performance of banks and ICT adoption have improved the customer satisfaction and retention.

Kaur (2016) aims to impart knowledge about the innovative banking activities in the national and international level banks. The research was based on secondary data and highlighted some of the innovative banking activities of foreign banks and how far it is adopted by the Indian banks. The use of biometric technology, In-car apps, facial recognition technology, smart watches, google glass technology, robotics, Augmented Reality (AR) apps, beacon technology, oculus rift, cryptocurrencies, Artificial Intelligence(AI) and cheque truncation was explained in the study. The researcher comes to the conclusion that Indian banks have to understand the importance of adopting latest technology in the banking activities to ensure their survival. Most of the foreign banks adopt new technologies much earlier than Indian banks but some private banks in India like ICICI, HDFC and Axis banks are taking initiatives in the field of innovative banking.

Kesavan (2015) in his conceptual paper made an attempt to identify various innovations initiated by the selected bank. The study also analysed how these innovations are benefited to the society especially to the backward classes and how profitable it is for the banks. It also deals with the strategies adopted by the banks to retain its existing customers and for social inclusion. IndusInd Bank was selected for the study and innovative initiatives of the bank like video branch, super saver pack, my account my number, check on cheque, denomination selection, cash on mobile, quick redeem, direct connect, green champions program, share2care program, financial literacy and promoting art, culture and sports was analysed in detail by the researcher. The study was concluded by stating that even though the rate of innovation adopted by the bank is very high it has to concentrate more on grievance redressal mechanism.

Kumar & Raju (2015) carried out a study to examine the products and services of new generation banks. Technological developments and other emerging trends in the banking sector were also analysed. Internet, Society for Worldwide Interbank Financial Telecommunications(SWIFT), Automated Teller Machine(ATM), Cash Dispensers,

Electronic Clearing Service, Banknet, Chip Card, Phone Banking, telebanking, Internet banking, Mobile Banking Anywhere banking, Voicemail and Kiosks were identified as the new developments in new generation banks. The study concluded that the Indian banking sector is developing with the huge customer base and innovative products and services. By revaluing the existing strategies with the government support they can become bigger and stronger with the global customer base.

Malik (2014) focused on how the financial innovations have contributed to the development of banking sector. The researcher also looks into the benefits and challenges of the recent trends in banking. The study gives a conceptual clarity about the innovations like ATM, debit card, credit card, NEFT and RTGS. With the help of reports on the increased number of ATMs, debit cards, credit cards, and the volume of transaction using electronic banking the researcher concluded that the innovations in banking sector have contributed to the development of banking sector.

Martovoy & Mention (2016) tried to find out whether the New Service Development(NSD) process have any impact on the financial services and also to analyse the patterns in the development of service innovations. Data were collected from executives and innovation managers of banks located in Luxembourg. The study explains NSD process in seven stages, i.e. definition of problems, idea generation, idea screening, testing, business analysis and introduction to a market and four patterns of NSD process namely problem driven pattern, proactivity driven pattern, market-driven pattern and strategy-driven pattern were identified.

Nath, Schrick, & Parzinger (2001)focuses on the effect of internet banking on the banking industry. Both strategic and operational dimensions were measured in the study. It also assesses the effect of internet banking on banks' customer, bank-customer relationships and technology considerations. Data were collected from 75 bricks and mortar banks in a large state in the Midwestern United States and the result shows that full benefits of internet banking are not realised by many banks and suggests that banks that do not offer internet banking should quickly move towards it. And from the operational perspective, it is found that internet banking has many benefits and this lead to the increase in the number of customers.

Pennings & Harianto (1992)carried out a study to examine the propensity of an organisation to adopt technological innovations. A sample of 152 banks from 300 large banks in the United States covering a period of 11 years was selected for the study. The research was done to address the introduction of a new form of innovation, video banking services. They tested whether the experience in computer and telecom, capital investments in system and equipment and interfirm linkages with firms from computer, insurance etc have an impact on the adoption of video banking services. The study resulted that the experience in IT and interfirm linkages have an impact on the adoption of innovations and the capital investments have no specific impact on the adoption of video banking in the American banking industry.

Phuong Nam (2014) targets to discover the reasons, motivations and challenges involved in the implementation process of e-banking services in Vietnam. It was a case study and after reviewing several kinds of literature and conducting semi-structured interviews with the representatives and customers the researcher concludes that the motivations for the implementation of e-banking serivices are to expand the market and to increase customer satisfaction. The study also identified the challenges in the e-banking implementation i.e. unwillingness and lack of knowledge of customers and underdeveloped infrastructure.

Prakash & Kumar (2016) gives an overview of the history and structure of Indian banking sector. The study gives a clear idea of the present state of banking in India. The concept of Customer Experience Management, differential branding and customer 3.0 was explained in the study. The study states that simplicity which is mutually beneficial to both customers and banks is the mantra of modern banking and to simplify the procedures banks should introduce multi- channel banking. The study was concluded with the statement that Indian banking is moving faster to the change from sellers market to buyers market. Indian banking industry will work on new benchmarks and will result in quality services at cheaper cost.

Rahman, Ferdousi, Chowdhury, & Haque (2015) aims to measure the impact of factors like core services, security and trust on the internet and the awareness about the services on the usage of online banking. The survey was done among 180 customers

living in the urban areas of Dhaka, the capital city of Bangladesh. Purposive sampling was employed for the sample selection and the criteria used for this was that only the customers having six months of online banking experience and with a bachelor degree was selected as samples for the study.The findings of the study after employing Structural Equation Modelling reveals that the effect of security and trust and the awareness of customers is significant and the factor core services are insignificant.

Ramakrishna (2012) intended to identify service innovations offered by selected public and private sector banks in India. The study was based on two innovation models developed by Bessant and Tidd (2007) and Six Dimensional Model of Service Innovation developed by Pim den Hertog, Wietze van der Aa and Mark W. de Jong. Bessant and Tidd(2007) identified 4Ps of innovation i.e. Product innovation, Process innovation, Position innovation and Paradigm innovation. Six-dimensional innovation model was developed by Pim den Hertog (2010) with the dimensions new service concept, new customer interaction, new value system, new revenue model and new organisational or technological service delivery system. The researcher aimed to make a comparative study of the innovative banking initiatives with reference to these models. State Bank of India, Andhra Bank, YES Bank and ICICI Bank were selected for the study. The study concluded that ICICI banks are more aggressive in innovation and more innovative services are offered by them. The study also come to the conclusion that both public and private sector banks have taken service innovation as their future strategy.

Reuben (2012)focus on the role of innovation in improving the banking sector and customer satisfaction. Both financial and technological innovations were taken into consideration and for this purpose four dimensions of innovations were identified, i.e. product, process, position and paradigm. The study focused on product, process and position and was conducted in two major banks in Ghana namely, Barclays bank and Nordea bank. From the research, it was concluded that innovation cannot be fully beneficial to both customers and bank without quality improvement. It was also found that the customers do not patronise some kinds of innovations and it was suggested to conduct further studies to find the reasons for the low patronage ratio.

Singh (2014) discussed the historical background, evolution and the recent trends of the Indian banking sector. The researcher has explained in detail the three phases of Indian banking system. Phase 1 is the early phase from 1786 to 1969 i.e. till nationalisation, Phase 2 is nationalization of Indian banks and unto 1991 and Phase 3 is phase of Indian banking sector reform after 1991. The study analysed various innovative banking activities like Credit cards, Global cards, Charge cards, Debit cards, Smart cards, ATMs, Intercity banking, Net banking, Mobile banking, Demat account, Online banking services, emphasis on Customer Relationship Management(CRM), Mergers Acquisitions and Takeovers and Moving to global markets. The paper was concluded by suggesting that the future focus should be on growth based on calculated risks.

Singh, Pandey, & Gupta (2011) gives an overview about the present state of the Indian banking sector and the important events taken place in the transformation of banking industry, i.e. from the traditional banking to the innovative banking. The driving force behind the transformation of banking and the factors that hinder this transformation was discussed in the study. Some important innovations like introduction of Electronic Clearing Service, Electronic Fund Transfer, Core Banking Solution, ATMs, CRM, Corporate Internet banking, Payment systems etc were explained in the study. They also discussed the risk factors associated with innovative banking like cheque frauds, ATM frauds(Phishing, Skimming &Spoofing) & Credit card frauds. Data was collected using a structured questionnaire, fifty customers using innovative banking products were selected as samples. The study was concluded by suggesting to design a system that widens the gap between marginal benefit and marginal cost involved in the transformation of banking sector and to promote the marginal efficiency of investment in technological advancement. some preventive measures to avoid banking frauds were also suggested.

Ughetto (2006) investigated to what extent the convergence of banks over risk-adjusted capital standards set by the new Basel capital accord may affect the way in which they screen innovative firms. It also gives an overview of the existing firms of credit support to R & D activities. The study is built upon a survey conducted in January and February 2006 on 12 main Italian banking groups. The study provides interesting insights on the use of non-financing parameters to assess the credit worthiness of

potential borrowers and on the architecture of the internal rating systems in the light of Basel II requirements. Results suggest that the majority of banks does not consider intangibles as meaningful determinants in credit risk assessment. This could imply that the sole implementation of the accord might not lead to reduce informational asymmetries between lenders and borrowers as it could be expected. However, such an effect could be compensated by specific measures provided by single financial intermediaries.

Wambuaa & Datcheb (2013) analysed the impact of innovations on financial inclusion with the help of the independent variables like perceived risk, perceived trust, ease of use and Anti Money Laundering. Innovative channels were used as an intervening variable in the study. E-banking, M banking and Agency banking was the innovative channels under consideration and customers of any of the five branches of equity bank ltd in Mombassa country, using any of these innovative channels were selected as the sample respondents. Stratified sampling was used for selecting the required sample of 200 customers. The findings of the study reveal that even though there are many innovative delivery channels, queues in the banks remain the same especially in the enquiry and customer service counters and if stringent measures like improving reliability will be introduced in the banks it will lead to increase in customer confidence and satisfaction.

III. Studies on Performance Measurement:

Agbolade (2011) conducted a study to analyse the role of ICT adoption in the profitability of banks in Nigeria. Ordinary Least Square approach was used by the researcher to examine the relationship between the variables. The findings of the research reveal that a marginal change in the investment level in ICT results in a proportionate change in the profit level of banks. The study recommended to increase the usage of ICT in banking services and to formulate appropriate policies to ensure proper monitoring and to identify the optimum size to attain organisational efficiency.

Akhisar, Tunay, & Tunay (2015) conducted a study to evaluate the effect of electronic banking services on the performance of banks. The bank's performance was measured in terms of ROA and ROE. Dynamic panel data model was used for the analysis of 23 developed and developing countries banking data. Both lagged level and

lagged differences of the variables were measured using GMM estimator. The findings of the study reveal that the number of customers using internet banking and the number of POS terminals has negative effect on profitability where as the ratio of ATM to the number of branches effects in positive profitability.

Bikker (2010) demonstrates that performance measurement is a difficult process and the indicators used for measuring performance differs in quality. Simple indicators and complex models have been used both in theory and practice to measure the performance and this study investigates which method should be preferred and how stronger measures can be formed by combining indicators. Twenty simple indicators of competition were analysed and after predictive validity test was combined to form five types of performance indicators i.e. cost, profit, market structure, competition and efficiency.

Dauda & Akingbade (2011) examined the relationship between technological innovation and performance of banks by analysing the responses of employees and customers. Customers and employees of 15 Nigerian banks were selected as the samples of the study. The study tested the relationship between technological innovation and employee performance and also the relationship between technological innovation and customer satisfaction and concluded that the introduction of ICT has contributed to the enhancement of customer satisfaction and also the performance of employees thereby leading to the improved performance of the banks. The study recommended that the investment in ICT should be an important component of the banking strategy.

Ebarefimia & Inedegbor (2013) investigated the relationship between organisational performance and product development by innovation. The study used product development and innovation as the independent variable and organisational innovation as dependent variable. Organisational performance is measured in terms of:

(1) Profitability
(2) Sales Volume
(3) Market Share
(4) Customer Satisfaction
(5) Customer Loyalty

Cross-sectional design was used by the researchers to study the relationship between the variables. Convenience sampling was used to collect data from the managers of Nigerian manufacturing and services firms. The study result shows that when consumer perceives product innovation as more favourable, stronger and unique, there will be more impact of product innovation on organisational performance.

Gichungu (2015) studies the relationship between technology-based bank innovations and the financial performance of commercial banks. Secondary data i.e. annual reports of banks over a period of five years were used for analysing the impact of innovations on the financial performance of the banks. The study concluded that the banking innovations like mobile banking, agency banking and ATM positively impacted the financial performance of banks when the online banking was not having the expected level of impact on the financial performance of banks over the period of five years.

Githikwa (2009) conducted a study to measure the impact of financial innovation on profitability of commercial banks in Kenya. The study concluded that banks consider financial innovation as a way to create an impact on the performance of banks by increasing profitability. The study also revealed that for the smooth implementation of financial innovation, all banks should have more resources and should implement cost reduction both in its operations and transactions, and should focus on customer satisfaction. Implementation of product, process and institutional innovation will aid in the increased flexibility of commercial banks in their operations.

Hossein (2013) in his article tries to examine the relationship between e-banking profitability, economic growth and total deposits. The study used panel data from selected Asian countries during the period 1990 to 2010. First, the existence of unit root in the data series was tested by the researcher, followed by determining the existence of long-run cointegration between GDP and independent variables. This was done with the help of panel cointegration tests. The study adapted an empirical model of Ceylan Onay et al (2008). The study result shows that in the year of adoption, online banking does not have a significant impact on the performance of banks and there exist a decrease in the profitability. This may be because of the high IT expenditures for the adoption process. But in the second year, a positive coefficient is visible on the ROE estimation. So the

researcher concluded that financial result of investment in IT is a gradual process and the adoption of online banking have a positive impact on the performance of banks.

Hughes & Mester (2008) discusses the application of the two empirical approaches in measuring the performance of banks i.e structural and non-structural. The study states that the structural approach in measuring the performance depends upon the theoretical model of the banking firm and also on the concept of optimisation. It relies on the cost or profit function i.e the performance is measured in terms of cost minimisation or profit maximisation. Non structural approach is the usage of financial ratios like ROA and ROE or the ratio of fixed costs to total costs to assess different aspects of performance. It also determines the relationship of performance with investment strategies.

Karim & Hamdan (2010) examined the effect of information technology on the Jordanian banking industry. Fifteen Jordanian banks were selected for the study and the level of IT used by these banks for a period of five years was examined. Two forms of the matrix were used for measuring the performance of banks. They are

1. The matrix of Financial Performance:

a. Market Value Added(MVA)

b. Return on Investment(ROI)

c. Earnings Per Share(EPS)

2. The matrix of Operational Performance

a.Net Profit Margin(NPR)

b. Operating Return on Assets(OROA)

c. Profitability per Employee(PE)

The utilisation of IT by Jordanian banks was measured by calculating the level of investment in hardware, software, internet banking, phone banking, number of ATMs, use of cyber branches and banking via SMS. By the use of Pooled Data Regression using Pooled Least Square Manner the study arrived at a result that there is the impact of use of IT in the Jordanian banks in MVA, EPS, ROA, NPM and there is no such impact in the case ROE.

Loof (2000) conducted a study to measure the relationship between the innovation output and firm performance. Innovation output is measured by sales of new products per employee and five different measures of firm performance are:

1. Employment growth
2. Value added per employee
3. Sales per employee
4. Operating profit per employee
5. Return on Assets

Malhotra and Singh (2009) conducted a study to measure the effect of internet banking on bank performance. The result of the study indicates that internet banking is profitable and have operational efficiency. They also found that internet banks have higher asset quality. These banks are better managed which leads to minimision of the expenses for building and equipment. The study also identified that smaller banks that adopt internet banking have a negative impact on profitability.

Mutuku & Nyaribo (2015) conducted a study to offer a better understanding of the effect of Information Technology on employee productivity. The independent variables of the study were Automated Teller Machines, Internet banking, Mobile banking and Electronic Fund Transfers and the dependent variable was employee productivity. The study was done among 150 employees of three selected banks of Nairobi, Kenya and stratified random sampling was employed to select the samples. The result of the study clearly indicates that an increase in the application of IT will certainly lead to an increase in the productivity of employees and the research recommended that the commercial banks in Kenya should improve their innovative capability due to the dynamics in the business.

Mwangi (2013) carried out a research to measure the impact of innovations on financial performance of banks. The study was carried out in the financial industry in Kenya. The findings of the study revealed that bank innovations had a significant impact on the performance of the banks which was measured through the variables like income, return on assets, profitability and customer deposits of commercial banks in Kenya. The study measured the moderating effect of mobile phones and internet services and

concluded that the moderating effect of mobile phones is higher than that of internet services when influencing financial performance of commercial banks in Kenya.

Nader (2011) carried out a study to measure the profitability of banks. The study was done in commercial banks of Saudi Arabia during the period 1998- 2007. The results of the study indicated phone banking, and number of ATMs and bank branches had a signficant positive impact on the profitability of banks. It is also found that the number of point of sale terminals PC banking and mobile banking have no signficant effect on the profitability of the banks.

Ngari(2014) aims to find out whether the financial innovations affects the financial performance and profitability of commercial banks in Kenya. 16 commercial banks from the 44 banks were selected for the purpose of the study and Slovin's formula was used to arrive at the sample size. Profitability ratio's like Net Profit Margin and Gross Profit and Efficiency ratios were also calculated for the financial performance measurement. By employing multiple linear regression models it was concluded that financial innovations had significant impact on financial performance of the banks.

Omotoso, Dada, Adelowo, & Siyanbola (2012) examined the role of ICT in the delivery of services in the Nigerian banking industry. The respondents of the study were the officials and customers randomly selected from the banks. Even though the findings of the study reveals that ICT has made an impact on the productivity of the banks, the study identified some challenges to the application of ICT in the banking sector. The study also suggested some measures to overcome the challenges and to improve the productivity of banks in Nigeria.

Rub & Abbadi(2012)promotes the use of balanced score card in evaluating the performance of banks. The study aims to analyse whether the bank managers are aware of these performance measures and whether they use them in their bank's performance measurement process. They also evaluate the difference between local and foreign banks, branches and head office etc regarding the performance measurement. Norton and Kaplan's model with four measures (i.e. financial, customer satisfaction, innovation of product and services and commitment, learning and growth of employees) was adopted and modified by the researchers to fit the Palestinian context.

Sharifi & Akhter (2016) measured the impact of Credit- Deposit Ratio on the financial performance of public sector banks in India. Financial performance was measured in terms of Return on Assets, Return on Equity and Net Interest Margin. The study was analysed using secondary data obtained from annual reports of RBI for the period 2008 to 2015. Panel data regression model was used for the analysis and the outcome reveals that CD ratio has a positive impact on the profitability of public sector banks in India.

Shirley and Sushanta (2006) measured the effect of information technology on the banking sector and identified how spending on information technology can impact bank profits. Panel data of 68 US banks for a period of over 20 years was used to estimate the impact of IT on the profitability of banks. The study found out that spending on IT leads to cost-saving but higher IT spending can lower the bank profits by creating network effects. They contend that the relationship between IT expenditures and bank's financial performance is conditional to the extent of network effect.

Stoica, Mehdian, & Sargu (2015) in their article aimed to analyse the way in which the internet banking services contribute to the overall efficiency of the Romanian banks. DEA approach was used in the study to measure the efficiency of Romanian banks. To identify different strategic groups among the banks PCA was employed to the bank's efficiency values obtained through DEA. 4 inputs and 2 output was used in the model to generate 45 possible combinations and 45 results based on the DEA. The weak and strong aspects of the selected banks can be identified through this. Principal Component Analysis was used to extract relevant data and eliminate redundant information. A sample of 24 banks engaged in universal banking activities was used for the study and the results of the study suggests that "cost-oriented" and "internet banking oriented" are the two business strategies practiced in Romanian banking sector and only 2 banks are able to efficiently use internet banking services and all other banks prefer to use mixed approach between internet banking services and cost reduction strategies.

Thangam & T (2016) have made an attempt to measure the productivity of selected banks in India. Three banks each were selected from the three sector of the banks i.e. from public, private and foreign banks. The biggest banks in terms of deposits and

advances were selected for the study and the productivity of these banks for the period of 2009-10 to2013-15 was measured. The variables used to measure productivity are:

1. Net Profits
2. Deposits
3.Advances
4.Total interest income
5. Total expenditure
6. Total business

Calculation was done on both per employee and per branch basis and it was found that large banks with high number of branches and employees have low productivity and it is suggested that banks should concentrate more on per branch productivity and per employee productivity.

IV. Studies on Customer Satisfaction

Ahmad, Rehman, & Safwan (2011) examined the effect of service quality on banks performance with the mediating effect of customer satisfaction. The proposed model was tested using Structural Equation Modelling(SEM). In this study service quality was measured by using modified version of SERVQUAL model developed by Parasuraman et al (1988,1991) and contains five dimensions i.e. tangibility, reliability, responsiveness, assurance and empathy. Customer satisfaction was measured using five dimensions i.e. core service or service product, human elements of service delivery, systematization of service delivery, tangibles of service and social responsibility. Performance of banks was measured by asking the respondents to rank some aspects of their bank like quality of product, market share, internal process coordination, profitability, personnel rotation, etc. The findings of the study revealed that customer satisfaction is not having any mediating role between service quality and performance of banks due to the lack of customer orientation and awareness campaigns.

Angelova & Zekiri (2011) focused on the application of ACSI model to describe how customers perceive service quality and to know whether they are satisfied with the services offered. Even though the study was done in the context of telecommunication industry, it is applicable to all service industries as it provides a clear idea about the

cause-and-effect model which includes drivers of satisfaction, satisfaction and outcomes of satisfaction. ACSI model measures the effect of customer satisfaction on customer loyalty and by looking at the indexes the users can easily identify that the increase in which driver of satisfaction will have more effect on customer loyalty.

Ankit (2011) focused on identifying the major factors that influence the satisfaction of online banking customers with regard to the service quality of the banks. The data was collected from 250 customers who are using or willing to adopt online banking facility in Vadodara. The study identified six factors for determining customer satisfaction. They are;

1. Banking Needs
2. Core Services
3. Problem Resolution
4. Cost Saved
5. Convenience
6. Risk and Privacy concerns

Feature availability and customer continuation were identified as the moderating variable by the researcher. The study suggested that providing education to the customers about the online banking services will increase the confidence of the customers and it will lead to the satisfaction of the customers.

Dewan & Mahajan (2014) explored the moderating effects of various demographic and situational factors on the customer satisfaction in the public sector banks. Gender, age, income, educational background, occupation, marital status, frequency of visit to the bank and years of relationship with bank are the various factors considered by the researcher. The researcher collected data from 300 bank customers of State Bank of India using structured questionnaire and the study suggested that the bank managers should assess and monitor customer satisfaction levels in their banks periodically and also focus on improving their relationship with the customers as it is an important factor for increasing the performance of the banks.

Hong & Marimuthu (2014) studied the impact of banking service quality on customer satisfaction. Servqual model with five dimensions (Assurance, Reliability, Tangibility, Empathy and Responsiveness) was implemented in the study to determine service quality of the banks. The gap was identified after measuring the difference between the expectation and perception of the customers regarding the dimensions of service quality. The result of the study reveals that the expectation of the customers was higher than the perception and the largest gap is found in the reliability dimension. It was also found that service quality has a positive and significant relationship with customer satisfaction.

Khanna & Gupta (2015) aims to focus on the perception of customers about the technological advancement in the delivery of financial products. Factors influencing customer perception were identified by conducting personal interviews with bank managers and customers. Thus the study identified five factors i.e. technology acceptability, safety, accessibility, user-friendliness and availability. The significant direction was given to Public Sector Banks for more effective cross selling and up selling of financial products and services.

Khondaker (2010) identifies the factors affecting customer satisfaction and explain how it can be utilised as a corporate government tool in the banking industry. The state-owned commercial banks of Bangladesh were selected for the purpose of the study. After testing the transaction-specific model by the use of factor analysis and multiple regression the findings of the study reveals that customer ranked responsiveness as the important factor for satisfaction and then physical comfort and assurance. The researcher comes to a conclusion that the specific study will guide the commercial banks to improve their customer satisfaction and the improved customer satisfaction will lead to improved financial sustainability and there by contributing to economic development of the country.

Komal & Rani (2012) looked into the satisfaction level of customers regarding various aspects of electronic banking i.e. ATM, internet banking, mobile banking and credit cards. The researcher collected data from 450 banking customers using judgemental purposive sampling method and the study results shows that the satisfaction

level of customers was high in the use of ATM facility, internet banking is at the second position and credit cards holds the third position and the mobile banking is at the lowest position. The study concluded that the opportunities in e-banking are immense and there is still an untapped market in India and banking institutions have a lot of scopes to expand their e-banking services.

Mandal (2015) examined the construct of customer satisfaction in relation to Indian retail banking industry by using a qualitative perspective. An attempt was made to explore the dimensions which might affect customer satisfaction. Depth interview and focus group of Indian banking customers were conducted and the analysis was done by using a tool called grounded theory. Open coding, index card coding, axial coding and selective coding were the procedures used to determine the dimensions affecting customer satisfaction and it provides the professionals and practitioners in the banking industry a better idea of customer satisfaction.

Mohajerani (2013) investigated the determinants of customer satisfaction and its consequences. The study was done by identifying 285 customers of 3 star, 4 star and 5-star hotels in Iran by using proportionate simple random sampling method. Structural Equation Modeling and Confirmatory Factor Analysis was used to analyse the relationship between dependant and independent variables. The result of the study reveals that perceived value and customer satisfaction are positively related and two factors namely percieved quality and customer expectation are not identified as the determinants of customer satisfaction. The study also identified that perceived value and perceived quality, perceived quality and image and perceived value and image, have a relationship and by improving one of them, the other one will become higher.

Musara & Fatoki (2010) tried to explore the impact of technological innovations on the efficiency of banking sector. The study also examined whether technological innovations lead to cost reduction to the customers. Data were collected from 200 customers banking with Standard Bank and FNB and residing in the town of Alice, South Africa. Stratified random sampling method was employed and 100 customers of Standard bank and 100 customers of FNB were selected randomly. The result of the

study reveals that ATMs was considered as an important technological innovation by the customers which leads to increased efficiency of the banks.

Osman & Sentosa (2014) carried out a study to understand the mediating role of customer satisfaction on the relationship between service quality and customer loyalty. The study was done in the context of Malaysian commercial banking industry. The result of the study after the application of SEM and PLS technique shows that service quality has a significant direct effect and positive relationship on customer satisfaction. The model also reveals that service quality has a positive and significant direct effect on customer loyalty. The mediating effect of customer satisfaction on service quality and customer loyalty was also justified by the study.

Osman, Mohamad, & Moham (2015) in their article have tried to understand the direct effect of service quality on customer loyalty, effect of customer satisfaction on customer loyalty and also the effect of banks image on customer loyalty in the context of Malaysian banking industry. SEM model was adopted to undertake the study and the model thus created was tested using Partial Least Square method. The servqual model developed by Parasuraman et al. (1985) was modified to measure the dimensions of service quality. The findings of the study show that customer satisfaction, service quality and banks image have a significant and positive effect on customer loyalty and this will lead to banks profitability.

Rizwan et al. (2014) identified six important factors which affect the satisfaction level of customers in using the modern banking services i.e awareness, security, trust, ease of use, responsiveness and reliability. The study was employed by collecting data from 120 banking customers using structured questionnaire. The result of the study shows that all the variables identified by the researcher have a significant positive relationship with the customer satisfaction of banking customers regarding modern banking services. The study implied that bankers should focus more on the development of innovative banking services as it is the main reason for the achievement of customer satisfaction.

Saha, Hasan, & Uddin (2014) gives insight into the quantitative parameters of customer satisfaction by identifying various service quality dimensions. The study was

done in the selected commercial banks in Rajshahi city. The fifteen influencing variables selected at the first stage were factored in to five important constructs i.e. (1) Bank safety, guarantees, (2) Branch environment (technical facilities, interior decoration etc.), (3) Bank opening hours; Request fulfilment time; Bank reputation, (4) Service speed, (5) Service costs and all the indicators used to measure the constructs were found statistically significant based on the survey.

Seyaal & Rahim (2011) aims to determine the satisfaction level of online banking customers and the role of demographic variables in assessing them. The study used Doll and Torkzadeh model for measuring the customer satisfaction. Hierarchical regression analysis was done and the result shows that the demographic variables have a role in determining customer satisfaction. the study concluded that the customers are satisfied with the online banking services even though there is lack of security issues, low speed of internet and the lack of skill. They suggested that the bank authorities can organise customer orientation and training programmes for both existing and prospective customers.

Zafar, Zaheer, Rahman, & Rehman (2011) intended to test whether the service quality dimensions will lead to customer satisfaction. A model was developed on the basis of theoretical background with the dimensions efficiency, reliability, responsiveness, fulfilment, privacy and assurance. 264 online banking customers were selected as samples using convenience sampling. The study concluded that the service quality dimensions have significant impact on customer satisfaction. The proposed model was accepted and the dimension 'assurance' was having the highest value.

Zani & Berzieri (2008) have focused on measuring customer satisfaction using ordinal variables with a different number of categories. The various dimensions of customer satisfaction used in the context of the study contact, waiting, courtesy, skill, quality, speed and complete. In addition to this overall satisfaction is also measured. The study has tried to consider and compare different approaches for quantifying the ordinal variables. Initially a pyramid of satisfaction which is a simple graphical method was used to visualise the entire variables and its categories with shares of each class of respondents. It was followed by a comparison of linear and non-linear for summarising

the level of satisfaction. The scores of PCA and CATPCA ranging from 0 to 10 were also related. The result of the study shows that multi dimensional approach with classes of unsatisfied, fairly satisfied and very satisfied respondents give a more appropriate estimate.

2.2 Research Gap

The literature survey reveals that though there are a number of empirical studies made on customer satisfaction and financial performance of banks, it is found that there are no specific studies made to assess the effect of financial innovation on the banking industry in terms of innovativeness and financial performance. In addition to this, no study has been made to compare the public and private sector banks on the dimensions of financial innovation and customer satisfaction. Use of econometrics procedure in measuring the financial performance was also not done before in the commerce discipline. As such the above factors are considered as the 'Gap' and keeping this gap as the basis this study has been taken up.

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Chapter 3

Financial Innovation in Indian Banking Industry: A Theoretical Framework

- ***Introduction***
- ***Innovation***
- ***Financial Innovation in Indian Banking Industry***
- ***Models of Innovation***
- ***Diffusion and Adoption of Financial Innovation***
- ***Dimensions of Innovation***
- ***Customer Satisfaction***
- ***Models of Customer Satisfaction***
- ***Performance Measurement***
- ***Profiles of Banks Selected***
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Chapter 3

Financial Innovation in Indian Banking Industry: A Theoretical Framework

3.1 Introduction

The review of related literature on financial innovation, customer satisfaction, banking industry and performance measurement was discussed in the previous chapter. The present chapter deals with the concepts, definitions, models and theory related to the major constructs of the study, i.e. Financial Innovation, Customer Satisfaction and Financial Performance. The chapter also gives a detailed explanation of the financial innovations in the selected public and private sector banks.

3.2 Innovation

Innovation has shaped human society and daily life in every age. Impact of innovation can be seen over the centuries in such diverse areas of human endeavour as religion, social organisation, architecture, military tactics, medicine, agriculture, and the arts. Though the term innovation entered the English vocabulary in the fifteenth century, it's probably safe to say that few people prior to the nineteenth century used it regularly. Recognising that innovation is the catalyst for economic progress and national competitiveness, government and business leaders demand innovation and periodically launch programs to encourage more of it.

Innovation is not synonymous with invention. "Invention" generally refers to the creation of a new idea, product or technique; "Innovation" refers to the introduction of something new to a system that has not used it before. "The perceived newness of the idea from the individual's point of view determines his or her reaction to it. If the idea seems new to the individual, it is an innovation (Robertson & Tu, 2001)". An innovation consists of certain technical knowledge about how the things can be done better than existing state of the art. The innovativeness of a new product and firm innovation capability is important for several reasons. Innovation products present opportunities for firms in terms of growth and expansions into new areas as

well as allows firms to gain competitive advantage, innovation by itself is defined as the generation, acceptance, and implementation of new ideas, processes, products or better services.

Table 3.1 demonstrates some important definitions of innovation

Table 3.1

Definitions of Innovation

Innovation means something new. Innovation is introduction of a new good, introduction of new method of production, the opening of a new market, the conquest of a new source of supply, carrying out of the new organization of any industry.	Schumpeter, 1982
Innovation is an idea, practice or object that is perceived as new by an individual or group (or organisation).	Rogers, 2003
Innovation is a new idea, which may be a recombination of old ideas, a scheme that challenges the present order, a formula or a unique approach, which is perceived as new by the individuals involved.	Andrew,1986
Innovation is a new element introduced in the network, which changes, even if momentarily, the costs of transactions between at least two actors, elements or nodes in the network.	Cabral, 2003
Innovation means new ways of doing something. It may refer to incremental, radical, and revolutionary changes in	Mckeown,2008

thinking products, processes or organizations.	
Innovation is the embodiment, combination or synthesis of knowledge in original, relevant, valued new products, processes or services.	Luecke & Katz, 2003

3.2.1 Financial Innovation in the Banking Industry

The banking industry is the lifeline of any economy. It is one of the important financial pillars of the financial system, which plays a vital role in the success or failure of an economy. A well-developed banking system is a prerequisite for the economic development of a modern economy. Banks are one of the oldest financial intermediaries in the financial system. The banking system is the fuel injection system which spurs economic efficiency by mobilizing savings and allocating them to high return investment. The banking system reflects the economic health of the country.

In India, banking originated at a time when indigenous bankers played a very important role in lending money and financing foreign trade and commerce. During the days of the East India Company, it was the turn of agency houses to carry on the banking business. The General Bank of India was the first joint stock bank to be established in 1786. The others were the bank of Hindustan and the Bengal Bank. In the first half of the 19th century, the East India Company established three banks- the Bank of Bengal, 1809; the Bank of Bombay, 1840; and the Bank of Madras, 1843. These three banks, also known as Presidency banks, were amalgamated in 1920 and a new bank, the Imperial Bank of India, was established in 1921 (Suresh & Paul, 2010).

In the financial services industry, innovation is viewed as "the act of creating and popularizing new financial instruments, technologies, institutions and markets, which facilitate access to information, trading and means of payment" (Solans, 2003). Financial innovation in the banking industry is referred to as the technological advancement in the financial markets (Reuben, 2012). According to Tufano (1989), financial innovation is "the act of creating and then popularizing new financial instruments as well as new financial technologies, institutions, and markets".

According to Lawrence (2010), financial Innovation involves “the design, the development, and the implementation of innovative financial instruments and processes, and the formulation of creative solutions to problems in finance”. Beaver (2002) believes that innovation is “an essential element for economic progress of a country and competitiveness of an industry”. Sandvik & Sandvik (2003) argues that innovation “is one of the most important competitive weapons and generally seen as a firm’s core value capability”. Innovation is also considered as an effective way to improve firm’s productivity due to the resource constraint issue facing a firm (Lumpkin & Dess, 1996). According to Visco (2007), financial innovations can be grouped as new products (e.g., adjustable rate mortgages; exchange-traded index funds); new services (e.g., on-line securities trading; Internet banking); new "production" processes (e.g., electronic record keeping for securities; credit scoring); or new organizational forms (e.g., a new type of electronic exchange for trading securities; Internet-only banks). Financial innovation has not only opened up new opportunities for the sector participants but also increased new market players arising from new products in the financial market (Noyer, 2007). The developments in the financial sector have not only led to the increase in the number of financial institutions, but also the development in level of sophistication with new payment systems and asset alternatives to holding money. Associated with this rapid expansion in the banking sector is a range of financial innovations: the ATMs, debit cards, the electronic money, Cheque Truncation System (CTS), RTGS, EFT, ACH, MICR, Retail Banking, free advisory services, implementation of standing instructions of customers, payments of utility bills, fund transfers, internet banking, telephone banking, mobile banking, selling insurance products, issue of free cheque books, travellers cheques and many more value added services were introduced.

3.2.2 Models of Innovation:

This section reviews the selected models of innovations and their contributions and shortcomings. (Schumpeter, 1934) viewed innovation as the carrying out of old and new combinations, 'employing existing resources in a different way, in doing new things with them, irrespective of whether those resources increase or not'. Innovation is also seen as the combination of invention and commercialisation which forms the foundation of firm competitiveness (Freeman, 1982; Porter, 1990). From the

organisational standpoint, innovations are defined as 'the adoption of ideas that are new to the adopting organisation' (Rogers, 1983). Moreover, the types of innovations may include technical, administrative, product, and process innovations (Damanpour, 1991; Utterback, 1994).

1. The Linear Model:

The linear model views innovation as following a determined sequence of stages. The ideas that shaped the model were introduced as early as the seventeenth century. The Linear Model of Innovation is an early model of innovation that suggests technical change happens in a linear fashion from Invention to Innovation to Diffusion. It prioritises scientific research as the basis of innovation and plays down the role of later players in the innovation process.

2. The Diffusion Model:

The linear model is commonly associated with the widely used innovation diffusion theory which defines diffusion as "the process by which an innovation is communicated through channels over time among members of a social system" (Rogers, 1983). This model explains how an innovation follows a particular path during diffusion, progressing in sequential stages. The model, although commonly criticised, has been widely used in different disciplines, and suggests that innovation diffusion follows a linear direction. Four major factors influence innovation diffusion under this model - innovation characteristics, communication channels, time, and social system. Moreover, the process of diffusing innovations involve two general stages, the adoption stage, involving knowledge acquisition, learning and decision-making; and the implementation stage, involving organisational changes and the support for technological deployment.

3. Teece's Model:

David Teece identified two major factors influencing innovation in firms (Teece, 1986). Firstly, the 'appropriability regime' of a firm can protect it from competitors imitating its technologies, particularly through the provision of intellectual property (patents, copyrights, trademarks and trade secrets) and the protection of technology. Secondly, the 'complementary assets' of a firm contributes

to the creation of capabilities required in innovation which also influences the development of an integrated research organisation. These assets include a firm's unique characteristics in manufacturing, marketing, distribution, services, reputation, and brand name.

4. The People Perspective:

Individuals also influence innovation in firms, mainly because they are in a position to identify and promote the potential of technological innovations. This may include, for example, the idea generator, the gatekeeper, the champion, and consultants. The idea generator are individuals that possess a mix of specific and general skills, characterised by a depth of knowledge in a particular discipline combined with the ability to integrate a breadth of knowledge in a wide range of areas, for example in the development of new products between different functions of a firm (Iansiti, 1993).

The gatekeeper serves as a bridge between a firm and its environment, identifying external sources of information and translating them into a language the organisation could understand (Allen, 1984; Tushman & Nadler, 1986). The champion is characterised by an individual who transforms his vision or an idea generator's suggestion of a particular innovation into reality and this is usually supported by an organisation's resources and commitment (Howell and Higgins, 1990; Beath, 1991; McKenney et al., 1995). Consultants also play an important role in the transfer of technology, particularly in bridging the 'managerial gap' which is required to absorb and assimilate new technology inputs (Bessant & Rush, 1995).

5. The Profit Chain Model:

The profit chain model attempts to integrate major innovation concepts in explaining how firms can profit from innovation. The model considers a range of factors that contribute towards the generation of company profits, including the characteristics of competencies, endowments, knowledge, environment internals, and the nature of innovations (Afuah, 1998). One of the key factors in this model is knowledge, which forms the foundation for developing low cost or differentiated product innovations, and is largely influenced by a company's competencies and

endowments. The competencies of a company are similar to its skills. For example, this may include capabilities in new product design and development. The endowments of a company range from non-skill-related factors which strengthen existing competencies, such as brand names, patents, reputation, geographic location, client relations, and distribution channels. The competencies and endowments of a company are in turn reinforced by its underlying marketing and technological knowledge, which together contribute to the development of new products and services.

6. The Services Model:

One of the common shortcomings in the previous models is that they are oriented towards product innovations, providing relatively weak analysis of innovation in services. Guile and Quinn (1988), suggest that although services have become the largest and fastest growing sector, it remained understudied, as compared to the manufacturing sector. There have been attempts to develop theories which interpret innovation processes in the service sector by the conceptualisation of 'products' as encompassing both manufacturing and services.

7. The Developing Country Model:

There are also limitations to the generalisation of the previous innovation models, as they were developed in the context of advanced industrialised nations, disregarding the context of developing countries which possess unique conditions. Several studies have suggested that the process of technological development in such countries proceed along a set of stages such as the alpha-beta stages, and learning through the elementary- intermediate-advanced stages (Enos, 1962; Lall, 1980). However, technological innovations do not follow sequential stages and require further elaboration through dynamic innovation models (Fransman & King, 1984).

Table 3.2 shows the summary of selected innovation models

Table 3.2

Summary of Selected Innovation Models

Model	Key Features
The linear model	Innovations follow a determined sequence of stages which is linear
The diffusion model	Innovations are communicated through channels over time among members of a social system, and also diffuse through the adoption and implementation stages.
The Teece model	The factors influencing innovation in firms are strategically boundary related, including their 'appropriability regimes' and 'complementary assets'.
The people perspective	Individuals in firms influence innovation, including the idea generator, gatekeeper, champion, leader, maestro, and Supertech.
The profit chain	The ability of firms to generate profit from innovations is based on its competencies, endowments, knowledge, environment internals and the nature of innovations.
The services model	Innovation in services follows a sequence of three stages in a reverse product cycle, including the use of technology to increase the efficiency of services, to improve the quality of services, and to transform or develop new services.
The developing country model	Innovation is influenced by four major factors - global technological trajectories, institutional environment, dynamic firm-learning, and technology transfer.

Source: (Khiaonarong, 1999)

3.2.3 Diffusion and Adoption of Innovations:

A number of characteristics of an innovation have been found to affect diffusion (Rogers, 2003):

1. Relative advantage
2. Compatibility

3. Complexity
4. Trialability
5. Observability

Relative Advantage is the degree to which an innovation is perceived to be better than the product it supersedes, or competing products. Relative advantage is typically measured in narrow economic terms, for example, cost or financial payback, but non-economic factors such as convenience, satisfaction and social prestige may be equally important. In theory: the greater the perceived advantage, the faster the rate of adoption. It is useful to distinguish between the primary and secondary attributes of an innovation. Primary attributes, such as size and cost, are invariant and inherent to a specific innovation irrespective of the adopter. Secondary attributes, such as relative advantage and compatibility, may vary from adopter to adopter, being contingent upon the perceptions and context of adopters. Incentives may be used to promote the adoption of an innovation, by increasing the perceived relative advantage of the innovation, subsidizing trials or reducing the cost of incompatibilities.

Compatibility is the degree to which an innovation is perceived to be consistent with the existing values, experience and needs of potential adopters. There are two distinct aspects of compatibility: existing skills and practices, and values and norms. The extent to which the innovation fits the existing skills, equipment, procedures and performance criteria of the potential adopter is important and relatively easy to assess. So-called 'network externalities' can affect the adoption process. For example, the cost of adoption and use, as distinct from the cost of purchase, may be influenced by the availability of information about the technology from other users, as well as the availability of trained skilled users, technical assistance and maintenance, and complementary innovations, both technical and organizational. However, compatibility with existing practices may be less important than how they fit with existing values and norms. Significant misalignments between an innovation and an adopting organization will require changes in the innovation or organization or both. In the most successful cases of implementation, a mutual adaptation of the innovation and organization occurs.

Complexity is "the degree to which an innovation is perceived to be difficult to understand or use". In general, innovations that are simpler for potential users to

understand will be adopted more rapidly than those which require the adopter to develop new skills and knowledge.

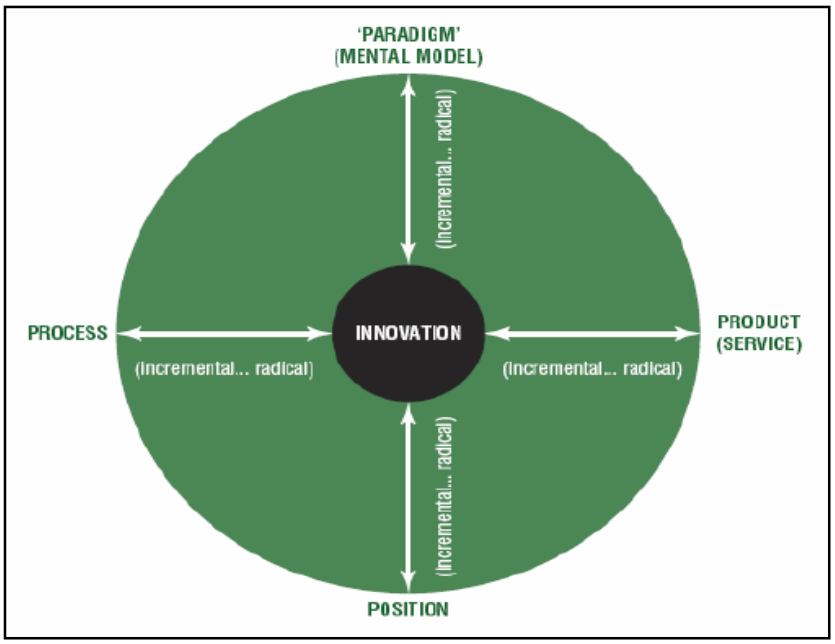
Trialability is the degree to which an innovation can be experimented with on a limited basis. An innovation that is trialable represents less uncertainty to potential adopters and allows for learning by doing. Innovations that can be trialled will generally be adopted more quickly than those which cannot. The exception is where the undesirable consequences of an innovation appear to outweigh the desirable characteristics. In general, adopters wish to benefit from the functional effects of an innovation, but avoid any dysfunctional effects. However, where it is difficult or impossible to separate the desirable from the undesirable consequences, trialability may reduce the rate of adoption.

Observability is the degree to which the results of an innovation are visible to others. The easier it is for others to see the benefits of an innovation, the more likely it will be adopted. The simple epidemic model of diffusion assumes that innovations spread as potential adopters come into contact with existing users of an innovation.

3.2.4 Dimensions of Innovation

a. Dimensions of Innovation Space (Tidd & Bessant,2009)

"The concept developed by Finnegan's Fish Bar focused on how the product, position, process and paradigm innovation. This shows how this approach can be used to explore opportunities for innovation in business" (Reuben, 2012). Fig 3.1 shows the dimensions of innovation space.



Source: Tidd and Bessant (2009)

Fig 3.1 The Four Dimensions of Innovation Space

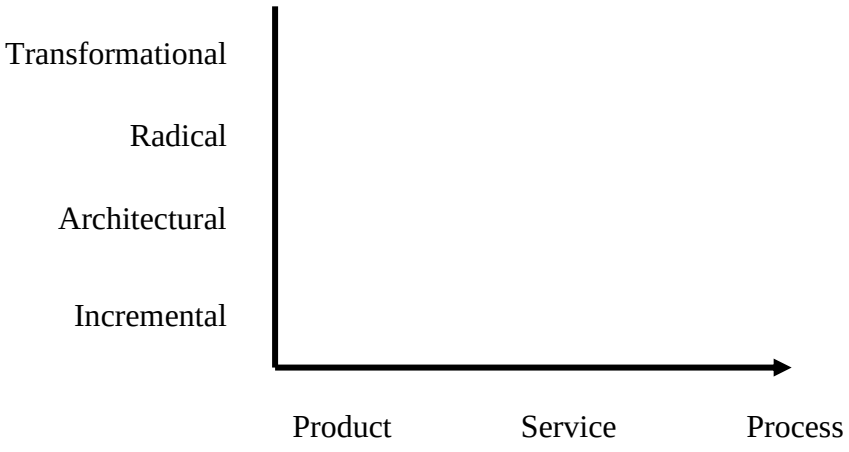
Product Innovation: Products and services that organisations offer to customers.

Process Innovation: Changes in the ways in which these products and services are created and delivered to all customers.

Position: Changes in the context in which the products and services are introduced.

Paradigm: Changes in the underlying mental models which frame what the organization does.

b. Dimensions of Innovation (*Alison M. (2002)*



Source: Alison M. (2002)

Fig 3.2 Dimensions of Innovation.

According toReuben (2012), “Transformational innovations are the change innovation brings to customers, Architectural innovations are the novel reconfigurations of existing components, Radical innovations redefines the way customers think and use the product and incremental innovations are the changes or impact a new product or highly differentiated product has on customers”.

3.2.5 Products and Process Innovations in India and the USA

Tables 3.3 and 3.4 give the list of product and process innovations of commercial banks in India and the USA.

Table 3.3

List of Product and Process Innovations of Commercial Banks in India

Product Innovations	Process Innovations
Innovative Deposit Schemes	Client Data Management System
Innovative Loan Schemes	Single Window Service Counters
Credit Cards	Simplified Authorisation Procedure
Debit Cards	Business Correspondent
Smart Cards	ATM
Portfolio Management Services	CDM
Wealth Management Services	Passbook Printing Machines
Bancassurance	Point of Sale Machines
	Information KIOSKs
	Phone Banking
	Internet Banking
	Mobile Banking
	RTGS
	NEFT
	IMPS
	CBS

Table 3.4

List of Product and Process Innovations of Commercial Banks in USA

Product Innovations	Process Innovations
ATMs (on bank premises)	Truncation of check handling process
ATMs linked to statewide networks	Automated mortgage generation
Debit cards	Computerized loan document generation
Credit cards	On-line teller terminals
NOW/Super NOW accounts	Derivatives (swaps, options futures/forwards)
Zero balance disbursement account	Lobby automation (video banking)
Sweep (asset management) account	Automated voice response systems
Self-directed IRA account	High-speed image processing of checks
Linked certificates of deposit	High-speed image processing of office documents
Money market deposit	Automated check reconciliation systems
Adjustable rate mortgage	Loan tracking system (retail)
Mortgage equity account	Risk management systems (tracking a bank's financial exposure)
Discount brokerage services	Customer information file
Mutual funds	Treasurer work station
Direct payroll deposit	
Lock box	
Personal banker	

Source: Damanpour & Gopalakrishnan (2001)

3.3 Customer Satisfaction

Customer satisfaction cannot be limited to short-term strategy. It is a long-term strategy for any firm. It has been increasingly popular due to its helpful attribute towards judgment of the customer preferences and choices. It simplifies the decision-maker role and helps to take any major or minor decision to cater customer. (Schnaars,1991). "Customer satisfaction, a business term is a measure of how product and services supplied by a company meet or surpass customer expectation"

(Nippatlapalli, 2013). When the expectation of customers is matched the resultant feeling is satisfaction and when expectation does not match than the resultant feeling is dissatisfaction. Customer satisfaction can be improved by strong communication to customer. A firm should know what customer expectation is and implement their expectation to make the customer satisfied. Customer satisfaction can be experienced in a variety of situations and connected to both goods and services.

3.3.1 Definitions of Customer Satisfaction

The definition of customer satisfaction has been widely debated as organizations increasingly attempt to measure it. Some of the important definitions of customer satisfaction are shown in Table 3.5

Table 3.5

Definitions of Customer Satisfaction

"While everyone knows what satisfaction means, it clearly does not mean the same thing to everyone".	Day (1980)
"A post choice evaluative judgement concerning a specific selection".	Westbrook & Oliver (1991)
"Customer satisfaction is a person's feeling of pleasure or disappointment resulting from comparing products perceived performance in relation to his or her expectation".	Kotler (2003)
"Conceptualized as a feeling developed from an evaluation of experience".	Codotte, Woodruff & Jenkins (1987)

3.3.2 Theories of Customer Satisfaction

The literature explains customer satisfaction in a number of frameworks and numerous theories are developed by several authors to address Customer Satisfaction. Some of the important theories of customer Satisfaction are explained below:

1. **The Expectancy- Disconfirmation Paradigm (EDP)**

Oliver (1997) developed the theory of EDP and it is considered as the most promising theory of customer satisfaction. This framework implies a comparison between a cognitive state prior to an event and a subsequent cognitive state, usually realized after the event is experienced. 'Confirmation' occurs when the outcome matches the expectation and 'Disconfirmation' occurs when there is a difference between outcome and expectation.

2. **The Value-Precept Theory**

According to this theory, satisfaction is an emotional response that is triggered by a cognitive evaluative process in which the perceptions of an object, action, or condition are compared to one's values, needs, wants or desires (Westbrook & Reilly, 1983). The smaller the disparity between percept's of the object on one's values, the more favourable the evaluation, and greater the satisfaction. Conversely, the greater the value-percept disparity, the less favourable the evaluation and it will lead to dissatisfaction.

3. **The Equity Theory**

According to the theory, satisfaction exists when consumers perceive their output/input ratio as being fair (Swan & Oliver, 1989). The concept of Equity theory states that "the ratio of outcomes to inputs should be constant across participants in an exchange" (Oliver & DeSarbo, 1988).

4. **Assimilation Theory**

According to Anderson (1973), "consumers seek to avoid dissonance by adjusting perceptions about a given product to bring it more in line with expectations". Assimilation theory is based on Festinger's (1957) dissonance theory which posits that consumers make some kind of cognitive comparison between expectations about the product and the perceived product performance. It is a view of

consumer's post-usage evaluation. Dissonance theory was introduced into the satisfaction literature in the form of assimilation theory.

5. The Contrast Theory

According to the contrast theory, any discrepancy of experience from expectations will be exaggerated in the direction of the discrepancy. If the firm raises expectations in his advertising, and then a customer's experience is only slightly less than that promised, the product/service would be rejected as totally un-satisfactory. Conversely, under-promising in advertising and over-delivering will cause positive disconfirmation also to be exaggerated.

6. Adaptation-level Theory b

The adaptation-level theory was originated by Helsen in 1964 and applied to customer satisfaction by Oliver. This theory is consistent with expectation and disconfirmation effects on satisfaction. Adaptation –level theory posits that one perceives stimuli only in relation to an adapted standard.

7. Hypothesis Testing Theory

Deighton (1983) suggested a two-step model for satisfaction generation. According to Deighton pre-purchase information (largely advertising) plays a substantial role in creating expectations for the products customers will acquire and use. This is the first hypothesis of Deighton. Second is that the customers will tend to attempt to confirm (rather than disconfirm) their expectations.

8. The Evaluation Congruity Theory

The Evaluation Congruity Theory treats satisfaction as a function of evaluative congruity, which is a cognitive matching process in which a perception is compared to an evoked referent cognition in order to evaluate a stimulus or action.

9. The Comparison Level Theory

The Comparison Level Theory argues that there are more than one basic determinants of comparison level for a product: consumers' prior experiences with similar products, situationally produced expectations (those created through advertising and promotional efforts), and the experience of other consumers who serve as referent persons.

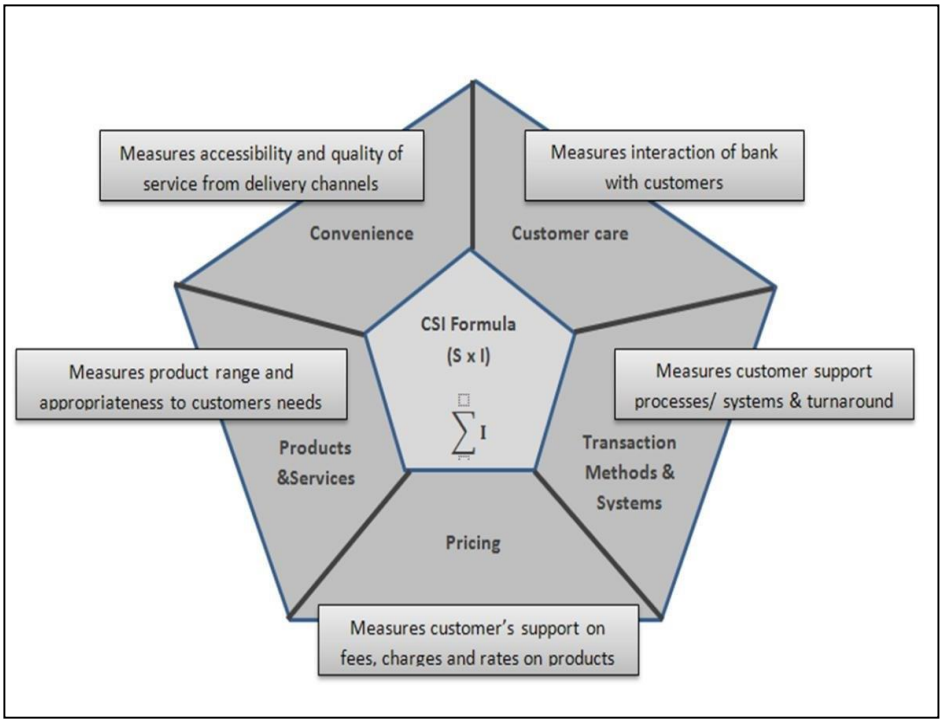
10. The Attribution Theory

Attribution theory addresses how cognition and emotion together influence people's behaviour. This theory is very useful in ascertaining customer dissatisfaction and complaining behaviour.

3.3.3 Models of Customer Satisfaction

1. Customer Satisfaction Index

Banking customer satisfaction Index is an indicator connected with the philosophy of growing revenue not come from just new markets or products but rather from the ability to deliver a high quality and differentiated customer experience. The Customer Satisfaction Index (CSI) Framework is the simply a weighted score that assigns importance ratings of banking service measures to the satisfaction ratings of those measures as provided by clients on the loans of their bank. It is shown in figure 3.3.



Source: KPMG Advisory Service, 2014

Figure 3.3 Customer Satisfaction Index and Service Factors

2. SERVQUAL Model:

SERVQUAL model has been widely applied in a variety of service industries including hospitality industry, hotel industry, insurance companies and

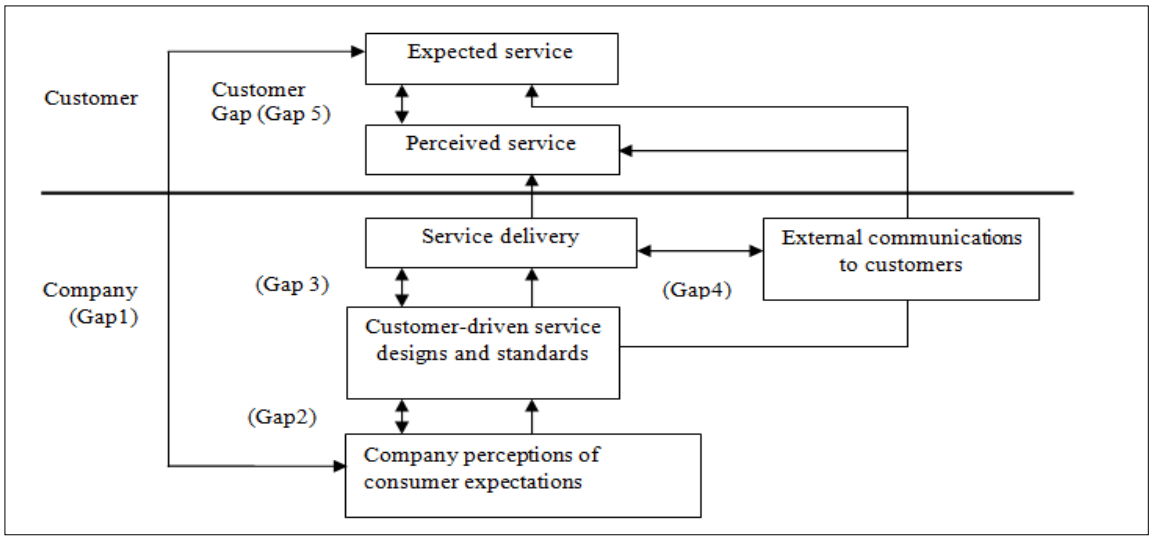
banking companies. It is mainly used to measure the service quality and customer satisfaction. Parasuraman, Zeithamal & Berry (1988) built a 22-item instrument called SERVQUAL for measuring consumer perceptions of service quality. SERVQUAL addresses many elements of service quality divided into the dimensions of tangibles, reliability, responsiveness, assurance, and empathy. SERVQUAL is based on five dimensions of service quality and they are explained in table 3.6.

Table 3.6

Dimensions of Service Quality

Dimensions	Meaning
Tangibility	Tangibility refers to the physical characteristics associated with the service encounter. The physical surroundings represented by objects (for example, interior design) and subjects (for example, the appearance of employees).
Reliability	Reliability means the ability of any service provider to provide services which are accurate and can be depend upon.
Responsiveness	A firm's willingness to assist its customers by providing fast and efficient service performances; the willingness that employees exhibit to promptly and efficiently solve customer requests and problems.
Assurance	Diverse features that provide confidence to customers (such as the firm's specific service knowledge polite and trustworthy behaviour from employees).
Empathy	The service firm's readiness to provide each customer with personal service

Figure 3.4 below gives the gap model of Service Quality



Source: Zeithaml & Bitner (2003)

Fig 3.4 Gap Model of Service Quality

3. Kano model

The Kano model is a theory developed by Professor Noriaki Kano and his colleagues of Tokyo Rika University. The Kano model of customer satisfaction classifies attributes based on how they are perceived by customers and their effect on customer satisfaction. The model is based on three types of attributes which are explained in Table 3.7.

Table 3.7

Attributes of Kano Model

Attributes	Meaning
Basic or expected attributes	Basic attributes without any major syignificance of worth mentioning
Performance or spoken attributes	The expressed expectations of the customer
Surprise and delight attributes	Which are beyond the customers' expectations

Kano model measures satisfaction against customer perceptions of attribute performance; grades the customer requirements and determines the levels of satisfaction. The underlying assumption behind Kano's method is that the customer satisfaction is not always proportional to how fully functional the product or service is

or in other words, higher quality does not necessarily lead to higher satisfaction for all product attributes or services requirements.

Basic Requirements Influencing Customer Satisfaction (Kano, 1984)

1) **Must be Requirements :**

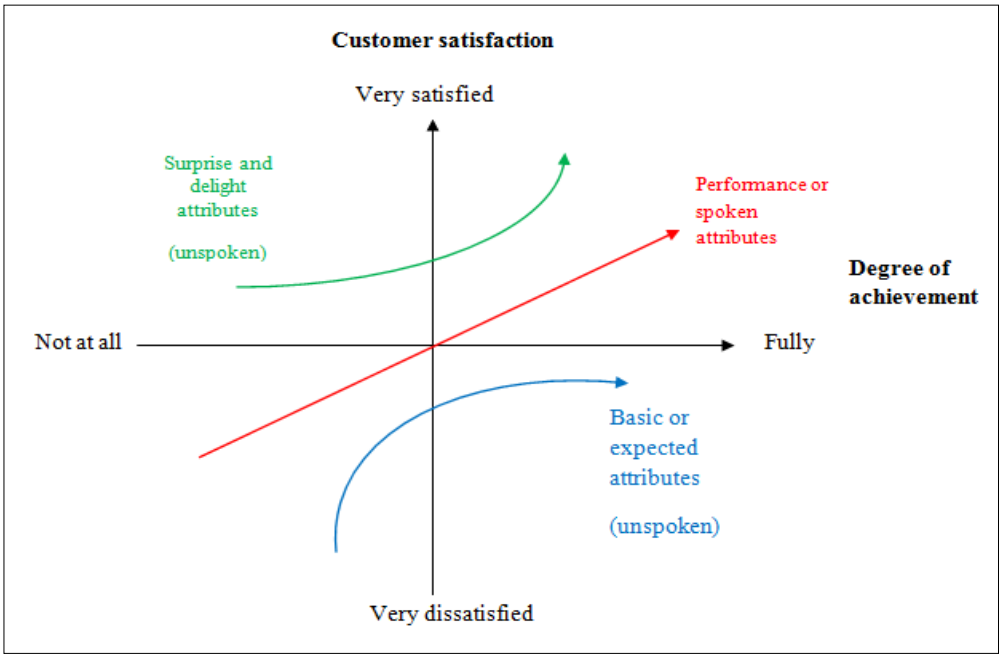
   If these requirements are not fulfilled, the customer will be extremely dissatisfied. On the other hand, as the customer takes these requirements for granted, their fulfilment will not increase his satisfaction.

2) **One-dimensional Requirements:**

   One dimensional requirement are usually explicitly demanded by the customer – the higher the level of fulfilment, the higher the customer's satisfaction and vice versa.

3) **Attractive Requirements:**

   These requirements are the product/service criteria which have the greatest influence on how satisfied a customer will be with a given product.



Source: Kano, Seraku et al. 1996)

Fig. 3.5: Kano model of Customer Satisfaction

4. ASCI Methodology:

The American Customer Satisfaction Index (ACSI) launched in 1994 was based on a model originally implemented in 1989 in Sweden called the 'Swedish Customer Satisfaction Barometer (SCSB). The American Customer Satisfaction Index uses two interrelated and complementary methods to measure and analyze customer satisfaction i.e. customer interviewing and econometric modelling. The customer interviews are used as input to a multi-equation econometric model developed at the University of Michigan's Ross School of Business.

Table 3.8

Objectives of ACSI Model

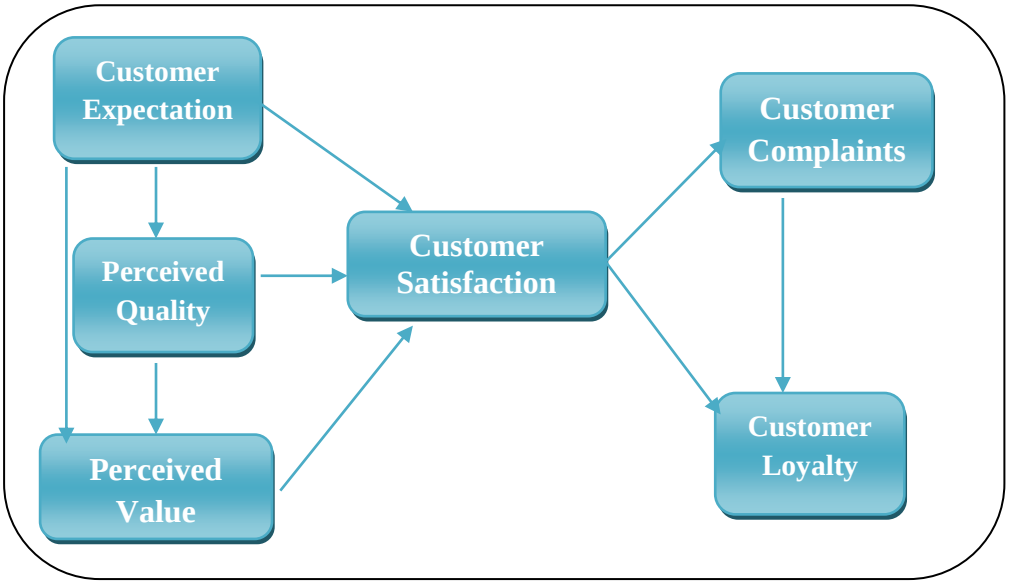
Objectives	Meaning
Measurement	To quantify the quality of economic output based on subjective consumer input
Contribution	To provide a conceptual framework for understanding how service and product quality related to economic indicators
Forecasting	To provide an indicator of future economic variability by measuring the intangible value of the buyer-seller relationship"

Source: Vavra, T.G (2007)

The ACSI model is a cause-and-effect model with the following indices:

1) Drivers of satisfaction on the left side:
   - ♦ Customer Expectations
   - ♦ Perceived Quality
   - ♦ Perceived Value
2) Satisfaction (ACSI) in the centre
3) Outcomes of satisfaction on the right side :

- Customer Complaints
- Customer Loyalty

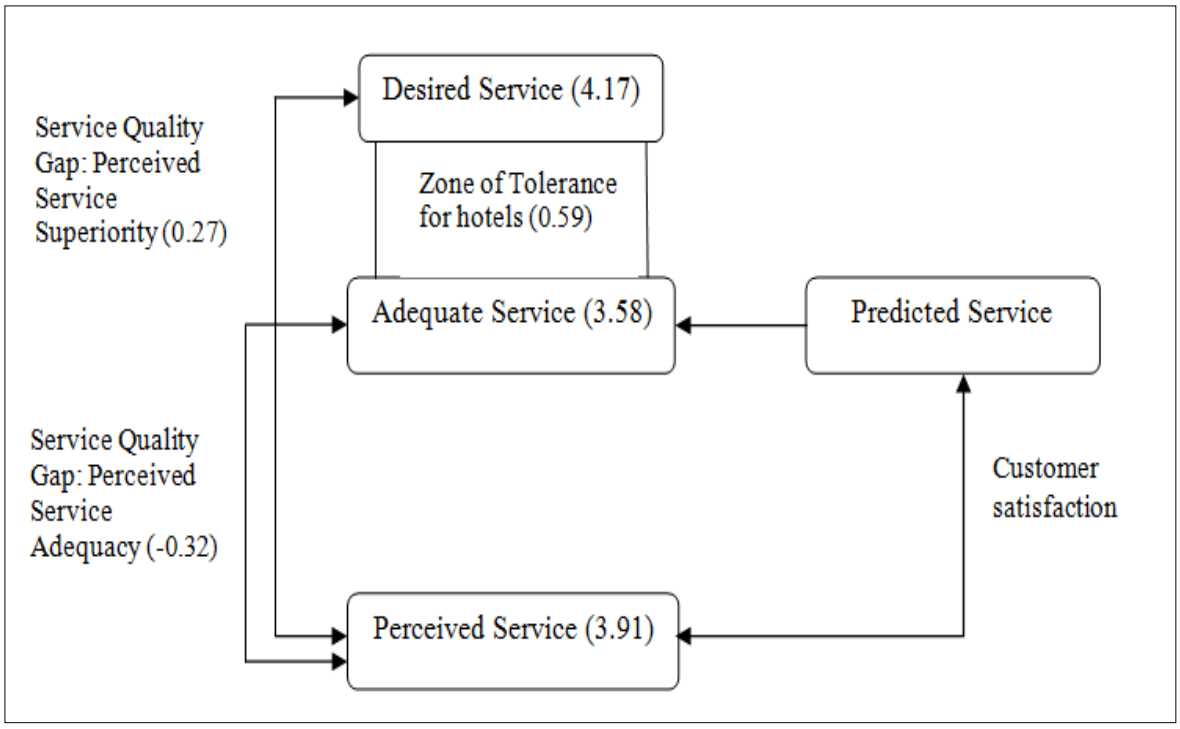


Source: ACSI Methodology, www.theacsi.org

Fig. 3.6: ACSI Model

5. HOTELZOT

HOTELZOT is a modified version of SERVQUAL which is used to measure the zone of tolerance in hotel service. The zone of tolerance can be defined as the extent to which customers recognize and are willing to accept heterogeneity. It is done by incorporating two levels of expectations i.e. desired and adequate. Desired expectations represent the level of hotel service that a customer hopes to receive. It blends of what a customer believes 'can be' and 'should be' offered. This differs from Parasuraman et al's (1988) conceptualization, which referred only to what the service 'should be'. Adequate expectations represent a lower level of expectations. They relate to what a hotel customer deems as 'acceptable level' of performance. Desired expectations are deemed to remain relatively stable over time, whereas adequate performance expectations might vary with time.



Source: Halil Nadiri & Kashif Hussain (2005)

Fig. 3.7: Zone of Tolerance for Hotels (HOTELZOT)

6. SERVPERF

SERVPERF model proposed by Cronin & Taylor (1992) is a performance-based service quality model. The perceived quality model postulates that an individual's perception of the quality is only a function of its performance. It is an alternative to SERVQUAL model and the effectiveness of SERVQUAL model and SERVPERF model for assessing service quality is still a matter of debate. SERVQUAL is a 'performance minus expectations' model and SERVPERF is a 'performance only' model.

3.4 Performance Measurement

Measuring performance means assessing business results to determine the effectiveness of a company's strategy and the efficiency of its operating processes and to make changes to address shortfalls and other problems. Companies take stock of their performance using different methods and criteria. However, in many organisations, performance measurement entails examining the results generated by key business activities, using specific performance metrics or measures. For each

business activity, there are numerous possible metrics. Table 3.9 shows a few examples.

Table 3.9

Specific Performance Metrics

Business Activity	Possible Performance Metrics
Finance	Profit margin Revenues Return on Invested capital
Marketing	Market share Customer loyalty Customer profitability
Production	Number of units manufactured within a specific time period Number of items shipped on time Machine change-over time
Sales	Percentage of customer visits that generate sales Percentage increase in sales over previous quarter or year Percentage of customers retained this period
Customer Service	Number of customer complaints Service- call response time
Purchasing	Vendor's ability to provide services or materials on time Defect rate of vendor's product
Quality	Product yield: ratio of good products produced to total products started into production Defect rate of vendor's products
Human Resources	Workforce turnover Employees skills Employee motivation

3.5 Profiles of the Banks Selected

3.5.1 State Bank of India

Imperial Bank of India was taken over by the newly constituted SBI With the passing of the State Bank of India (SBI) Act in 1955. State Bank of India (Subsidiary Banks) Act was passed in 1959, enabling the State Bank of India to take over eight former State-associated banks as its subsidiaries and was later named as Associates of SBI.

The concept of banking as mere repositories of the community's savings and lenders to creditworthy parties was soon to give way to the concept of purposeful banking sub-serving the growing and diversified financial needs of planned economic development (Nippatlapalli, 2013). The State Bank of India was destined to act as the pacesetter in this respect and lead the Indian banking system into the exciting field of national development. On 1st April 2017, State Bank of Bikaner & Jaipur, State Bank of Hyderabad, State Bank of Mysore, State Bank of Patiala and State Bank of Travancore, and Bharatiya Mahila Bank were merged with State Bank of India. The present chairman of SBI is Shri Rajnish Kumar. Customer satisfaction is the main vision of SBI.

Vision

My SBI, My Customer first, My SBI: First in customer satisfaction

Mission

We will be prompt, polite and proactive with our customer's, we will speak the language of young India. We will create products and services that help our customers achieve their goals. We will go beyond the call of duty to make our customers feel valued. We will be of service even in the remotest part of our country. We will offer excellence in services to those abroad as much as we do to those in India. We will imbibe state of the art technology to drive excellence.

Financial Innovations of SBI

SBI provides variety of products and services which will satisfy the needs of the customer. It includes investment of the surplus funds, Fund for children's'

education and marriage. All the branches of SBI are fully computerised and have a vast network. SBI products are designed with flexibility to suit customer's personal requirements. SBI provides 24-hour banking facility through Internet Banking and widest network of ATMs.

❖ **Deposit Schemes**

Customers can place funds in Multi Option Deposit Scheme, a term deposit which is not fixed at all and comes with a unique break-up facility which provides full liquidity as well as benefits of higher rates of returns, through savings bank account/Current account. Recurring Deposit Account helps the customers to save a little every month to meet future requirement of funds.

- ✓ Current account
- ✓ Savings bank account
- ✓ Term deposit
- ✓ Special term deposit
- ✓ Multi-option deposit scheme
- ✓ Savings plus account
- ✓ Basic banking 'No frills account'
- ✓ Recurring deposit account
- ✓ SBI tax savings scheme, 2006

❖ **Personal Finance**

State Bank of India has a variety of schemes under Personal Finance to satisfy varying needs of the banking public. The Bank offers the following schemes with attractive rates of interest:

- ✓ Housing Loan
- ✓ Car Loan
- ✓ Personal Loans
- ✓ Loans Against Property
- ✓ Education Loan

❖ **eZ-trade@sbi**

State Bank of India (SBI) introduces a State-of-the-Art broking which makes the buying and selling of shares, just a click away. With this service, the customer's have the power of research expertise which aids them in making the right decisions, operational ease allows them to seamlessly execute their transactions, timely advice that helps them to pick the right opportunities and a customized trading experience to suit their needs and demands (Nippatlapalli, 2013).

State Bank ATM Services

State Bank offers convenience of 43,000+ ATMs in India, the largest network in the country and is continuing to expand fast. Besides all debit cards issued by State Bank of India, following cards are also accepted at State Bank ATMs.

- ✓ State Bank Credit Card.
- ✓ Cards issued by other banks displaying Maestro, Master Card, Cirrus, VISA and VISA Electron logos.
- ✓ All Debit/ Credit Cards issued by any bank outside India displaying Maestro, Master Card, Cirrus, VISA and VISA Electron logos.

- **State Bank ATM-cum-Debit Cards:**

  India's largest bank offers a range of debit cards to suit customer's needs. Apart from access to ATM network, these cards can be used at merchant establishments.

- **ATM Access and Enhanced Convenience**
  - ✓ Using State Bank ATM-cum-Debit card, customers can transact for FREE at any of SBI's 43,000+ ATMs in India.
  - ✓ Customers can also transact at over 1 lakh ATMs of other banks linked to the National Financial Switch. As per RBI guidelines, customers are entitled to 5 FREE transactions (Financial and Non-Financial) in a calendar month (for Savings Bank account holders only).
  - ✓ Customers can also use their debit card to make payments for purchases at more than 6 lakh merchant establishments' viz. shops, restaurants, shopping malls, hotels, petrol pumps and many other outlets.

- **ATM Features:**

'Banking' option on State Bank ATMs

✓ **Cash Withdrawal-** The most popular service on SBI ATMs enables customers to withdraw up to a daily limit of Rs. 40,000/- (limit on Classic Debit Card. Higher value cards permit daily withdrawal limits of up to Rs. 1 lakh per day)

✓ **Fast Cash-** Fast cash enables customers to withdraw preferred amounts with just a touch. The options in the denomination of 100, 200, 500, 1000, 2000, 3000, 5000, 10,000 are available.

✓ **Pin Change-** It helps to change password at regular intervals.

✓ **Balance Enquiry-** This service can be used to check the current available balance in customers account. This service is also available on the main options screen after swiping the card. Customers can also 'Go Green' by selecting the view option as the balance is displayed on the screen else get a transaction receipt by selecting print.

✓ **Mini Statement-** Customers can keep track of the transactions in their account by availing this service. Mini-statement gives an insight into the last 10 transactions in the account.

'Transfer option on State Bank ATMs

✓ **Card to Card Transfer -** Customers can send cash in a flash from one SBI Debit Card to the other. Rs.40,000/- per day can be sent using this service and there is no limit on number of transactions. The limit of Rs.40,000/- per day will be common across the C2C and Card to Account facility. All that need is SBI debit card, in and the beneficiary's debit card number.

✓ **Credit Card Payment (Visa) -** This service can be used to pay the bill of any Visa credit card.

'Services' option on State Bank ATMs

✓ **Credit Card Payment-** Make a paperless payment of SBI credit card bill using this service.

- ✓ **SBI Life Premium Payment-** SBI Life insurance premium can be paid using any of SBI ATMs.
- ✓ **Mobile Top-up –** Customers can recharge mobile prepaid connection from any of SBIs 43000+ ATMs.
- ✓ **Cheque Book Request –** Customers can order cheque book at the address registered in the branch without visiting the branch or filling in any transaction slips.
- ✓ **Trust Donation-** Make a donation to a charity using this facility.
- ✓ **Bill Payment –** ATMs can be used to pay the utility bills.

'Mobile Registration' option on State Bank ATMs

- ✓ **Mobile Banking Registration-** Customers can register/deregister the mobile banking application using SBI ATMs.
- ✓ **Inter-mobile Mobile Payment System -** Customers can register for the IMPS service at all our ATMs. This service allows you to transfer money to any other person with a registered IMPS number instantly.

Term Deposit can be created using SBI ATMs, click the 'TDR/STDR' option

The minimum amount of Rs. 10,000/- (valid in singly owned accounts only)

Mobile Banking App's of SBI

- **Anywhere Personal** - State Bank Anywhere Personal is State Bank of India's retail internet banking application for customers using smart phones.
- **Secure OTP -** State Bank secure OTP is an OTP generation App for verifying transactions done through State bank Anywhere App.
- **Anywhere Saral -** State Bank Anywhere Saral is State Bank of India's corporate internet banking based application for business entities.
- **Anywhere Corporate -** State Bank Anywhere Corporate is a corporate internet banking based mobile application for Khata plus, Vyapaar and Vistaar variants of SBI corporate internet banking.

M Cash - State Bank M Cash is a simple and quick way to claim funds sent by SBI customers through Online SBI or State Bank Anywhere.

SMS Banking - SMS Banking services are available on all phones. Keywords can be sent as SMS to 9223440000. Ordinary SMS charges are applicable to avail this service.

SBI Pay - SBI Pay can be used to make payments easier using Virtual Payment Address (VPA) Pay and collect in SBI Pay.

***99# -** State Bank of India's *99# unifies USSD system with highly interoperable UPI platform.

Wallets

- **SBI Mobicash -** Mobile wallet App is a menu is driven and user-friendly App
- **State Bank Buddy -** State Bank Buddy comes with several features like send money to registered and new users. It can also be used recharge and pay bills instantly.

Utilities

- **No Queue -** State Bank No Queue is a unique App to enable customers to book virtual queue ticket (e- token) for selected services at selected branches.
- **SBI Finder -** The customers can navigate to find State Bank ATMs, CDMs, branches and E corners.

❖ **Internet Banking**

Online SBI, the Internet banking portal of SBI, enables its retail banking customers to operate their accounts from anywhere anytime, removing the restrictions imposed by geography and time. It's a platform that enables the customers to carry out their banking activities from their desktop, aided by the power and convenience of the Internet.

Using Internet banking services, customers can do the following normal banking transactions online:

- ✓ Funds transfer between own accounts.
- ✓ Third party transfers to accounts maintained at any branch of SBI
- ✓ Group Transfers to accounts in SBI Group

- ✓ Inter Bank Transfers to accounts with other Banks
- ✓ Online standing instructions for periodical transfer for the above
- ✓ Credit PPF accounts across branches
- ✓ Request for Issue of Demand Draft
- ✓ Request for opening of new accounts
- ✓ Request for closure of Loan Accounts
- ✓ Request for Issue of Cheque Book
- ✓ Earn reward points for transactions through Internet Banking

Apart from these, the other salient value-added features available are:

- ✓ Utility bill payments
- ✓ Online Ticket Booking for travel by Road, Rail and Air
- ✓ SBILIFE, LIC and other insurance premia payments
- ✓ SBI and other Mutual funds Investments
- ✓ SBI and other Credit Card dues payments
- ✓ Tax Payment • Income, Service, State Govt
- ✓ Customs Duty Payment
- ✓ Online Share Trading (eZ-trade@SBI)
- ✓ Online Application for IPO
- ✓ Fee Payment to select educational institutions including IITs and NITs

❖ **Foreign Inward Remittance**

Sending remittances to India for credit to the account of customer or family with SBI is very simple and convenient with SBI's wide foreign office's network and correspondent banking arrangement with about 600 banks worldwide. Wherever in the world, the customer may be, there is SBI office or a bank having corresponding banking arrangement with the bank in India to provide facilities of remittances.
Any of the following ways can be used to send the remittances

- ✓ SBI Express Remit Facility
- ✓ Demand Drafts in Rupees
- ✓ Telegraphic/wire transfers
- ✓ Personal cheques/ traveller's cheques (in person only)/ DDs in foreign currency

❖ **Green Remit Card**

Salient Features of the Green Remit Card

<table>
<tr><td>1.</td><td>Type and Nature of Card</td><td>SBI Green Remit Card is a simple Magstripe based card without PIN.
The product is targeted to facilitate Non-Home Cash Deposit Transactions to be routed through Green Channel Counter (GCC)/ Cash Deposit Machine (CDM)</td></tr>
<tr><td>2.</td><td>Eligibility</td><td>All customers (remitters), particularly non-account holders, who want to remit money to an SBI bank account at regular intervals
Customer may visit any GCC branch or CDM branch and submit simple Application Form along with one ID proof document
Card would be mapped to the particular beneficiary account (Has to be an SBI account).</td></tr>
<tr><td>3.</td><td>Nature of use</td><td>Card can be used for deposit of Cash (INR) to the designated beneficiary's SBI account.
Card is accepted at all Green Channel Counter Branches and Cash Deposit Machines.</td></tr>
<tr><td>4.</td><td>Deposit Limit</td><td>Deposit can be made by way of cash only.
Transaction limit is Rs.25,000/- per transaction subject to a monthly cap of Rs.1,00,000/-</td></tr>
<tr><td>5.</td><td>Service Charges</td><td><table>
<tr><td>Issue of Card</td><td>Rs.20/- (w.e.f. 15 the July 2013)</td></tr>
<tr><td>Transaction Charges in GCC</td><td rowspan="2">As applicable to regular non-home cash deposit transactions at branch</td></tr>
<tr><td>Transaction Charges in CDM</td></tr>
</table></td></tr>
<tr><td>6.</td><td>Cards Issuance</td><td>Branch will issue pre-printed SBI Green Remit Card instantaneously to the remitter.</td></tr>
</table>

7.	Transactions through GRC	Remitter can visit any GCC branch or CDM to deposit cash to the predetermined SBI account When card is swiped, account particulars are shown on the screen for confirmation. Customer is prompted to enter amount and after cash is collected and verified, acknowledgement is generated. Remitter and Beneficiary will get SMS immediately upon successful completion of the transaction. Beneficiary SBI account will be updated with the transaction amount along with Card number.

- **sbiINTOUCH**

SBI has always sought to provide futuristic technology at fingertips. One step in this direction was setting up the high-tech, one of its kind, 257 sbiINTOUCH branches equipped with state-of-the-art digital technology. These sbiINTOUCH branches cover more than 143 districts across the country. The goal of SBI is to create a 'Phygital' marketplace within these futuristic branches, to offer customers banking through self-service kiosks and services of other SBI subsidiaries such as Life Insurance, General Insurance, Mutual Funds, Credit Cards, and online trading through SBI Cap Securities.

Cutting-edge Technological Kiosks:

AOK: State of the art Kiosks which enables customers to open accounts with just a few touches

DCPK: State of the art kiosk which enables customers to instantly print debit cards with their own photograph on it

CDM: Cash Deposit Machine

ECDM: Electronic Cheque Deposit Machine, available 24*7 to our customers

Swayam: Passbook Printer, available 24*7 to our customers

ATM: Automatic Teller Machine, available 24*7 to our customers

Services

Account Opening: At the sbiINTOUCH branches, banking services such as the opening of Savings Bank, Current Accounts, CSP/DSP Accounts, Pehla Kadam, PPF etc. Account opening Kiosk (AOK) enables customers to open their account with just a few touches then and there.

Debit Card Printing: The printing of personalised photo debit cards on the spot is available by revolutionary touch technology Debit Card Printing Kiosks (DCPK).The whole process of opening an account and printing a debit card takes less than 15 mins.

Deposits: Cheque deposits through Electronic Cheque Deposit Machine, deposits such as e-TDR, e-STDR, e-SBI Flexi, e-Tax Saving etc. are available. Cash deposits through cash deposit machine are also available.

Loans: Personal segment loans such as housing, car, education, personal etc. are available at these sbiINTOUCH branches.

Financial Advice: Financial counselling through hi-definition Audio Video conferencing service is provided at select branches termed Remote Expert Module (REM), where customers can interact with financial experts.

Quick Photo Debit Card: A new service has been launched wherein sbiINTOUCH Branches will be able to provide all SBI customers having A/c, pan India, with personalised debit cards with photographs in just 5 minutes. Customers are required to bring only Aadhaar card for verification purposes to sbiINTOUCH Branches and get their personalised photo debit cards. This facility can also be used in case our customers have lost their cards or want a new one irrespective of older card.

- **SBI FASTag.**

SBI FASTag is a device that employs Radio Frequency Identification (RFID) technology for making toll payments directly from the prepaid or savings account linked to it. It is affixed to the windscreen of vehicle and enables to drive through toll plazas, without stopping for cash transactions. The tag can be purchased from Tag issuers and if it is linked to the prepaid account, then customers need to recharge/ top up the tag as per the requirement.

- **Benefits of the SBI FASTag**

✓ 7.5% Cash back for all the transactions at all the National Highway Toll plazas during 2017-18.

✓ Save Time, Fuel and Money

✓ Easy recharge/Top up of the FASTag account through authorised service providers of SBI across country.

✓ Online recharge of the SBI FASTag through dedicated online portal for the customer through credit card, debit card, net banking, wallets etc.

✓ Can view transaction history, toll payment history, balance in the account etc. in the customer portal.

❖ **BHIM SBI Pay**

"BHIM SBI Pay" (UPI App of SBI) is a payment solution that allows account holders of banks participating in UPI to send and receive money from their smart phones with a virtual payment address which is the identifier. No additional details are required to be used other than the Virtual payment address.

❖ **Revamped Gold Deposit Scheme (R- GDS)**

Revamped Gold Deposit Scheme (R- GDS) is in the nature of a fixed deposit in gold. The customers can deposit their idle gold under R- GDS which will provide them safety, interest earnings and a lot more.

3.5.2 Canara Bank

Canara Bank has a track record in the service of the nation for over 111 years. Today, Canara Bank has a strong pan India presence with 6179 branches and 9743 ATMs, catering to all segments of an ever growing clientele accounts base of 8.18 crore. Across the borders, the Bank has 8 branches, one each at London, Leicester, Hong Kong, Shanghai, Manama, Johannesburg, New York and DIFC (Dubai) & a Representative Office at Sharjah, UAE**.** Canara bank is recognized as a leading financial conglomerate in India, with as many as ten subsidiaries/sponsored institutions/joint ventures in India and abroad. Founded as 'Canara Bank Hindu Permanent Fund' in 1906, by late Shri Ammembal Subba Rao Pai, a philanthropist, this small seed blossomed into a limited company as 'Canara Bank Ltd.' in 1910 and became Canara Bank in 1969 after nationalization.

Vision

To emerge as a 'Preferred Bank' by pursuing global benchmarks in profitability, operational efficiency, asset quality, risk management and expanding the global reach.

Mission

To provide quality banking services with good customer care, create value for all stakeholders and continue as a responsive corporate social citizen.

Financial Innovations of Canara bank

Savings & Deposits

- KAMADHENU DEPOSIT (Re-investment Plan)

Individual, Joint (not more than 4), a Guardian on behalf of a minor, HUF, Partnership, a Company, Association or any other Institution are eligible to open this account with a minimum of Rs 1000. There no maximum ceiling. Period of deposit is a minimum of 5 months and a maximum of 120 months. A facility of part withdrawal of deposits in units of Rs.1000/-, keeping the rest of the deposit to earn contracted rate of interest is the extra facility available.

- Canara Tax Saver Scheme

Canara Tax Saver Scheme is a term deposit scheme under the Fixed Deposit & Kamadhenu Deposit streams. The scheme is best suited for Salaried Class, Businessmen, and Professionals who come under the ambit of Tax Payers.

- Canara Champ Deposit Scheme

It is basically an SB account for children up to the age of 12. The initial deposit can be any nominal amount with a minimum of Rs.100/- and there is no penalty in case of non-maintenance of minimum balance. After the child attains majority, the account can be converted to regular SB Deposits, whether the Education loan facility under this scheme has been availed or not. TDS is not applicable for SB Canara Champ Deposit.

- Ashraya deposit scheme for senior citizens

Individuals, who have completed the age of 60 years and above, can open this account in single or joint names. In case of joint account, the account can be opened jointly with other senior citizens or with other persons below the age of 60 years subject to the condition that the senior citizen is No. 1 deposit.

- Canara NSGSE Savings Bank Deposit Account

An SB product designed as per directives of the Ministry of Human Resources Development, Government of India to reduce School dropouts and to promote the enrolment of girl child belonging to SC/ST communities in Secondary Schools.

Other deposit schemes of Canara bank are Savings Bank account, Recurring Deposit, Canara Basic Savings Bank Deposit Account, Canara SB Power Plus, Canara Privilege Current Account, SB gold scheme, Fixed Deposit, Canara Payroll Package Saving Bank Account, Current Account, Canara Small Saving Bank Deposit Account, Canara Jeevandhara – SB Account for Senior Citizens, Canara Junior Saving Account and Canara Dhanvarsha- A Flexi Recurring Deposit Scheme

Loan Products

Loan products of Canara bank are Housing Loan, Home Improvement Loan, Canara Cash(Shares), Canara Vehicle, Canara Site Loan, Canara Budget, Canara Pension – General Public, Teachers Loan, Swarna Loan (Gold Loan), Canara Mortgage, Housing- Cum- Solar Loan, Canara Rent, Canara Jeevan, Canara Consumer Loan, Canara Home Loan Plus, Housing Loan to Agriculturists, Home Loan for NRIS Scheme., Canara Vehicle to Agriculturists, Yuwa Awas Rin- Canyar and Pradhan Mantri Awas Yojna.

Technology Products

- **ATM - cum - Debit card**

Facilities Available	1. Transactions through Canara bank ATMs and other bank ATMs 2. Purchase of goods and services at POS merchant establishments 3. Mobile top-up 4. VISA money transfer 5. E-ticketing
Types of Accounts	SB/CA/OD accounts in the name of individuals as well as joint accounts (operated severally)

Eligibility	All SB, Current and OD account holders including NRIs, employees and ex-employees
Ineligible Accounts	Joint Accounts where operation condition is 'Jointly' Accounts of illiterate persons/blind persons/minors Accounts under Garnishee/attachment orders or which are under litigation/dispute Encumbered accounts
Application	Account holders desirous of having an ATM-CUM-DEBIT card are required to submit an application in the prescribed format to the branch manager of the branch where the account is being maintained.
Operations	The card can be linked to a maximum of 4 accounts. However, one account as indicated by the customer will be designated as Primary Account. All transactions done at POS merchant locations and at other Bank ATMs will be debited to Primary account to which the card is linked. Therefore transactions at other Bank ATM and POS are restricted to the balance available in the primary account.
Per Day Transaction Limit	Per day transaction at POS Merchant Establishments: Rs 20,000/- Cash withdrawal at our ATM/ Other Bank ATM: Rs 25,000/-
Validity	10 years from date of issue of the card

The following facilities are available at Canara bank's ATMs. Customers can avail these services by following the menu driven options.

- Mobile Recharge
- Mobile Top-ups
- Airline Ticket Booking
- VISA Money Transfer
- Deposit of Collection Cheques

RTGS/NEFT- an inter bank fund transfer facility for customers

Real Time Gross Settlement (RTGS) and National Electronic Fund Transfer System (NEFT) are two efficient, secure, economical, reliable system of funds transfer from Bank to Bank. Now fund transfer can be made to more than 36000 Bank branches across India. These facilities are available in more than 3500 branches of Canara Bank. NEFT/RTGS facilities are available across all the branches irrespective of the home branch.

Real Time Gross Settlement (RTGS)

- ✓ An electronic payment system in which payment instructions between banks are processed and settled individually on a real-time basis.
- ✓ Minimum amount of funds transfer under this facility is Rs.2,00,000/-.
- ✓ RTGS system works on all days except on Sundays and national holidays.
- ✓ Customer should furnish details of payees name, bank account number and type, receiver bank name, branch name and IFSC code of the receiver Bank branch

National Electronic Funds Transfer (NEFT):

- ✓ Another electronic payment system in which payment instructions between banks are settled at fixed intervals.
- ✓ There is no minimum / maximum limit for transactions under NEFT.
- ✓ NEFT system works on all days except on Sundays and national holidays.
- ✓ Customer should furnish details of payees name, bank account number and type, receiver bank name, branch name and IFSC code of the receiver Bank branch.

Mutual Funds

Canara has tie-up with Canara Robeco for cross-selling of their mutual fund products through Canara branches. Investment can be made in twenty-one schemes provided by the bank.

Insurance Business

Life Insurance

Bank has started a Joint Venture Insurance Company "Canara HSBC Oriental Bank of Commerce Life Insurance Company Limited". The new JV insurance company was

launched on 16th of June 2008. In the JV insurance company, Canara bank has a stake of 51%, HSBC Insurance (Asia Pacific) Holdings Ltd 26% and Oriental Bank of Commerce 23%. Canara bank also acts as a Corporate Agent of their JV Company.

General Insurance

1) The New India Assurance Company Limited

Bank has entered into a corporate agency Tie-up with The New India Assurance Co. for selling their general insurance products across Canara bank branches.

Products:

All types of General Insurance products like Fire, PA, Marine, Motor, Health etc are being offered to customers under this tie-up arrangement.

Additionally, New India Canara Family Floater Plan is introduced exclusively for existing Canara mediclaim Policy holders, on a renewal basis. This Plan is not available for others

- ✓ New India Canara Family floater Plan-Proposal Form.
- ✓ New India Canara Family floater Plan-Premium Chart.
- ✓ New India Assurance Company Proposal Form.
- ✓ Premium Chart for New Enrollments

2) Bajaj Allianz General Insurance Co. Ltd

Bank has entered into a corporate agency Tie-up with Bajaj Allianz General Insurance Co. Ltd. for selling their general insurance products across Canara bank branches

Products:

All types of General Insurance products like Fire, PA, Marine, Motor, Health etc are being offered to our customers under this tie-up arrangement.

Additionally, the following products are designed exclusively for our Customers.

- ✓ Global Personal Guard Policy
- ✓ My Home Insurance
- ✓ Fire and PA Cover

3.5.3 Federal Bank

Federal Bank Limited is a major Indian commercial bank in the private sector headquartered at Aluva, Kerala having more than a thousand branches and ATMs spread across different States in India. The Bank is a pioneer among traditional banks

in India in the area of using technology to leverage its operations and was among the first banks in India to computerize all its branches. The Bank offer its customers, a variety of services such as Internet banking, Mobile banking, on-line bill payment, online fee collection, depository services, Cash Management Services, merchant banking services, insurance, mutual fund products and many more as part of its strategy to position itself as a financial super market and to enhance customer convenience.

The history of Federal Bank dates back to the pre-independence era. The Bank was incorporated on April 23, 1931, as the Travancore Federal Bank Limited, Nedumpuram under the Travancore Companies Regulation, 1916. Late K.P. Hormis, the visionary banker and founder took up the reigns in 1945 and built the bank a nationwide institution. The Bank's name was changed to The Federal Bank Limited on December 2, 1949. The Bank was licensed under the Banking Regulation Act, 1949, on July 11, 1959 and became a scheduled commercial bank under the Second Schedule of Reserve Bank of India Act, 1934 on July 20, 1970. Today the bank is present in 25 States, Delhi NCT and 4 Union Territories and the bank is listed in BSE, NSE and London Stock Exchange.

Vision

To be the ‘Most Admired Bank' which is Digitally enabled with a sharp focus on Micro, Medium and Middle market enterprises.

Mission

Devote balanced attention to the interests and expectations of stakeholders, and in particular.

Shareholders: Achieve a consistent annual post-tax return of 18% on net worth.

Employees: Develop in every employee a high degree of pride and loyalty in serving the Bank.

Customers: Meet and even exceed expectations of target customers by delivering appropriate products and services, employing as far as feasible, single window and 24-hour-seven-day-week concepts, leveraging a strengthened branch infrastructure, ATMs, other alternative distribution channels, cross-selling a range of products and services to meet customer needs varying over time, and ensuring the highest standards of service at all time, guided by our principle of being 'Digital at the fore, human at the core'.

Financial Innovations of the Federal Bank

1. Products:

Savings Account

Federal Bank has a list of savings accounts with varied features. It includes: Internet Banking, Electronic Fund Transfers, e-statements, online bill payments etc. These services make banking a smoother experience for the customer.

- FedBook Selfie-

  FedBook Selfie is a mobile-based application which helps to open SB account, which is the first of its kind in India. Customers can open a Savings account through the mobile app using Aadhaar and PAN Card. Account number will be generated instantly and once the account is opened, the app will turn itself into the digital passbook of the customer.

- Freedom SB

  Freedom SB is not just a regular savings account. Along with saving the customers money, it provides access to a wide variety of services. It makes the everyday banking a hassle free process with its exciting features like International Debit Card, free account statements and new age banking channels.

- Young Champ

  Young champ is an innovating saving bank account exclusively for children and is fully loaded with a handful of exciting features such as a specially designed debit card, free access to digital banking channels and reward points.

- Fed Excel

  Fed Excel is a saving account exclusively for professionals and budding entrepreneurs. There is no need for a minimum balance requirement for this account.

- SB Plus

  SB Plus Savings Bank account is for the dynamic customer and is having exciting features like Debit Card, new age banking channels and free monthly Demand Draft issuance.

- FedPower+

  FedPower+ provides International Gold Debit Card, high ATM daily withdrawal limits, free Demand Draft issuance, and a host of concessions on Federal bank's retail loan products.

- Mahila Mitra

  Mahila Mitra is savings account exclusively for women based on the concept that every woman deserves more. This account is endowed with exciting features like International Gold Debit Card, Free Demand Draft, Mobile & Internet Banking, RTGS/NEFT.

- Yuva Mitra

  "Yuva Mitra account is exclusively for students and is endowed with various futuristic features like Debit Card, Mobile Banking, Internet Banking and FedBook.

- PetSmart

  PetSmart is a savings account, which has features like New-Age banking channels, high daily cash withdrawal limits, anywhere banking, International Debit Card and lot of free services.

- Basic Savings Bank Deposit Account

  Basic Savings Bank Deposit Account (BSBDA) is an account with zero balance facility. It takes care of customers simple banking needs with facilities like free ATM card, monthly statement, and cheque book. Other services available free in the 'Basic Savings Bank Deposit Account' includes deposit and withdrawal of cash, receipt/credit of money through electronic payment channels or by means of deposit/collection of cheques at bank branches as well as ATMs.

- FISA

  Federal Institutional Savings Account (FISA) is a tailor-made operative account for institutions like Trusts, Associations, Clubs, Committees, and Governing Bodies which are non profit making organisations, i.e. organisations that are not into business, trade or any other services for profit or fee. This account takes care of all the institutional banking needs of its customer.

Salary Account

- FedClassic

Fed Classic is an account designed exclusively for salaried individuals. It is a tailor made account to suit the banking needs of professionals with no minimum balance requirement. FedClassic account holders can avail Debit Card, Internet Banking, Mobile Banking, Missed Call Banking services, e-mail alerts and Personal Accident Death Cover of Rs.2 Lakhs without any charges. They also get concessions in processing fee/administration fee for retail loans and anywhere banking facilities.

- FedClassic Premium

FedClassic Premium is a Savings Bank Account for high-end salary earners. The account comes with handful of features such as no minimum balance requirement, VISA Gold/Platinum debit card, auto sweep facility, temporary overdraft facility, personal loans facility, cheque collection, door step banking, cash pickup facility, Free Personal Accidental Death Cover of Rs. 10 Lakhs, Demat facility, NPS Services, Financial planning services and much more.

Noor - Personal Account

'Noor Personal Account' is a feature rich account of meeting customers' personal banking needs. This project is launched as a non interest bearing account with exciting features including free airport lounge access program.

Deposits

Unlike investment in the stock markets, term deposits are not a risky investment as they do not depend on fluctuating market rates. The various deposit schemes of the federal bank are:

- Fixed Deposit
- Cash Certificate
- Tax Saving Deposit
- Recurring Deposit
- Millionaire Deposit

Loans

The variants of the loan provided by the federal bank are:

- ✓ Gold loans

- ✓ Car loans
- ✓ Housing loans
- ✓ Property loans
- ✓ Education & Career loans

Cards

- ✓ Credit cards
- ✓ Debit cards
- ✓ Gift cards
- ✓ Travel cards

Insurance & Investments

Life Insurance, Health Insurance, General Insurance, Fed-e-Trade(Online Trading), Mutual Funds, National Pension System and Indian Gold Coin are the insurance and investment products.

2. Payments

Transfer Funds

- ✓ NEFT
- ✓ RTGS
- ✓ Lotza UPI
- ✓ Immediate Payment Service (IMPS)
- ✓ ECS
- ✓ Scan N Pay

Pay Fees & Bills

- ✓ Pay Telephone Bills
- ✓ Pay Electricity Bills
- ✓ Pay School Fees
- ✓ Pay LIC Premium
- ✓ Pay Taxes Online
- ✓ Billdesk Bill Pay
- ✓ Federal FASTag for Toll Collection
- ✓ Shop Online & More
- ✓ Deals & Offers

- ✓ Utsav Rewards
- ✓ Book Healthcare Checkups
- ✓ eFile Tax Returns
- ✓ Online Will

Invest & Donate

- ✓ Buy Health Insurance
- ✓ Buy Car Insurance
- ✓ Buy Indian Gold Coin
- ✓ Make Religious Offerings online
- ✓ Make Religious Donations thru Mobile

3. Ways to bank

Internet Banking

- ✓ FedNet – An overview of the facilities available in FedNet is provided in the website and the users can register online for FedNet activation. The transactions using FedNet is secured with a two-factor authentication.

Mobile Banking

- ✓ FedMobile - FedMobile is one of the fastest, secure and state-of-the-art mobile banking systems in the country with latest technology being employed for its deployment. Customers can explore the power of M-Commerce via FedMobile. It can also be used for transfer of funds in seconds, top-up Mobile / DTH on the go, Pay bills and school fees instantly and many more.

- ✓ Lotza - LoTZA bundles all the bank accounts of the customer in a single App. Banking now is more secured through LOTZA. It helps to link different bank accounts to a single app for banking requirements. LOTZA is one of the UPI (Unified Payment Interface) PSP App to be approved by National Payments Corp. of India Ltd (NPCI).

- ✓ FedBook - Federal Bank introduces FedBook - a convenient and secure mobile app to get the account passbook on smart phone. Though the bank is more than happy to serve customers at their branch, they believe that the time is as valuable as money.

Unlike any other banking application, customers need not fill in any application form- Just download FedBook app and start using it.

- ✓ SMS Banking - Federal Bank provides you with the finest SMS Banking experience- access your bank account details at your fingertips. It is all about sending SMS to know your account details and to avail a host of value-added services offered by your bank.

- ✓ Missed Call Based Banking Service- Customers can avail a host of banking services by just giving a missed call. Federal Bank has introduced a handful of services which can be availed through Missed Call Banking. Customers can know the balance of their account(s), get mini statement, top up your mobile and even make fund transfers.

ATMs

Federal Bank has a wide network of Automatic Teller Machines (ATMs) that cater your needs 24x7.

Customers can avail the following services from the federal ATMs.

- ✓ Cash Withdrawal
- ✓ Fast Cash
- ✓ Balance Inquiry
- ✓ PIN Change
- ✓ Cash & Cheque Deposits
- ✓ Funds Transfer to own accounts
- ✓ Mini Statement – Last five transactions
- ✓ Card-to-Card (C2C) Transfer
- ✓ Soft Pin Facility - To activate/reset your debit card PIN

Cash Deposit Machines (CDM) / Bulk Note Acceptors (BNA)

Federal Bank has introduced Cash Deposit Machines or Bunch Note Acceptors (BNA) at selected branches which facilitates remittance of cash on real-time basis to customers' accounts on a 24x7 time frame, i.e. even beyond the business hours of the Bank.

- ✓ The machine has the inbuilt intelligence to identify fake notes and to sort cash deposited by customers into different denominations.

- ✓ It also provides other facilities like balance enquiry and mini statement.
- ✓ This machine will work around the clock and accept bulk amounts of deposits, sort the cash, count it and instantly credit it to the account of the depositor.
- ✓ It allows the customer to make an envelope-free cash deposit in bundles of currency notes of various denominations.
- ✓ It increases customer acceptance by validating, denominating and counting deposited currency emulating a teller transaction.
- ✓ Deposit details are printed on the customer's receipt.
- ✓ As this machine does not demand any vouchers or other formalities usually needed for a banking transaction, it makes things easier for customers.

Other Services

- ✓ Fed-e-Trade (Online Trading) - Federal Bank offers Fed-e-Trade - a feature packed 3-in-1 Account. A Savings and Demat Account with federal bank and a Trading Account with M/s Geojit BNP Paribas Financial Services Ltd.
- ✓ E mail Alerts
- ✓ Mobile Alerts
- ✓ Tele Banking
- ✓ NETC FASTag - Federal Bank FASTag is a perfect solution for a hassle-free trip on national highways. Federal Bank FASTag is a device that employs Radio Frequency Identification (RFID) technology for making toll payments directly from the prepaid or savings account linked to it FASTag is presently operational at 397 toll plazas across national and state highways. More toll plazas will be brought under the FASTag program soon.

3.5.4 HDFC

HDFC Bank was incorporated in August 1994. As of September 30, 2017, the Bank had a nationwide distribution network 4,729 branches and 12,259 ATM's in 2,669 cities/towns. As part of RBI's liberalisation of the Indian Banking Industry in 1994, HDFC was the first bank which received an 'in principle' approval from the Reserve Bank of India (RBI) to set up a bank in the private sector. The bank was incorporated in August 1994 in the name of 'HDFC Bank Limited'. The registered office was in

Mumbai, India. HDFC Bank commenced operations as a Scheduled Commercial Bank in January 1995.

Mission and Vision

"HDFC Bank's mission is to be a World Class Indian Bank".

"The objective is to build sound customer franchises across distinct businesses so as to be the preferred provider of banking services for target retail and wholesale customer segments, and to achieve healthy growth in profitability, consistent with the bank's risk appetite. The bank is committed to maintaining the highest level of ethical standards, professional integrity, corporate governance and regulatory compliance. HDFC Bank's business philosophy is based on five core values: Operational Excellence, Customer Focus, Product Leadership, People and Sustainability".

Financial Innovations of HDFC Bank

Products

Accounts and Deposits

- ✓ Savings accounts – Savings max account, Regular savings account, Women's savings account, Kids advantage account, Senior citizens account, Family savings group account, Basic savings bank deposit account, Government/ Institutional savings account, BSBDA small account, Government scheme beneficiary savings account are the different savings account provided by HDFC bank.
- ✓ Salary accounts – Premium salary account, Regular salary account, Defence salary account, Classic salary account, Basic savings bank deposit account-salary, Salary family account and Reimbursement account are the various salary accounts of HDFC bank.
- ✓ Current accounts – HDFC bank provides ULTIMA current account, Supreme current account, Apex current account, EZEE current account, Max current account, Agri current account, Plus current account, Current account for hospitals and nursing homes, Trade current account, Current account for professionals, Premium current account, Merchant advantage plus current account, Regular current account, Merchant

advantage current account, Flexi current account, Institutional current account, Smart up solution for start ups, Ascent current account, RFC domestic current account, Exchange Earners Foreign Currency(EEFC) account, E-comm current account and Saksham current account.

- ✓ Deposits – Dream deposit, Regular fixed deposit, 5-year tax saving fixed deposit, Overdraft against fixed deposit and sweep – facility are the deposit schemes of HDFC bank.
- ✓ Safe deposit locker, rural accounts and pension accounts are other accounts of HDFC bank

Loans

Personal loan, car loan, business loan, loan on credit card, loans for professionals, loan against securities, home loan, two wheeler loans, gold loan, loan against property, educational loan, government-sponsored programs, rural loans, smart draft-overdraft against salary, loan against assets and consumer durable loan are the loan schemes provided by HDFC bank.

Cards

HDFC bank provides cards and schemes like Credit cards, debit cards, prepaid cards, credit card rewards program and loan on credit card.

Demat

HDFC's safe and dependable demat platform empowers traders, long-term investors as well as beginners to make the best decisions. It is a flexible and customizable solution for buying and storing customers investments in equity, mutual funds, IPOs, ETF Exchange Traded Funds - Gold & index, bonds, and CDs. 2 in 1 and 3 in 1 are the two schemes provided by the bank.

Investments

Mutual funds, Equities and derivatives, Saving bonds, Sec 54 EC capital gain bonds and Inflation Indexed National Savings Securities-Cumulative are the various investment products of HDFC bank. National Pension System, Atal Pension Yojana, Public Provident Fund and Sukanya Samithi Account.

Insurance

Life Insurance, Health and Accident Insurance, Motor Insurance, Travel Insurance, Home Insurance, Two Wheeler Insurance and student travel insurance are the insurance products of HDFC bank.

Premier Banking

Imperia banking, Preferred banking, Classic banking and Prime banking are the premier banking products of HDFC bank.

Making Payments

pay app

HDFC Bank PayZapp is a complete payment solution which gives customer the power to pay in just one click. By using PayZapp, customers can shop on their mobile at the apps which have partnership with PayZapp. The app can also be used to buy movie tickets and groceries. Comparison and booking of flight tickets and hotels are other advantage of this app. Other facilities are:

- ✓ Online shopping
- ✓ Discounts at SmartBuy
- ✓ Send money to anyone on contact list or to own bank account
- ✓ Pay bills
- ✓ Recharge mobile, DTH and data card

Debit & Credit Card of any bank can be linked to PayZapp. It is the most convenient and secure way of payment.

Pay via SmartHub

It is the hassle-free process of paying all the taxes, utility bills, credit card bills or even making donations with great ease. Pick the payment option, select the state, city and type of payment from the dropdown menu to view if the payment can be made online and the list of branches the payment can be made.

Ways to Bank

- Bank online
  - ✓ Net banking
  - ✓ Credit card net banking
  - ✓ E mail statements
  - ✓ Loan accounts online
- Bank in person
  - ✓ ATMs
  - ✓ Branch network
  - ✓ Cash @shop

- Bank with your phone
  - ✓ Mobile banking
  - ✓ Easy keys- your bank on your mobile keyboard
  - ✓ Insta alerts- SMS & E-mail
  - ✓ Phone banking
  - ✓ Instant transfers and recharges through chillr app
- Bank with your watch

  Watch Banking is now available exclusively for HDFC Bank customers through an Apple Watch. Customers can now do their favourite transactions right from Apple Watch without even taking out the phone.
- Services on social media

  Discover the easiest way to bank with HDFC Bank OnChat. Open Facebook Messenger, find 'HDFC Bank OnChat', and just say 'Hi'. No more app downloads, figuring out complex menus or loading wallets.

  Start chatting to:

  Recharge mobile phone

  Pay utility bills like post-paid mobile, electricity, DTH, data card and

  Book a cab from Ola or Uber

  Seamless discovery and booking of buses

  Avail movie and event tickets

  HDFC Bank OnChat is at 24/7 service

HDFC Bank OnChat can be used by everyone whether an HDFC Bank customer or not.

Conclusion

This chapter gives a brief account of the theoritical background for the study. Theories on the three major constructs of the study i.e. 'Financial Innovation', 'Customer Satisfaction' and 'Financial Performance' was discussed in the chapter. It also presents the profile of the selected banks and the major financial innovations introduced by these banks. The next chapter analyses the effect of financial innovations on financial performance of the banks.

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Chapter 4

Effect of Financial Innovation on Financial Performance

- ***Introduction***
- ***Effect of Financial Innovation on Productivity***
  - ✓ ***FII and Deposits***
  - ✓ ***FII and Advances***
- ***Effect of Financial Innovation on Profitability***
  - ✓ ***FII and ROA***
  - ✓ ***FII and ROE***
- ***Conclusion***

Chapter 4

Effect of Financial Innovation on Financial Performance

Introduction

This chapter deals with the measurement of the effect of financial innovation on financial performance of the banks. To measure the status of financial innovation in the selected banks an index was developed by the researcher with the help of existing literatures and based on the opinion of the experts. 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

$$\text{Financial Innovation Index} = \frac{\text{Current period innovative transactions}}{\text{Base period innovative transactions}} * 100$$

To assess the effect of financial innovation on the financial performance of banks econometrics procedures was employed by the researcher. The major tools used in the study are Unit Root Test, Cointegration analysis, Vector Error Correction Model and Granger causality/Block Exogeneity test.

The variables used to measure the 'Financial Performance' in the study are productivity and profitability. 'Productivity' of banks are measured in terms of its 'Deposits' and 'Advances' and the 'Profitability' of the banks selected are measured in terms of 'Return on Assets'(ROA) and 'Return on Equity'(ROE).

A. Effect of Financial Innovation on Productivity

1. State Bank of India:

a. FII and Deposits:

The empirical evaluation of this issue is based on unit root test of stationarity, Johansen cointegration test, Vector Error Correction Model and Granger Causality test. The object of this analysis is to check whether there exists any long run relationship between deposits and financial innovation in banking sector. The deposits and financial innovation have been subjected to logarithmic transformation and the series obtained are LDEP and LFII respectively.

The pattern of Financial Innovation and Deposits when transformed to log is shown in the figure 4.1 and 4.2

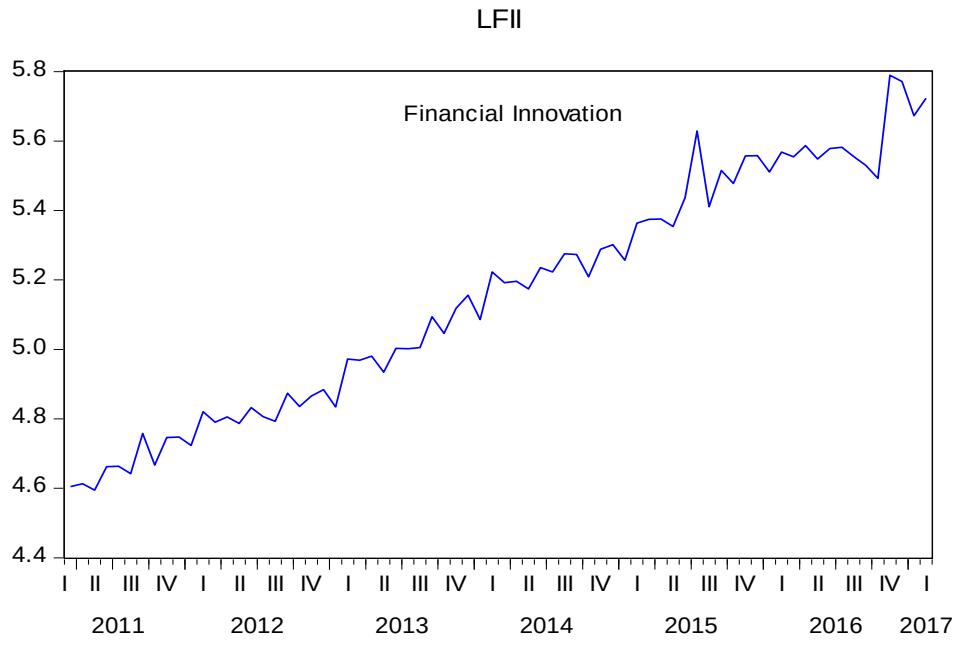


Fig 4.1 Financial Innovation Pattern (In Log) - FII and Deposits (SBI)

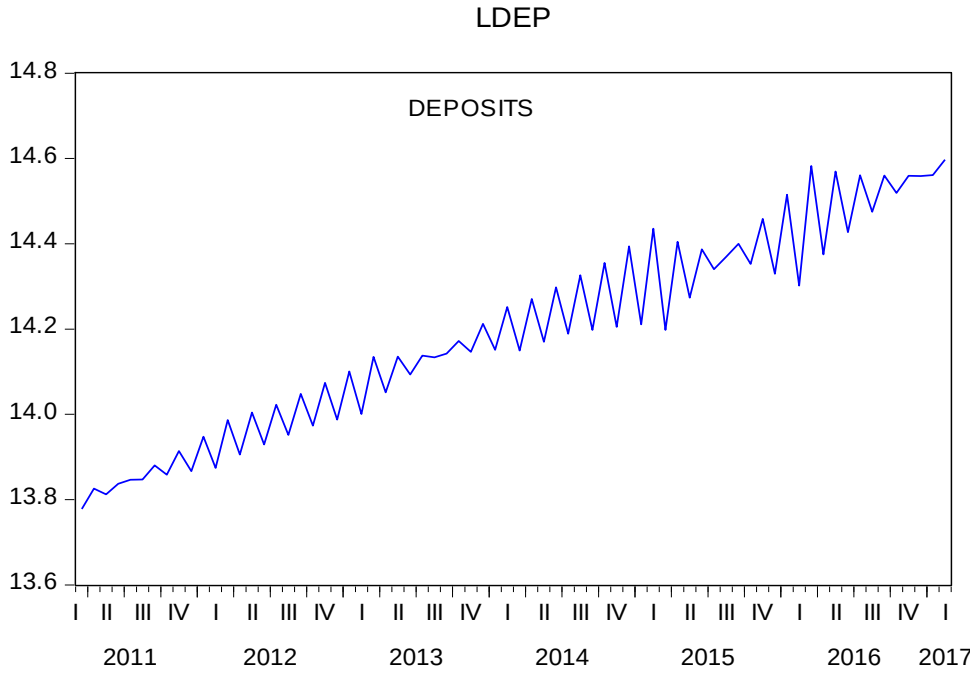


Fig 4.2 Deposit Pattern (In Log) - SBI

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LDEP have a unit root

The result of unit root analysis is shown in the Table 4.1

Table 4.1

Result of Unit Root Test – FII and Deposits (SBI)

Variable	Test Statistic	P value
LFII	-0.018337	0.9532
LDEP	-0.344383	0.9119
ΔLFII	-7.827642	0.0000*
ΔLDEP	-21.58918	0.0001*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Before determining the cointegration of variables a test for determining lag length was done. The result of lag length criteria using AIC (Akaike Information Criterion) has given a result that 3 lags should be included in the test. Table 4.2 and 4.3 shows the result of Johansen system test for cointegration based on optimum lag length selected by using AIC criterion.

Table 4.2

Result of Unrestricted Cointegration Rank Test (Trace) - FII and Deposits (SBI)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.397375	41.24989	0.0000
At most 1	0.095303	6.810562	0.1368

Table 4.3

Result of Unrestricted Cointegration Rank Test (Maximum Eigen Value) - FII and Deposits (SBI)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.397375	34.43933	0.0000
At most 1	0.095303	6.810562	0.1368

The λ_{trace} and λ_{max} indicate that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and Deposits is given by

$$LDEP = 12.01505 + 0.636637LFII \quad (1)$$

The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship. As the equation (1) shows when there is a 1per cent change in FII, there is 63 per cent change in DEP in the long run.

$$\Delta LDEP_t = -1.582840\,\Delta LDEP_{t-1} - 0.532112\,\Delta LDEP_{t-2} + 0.111233$$
$$\Delta LDEP_{t-3} - 0.04774\Delta LFII_{t-1} - 0.030174\Delta LFII_{t-2}$$
$$-0.044742\,\Delta LFII_{t-3} - 0.031894(LDEP_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (2)$$

$$\Delta LFII_t = 0.009869\Delta LDEP_{t-1} + 0.207824\Delta LDEP_{t-2} + 0.253520$$
$$\Delta LDEP_{t-3} - 0.761828\Delta LFII_{t-1} - 0.561820\Delta LFII_{t-2} - 0.222560$$
$$\Delta LFII_{t-3} - 0.032180(LDEP_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (3)$$

Granger Causality Test:

Null Hypothesis:

H0: LFII does not granger cause LDEP

H0: LDEP does not granger cause LFII

The result of granger causality test is shown in the tables 4.4 and 4.5

Table 4.4

Result of Granger Causality Test for Dependent Variable D (LDEP) - FII and Deposits (SBI)

Excluded	Chi-sq	df	Prob.
D(LFII)	2.628763	3	0.0001

Table 4.5

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and Deposits (SBI)

Excluded	Chi-sq	df	Prob.
D(LDEP)	1.306371	3	0.7276

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LDEP) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LDEP) and D (LDEP) is not the cause for D (LFII).

b. FII and Advances:

Vector Error Correction Model is employed by the researcher to check the existence of long run relationship between advances and financial innovation. Prior to VECM, the empirical evaluation of this issue is based on Unit Root Test of stationarity and Johansen cointegration test. The advances and financial innovation have been subjected to logarithmic transformation and the series obtained are LADV and LFII respectively.

The pattern of Financial Innovation and Advances when transformed to log is shown in the figure 4.3 and 4.4.

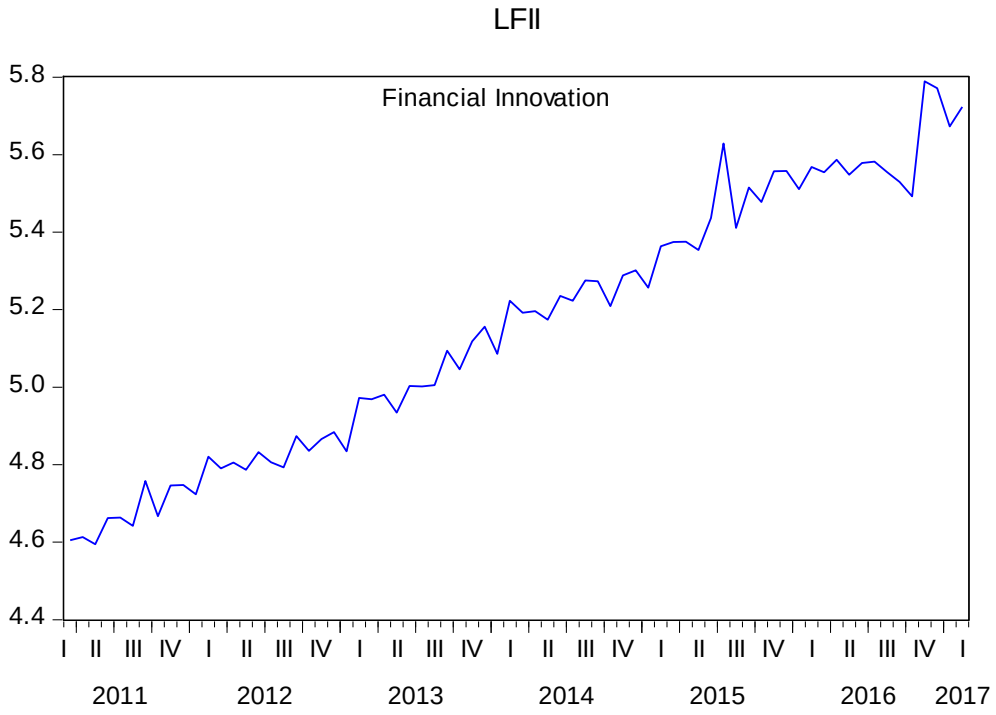


Fig 4.3 Financial Innovation Pattern (In Log) - FII and Advances (SBI)

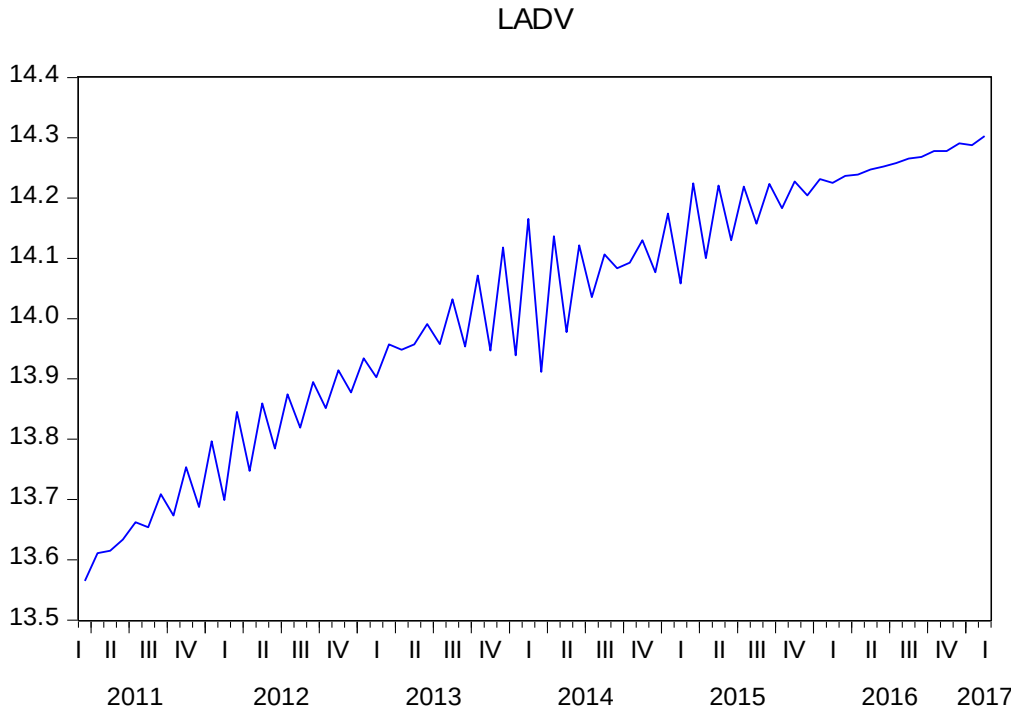


Fig 4.4 Advances Pattern (In Log) - SBI

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LADV have a unit root

The result of unit root analysis is shown in the Table 4.6

Table 4.6

Result of Unit Root Test- FII and Advances (SBI)

Variable	Test Statistic	P value
LFII	-0.018337	0.9532
LADV	-0.017452	0.7145
ΔLFII	-7.827642	0.0000*
ΔLADV	-7.017520	0.0001*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables LFII and LDEP in the first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Lag length determination using AIC (Akaike Information Criterion) shows a result that 3 lags should be included in the test. Table 4.7 and Table 4.8 clearly indicate the result of Johansen system test for cointegration based on the optimum lag length determined by AIC criterion.

Table 4.7

Result of Unrestricted Cointegration Rank Test (Trace) - FII and Advances (SBI)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.378775	39.80334	0.0000
At most 1	0.103522	7.431181	0.1055

Table 4.8

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue) - FII and Advances (SBI)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.378775	32.37216	0.0001
At most 1	0.103522	7.431181	0.1055

The λ trace and λ max indicates that there is one co integrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and Advances is given by

LADV= 13.68592+ 0.151164LFII (4)

The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship. The equation (4) states that a 1 per cent change in the FII will lead to 15 per cent change n advances.

$$\Delta LADV_t = -1.543850\ \Delta LADV_{t-1} - 0.480318\ \Delta LADV_{t-2} + 0.149886$$

$$\Delta LADV_{t-3} - 0.015395 \Delta LFII_{t-1} - 0.002225 \Delta LFII_{t-2}$$

$$-0.004679 \Delta LFII_{t-3} - 0.065703 (LADV_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (5)$$

$$\Delta LFII_t = -0.121426 \Delta LADV_{t-1} - 0.410510 \Delta LADV_{t-2} - 0.327849$$

$$\Delta LADV_{t-3} - 0.714256 \Delta LFII_{t-1} - 0.496459 \Delta LFII_{t-2} - 0.167520$$

$$\Delta LFII_{t-3} - 0.097255 (LADV_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (6)$$

Granger Causality

Null Hypothesis:

H0: LFII does not granger cause LADV

H0: LADV does not granger cause LFII

The result of granger causality test is shown in the table 4.9 and 4.10

Table 4.9

Result of Granger Causality Test for Dependent Variable D (LADV) - FII and Advances (SBI)

Excluded	Chi-sq	df	Prob.
D(LFII)	0.377615	3	0.0000

Table 4.10

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and Advances (SBI)

Excluded	Chi-sq	df	Prob.
D(LADV)	0.634919	3	0.8884

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LADV) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LADV) and D (LADV) is not the cause for D (LFII).

2. CANARA BANK:

a. FII and Deposits:

The empirical evaluation of this issue is based on unit root test of stationarity, Johansen cointegration test, Vector Error Correction Model and Granger Causality test. The object of this analysis is to check whether there exists any long run relationship between deposits and financial innovation in banking sector. The deposits and financial innovation have been subjected to logarithmic transformation and the series obtained are LDEP and LFII respectively. The pattern of financial innovation and deposits when transformed to log is shown in the figure 4.5 and 4.6.

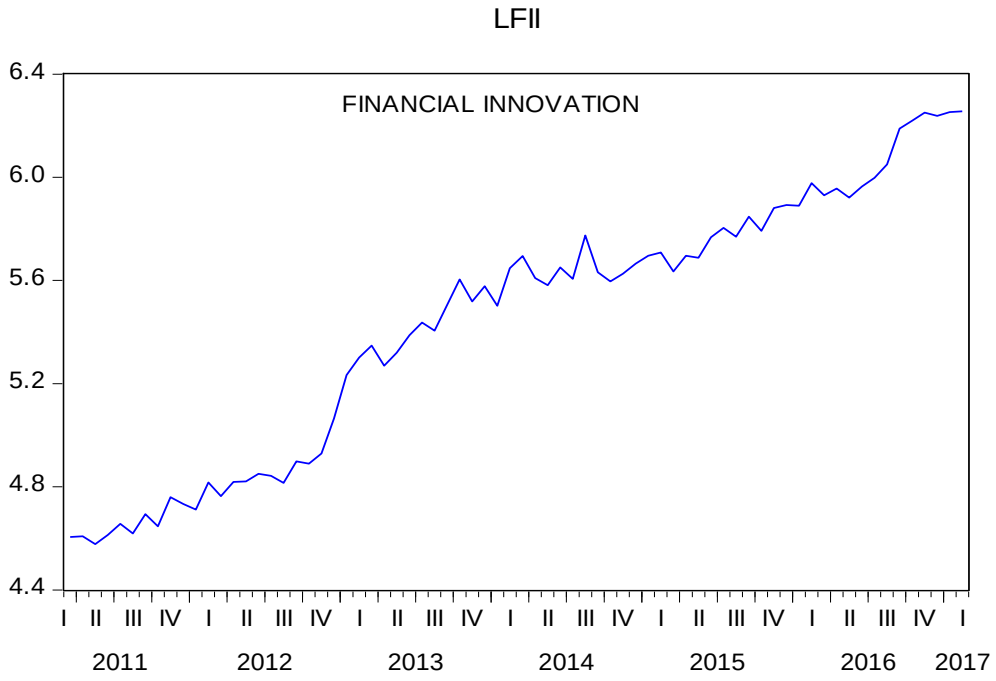


Fig 4.5 Financial Innovation Pattern (In Log) - FII and Deposits (Canara Bank)

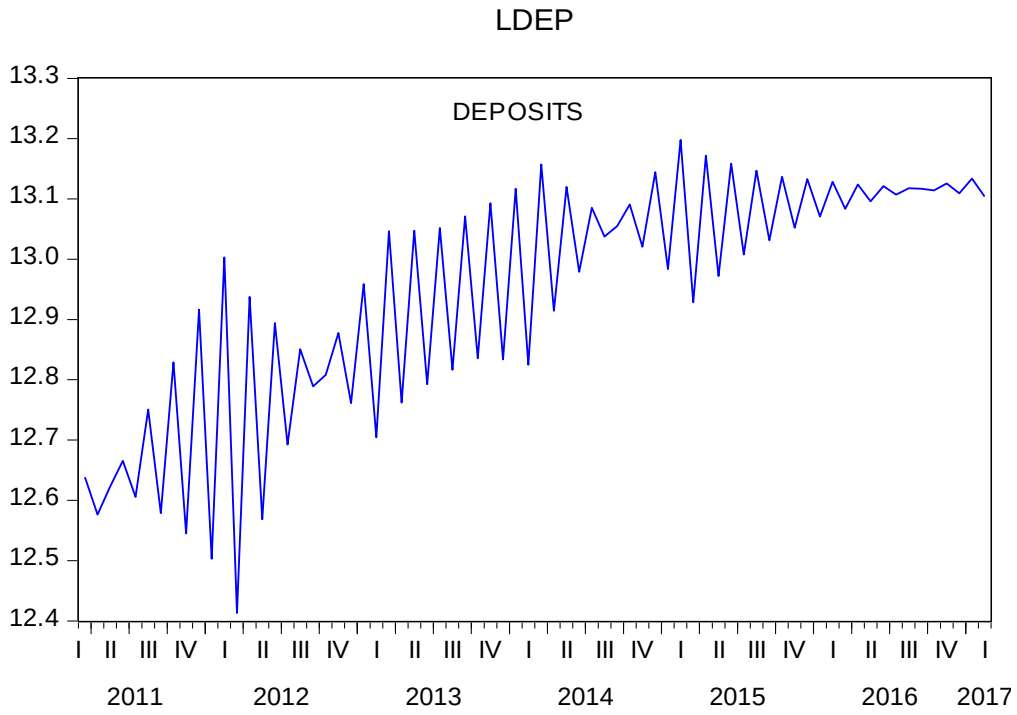


Fig 4.6 Deposit Pattern (In Log)-Canara Bank

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LDEP have a unit root

The result of unit root analysis is shown in the table 4.11

Table 4.11

Result of Unit Root Test- FII and Deposits (Canara Bank)

Variable	Test Statistic	P value
LFII	-0.573318	0.8692
LDEP	-0.570923	0.9775
ΔLFII	-11.11289	0.0001*
ΔLDEP	-21.21537	0.0001*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Before determining the cointegration of variables a test for determining lag length was done. The result of lag length criteria using AIC (Akaike Information Criterion) has given a result that 3 lags should be included in the test. Table 4.12 and 4.13 shows the result of Johansen system test for cointegration based on the optimum lag length selected by using AIC criterion.

Table 4.12

Result of Unrestricted Cointegration Rank Test (Trace) - FII and Deposits (Canara Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.237796	22.89510	0.0212
At most 1	0.063074	4.430294	0.3518

Table 4.13

Result of Unrestricted Cointegration Rank Test (Maximum Eigen value) - FII and Deposits (Canara Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.237796	18.46480	0.0193
At most 1	0.063074	4.430294	0.3518

The λ trace and λ max indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long-run relationship between financial innovation and Deposits is given by

$$LDEP= 12.87560+ 0.68398LFII \quad (7)$$

The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship and the equation (7) makes it clear that a one per cent change in FII leads to a 68 percent change in DEP.

$$\Delta LDEP_t = -1.499608\Delta LDEP_{t-1} - 0.383147\Delta LDEP_{t-2} + 0.195154$$

$$\Delta LDEP_{t-3} + 0.075877\Delta LFII_{t-1} + 0.000354\Delta LFII_{t-2}$$

$$+0.047353\ \Delta LFII_{t-3} - 0.060444(LDEP_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (8)$$

$$\Delta LFII_t = -0.129415\Delta LDEP_{t-1} - 0.111761\Delta LDEP_{t-2} + 0.072020$$

$$\Delta LDEP_{t-3} - 0.268870\Delta LFII_{t-1} + 0.005420\Delta LFII_{t-2} - 0.043183$$

$$\Delta LFII_{t-3} - 0.100606(LDEP_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (9)$$

Granger Causality Test

Null Hypothesis:

H0: LFII does not granger cause LDEP

H0: LDEP does not granger cause LFII

The result of granger causality test is shown in the table 4.14 and 4.15

Table 4.14

Result of Granger Causality test for Dependent Variable D (LDEP) - FII and Deposits (Canara Bank)

Excluded	Chi-sq	df	Prob.
D(LFII)	2.183895	3	0.0003

Table 4.15

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and Deposits (Canara Bank)

Excluded	Chi-sq	df	Prob.
D(LDEP)	3.526728	3	0.3173

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LDEP) while it is accepted for the

dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LDEP) and D (LDEP) is not the cause for D (LFII).

b. FII and Advances:

Vector Error Correction Model is employed by the researcher to check the existence of long run relationship between advances and financial innovation. Prior to VECM, the empirical evaluation of this issue is based on Unit Root Test of stationarity and Johansen cointegration test. The advances and financial innovation have been subjected to logarithmic transformation and the series obtained are LADV and LFII respectively. The pattern of financial innovation and advances when transformed to log is shown in the figure 4.7 and 4.8.

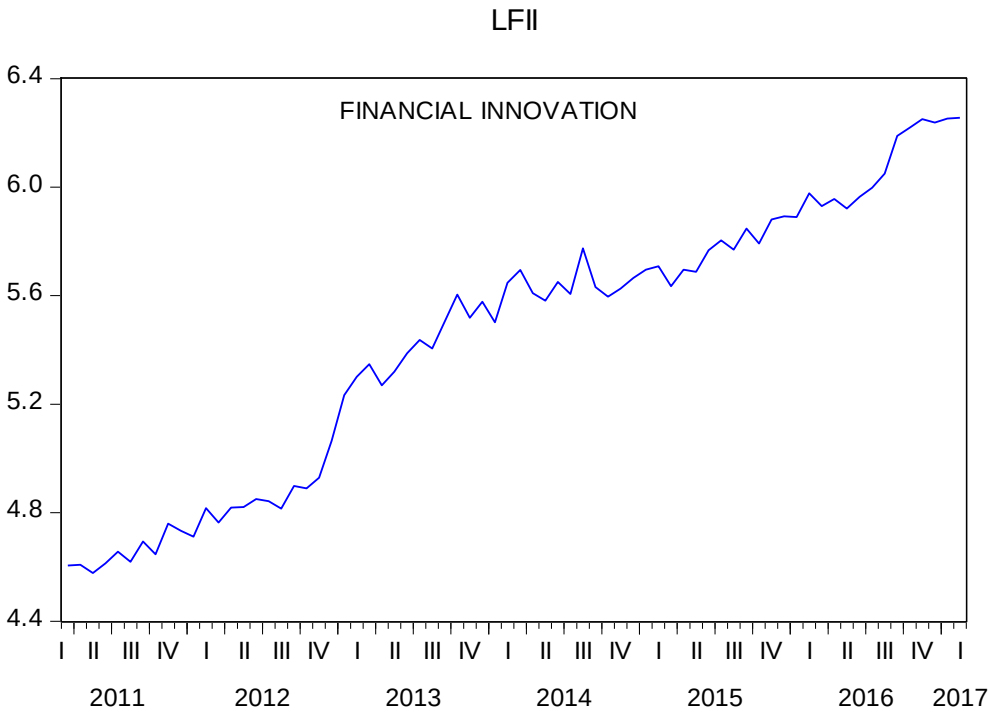


Fig 4.7 Financial Innovation Pattern (In Log) –FII and Advances

(Canara Bank)

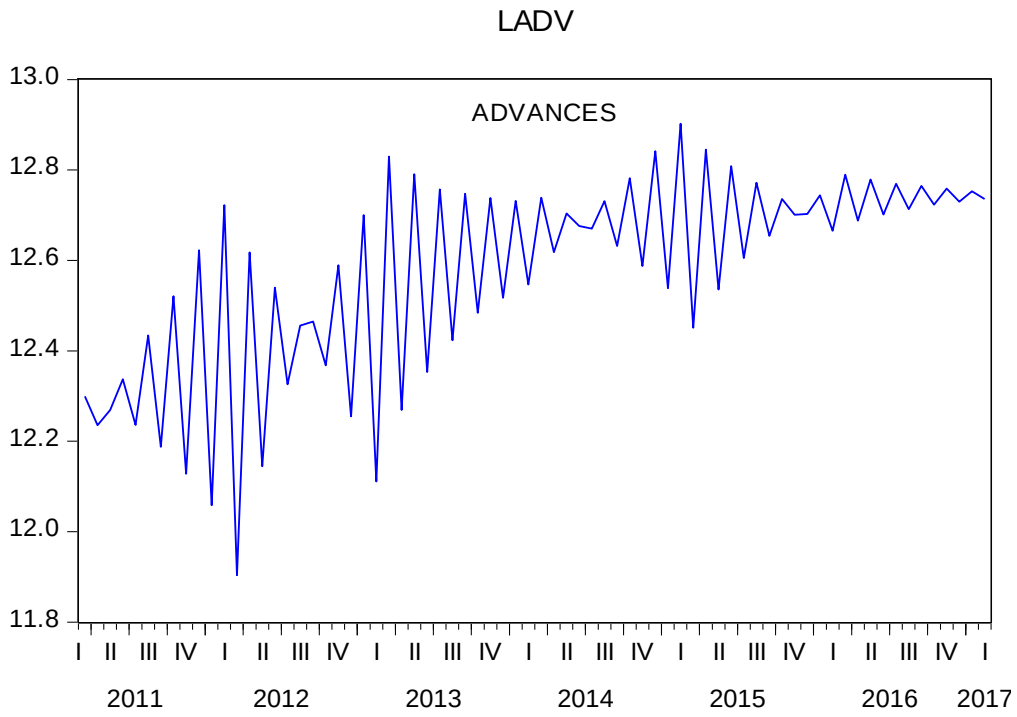


Fig. 4.8: Advances Pattern (In Log) - Canara Bank

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LADV have a unit root

The result of unit root analysis is shown in the Table 4.16

Table 4.16

Result of Unit Root Test- FII and Advances (Canara Bank)

Variable	Test Statistic	P value
LFII	-0.573318	0.8692
LADV	-0.983426	0.9392
ΔLFII	-11.11289	0.0001*
ΔLADV	-19.39226	0.0001*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Lag length determination using AIC (Akaike Information Criterion) shows a result that 3 lags should be included in the test. Table 4.17 and Table 4.18 clearly indicate the result of Johansen system test for cointegration.

Table 4.17

Result of Unrestricted Cointegration Rank Test (Trace) - FII and Advances (Canara Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.336683	34.56228	0.0003
At most 1	0.086434	6.237588	0.1732

Table 4.18

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue) - FII and Advances (Canara Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.336683	28.32470	0.0004
At most 1	0.086434	6.237588	0.1732

The λ_{trace} and λ_{max} indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and Advances is given by

$$LADV = 11.32176 + 0.251257LFII \quad (10)$$

The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship.

$$\Delta LADV_t = -1.385583\ \Delta LADV_{t-1} - 0.376518\Delta LADV_{t-2} + 0.164835$$

$$\Delta LADV_{t-3} - 0.042242\Delta LFII_{t-1} - 0.074121\Delta LFII_{t-2}$$

$$+0.064067\Delta LFII_{t-3} - 0.203577(LADV_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (11)$$

$$\Delta LFII_t = 0.104880\Delta LADV_{t-1} + 0.075573\Delta LADV_{t-2} + 0.090051$$

$$\Delta LADV_{t-3} - 0.307768\Delta LFII_{t-1} - 0.046890\Delta LFII_{t-2} - 0.073068$$

$$\Delta LFII_{t-3} - 0.256405(LADV_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (12)$$

Granger Causality Test

Null Hypothesis:

H0: LFII does not granger cause LADV

H0: LADV does not granger cause LFII

The result of granger causality test is shown in the table 4.19 and 4.20.

Table 4.19

Result of Granger Causality test for Dependent Variable D (LADV) - FII and Advances (Canara Bank)

Excluded	Chi-sq	df	Prob.
D(LFII)	1.150814	3	0.0002

Table 4.20

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and Advances (Canara Bank)

Excluded	Chi-sq	df	Prob.
D(LADV)	6.448784	3	0.0917

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LADV) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LADV) and D (LADV) is not the cause for D (LFII).

3. Federal Bank:

a. FII and Deposits:

The empirical evaluation of this issue is based on unit root test of stationarity, Johansen cointegration test and Vector Error Correction Model. The object of this analysis is to check whether there exists any long run relationship between deposits and financial innovation in banking sector. The deposits and financial innovation have been subjected to logarithmic transformation and the series obtained are LDEP and LFII respectively.

The pattern of financial innovation and deposits when transformed to log is shown in the figure 4.9 and 4.10.

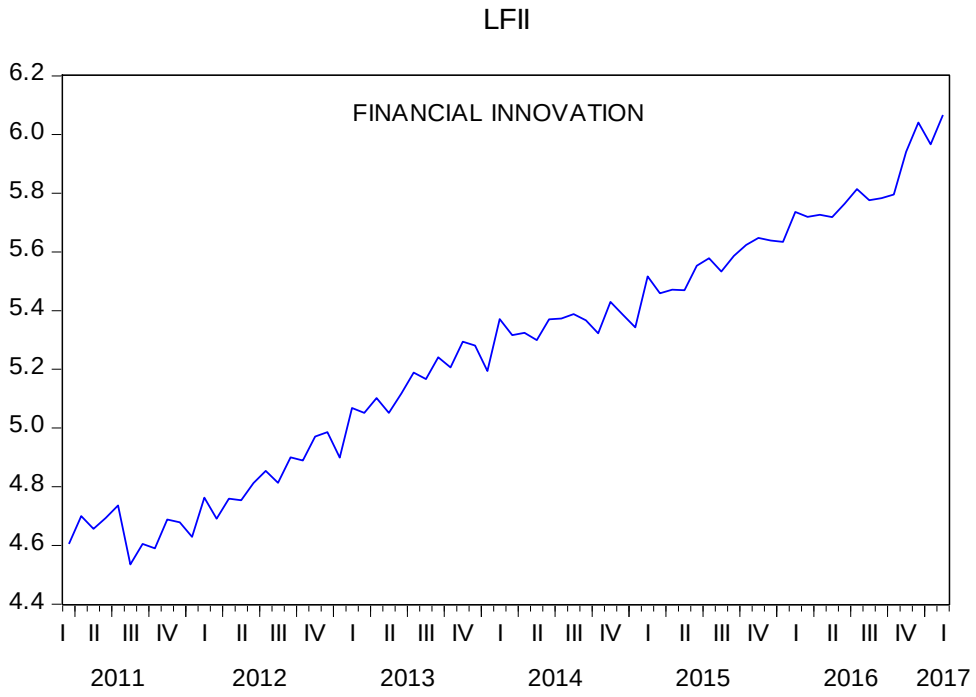


Fig. 4.9: Financial Innovation Pattern (In Log) – FII and Deposits (Federal Bank)

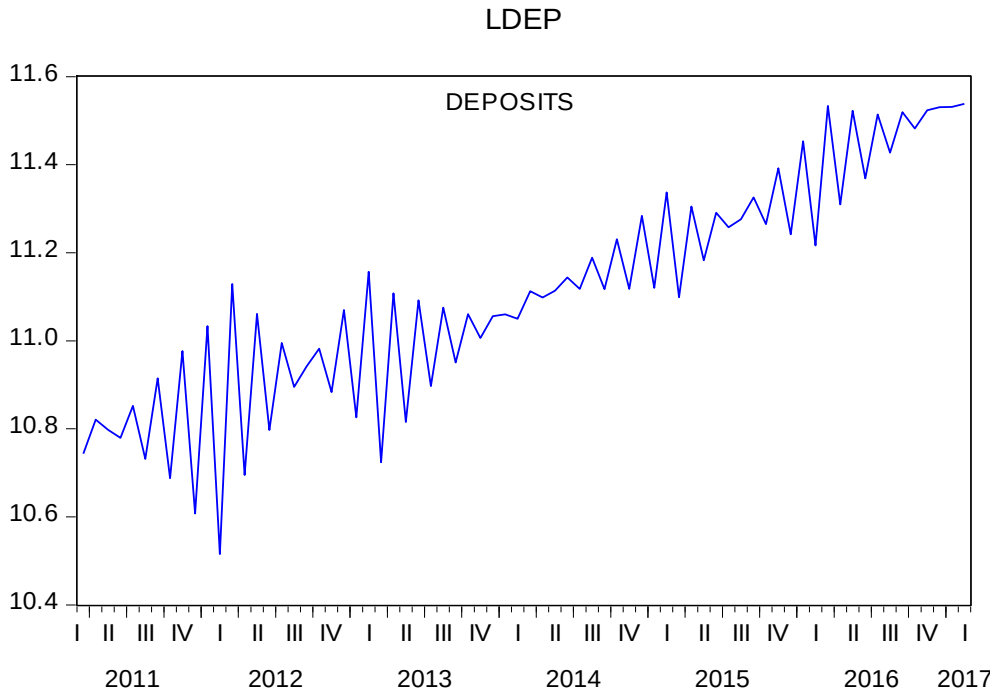


Fig 4.10 Deposit Pattern (In Log) - Federal Bank

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LDEP have a unit root

The result of unit root analysis is shown in the Table 4.21

Table 4.21

Result of Unit Root Test - FII and Deposits (Federal Bank)

Variable	Test Statistic	P value
LFII	0.509680	0.9859
LDEP	1.352230	0.9987
ΔLFII	-14.46522	0.0000*
ΔLDEP	-5.681548	0.0000*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables LFII and LDEP in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Before determining the cointegration of variables a test for determining lag length was done. The result of lag length criteria using AIC (Akaike Information Criterion) has given a result that 6 lags should be included in the test. Table 4.22 and 4.23 shows the result of Johansen system test for cointegration based on optimum lag length selected by using AIC criterion.

Table 4.22

Result of Unrestricted Cointegration Rank Test (Trace) - FII and Deposits (Federal Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.285388	27.11543	0.0048
At most 1	0.060813	4.266365	0.3739

Table 4.23

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue) - FII and Deposits (Federal Bank

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.285388	22.84907	0.0034
At most 1	0.060813	4.266365	0.3739

The λ_{trace} and λ_{max} indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and Deposits is given by

$$LDEP = 8.422966 + 0.466617LFII \quad (13)$$

The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship and the equation (13) shows that 1 per cent change in FII leads to 46 per cent change in deposits in the long run.

$$\Delta LDEP_t = -1.494525\ \Delta LDEP_{t-1} - 0.485780\ \Delta LDEP_{t-2} - 0.186103\Delta LDEP_{t-3}$$

$$-0.297984\Delta LDEP_{t-4} - 0.187865\Delta LDEP_{t-5} - 0.129854\Delta LDEP_{t-6}$$

$$-0.135864\Delta LFII_{t-1} + 0.048426\Delta LFII_{t-2} + 0.052229\ \Delta LFII_{t-3}$$

$$+0.198545\Delta LFII_{t-4} + 0.251306\Delta LFII_{t-5} + 0.303834\Delta LFII_{t-6}$$

$$+0.121100(LDEP_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (14)$$

$$\Delta LFII_t = -0.224880\Delta LDEP_{t-1} - 0.141253\Delta LDEP_{t-2} - 0.073535\Delta LDEP_{t-3}$$

$$-0.180665\Delta LDEP_{t-4} - 0.263132\Delta LDEP_{t-5} - 0.130863\Delta LDEP_{t-6}$$

$$-0.585410\Delta LFII_{t-1} - 0.328117\Delta LFII_{t-2} - 0.046534\Delta LFII_{t-3} + 0.122954\Delta LFII_{t-4}$$

$$+0.358376\Delta LFII_{t-5} - 0.144897\Delta LFII_{t-6} + 0.204134(LDEP_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (15)$$

Granger Causality Test

Null Hypothesis:

H0: LFII does not granger cause LDEP

H0: LDEP does not granger cause LFII

The result of granger causality test is shown in the tables 4.24 and 4.25

Table 4.24

Result of Granger Causality Test for Dependent Variable D (LDEP) - FII and Deposits (Federal Bank)

Excluded	Chi-sq	df	Prob.
D(LFII)	9.119867	6	0.0009

Table 4.25

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and Deposits (Federal Bank)

Excluded	Chi-sq	df	Prob.
D(LDEP)	9.700397	6	0.1378

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LDEP) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LDEP) and D (LDEP) is not the cause for D (LFII).

b. FII and Advances:

Vector Error Correction Model is employed to check the existence of long run relationship between advances and financial innovation. Prior to VECM, the empirical evaluation of this issue is based on Unit Root Test of stationarity and Johansen cointegration test. The advances and financial innovation have been subjected to logarithmic transformation and the series obtained are LADV and LFII respectively. The pattern of financial innovation and advances when transformed to log is shown in the figure 4.11 and 4.12.

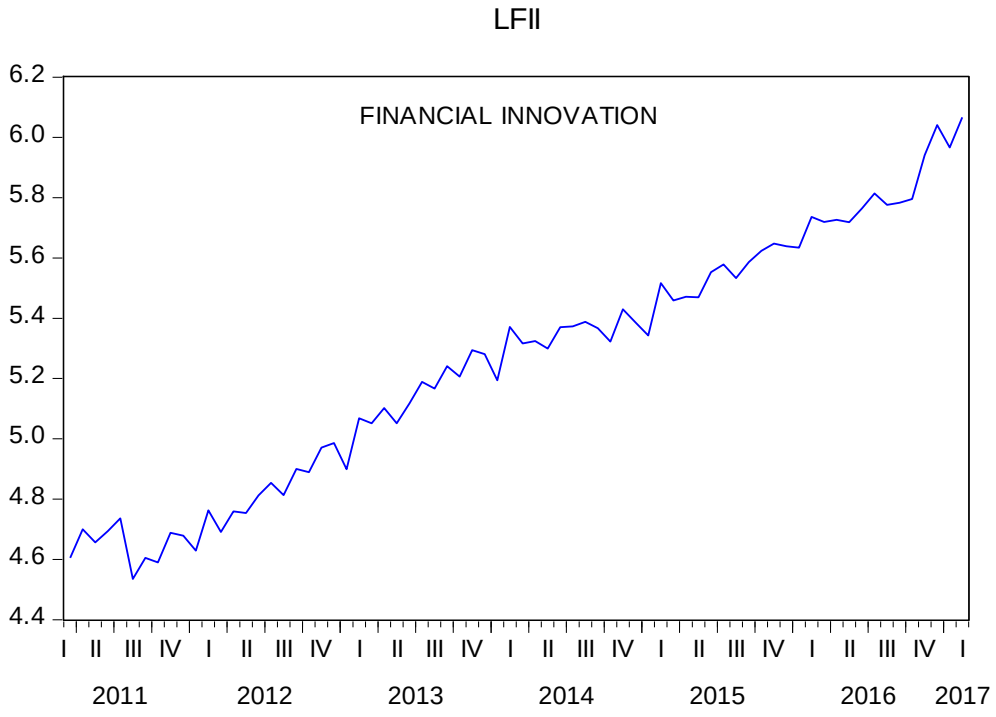


Fig 4.11 Financial Innovation Pattern (In Log) – FII and Advances (Federal Bank)

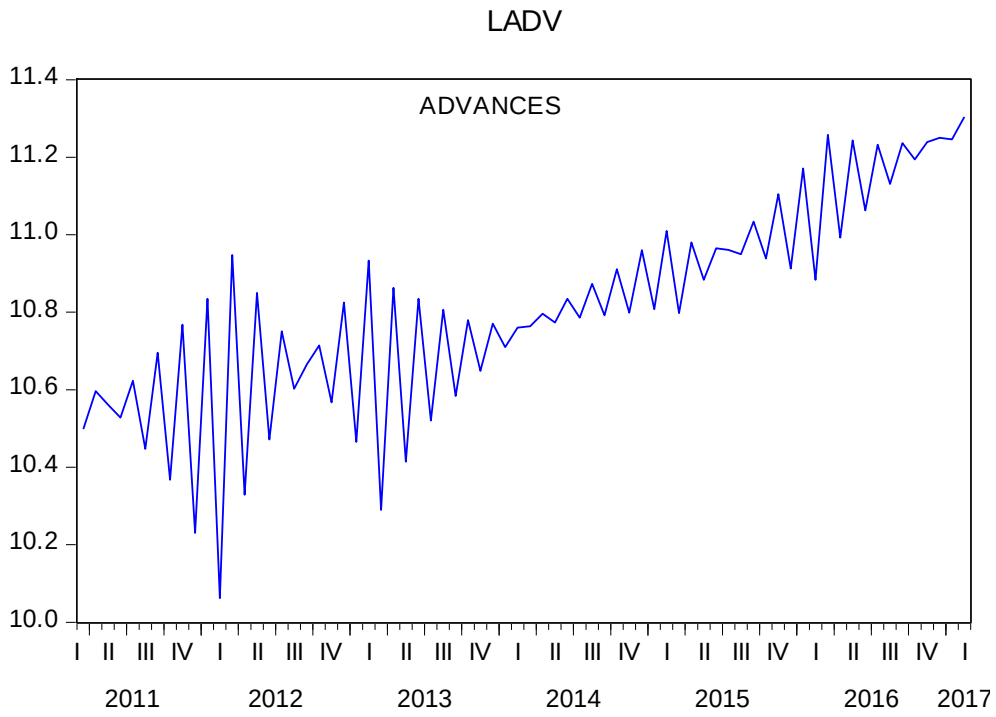


Fig 4.12 Advances Pattern (In Log) – Federal Bank

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LADV have a unit root

The result of unit root analysis is shown in the table 4.26

Table 4.26

Result of Unit Root Test- FII and Advances (Federal Bank)

Variable	Test Statistic	P value
LFII	0.509680	0.9859
LADV	1.830462	0.9997
ΔLFII	-14.46522	0.0000*
ΔLADV	-16.47502	0.0001*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Lag length determination using AIC (Akaike Information Criterion) has given a result that 6 lags should be included in the test. Table 4.27 and Table 4.28 clearly indicates the result of Johansen system test for cointegration.

Table 4.27

Result of Unrestricted Cointegration Rank Test (Trace) - FII and Advances (Federal Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.389918	38.56409	0.0001
At most 1	0.062686	4.466872	0.3470

Table 4.28

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue) - FII and Advances (Federal Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.389918	34.09722	0.0000
At most 1	0.062686	4.466872	0.3470

The λ trace and λ max indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and Advances is given by

LADV= 8.177023+ 0.461634LFII (16)

The equation (16) shows when there is 1 per cent change in FII, there is 46 per cent change in advances. The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship

$$\Delta LADV_t = -1.389070\Delta LADV_{t-1} - 0.313807\Delta LADV_{t-2} - 0.028937\Delta LADV_{t-3}$$
$$-0.196242\Delta LADV_{t-4} - 0.137412\Delta LADV_{t-5} - 0.114342\Delta LADV_{t-6}$$
$$-0.217455\Delta LFII_{t-1} + 0.128470\Delta LFII_{t-2} + 0.148818\Delta LFII_{t-3}$$
$$+0.318797\Delta LFII_{t-4} + 0.380606\Delta LFII_{t-5} + 0.420591\Delta LFII_{t-6}$$
$$+0.065011(LADV_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (17)$$

$$\Delta LFII_t = -0.190583\Delta LADV_{t-1} - 0.092145\Delta LADV_{t-2} - 0.043389\Delta LADV_{t-3}$$
$$-0.124828\Delta LADV_{t-4} - 0.179831\Delta LADV_{t-5} - 0.090060\Delta LADV_{t-6}$$
$$-0.588711\Delta LFII_{t-1} - 0.310479\Delta LFII_{t-2} - 0.017908\Delta LFII_{t-3}$$
$$+0.159491\Delta LFII_{t-4} + 0.393929\Delta LFII_{t-5} - 0.122634\Delta LFII_{t-6}$$
$$+0.204762(LADV_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (18)$$

Granger Causality Test

Null Hypothesis:

H0: LFII does not granger cause LADV

H0: LADV does not granger cause LFII

The result of granger causality test is shown in the table 4.29 and 4.30

Table 4.29

Result of Granger Causality Test for Dependent Variable D (LADV) - FII and Advances (Federal Bank)

Excluded	Chi-sq	df	Prob.
D(LFII)	10.49405	6	0.0374

Table 4.30

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and Advances (Federal Bank)

Excluded	Chi-sq	df	Prob.
D(LADV)	13.37595	6	0.1053

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LADV) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LADV) and D (LADV) is not the cause for D (LFII).

4. HDFC Bank:

a. FII and Deposits:

The empirical evaluation of this issue is based on unit root test of stationarity, Johansen cointegration test and Vector Error Correction Model. The object of this analysis is to check whether there exists any long run relationship between deposits and financial innovation in banking sector. The deposits and financial innovation have been subjected to logarithmic transformation and the series obtained are LDEP and LFII respectively.

The pattern of financial innovation and deposits when transformed to log is shown in the figure 4.13 and 4.14.

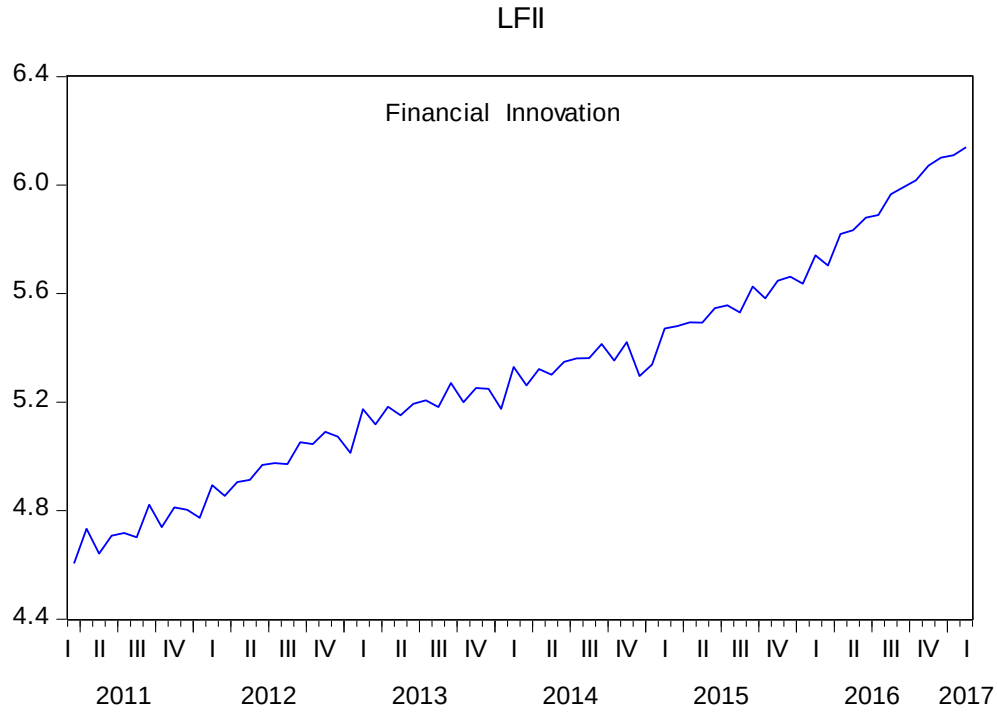


Fig 4.13 Financial Innovation Pattern (In Log) - FII and Deposits (HDFC)

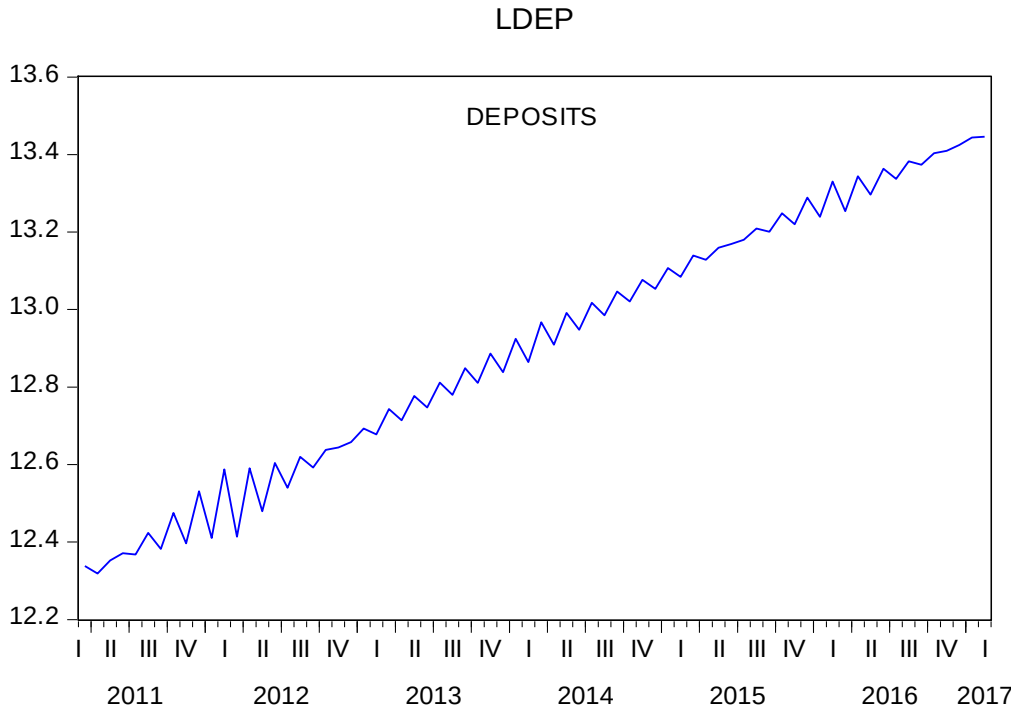


Fig. 4.14: Deposit Pattern (In Log) -HDFC

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LDEP have a unit root

The result of unit root analysis is shown in the Table 4.31

Table 4.31

Result of Unit Root Test- FII and Deposits (HDFC)

Variable	Test Statistic	P value
LFII	1.285098	0.9984
LDEP	0.708756	0.9996
ΔLFII	-18.34673	0.0001*
ΔLDEP	-21.97070	0.0001*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Before determining the cointegration of variables a test for determining lag length was done. The result of lag length criteria using AIC (Akaike Information Criterion) has given a result that 3 lags should be included in the test. Table 4.32 and 4.33 shows the result of Johansen system test for cointegration.

Table 4.32

Result of Unrestricted Cointegration Rank Test (Trace) - FII and Deposits (HDFC)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.401455	37.79198	0.0001
At most 1	0.041620	2.890734	0.6013

Table 4.33

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue) - FII and Deposits (HDFC)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.401455	34.90124	0.0000
At most 1	0.041620	2.890734	0.6013

The λ_{trace} and λ_{max} indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and Deposits is given by

$$LDEP = 31.31417 + 0.743441LFII \quad (19)$$

The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship. The equation (19) clearly states that a 1per cent change in FII leads to 74 per cent change in deposits in the long run.

$$\Delta LDEP_t = -1.553746\ \Delta LDEP_{t-1} - 0.411390\ \Delta LDEP_{t-2} + 0.186588$$

$$\Delta LDEP_{t-3} + 0.007877 \Delta LFII_{t-1} - 0.003165 \Delta LFII_{t-2}$$

$$+0.007838\ \Delta LFII_{t-3} - 0.003067(LDEP_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (20)$$

$$\Delta LFII_t = -0.764247 \Delta LDEP_{t-1} - 1.724254 \Delta LDEP_{t-2} - 1.030732$$

$$\Delta LDEP_{t-3} - 0.753515 \Delta LFII_{t-1} - 0.117471 \Delta LFII_{t-2} + 0.163489$$

$$\Delta LFII_{t-3} - 0.006404(LDEP_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (21)$$

Granger Causality Test

Null Hypothesis:

H0: LFII does not granger cause LDEP

H0: LDEP does not granger cause LFII

The result of granger causality test is shown in the tables 4.34 and 4.35

Table 4.34

Result of Granger Causality Test for Dependent Variable D (LDEP) - FII and Deposits (HDFC)

Excluded	Chi-sq	df	Prob.
D(LFII)	0.654243	3	0.0008

Table 4.35

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and Deposits (HDFC)

Excluded	Chi-sq	df	Prob.
D(LDEP)	3.201718	3	0.3616

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LDEP) while it is accepted for the

dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LDEP) and D (LDEP) is not the cause for D (LFII).

b. FII and Advances:

Vector Error Correction Model is employed by the researcher to check the existence of long run relationship between advances and financial innovation. Prior to VECM, the empirical evaluation of this issue is based on Unit Root Test of stationarity and Johansen cointegration test. The advances and financial innovation have been subjected to logarithmic transformation and the series obtained are LADV and LFII respectively.

The pattern of financial innovation and advances when transformed to log is shown in the figure 4.15 and 4.16.

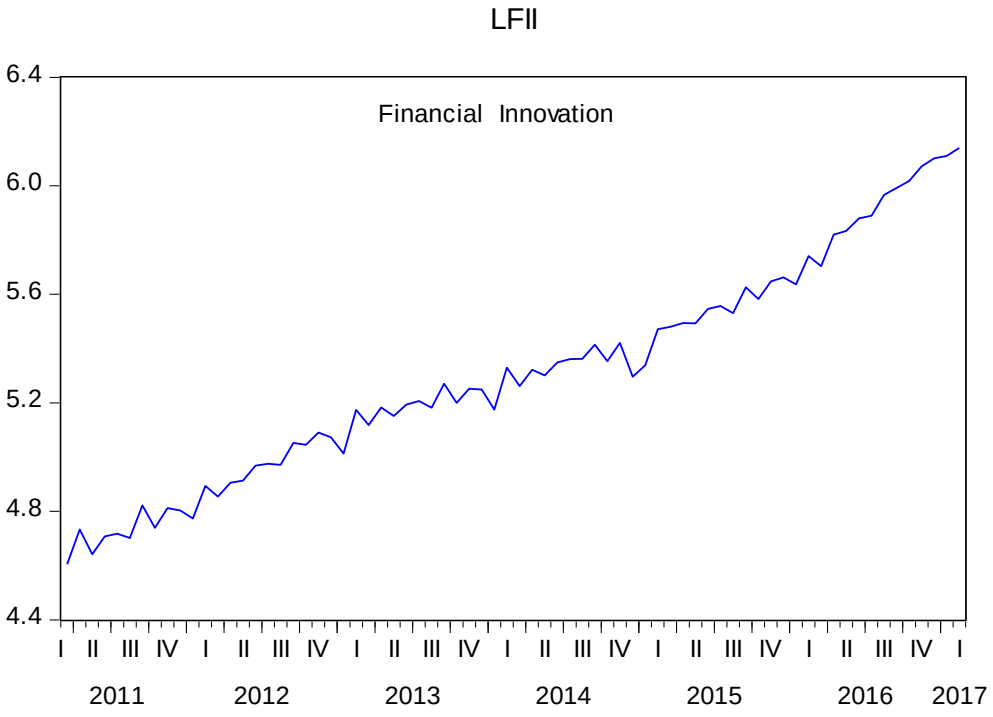


Fig. 4.15: Financial Innovation Pattern (In Log) – FII and Advances (HDFC)

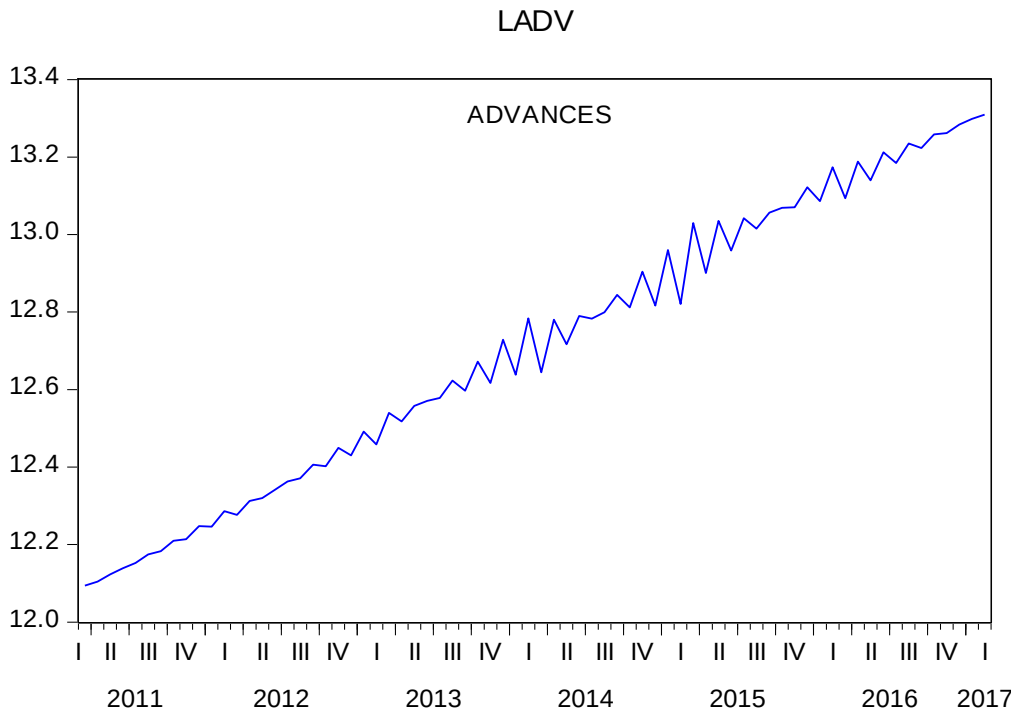


Fig. 4.16: Advances Pattern (In Log) - HDFC

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LADV have a unit root

The result of unit root analysis is shown in the table 4.36

Table 4.36

Result of Unit Root Test- FII and Advances (HDFC)

Variable	Test Statistic	P value
LFII	1.285098	0.9984
LADV	-0.935060	0.7713
ΔLFII	-18.34673	0.0001*
ΔLADV	-18.97965	0.0001*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Lag length determination using AIC (Akake Information Criterion) shows a result that 6 lags should be included in the test. Table 4.37 and Table 4.38 clearly indicate the result of Johansen system test for cointegration bbased on optimum lag length selected by the use of AIC criterion.

Table 4.37

Result of Unrestricted Cointegration Rank Test (Trace) - FII and Advances (HDFC)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.297560	26.49804	0.0060
At most 1	0.053010	3.540346	0.4849

Table 4.38

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue)- FII and Advances (HDFC)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.297560	22.95769	0.0033
At most 1	0.053010	3.540346	0.4849

The λ_{trace} and λ_{max} indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and Advances is given by

$$LADV = 0.314190 + .1047096LFII \quad (22)$$

The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship and the equation (22) shows that a 1 per cent change in FII will lead to 10 per cent change in advances.

$$\Delta LADV_t = -1.398607\Delta LADV_{t-1} - 0.386729\,\Delta LADV_{t-2} - 0.031745\,\Delta LADV_{t-3} - 0.150079\,\Delta LADV_{t-4} - 0.133147\,\Delta LADV_{t-5} - 0.153078\,\Delta LADV_{t-6} + 0.020379\Delta LFII_{t-1} + 0.058128\Delta LFII_{t-2} - 0.005688\Delta LFII_{t-3} - 0.089479\Delta LFII_{t-4} - 0.047302\Delta LFII_{t-5} + 0.007313\Delta LFII_{t-6} + 0.008414(LADV_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (23)$$

$$\Delta LFII_t = -0.619035\Delta LADV_{t-1} - 1.218470\Delta LADV_{t-2} - 1.157644\,\Delta LADV_{t-3} - 1.038436\Delta LADV_{t-4} - 1.122899\Delta LADV_{t-5} - 0.480801\Delta LADV_{t-6} - 0.610229\Delta LFII_{t-1} - 0.187617\Delta LFII_{t-2} + 0.045875\Delta LFII_{t-3} + 0.000822\Delta LFII_{t-4} + 0.215426\Delta LFII_{t-5} - 0.117935\Delta LFII_{t-6} + 0.019406(LADV_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (24)$$

Granger Causality Test

Null Hypothesis:

H0: LFII does not granger cause LADV

H0: LADV does not granger cause LFII

The result of granger causality test is shown in the table 4.39

Table 4.39

Result of Granger Causality Test for Dependent Variable D (LADV) - FII and Advances (HDFC)

Excluded	Chi-sq	df	Prob.
D(LFII)	5.215527	6	0.0005

Table 4.40

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and Advances (HDFC)

Excluded	Chi-sq	df	Prob.
D(LADV)	8.153599	6	0.2271

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LADV) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LADV) and D (LADV) is not the cause for D (LFII).

B. Effect of Financial Innovation on Profitability

1. State Bank of India

a. FII and ROA:

The empirical evaluation of this issue is based on unit root test of stationarity, Johansen cointegration test and Vector Error Correction Model. The object of this analysis is to check whether there exists any long run relationship between ROA and Financial Innovation in banking sector. The variables ROA and financial innovation have been subjected to logarithmic transformation and the series obtained are LROA and LFII respectively.

The pattern of financial innovation and ROA when transformed to log is shown in the figure 4.17 and 4.18.

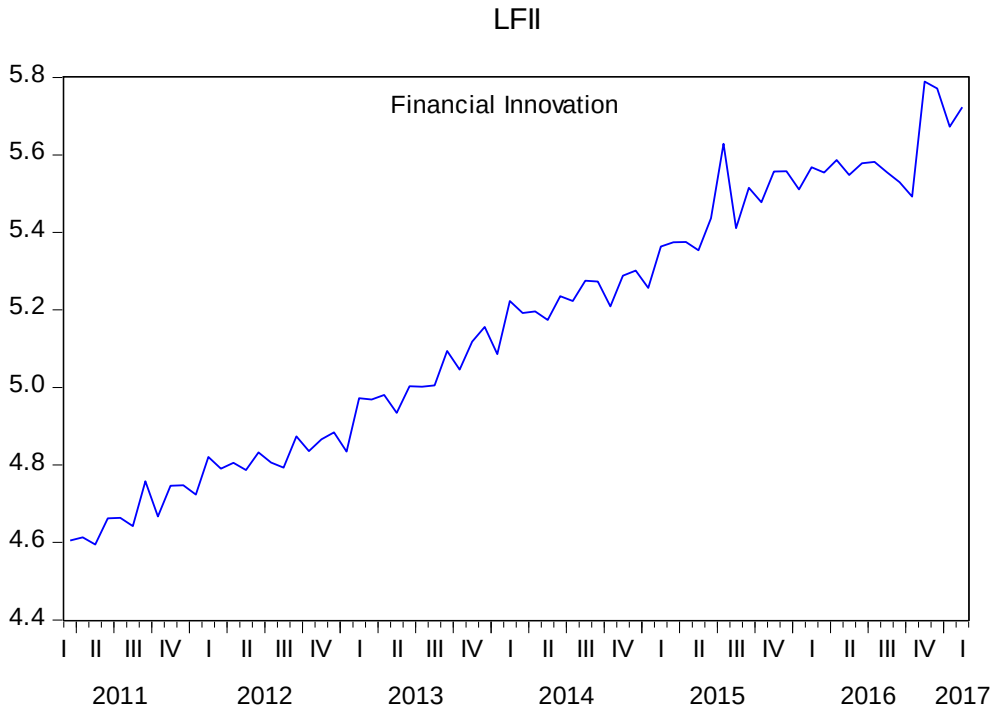


Fig 4.17 Financial Innovation Pattern (In Log) – FII and ROA (SBI)

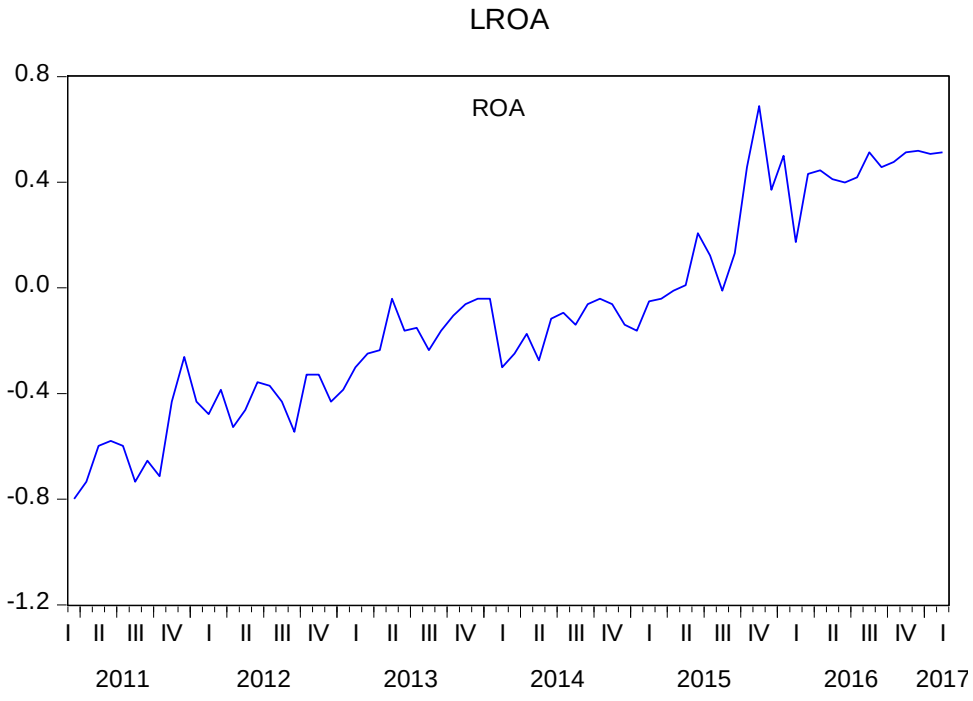


Fig. 4.18: ROA Pattern (In Log) - SBI

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LROA have a unit root

The result of unit root analysis is shown in the table 4.41

Table 4.41

Result of Unit Root Test- FII and ROA (SBI)

Variable	Test Statistic	P value
LFII	-0.018337	0.9532
LROA	-1.548243	0.5036
ΔLFII	-7.827642	0.0000*
ΔLROA	-10.41033	0.0001*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Before determining the cointegration of variables, a test for determining lag length was done. The result of lag length criteria using AIC (Akaike Information Criterion) has given a result that 3 lags should be included in the test. Table 4.42 and 4.43 shows the result of Johansen system test for cointegration.

Table 4.42

Result of Unrestricted Cointegration Rank Test (Trace) - FII and ROA (SBI)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.321718	34.71879	0.0003
At most 1	0.115186	8.321709	0.0721

Table 4.43

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue) - FII and ROA (SBI)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.321718	26.39708	0.0008
At most 1	0.115186	8.321709	0.0721

The λ trace and λ max indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and ROA is given by

LROA= 4.905852+ 0.516645LFII (25)

The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship and the equation (25) states that a 1 per cent change in FII will lead to a 51 per cent change in ROA.

$$\Delta LROA_t = -0.799963\ \Delta LROA_{t-1} - 0.561335\ \Delta LROA_{t-2} - 0.218089$$

$$\Delta LROA_{t-3} + 0.121706 \Delta LFII_{t-1} + 0.032621 \Delta LFII_{t-2}$$

$$+0.056160\ \Delta LFII_{t-3} + 0.101998(LROA_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (26)$$

$$\Delta LFII_t = -0.473558 \Delta LROA_{t-1} - 0.638425 \Delta LROA_{t-2} - 0.504481$$

$$\Delta LROA_{t-3} - 0.261382 \Delta LFII_{t-1} - 0.185459 \Delta LFII_{t-2} - 0.225511$$

$$\Delta LFII_{t-3} + 0.184187(LROA_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (27)$$

Granger Causality Test

Null Hypothesis:

H0: LFII granger cause LROA

H0: LROA granger cause LFII

The result of granger causality test is shown in the tables 4.44 and 4.45

Table 4.44

Result of Granger Causality Test for Dependent Variable D (LROA) - FII and ROA (SBI)

Excluded	Chi-sq	df	Prob.
D(LFII)	20.86110	3	0.0001

Table 4.45

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and ROA (SBI)

Excluded	Chi-sq	df	Prob.
D(LROA)	4.808992	3	0.1863

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LROA) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LROA) and D (LROA) is not the cause for D (LFII).

b. FII and ROE:

To check the existence of long run relationship between financial innovation and ROE, Vector Error Correction Model was used. The empirical evaluation of this issue is based on Unit Root Test of stationarity and Johansen cointegration test. The variables ROE and financial innovation have been subjected to logarithmic transformation and the series obtained are LROE and LFII respectively. Figure 4.19 and 4.20 shows the pattern of financial innovation and ROE when transformed to log.

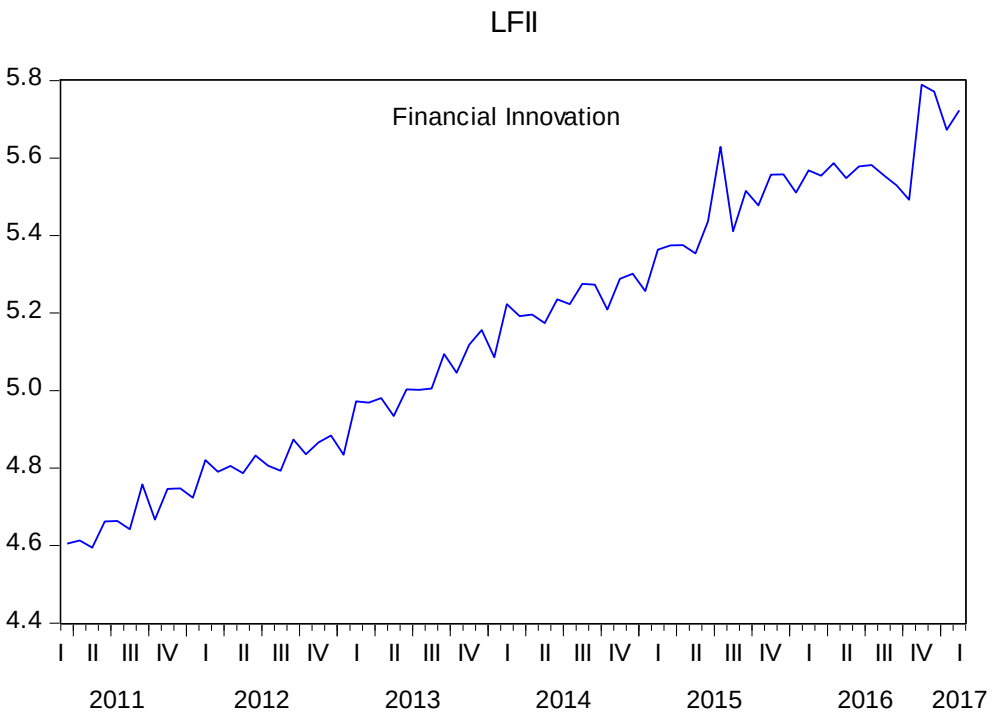


Fig 4.19 Financial Innovation Pattern (In Log) – FII and ROE (SBI)

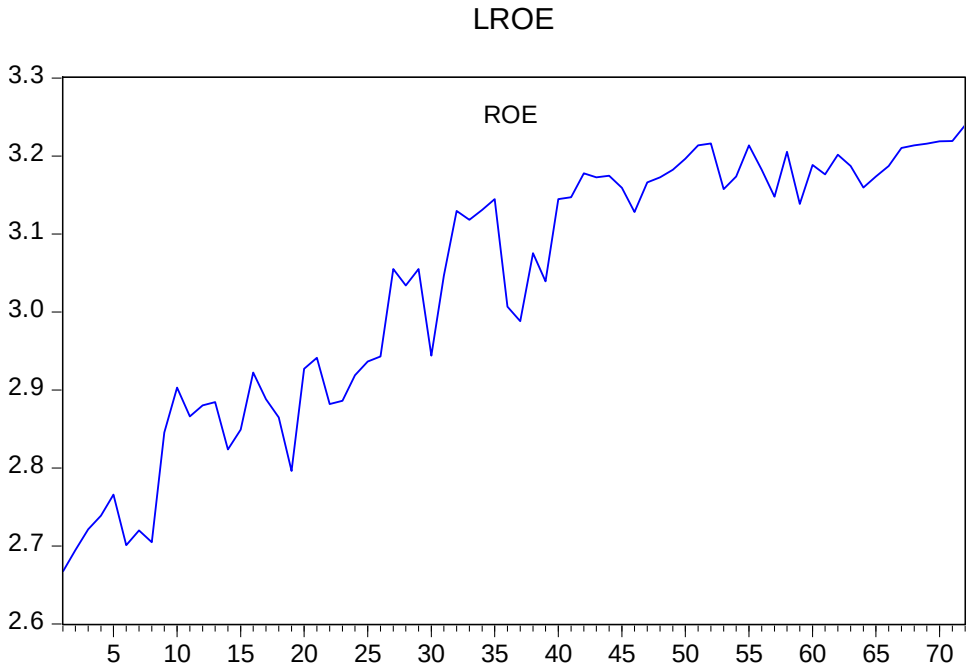


Fig 4.20 ROE Pattern (In Log) - SBI

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LROE have a unit root

The result of unit root analysis is shown in the table 4.46

Table 4.46

Result of Unit Root Test- FII and ROE (SBI)

Variable	Test Statistic	P value
LFII	-0.018337	0.9532
LROE	-1.931457	0.3163
ΔLFII	-7.827642	0.0000*
ΔLROE	-10.19642	0.0001*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the

variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Cointegration test should be done only after determining the lag length. Lag length determination test using AIC (Akaike Information Criterion) has given a result that 3 lags should be included in the test. Table 4.47 and 4.48 shows the result of Johansen system test for cointegration.

Table 4.47

Result of Unrestricted Cointegration Rank Test (Trace) - FII and ROE (SBI)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.256719	27.12997	0.0048
At most 1	0.097231	6.955616	0.1288

Table 4.48

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue) - FII and ROE (SBI)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.256719	20.17435	0.0100
At most 1	0.097231	6.955616	0.1288

The λ_{trace} and λ_{max} indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and ROE is given by

$$LROE = 0.022050 + 0.549104LFII \quad (28)$$

The equation (28) shows that a when there is 1 per cent change in FII, there is 54 per cent change in ROE. The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship.

$$\Delta LROE_t = -0.297017\Delta LROE_{t-1} - 0.243808\ \Delta LROE_{t-2} - 0.163277$$

$$\Delta LROE_{t-3} + 0.043437\Delta LFII_{t-1} + 0.082354\Delta LFII_{t-2}$$

$$+0.092797\ \Delta LFII_{t-3} + 0.021784(LROE_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (29)$$

$$\Delta LFII_t = -0.173647\Delta LROE_{t-1} + 0.017312\Delta LROE_{t-2} - 0.029324$$

$$\Delta LROE_{t-3} - 0.724335\Delta LFII_{t-1} - 0.527048\Delta LFII_{t-2} - 0.218873$$

$$\Delta LFII_{t-3} + 0.122278(LROE_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (30)$$

Granger Causality Test

Null Hypothesis:

H0: LFII granger cause LROE

H0: LROE granger causes LFII

The result of granger causality test is shown in the tables 4.49 and 4.50

Table 4.49

Result of Granger Causality Test for Dependent Variable D (LROE) - FII and ROE (SBI)

Excluded	Chi-sq	df	Prob.
D(LFII)	31.67472	3	0.0000

Table 4.50

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and ROE (SBI)

Excluded	Chi-sq	df	Prob.
D(LROE)	4.473503	3	0.4850

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LROE) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LROE) and D (LROE) is not the cause for D (LFII).

2. CANARA BANK:

a. FII and ROA:

The empirical evaluation of this issue is based on unit root test of stationarity, Johansen cointegration test and Vector Error Correction Model. The object of this analysis is to check whether there exists any long run relationship between ROA and Financial Innovation in banking sector. The variables ROA and financial innovation have been subjected to logarithmic transformation and the series obtained are LROA and LFII respectively. The pattern of financial innovation and ROA when transformed to log is shown in the figure 4.21and 4.22.

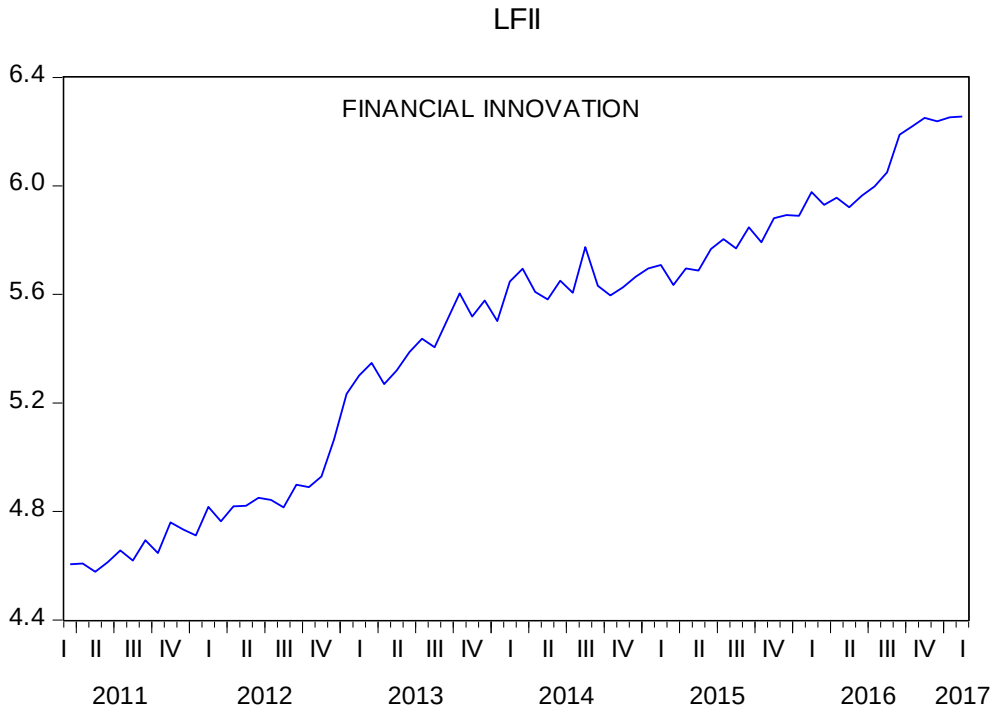


Fig 4.21 Financial Innovation Pattern (In Log) – FII and ROA (Canara Bank)

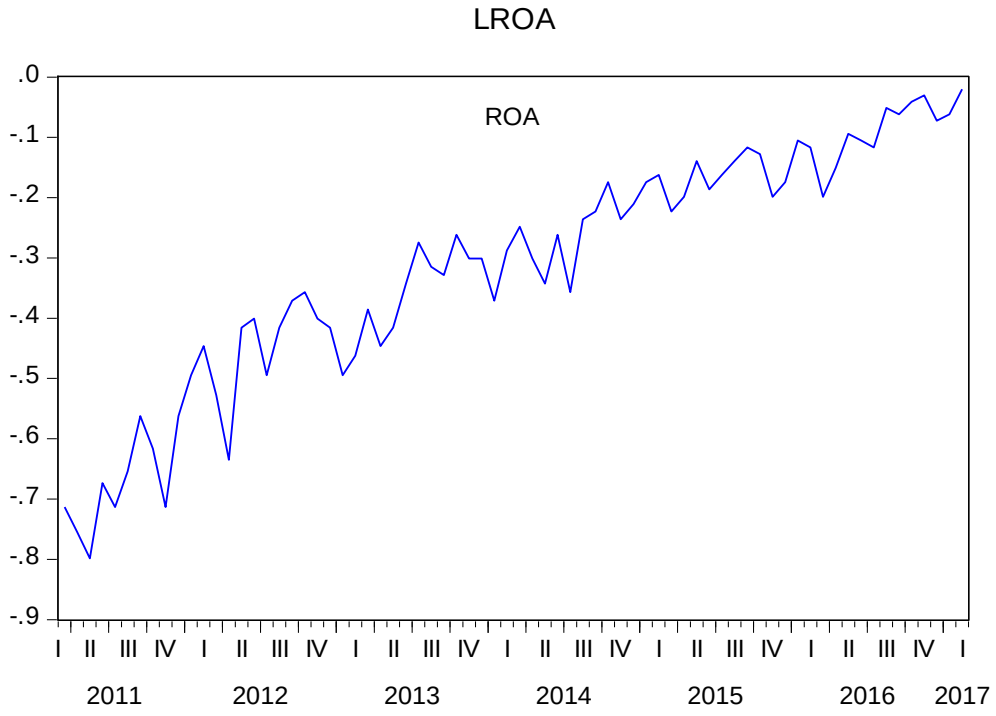


Fig 4.22 ROA Pattern (In Log) –Canara Bank

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LROA have a unit root

The result of unit root analysis is shown in the table 4.51

Table 4.51

Result of Unit Root Test- FII and ROA (Canara Bank)

Variable	Test Statistic	P value
LFII	-0.573318	0.8692
LROA	-2.029407	0.2739
ΔLFII	-11.11289	0.0001*
ΔLROA	-8.300915	0.0000*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Before determining the cointegration of variables a test for determining lag length was done. The result of lag length criteria using AIC (Akaike Information Criterion) has given a result that 4 lags should be included in the test. Table 4.52 and 4.53 shows the result of Johansen system test for cointegration based on the optimum lag length determined by AIC criterion.

Table 4.52

Result of Unrestricted Cointegration Rank Test (Trace) - FII and ROA (Canara Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.276238	34.49034	0.0003
At most 1	0.161857	12.18312	0.0730

Table 4.53

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue)- FII and ROA (Canara Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.276238	22.30721	0.0043
At most 1	0.161857	12.18312	0.0730

The λ_{trace} and λ_{max} indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and ROA is given by

$$LROA = 1.060094 + 0.594275LFII \quad (31)$$

Equation (31) shows that a 1 per cent change in FII leads to 59 per cent change in ROA. The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship.

$$\Delta LROA_t = -0.435707\Delta LROA_{t-1} - 0.653479\Delta LROA_{t-2} - 0.356189 \Delta LROA_{t-3} - 0.126614 \Delta LROA_{t-4} - 0.179784\Delta LFII_{t-1} - 0.149275\Delta LFII_{t-2} - 0.090554\Delta LFII_{t-3} - 0.145967\Delta LFII_{t-4} - 0.140137(LROA_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (32)$$

$$\Delta LFII_t = 0.236543\Delta LROA_{t-1} - 0.047803\Delta LROA_{t-2} - 0.103692 \Delta LROA_{t-3} + 0.162856 \Delta LROA_{t-4} - 0.259618 \Delta LFII_{t-1} - 0.008917\Delta LFII_{t-2} - 0.052363\Delta LFII_{t-3} - 0.189940\Delta LFII_{t-4} - 0.11579(LROA_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (33)$$

Granger Causality Test

Null Hypothesis:

H0: LFII granger cause LROA

H0: LROA granger causes LFII

The result of granger causality test is shown in the tables 4.54 and 4.55.

Table 4.54

Result of Granger Causality Test for Dependent Variable D (LROA) - FII and ROA (Canara Bank)

Excluded	Chi-sq	df	Prob.
D(LFII)	10.88846	4	0.0043

Table 4.55

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and ROA (Canara Bank)

Excluded	Chi-sq	df	Prob.
D(LROA)	4.625982	4	0.0990

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LROA) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LROA) and D (LROA) is not the cause for D (LFII).

b. FII and ROE:

To check the existence of long run relationship between financial innovation and ROE, Vector Error Correction Model was used. The empirical evaluation of this issue is based on Unit Root Test of stationarity and Johansen cointegration test. The variables ROE and financial innovation have been subjected to logarithmic transformation and the series obtained are LROE and LFII respectively. Figure 4.23 and 4.24 shows the pattern of financial innovation and ROE when transformed to log.

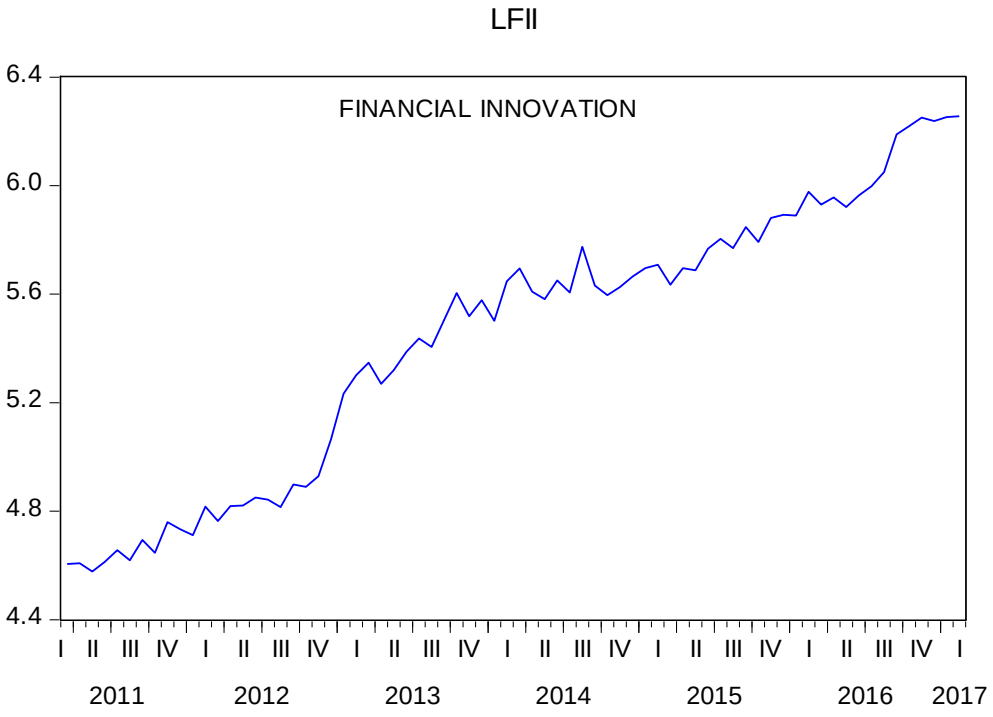


Fig 4.23 Financial Innovation Pattern (In Log)- FII and ROE (Canara Bank)

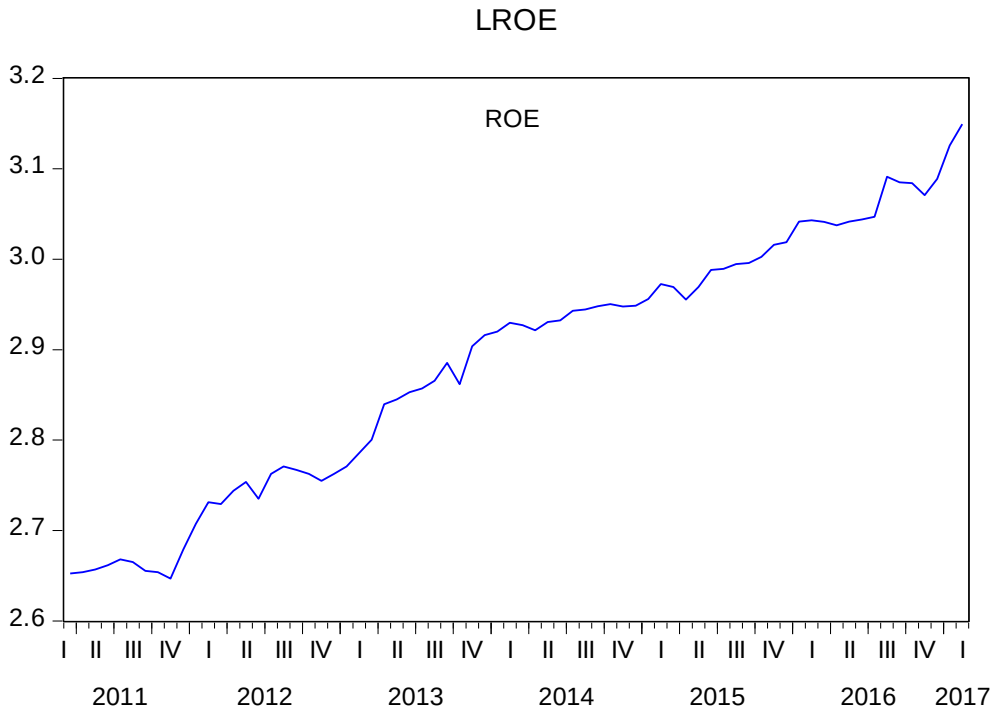


Fig 4.24 ROE Pattern (In Log) - Canara Bank

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LROE have a unit root

The result of unit root analysis is shown in the table 4.56

Table 4.56

Result of Unit Root Test- FII and ROE (Canara Bank)

Variable	Test Statistic	P value
LFII	-0.573318	0.8692
LROE	0.065174	0.9608
ΔLFII	-11.11289	0.0001*
ΔLROE	-8.234100	0.0000*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Cointegration test should be done only after determining the lag length. Lag length determination test using AIC (Akaike Information Criterion) has given a result that 1 lag should be included in the test. Table 4.57 and 4.58 shows the result of Johansen system test for cointegration.

Table 4.57

Result of Unrestricted Cointegration Rank Test (Trace) - FII and ROE (Canara Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.324776	36.36400	0.0001
At most 1	0.119068	8.874235	0.0567

Table 4.58

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue) - FII and ROE (Canara Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.324776	27.48977	0.0005
At most 1	0.119068	8.874235	0.0567

The λ_{trace} and λ_{max} indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and ROE is given by

$$LROE = 1.407188 + 0.279114LFII \quad (34)$$

As the equation (34) shows when there is 1 per cent change in FII, there is 27 per cent change in ROE. The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship.

$$\Delta LROE_t = 0.035114\Delta LROE_{t-1} - 0.033476\Delta LFII_{t-1} - 0.212262(LROE_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (35)$$

$$\Delta LFII_t = 1.427655\Delta LROE_{t-1} - 0.228127\Delta LFII_{t-1} - 0.233316(LROE_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (36)$$

Granger Causality Test

Null Hypothesis:

H0: LFII granger cause LROE

H0: LROE granger cause LFII

The result of granger causality test is shown in the tables 4.59 and 4.60.

Table 4.59

Result of Granger Causality Test for Dependent Variable D (LROE) - FII and ROE (Canara Bank)

Excluded	Chi-sq	df	Prob.
D(LFII)	7.007783	1	0.0081

Table 4.60

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and ROE (Canara Bank)

Excluded	Chi-sq	df	Prob.
D(LROE)	1.684119	1	0.1944

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LROE) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LROE) and D (LROE) is not the cause for D (LFII).

3. Federal Bank:

a. FII and ROA:

The empirical evaluation of this issue is based on Unit Root Test of stationarity, Johansen cointegration test and Vector Error Correction Model. The object of this analysis is to check whether there exists any long run relationship between ROA and Financial Innovation in banking sector. The variables ROA and financial innovation have been subjected to logarithmic transformation and the series obtained are LROA and LFII respectively.

The pattern of financial innovation and ROA when transformed to log is shown in the figure 4.25 and 4.26.

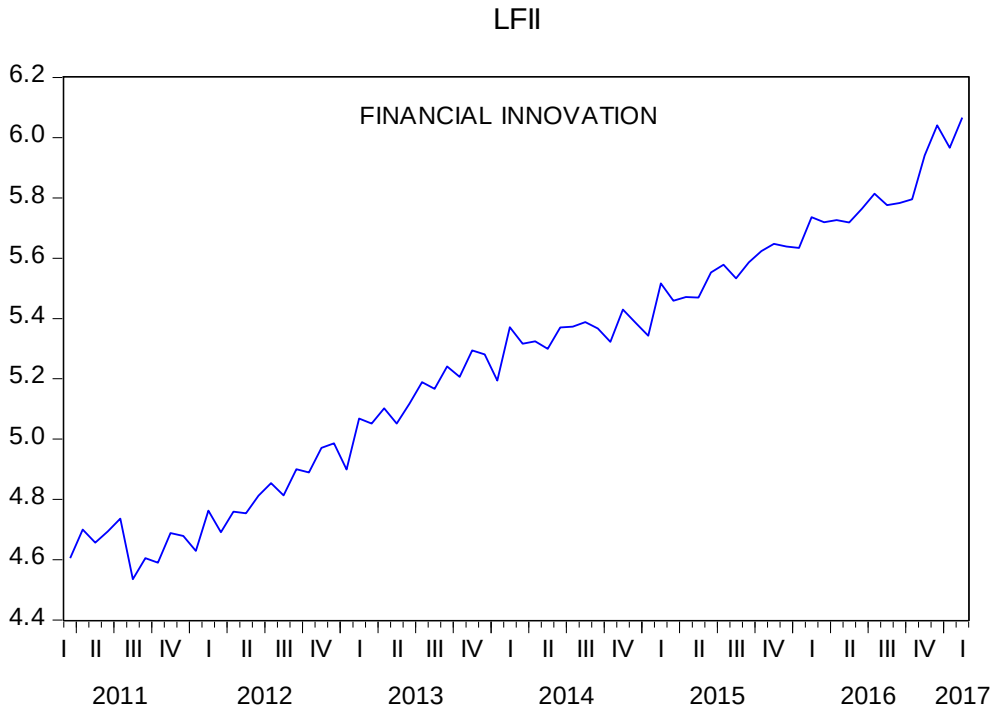


Fig 4.25 Financial Innovation pattern (in log) –FII and ROA (Federal Bank)

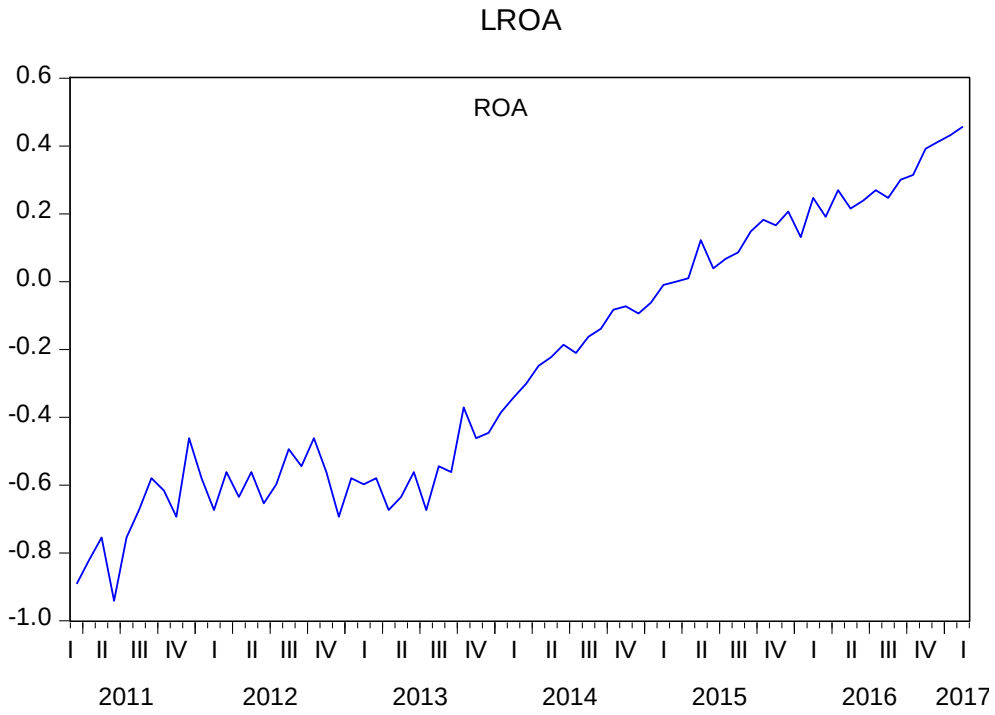


Fig 4.26 ROA pattern (in log) –Federal Bank

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LROA have a unit root

The result of unit root analysis is shown in the table 4.61

Table 4.61

Result of Unit Root Test- FII and ROA (Federal Bank)

Variable	Test Statistic	P value
LFII	0.509680	0.9859
LROA	-0.52474	0.9499
ΔLFII	-14.46522	0.0000*
ΔLROA	-13.68521	0.0001*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Before determining the cointegration of variables a test for determining lag length was done. The result of lag length criteria using AIC (Akaike Information Criterion) has given a result that 6 lags should be included in the test. Table 4.62 and 4.63 shows the result of Johansen system test for cointegration.

Table 4.62

Result of Unrestricted Cointegration Rank Test (Trace) - FII and ROA (Federal Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.403379	38.46183	0.0001
At most 1	0.040117	2.825143	0.6139

Table 4.63

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue) - FII and ROA (Federal Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.403379	35.63669	0.0000
At most 1	0.040117	2.825143	0.6139

The λ_{trace} and λ_{max} indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and ROA is given by

LROA= 6.278427+ .307770LFII (37)

Equation (37) states that a 1 per cent change in FII leads to 30 per cent change in ROA. The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship

$$\Delta LROA_t = -0.527596\ \Delta LROA_{t-1} - 0.243694\ \Delta LROA_{t-2} - 0.106090\ \Delta LROA_{t-3} - 0.062496\ \Delta LROA_{t-4} + 0.118386\ \Delta LROA_{t-5} - 0.162076\ \Delta LROA_{t-6} - 0.229268 \Delta LFII_{t-1} - 0.278587 \Delta LFII_{t-2} - 0.270500\ \Delta LFII_{t-3} - 0.356698\ \Delta LFII_{t-4} - 0.344407\ \Delta LFII_{t-5} + 0.045001\ \Delta LFII_{t-6} - 0.072674\ (LROA_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (38)$$

$$\Delta LFII_t = 0.151127 \Delta LROA_{t-1} + 0.036497 \Delta LROA_{t-2} - 0.083501\ \Delta LROA_{t-3} + 0.034007 \Delta LROA_{t-4} - 0.009427\ \Delta LROA_{t-5} - 0.005411\ \Delta LROA_{t-6} - 0.603680 \Delta LFII_{t-1} - 0.355986 \Delta LFII_{t-2} - 0.093183 \Delta LFII_{t-3} + 0.103478 \Delta LFII_{t-4} + 0.349736\ \Delta LFII_{t-5} - 0.129406\ \Delta LFII_{t-6} - 0.040925\ (LROA_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (39)$$

Granger Causality Test

Null Hypothesis:

H0: LFII granger cause LROA

H0: LROA granger cause LFII

The result of granger causality test is shown in the table 4.64 and 4.65

Table 4.64

Result of Granger Causality Test for Dependent Variable D (LROA) - FII and ROA (Federal Bank)

Excluded	Chi-sq	df	Prob.
D(LFII)	10.958457	6	0.0007

Table 4.65

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and ROA (Federal Bank)

Excluded	Chi-sq	df	Prob.
D(LROA)	4.198026	6	0.6499

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LROA) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LROA) and D (LROA) is not the cause for D (LFII).

b. FII and ROE:

To check the existence of long run relationship between financial innovation and ROE, Vector Error Correction Model was used. The empirical evaluation of this issue is based on Unit Root Test of stationarity and Johansen cointegration test. The variables ROE and financial innovation have been subjected to logarithmic transformation and the series obtained are LROE and LFII respectively.

Figure 4.27 and 4.28 shows the pattern of financial innovation and ROE when transformed to log.

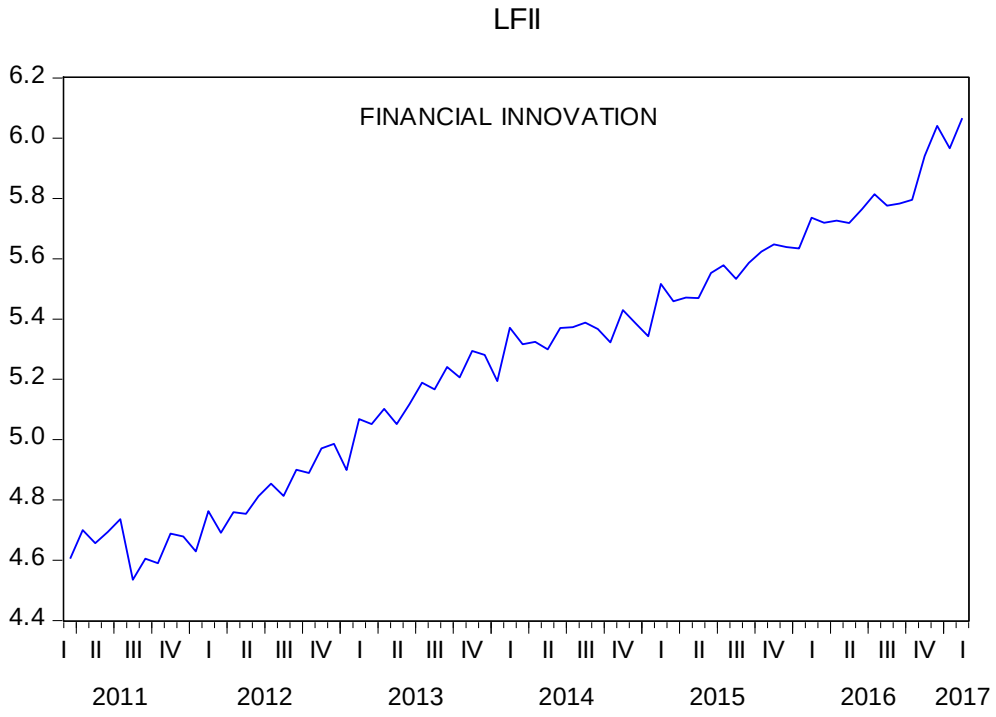


Fig 4.27 Financial Innovation pattern (in log) – FII and ROE (Federal Bank)

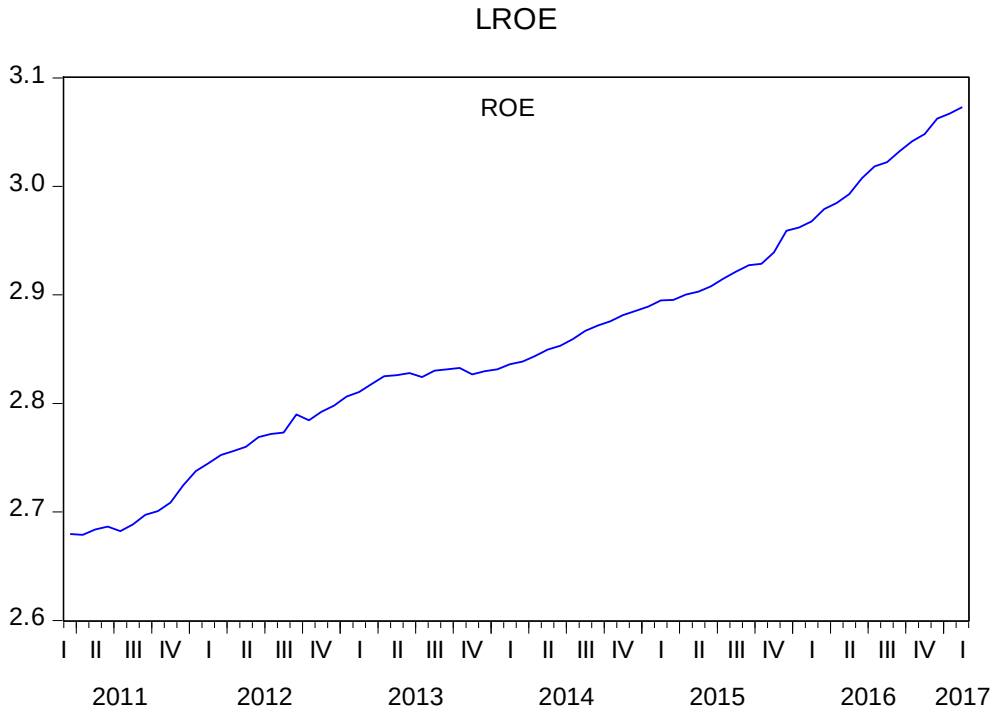


Fig 4.28 ROE Pattern (In Log) – Federal Bank

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LROE have a unit root

The result of unit root analysis is shown in the table 4.66

Table 4.66

Result of Unit Root Test- FII and ROE (Federal Bank)

Variable	Test Statistic	P value
LFII	0.509680	0.9859
LROE	1.895579	0.9998
ΔLFII	-14.46522	0.0000*
ΔLROE	-7.405491	0.0000*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Cointegration test should be done only after determining the lag length. Lag length determination test using AIC (Akaike Information Criterion) has given a result that 6 lags should be included in the test. Table 4.67 and 4.68 shows the result of Johansen system test for cointegration.

Table 4.67

Result of Unrestricted Cointegration Rank Test (Trace) - FII and ROE (Federal Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.281214	29.64812	0.0019
At most 1	0.118327	8.185676	0.0765

Table 4.68

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue) - FII and ROE (Federal Bank)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.281214	21.46245	0.0060
At most 1	0.118327	8.185676	0.0765

The λ_{trace} and λ_{max} indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and ROE is given by

$$LROE = 1.599125 + 0.225770LFII \quad (40)$$

As the equation shows that when there is a 1 per cent change in FII, there is 22 per cent change in ROE. The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship.

$$\Delta LROE_t = -0.097656\Delta LROE_{t-1} + 0.071045\ \Delta LROE_{t-2} + 0.177785\ \Delta LROE_{t-3} +$$

$$0.043857\ \Delta LROE_{t-4} - 0.177929\ \Delta LROE_{t-5} + 0.038659\ \Delta LROE_{t-6}$$

$$+0.001741\Delta LFII_{t-1} - 0.004253\Delta LFII_{t-2} - 0.028125\ \Delta LFII_{t-3} -$$

$$0.043026\ \Delta LFII_{t-4} - 0.026340\Delta LFII_{t-5} - 0.003830\ \Delta LFII_{t-6}$$

$$+0.095924(LROE_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \qquad (41)$$

$$\Delta LFII_t = -2.236111\Delta LROE_{t-1} - 1.461915\Delta LROE_{t-2} - 0.976153\Delta LROE_{t-3}$$

$$-3.312315\ \Delta LROE_{t-4} - 0.740553\ \Delta LROE_{t-5} + 0.789835\Delta LROE_{t-6}$$

$$-0.527981\Delta LFIIt_{-1} - 0.383545\Delta LFII_{t-2} - 0.224561\Delta LFII_{t-3}$$

$$-0.111842\Delta LFII_{t-4} + 0.137878\Delta LFII_{t-5} - 0.199374\ \Delta LFII_{t-6}$$

$$+1.299992(LROE_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \qquad (42)$$

Granger Causality Test

Null Hypothesis:

H0: LFII granger cause LROE

H0: LROE granger cause LFII

The result of granger causality test is shown in the tables 4.69 and 4.70

Table 4.69

Result of Granger Causality Test for Dependent Variable D (LROE) - FII and ROE (Federal Bank)

Excluded	Chi-sq	df	Prob.
D(LFII)	11.13329	6	0.0091

Table 4.70

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and ROE (Federal Bank)

Excluded	Chi-sq	df	Prob.
D(LROE)	9.602654	6	0.1424

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LROE) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LROE) and D (LROE) is not the cause for D (LFII).

HDFC Bank:

a. FII and ROA:

The empirical evaluation of this issue is based on unit root test of stationarity, Johansen cointegration test and Vector Error Correction Model. The object of this analysis is to check whether there exists any long run relationship between ROA and Financial Innovation in banking sector. The variables ROA and financial innovation have been subjected to logarithmic transformation and the series obtained are LROA and LFII respectively.

The pattern of financial innovation and ROA when transformed to log is shown in the figure 4.29 and 4.30.

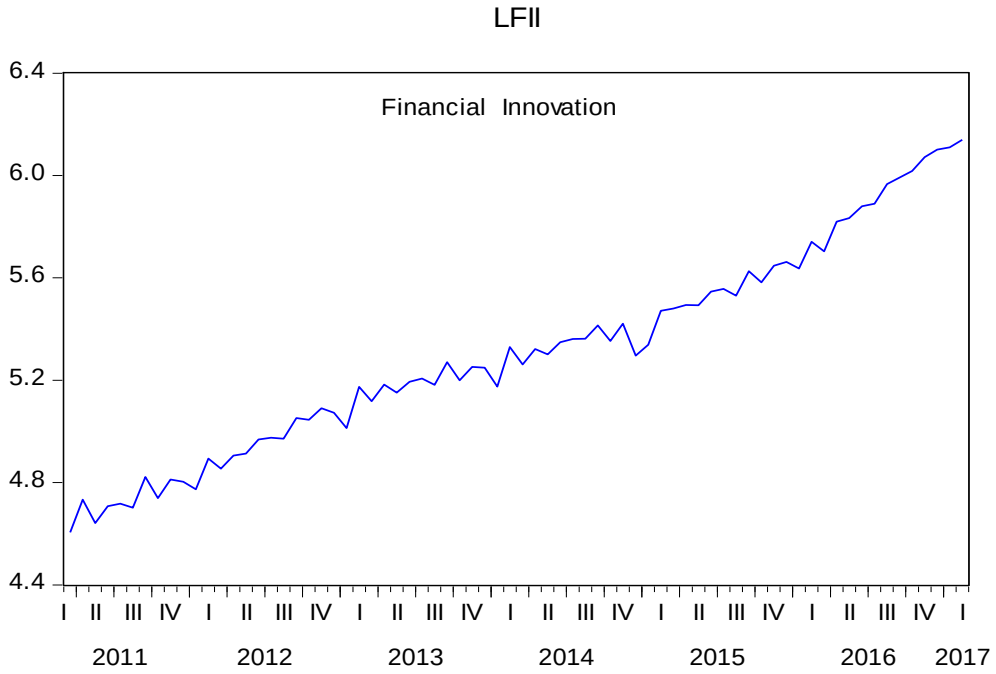


Fig 4.29 Financial Innovation Pattern (In Log) - FII and ROA (HDFC)

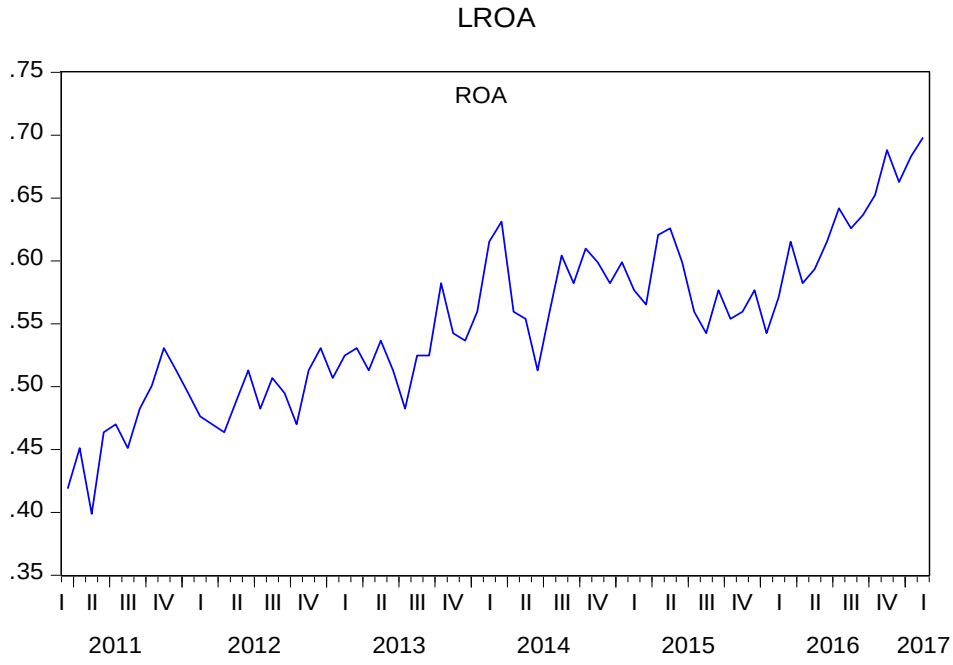


Fig 4.30 ROA Pattern (In Log) –HDFC

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LROA have a unit root

The result of unit root analysis is shown in the table 4.71

Table 4.71

Result of Unit Root Test- FII and ROA (HDFC)

Variable	Test Statistic	P value
LFII	1.285098	0.9984
LROA	-1.852384	0.3527
ΔLFII	-18.34673	0.0001*
ΔLROA	-8.295949	0.0000*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegaraton.

Johansen System Test for Cointegration:

Before determining the cointegration of variables a test for determining lag length was done. The result of lag length criteria using AIC (Akaike Information Criterion) has given a result that 6 lags should be included in the test. Table 4.72 and 4.73 shows the result of Johansen system test for cointegration.

Table 4.72

Result of Unrestricted Cointegration Rank Test (Trace) - FII and ROA (HDFC)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.455822	53.62929	0.0000
At most 1	0.155286	11.64425	0.1956

Table 4.73

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue) - FII and ROA (HDFC)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.455822	41.98503	0.0000
At most 1	0.155286	11.64425	0.1956

The λ_{trace} and λ_{max} indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and ROA is given by

$$LROA = 0.319166 + 0.175210LFII \quad (43)$$

Equation (43) shows that a 1 per cent change in FII leads to 17 per cent change in ROA. The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship

$$\Delta LROA_t = -0.029626\ \Delta LROA_{t-1} - 0.149262\ \Delta LROA_{t-2} - 0.054740\ \Delta LROA_{t-3} + 0.164588\ \Delta LROA_{t-4} + 0.114775\ \Delta LROA_{t-5} + 0.003918\ \Delta LROA_{t-6} - 0.074796 \Delta LFII_{t-1} - 0.038673 \Delta LFII_{t-2} - 0.006663\ \Delta LFII_{t-3} - 0.211723\ \Delta LFII_{t-4} - 0.186619\ \Delta LFII_{t-5} + 0.012841\ \Delta LFII_{t-6} - 0.268845\ (LROA_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (44)$$

$$\Delta LFII_t = 0.550271 \Delta LROA_{t-1} + 0.200278 \Delta LROA_{t-2} + 0.259126\ \Delta LROA_{t-3} + 0.195258\ \Delta LROA_{t-4} + 0.100070\ \Delta LROA_{t-5} + 0.369424\ \Delta LROA_{t-6} - 0.709388\ \Delta LFII_{t-1} - 0.269702 \Delta LFII_{t-2} - 0.076737\ \Delta LFII_{t-3} - 0.078094\ \Delta LFII_{t-4} + 0.165301\ \Delta LFII_{t-5} - 0.152780\ \Delta LFII_{t-6} - 0.607184\ (LROA_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (45)$$

Granger Causality Test

Null Hypothesis:

H0: LFII granger causes LROA

H0: LROA granger causes LFII

The result of granger causality test is shown in the tables 4.74 and 4.75

Table 4.74

Result of Granger Causality Test for Dependent Variable D (LROA) - FII and ROA (HDFC)

Excluded	Chi-sq	df	Prob.
D(LFII)	15.67203	6	0.0004

Table 4.75

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and ROA (HDFC)

Excluded	Chi-sq	df	Prob.
D(LROA)	0.506034	6	0.7765

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LROA) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LROA) and D (LROA) is not the cause for D (LFII).

b. FII and ROE:

To check the existence of long run relationship between financial innovation and ROE, Vector Error Correction Model was used. The empirical evaluation of this issue is based on Unit Root Test of stationarity and Johansen cointegration test. The variables ROE and financial innovation have been subjected to logarithmic transformation and the series obtained are LROE and LFII respectively. Figure 4.31 and 4.32 shows the pattern of financial innovation and ROE when transformed to log.

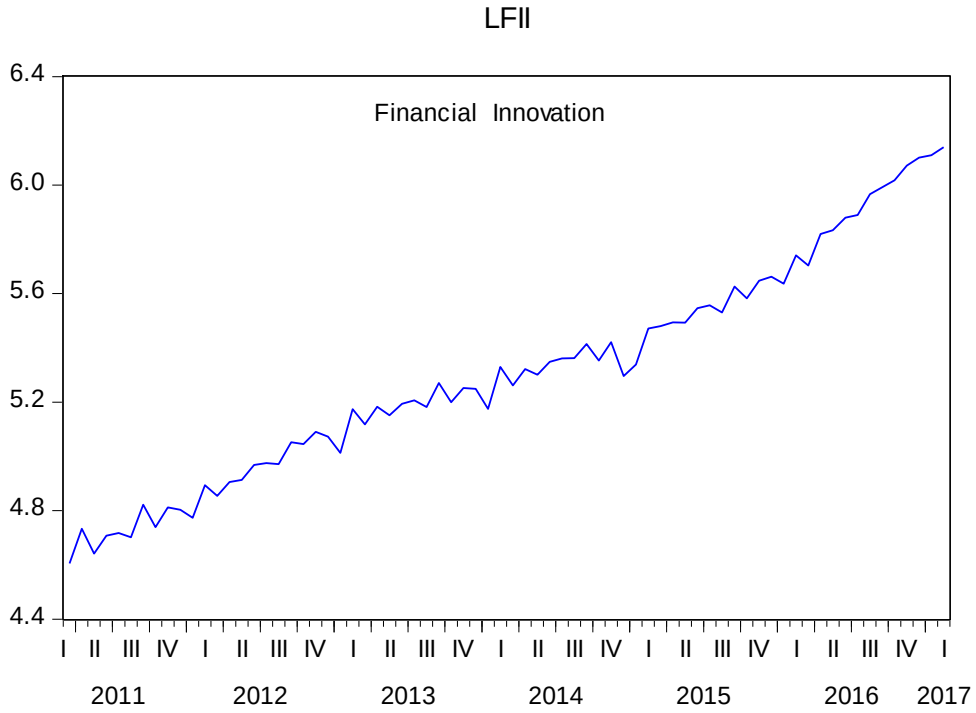


Fig 4.31 Financial Innovation Pattern (In Log) – FII and ROE (HDFC)

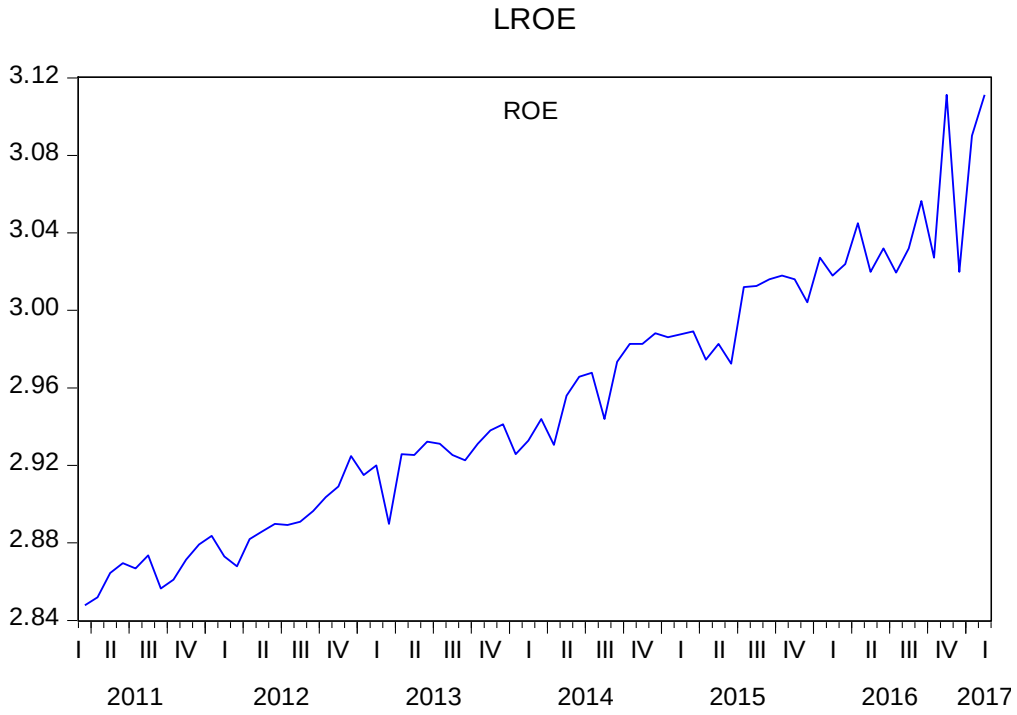


Fig 4.32 ROE Pattern (In Log) -HDFC

Unit Root Test for Stationarity

Null Hypothesis:

H0: LFII and LROE have a unit root

The result of unit root analysis is shown in the table 4.76

Table 4.76

Result of Unit Root Test- FII and ROE (HDFC)

Variable	Test Statistic	P value
LFII	1.285098	0.9984
LROE	1.407512	0.9989
ΔLFII	-18.34673	0.0001*
ΔLROE	-8.986950	0.0000*

* Significant at 5% level

The result indicates that the null hypothesis of unit root is rejected at 5% significance level for both the variables in first difference, while it is accepted in levels. Thus the variables are difference stationary and are integrated series of first order. Since both the variables are integrated of same order, these variables can be used for testing for cointegration.

Johansen System Test for Cointegration:

Cointegration test should be done only after determining the lag length. Lag length determination test using AIC (Akaike Information Criterion) has given a result that 6 lags should be included in the test. Table 4.77 and 4.78 shows the result of Johansen system test for cointegration.

Table 4.77

Result of Unrestricted Cointegration Rank Test (Trace) - FII and ROE (HDFC)

Hypothesized No. of CE(s)	Eigenvalue	λ_{trace}	P value
None *	0.503240	58.15291	0.0000
At most 1	0.133374	9.877222	0.1366

Table 4.78

Result of Unrestricted Cointegration Rank Test (Maximum Eigenvalue) - FII and ROE (HDFC)

Hypothesized No. of CE(s)	Eigenvalue	λ_{max}	P value
None *	0.503240	48.27568	0.0000
At most 1	0.133374	9.877222	0.1366

The λ trace and λ max indicates that there is one cointegrating relationship between the variables at 5% level of significance.

Vector Error Correction Model

The long run relationship between Financial Innovation and ROE is given by

LROE= 1.890334+ 0.153035LFII (46)

As the equation (46) shows, when there is a 1 per cent change in FII there is 15 per cent change in ROE. The VAR is transformed into a Vector Error Correction Model (VECM) imposing the cointegrating relationship.

$$\Delta LROE_t = -0.917737\Delta LROE_{t-1} - 0.603015\ \Delta LROE_{t-2} - 0.387655\ \Delta LROE_{t-3} +$$

$$0.657710\ \Delta LROE_{t-4} - 0.163533\ \Delta LROE_{t-5} - 0.154992\ \Delta LROE_{t-6}$$

$$- 0.122241\Delta LFII_{t-1} - 0.078389\Delta LFII_{t-2} - 0.034025\ \Delta LFII_{t-3} +$$

$$0.008045\ \Delta LFII_{t-4} + 0.041860\ \Delta LFII_{t-5} + 0.044658\ \Delta LFII_{t-6}$$

$$- 0.216723(LROE_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{1t} \quad (47)$$

$$\Delta LFII_t = 0.452268\Delta LROE_{t-1} + 0.203344\Delta LROE_{t-2} - 0.047750\Delta LROE_{t-3}$$

$$+0.880813\ \Delta LROE_{t-4} + 0.676778\ \Delta LROE_{t-5} - 0.132248\Delta LROE_{t-6}$$

$$-0.712758\Delta LFIIt_{-1} - 0.254585\Delta LFII_{t-2} - 0.055480\Delta LFII_{t-3}$$

$$- 0.062178\Delta LFII_{t-4} + 0.167750\ \Delta LFII_{t-5} - 0.122392\ \Delta LFII_{t-6}$$

$$-0.492570(LROE_{t-1} - \alpha - \beta LFII_{t-1}) + \varepsilon_{2t} \quad (48)$$

Granger Causality Test

Null Hypothesis:

H0: LFII granger cause LROE

H0: LROE granger cause LFII

The result of granger causality test is shown in the tables 4.79 and 4.80.

Table 4.79

Result of Granger Causality Test for Dependent Variable D (LROE) - FII and ROE (HDFC)

Excluded	Chi-sq	df	Prob.
D(LFII)	10.007783	1	0.0008

Table 4.80

Result of Granger Causality Test for Dependent Variable D (LFII) - FII and ROE (HDFC)

Excluded	Chi-sq	df	Prob.
D(LROE)	1.73544	1	0.1998

The result indicates that the null hypothesis of granger causality is rejected at 5% significance level for the dependent variable D (LROE) while it is accepted for the dependent variable D (LFII). It clearly indicates that D (LFII) is a cause for D (LROE) and D (LROE) is not the cause for D (LFII).

Conclusion

This chapter analysed the effect of financial innovations on financial performance of two public and two private sector banks. Status of financial innovations in the selected banks was measured by developing an index namely Financial Innovation Index. The result shows that the status of financial innovation has more than trebled during the period April 2011 to March 2017. The pattern of the financial innovation shows a continuously increasing trend during the period. The result of econometrics procedures shows that financial innovations have a significant impact on the deposits, advances, Return on Assets and Return on Equity of the banks. Next chapter deals with the perception of customers on the dimensions of financial innovations.

AMRITHA. N.P “FINANCIAL INNOVATIONS IN INDIAN BANKING INDUSTRY: AN EVALUATION OF INNOVATIVENESS AND FINANCIAL PERFORMANCE OF SELECTED BANKS”. THESIS. DEPARTMENT OF COMMERCE AND MANAGEMENT STUDIES, UNIVERSITY OF CALICUT, 2018.

Chapter 5

Dimensions of Financial Innovation

- ***Introduction***
- ***Profile of the Sample Respondents***
- ***Dimensions of Financial Innovation***
  - ✓ ***Exploratory Factor Analysis***
  - ✓ ***Confirmatory Factor Analysis***
- ***Perception of Customers on Dimensions of Financial Innovation.***
  - ✓ ***Awareness***
  - ✓ ***Usage***
  - ✓ ***Satisfaction***
    - ➢ ***Sector- wise Comparison***
    - ➢ ***Age-wise Comparison***
    - ➢ ***Area- wise Comparison***
- ***Conclusion***

Chapter 5

Dimensions of Financial Innovation

5.1 Introduction:

In the previous chapter, the status of financial innovation in the Indian banking sector and its impact on the financial performance of the banks has been examined. To measure the status of financial innovation an index namely 'Financial Innovation Index' (FII) was developed and the financial performance of the banks is measured using the profitability and productivity. The analysis of the secondary data collected was done with the help of econometric procedures.

This chapter presents a detailed analysis of the financial innovation with the primary data collected from the sample customers from the State of Kerala. Financial Innovation in the banking sector should be focused on the needs of the customers. It is important to measure how receptive are the customers to the innovations introduced by the banks. To evaluate the perception of customers on financial innovations, dimension wise analysis is done. Three dimensions of financial innovation namely product innovation, technological innovation and process innovation are identified. Perception is measured in terms of awareness, usage and satisfaction of customers on financial innovation. Sector-wise analysis is carried out to compare the perception of customers of public and private sector banks. Age and area of residence are the demographic variables used in the analysis.

The present chapter is divided into two sections. Section A deals with the profile of the sample respondents and Section B deals with the perception of customers on financial innovation. Mean score value, Percentages, Quartile Deviation, Independent sample t-test, One way ANOVA, Exploratory Factor Analysis, and Confirmatory Factor Analysis are the various measures and tools used for the analysis of primary data collected from 400 customers of public and private sector banks.

Section A

5.2 Profile of Sample Respondents

The sample respondents of the study include 400 customers from the four selected banking companies. The sector-wise classification of the number of sample respondents and their demographic profile are presented in Tables 5.1 and 5.2

5.2.1 Number of Sample Respondents:

Table 5.1 shows the number and percentage of customers selected from the four selected banks.

Table 5.1

Number of Sample Respondents

Sector	Name of the bank	Number	Percentage
Public	State Bank of India	112	28.0
	Canara bank	103	25.8
Total		**215**	**53.8**
Private	The federal bank	98	24.5
	HDFC bank	87	21.7
	Total	**185**	**46.2**
Grand Total		**400**	**100**

Source: Survey Data

Table 5.1 indicates that out of the 400 sample respondents used for analysis, 215 respondents were customers of public sector banks which include 112(28%) from State Bank of India and 103(25.8%) from Canara Bank. Customers of private sector banks were 185 in number which includes 98(24.5%) customers of The Federal bank and 87(21.8%) customers of HDFC bank.

5.2.2 Demographic Profile of the Sample Respondents

Table 5.2 shows the demographic profile of the sample respondents which includes gender, age, educational qualification, occupation, area of residence, annual income and association of the customers with the bank in years. The profiles of the customers of public and private sector banks are given separately.

Table 5.2

Demographic Profile of the Respondents

Variables		Public Sector		Private Sector		Total	
		Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Gender	Male	118	54.9	107	57.8	225	56.2
	Female	97	45.1	78	42.2	175	43.8
	Total	**215**	**100**	**185**	**100**	**400**	**100**
Age	18-25	39	18.1	44	23.8	83	20.8
	25-50	165	76.7	117	63.2	282	70.4
	50 & Above	11	5.1	24	12.9	35	8.8
	Total	**215**	**100**	**185**	**100**	**400**	**100**
Education	Matriculate	4	1.8	0	0	4	1.0
	Under Graduation	22	10.2	15	8.1	37	9.2
	Graduation	71	33.0	83	44.9	154	38.5
	Post graduation	111	51.6	84	45.4	195	48.8
	Professional	7	3.3	3	1.6	10	2.5
	Total	**215**	**100**	**185**	**100**	**400**	**100**

Occupation	Government Employee	46	21.4	18	9.7	64	16.0
	Private Employee	98	45.6	77	41.6	175	43.8
	Self Employee	13	6.0	32	17.3	45	11.3
	Business	24	11.2	14	7.6	38	9.5
	Student	22	10.2	37	20.0	59	14.8
	Retired	12	5.6	7	3.8	19	4.8
	Total	**215**	**100**	**185**	**100**	**400**	**100**
Area of residence	Rural	99	46.0	81	43.8	180	45.0
	Semi-urban	39	18.1	40	21.6	79	19.7
	Urban	77	35.8	64	34.6	141	35.3
	Total	**215**	**100**	**185**	**100**	**400**	**100**
Annual Income	Below 2 lakhs	43	20.0	35	18.9	78	19.5
	2 -5 lakhs	138	64.2	140	75.7	278	69.5
	Above 5 lakhs	34	15.8	10	5.4	44	11
	Total	**215**	**100**	**185**	**100**	**400**	**100**
Association with bank	Up to 3 years	44	20.5	56	30.3	100	25
	3-10 years	125	58.1	115	62.2	240	60
	Above 10 years	46	21.4	14	7.6	60	15
	Total	**215**	**100**	**185**	**100**	**400**	**100**

Source: Survey Data

In the case of both public and private sector banks majority of sample respondents were male, which is 118(54.9%) from public sector banks, 107(57.8%) from private sector banks and a total of 225 out of 400. Female representation was 97(45.1%) from public sector banks, 78(42.2%) from private sector banks and a total of 175 out of

400. The respondents of the public sector banks were maximum in the age group of 25-50 years (76.7%) followed by 18-25 years (18.1%) and Above 50 years (5.1%) In the case of private sector banks 63.2% of the respondents were of 25-50 years followed by 23.8% in 18-25 age category and 12.9% of above 50 years.

It is also clear from the table that most of the public sector banking customers are post graduates (51.6%) followed by graduates (33%), Under Graduates (10.2%), Professionals (3.3%) and matriculates(1.8%). Majority of private sector banking customers are post graduates (45.4%) and only 1.6% of the respondents were professionals and there were no respondents with only matriculation as qualification. In terms of the occupation of the sample respondents, most of the respondents i.e. 175(43.8%) respondents were private employees, and retired people constituted the least [19(4.5%)] respondents. In the case of public sector banks, 45.6% of respondents were private employees followed by 21.4% respondents with government jobs, 11.2% in business, 10.2 % students and 6% in self-employment and 5.6% retired. 41.6% customers of the private sector banks have private jobs followed by 20% students, 17.3% respondents having self-employment, 9.7% government employees, 7.6% having business and 3.8% retired from employment.

Majority of the respondents of public sector banks and private sector banks were from rural area (46% and 43.8%) followed by urban area (35.8% and 34.6%). Only 19.8% of the total respondents reside in semi-urban area. The annual income of most respondents falls m in the range of ₹ 2, 00,000 to ₹ 5, 00,000 (69.5%) followed by 19.5% in the range below ₹2, 00,000 and 11% having above ₹ 5, 00,000. In the case of public sector banks 64.2% of the respondents have an annual income in the range of ₹ 2, 00,000 to ₹ 5, 00,000 followed by 20% respondents having below ₹2, 00,000 and 15.8% above ₹ 5, 00,000. 75.7% of the respondents from private sector banks were having an annual income in the range of ₹ 2, 00,000 to ₹ 5, 00,000 and only 5.4% of the respondents were having an income above ₹ 5, 00,000.

Most of the respondents were having an association with their banks between 3 to 10 years (60%), followed by 25% respondents having an association of below 3 years

and 15% having relationship with their bank for more than 10 years. In the case of public sector banks, most of the respondents were having an association with their bank during a period of 3 to 10 years and almost same percent of respondents were having below 3 years and above 10 years relationship (20.5% and 21.4%). 62.2% respondents of private sector banks were having relationship with their bank for a period of 3 to 10 years and only 7.6% i.e. 14 respondents was having an association of more than 10 years wit their bank.

5.3 Reason for Selecting the Bank

The respondents were asked for the reason for selecting a particular bank. Confirmatory Factor Analysis is used for ascertaining the most influencing reason for selecting a bank. The reason may be different for public and private sector customers, so multi-group analysis was done with two groups, public and private sector. The researcher identified six important reasons for selecting a bank. They are listed below:

1. Convenience

2. Proximity

3. Customer Friendliness

4. Low transaction cost

5. Facilities available with the bank

6. Confidentiality of transactions

5.3.1 Confirmatory Factor Analysis

To identify the most influencing reason for selecting a bank, Confirmatory Factor Analysis was employed. Multi-group analysis was used to identify the reason for the bank selection. Two groups namely public and private were used for the analysis, as the reason for selecting a bank may be different for the customers of two sectors. The

result of the analysis shows that there is adequate fit for the model. It is illustrated in table 5.3.

Table 5.3

Model Fit Indices- Reasons for Bank Selection

Indices	Value Obtained	Recommended Value of Good Fit
Normed chi- square CMIN/DF	.661	<3
Root Mean Square Error of Approximation(RMSEA)	.020	<0.05
Comparative Fix Index(CFI)	1.000	>0.90
Goodness of Fit Index(GFI)	.990	>0.90
Normed fit Index(NFI)	.984	>0.90
Tucker - Lewis Index(TLI)	1.015	>0.90
Incremental Fit Index(IFI)	1.009	>0.90

Source: Survey Data

The fit of the measurement model was tested and confirmed by Confirmatory Factor Analysis using AMOS 20. Table 5.3 shows the model fit indices of CFA like CMIN/DF, RMSEA, CFI, GFI, NFI, TLI and IFI. Confirmatory Factor Analysis confirms the structure of measurement scales as all the fit indices are satisfactory. The measurement model of public and private sector is shown in fig 5.1 and 5.2.

a) Public Sector

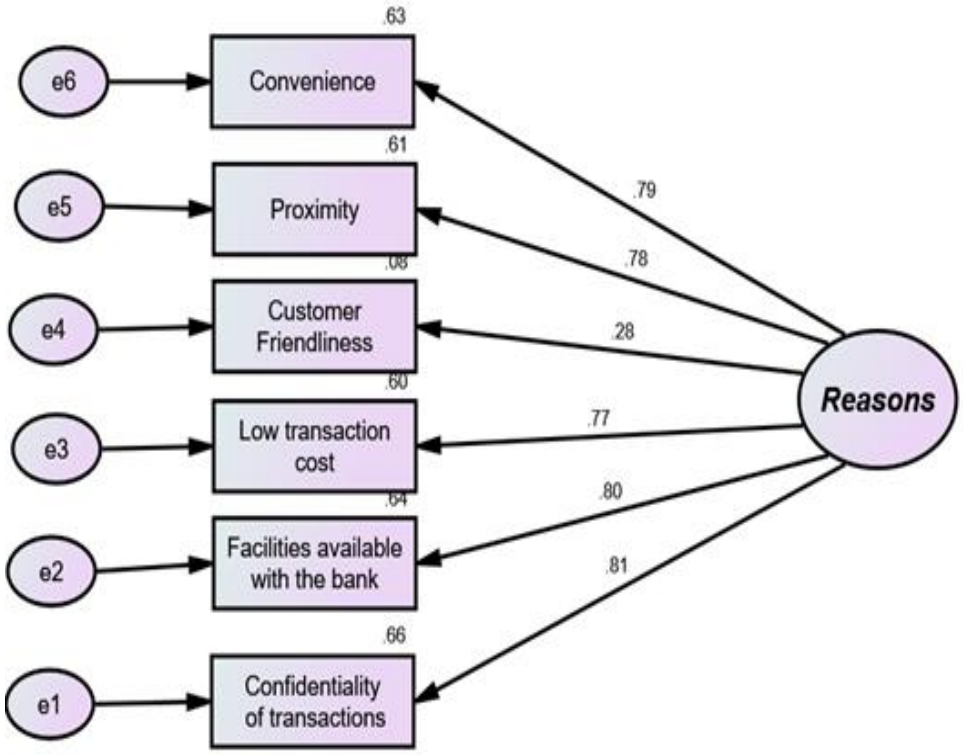


Fig 5.1 Reason for Bank Selection (Public Sector)

The regression coefficient is used to explain most influencing reason for selecting a particular bank. From the fig 5.1 it is clear that, in the case of public sector, the regression coefficient of the factor 'convenience' is .79 and the variance explained is .63. This means 63 percent variance is explained by the factor 'convenience' and 37 percent variance is explained by the error term. The regression coefficients of the other factors are, proximity (.78), customer friendliness (.28), low transaction cost (.77), facilities available with the bank (.80) and confidentiality of transactions (.81). The six factors are ranked on the basis of these regression coefficients. It is shown in table 5.4.

Table 5.4

Reasons for Bank Selection- Public Sector

Sl.No	Reasons	Regression Coefficients (β)	Variance Explained	Rank
1	Convenience	.79	.63	3
2	Proximity	.78	.61	4
3	Customer Friendliness	.28	.08	6
4	Low transaction cost	.77	.60	5
5	Facilities available with the bank	.80	.61	2
6	Confidentiality of transactions	.81	.66	1

Source: Survey Data

Among the six factors identified as the reasons for selecting a bank, the customers of public sector banks consider 'confidentiality of transaction' (.81) as the most important reason. The next important reason is 'facilities available with the bank (.80) followed by convenience (.79), proximity (.78) and low transaction cost (.77). The regression coefficient of the factor 'customer friendliness' is the least (.28) indicating that the customers of public sector banks least considers 'customer friendliness' as a reason for selecting a bank.

b) Private Sector

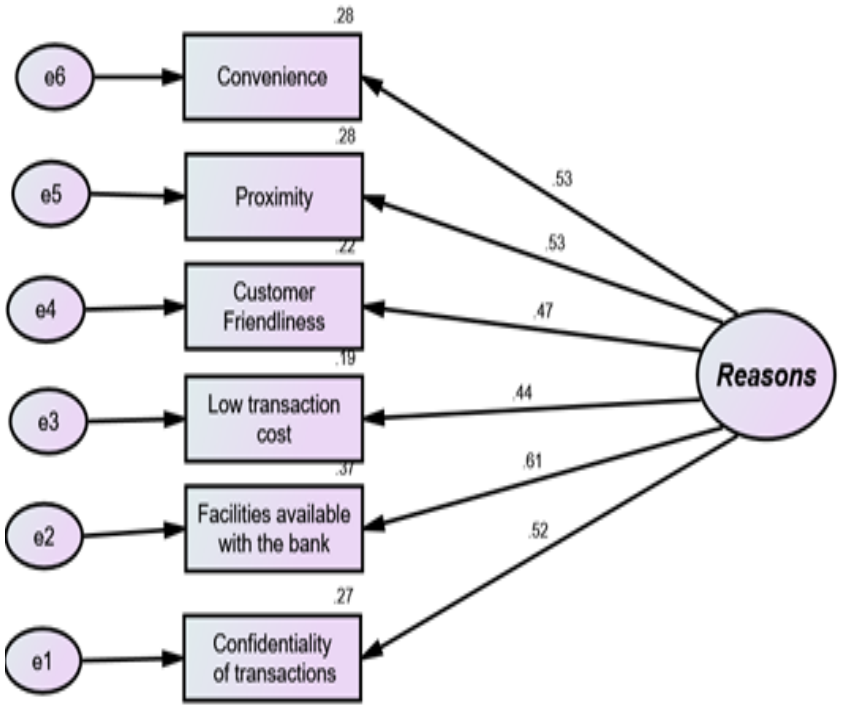


Fig 5.2 Reason for Bank Selection (Private Sector)

Ranks were imparted to the factors influencing a customer to select a bank based on the regression coefficient. Fig 5.2 clearly indicates that, in the case of private sector, the regression coefficient of the factors 'convenience' and 'proximity is .53 and the variance explained is 28 percent. This means 72 percent variance is explained by the error term. The regression coefficients of the other factors are customer friendliness (.47), low transaction cost (.44), facilities available with the bank (.61) and confidentiality of transactions (.52). Fig 5.5 shows the ranks assigned to the six factors on the basis of these regression coefficients.

Table 5.5

Reasons for Bank Selection- Private Sector

Sl.No	Reasons	Regression Coefficients (β)	Variance Explained	Rank
1	Convenience	.53	.28	2
2	Proximity	.53	.28	2
3	Customer Friendliness	.47	.22	4
4	Low transaction cost	.44	.19	5
5	Facilities available with the bank	.61	.37	1
6	Confidentiality of transactions	.52	.27	3

Source: Survey Data

Regression coefficients are given in table 5.5 clearly shows that the customers of private sector banks give priority to the 'facilities available with the bank' as a reason for selecting a bank. The next dominating factors are convenience (.53), proximity (.53), 'confidentiality of transactions' (.52) and 'customer friendliness' (.47). 'Low transaction cost' (.44) exhibits the low regression coefficient making it the least considered factor as a reason for selecting a bank.

Section B

5.4 Analysis of Financial Innovations and its Dimensions

In the current research context, the researcher has identified three types of financial innovations and has measured the satisfaction of customers regarding these innovations. They are:

1. Product Innovation
2. Technological Innovation
3. Process Innovation

Financial Innovation is a multidimensional, multiple – scale variable; the Financial Innovation construct was taken as the dependent variable in the study and contained 24 items after content validity through experts opinion.

5.4.1 Exploratory Factor Analysis

To test whether the factors extracted are similar to the dimensions proposed in the study, Exploratory Factor Analysis was done. After first EFA it was found that the five items of process innovation dimension was found to have cross loading and was also considerably small. Hence those items were deleted and then EFA was conducted once more to explore the dimension structure.

The analysis was done with the software SPSS 20 and the result of the analysis is shown below.

Table 5.6

KMO and Bartlett's Test- Financial Innovation

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.915
Bartlett's Test of Sphericity	Approx. Chi-Square	2365.309
	Df	171
	Sig.	.000

Source: Survey Data

The Kaiser-Meyer Olkin (KMO) and Bartlett's Test measure of sampling adequacy were used to examine the appropriateness of Factor Analysis. The result of the tests shown in the table 5.6 reveals that Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.915 and Bartlett's test of sphericity is significant ($p<0.001$) with a chi-square value of 2365 with 171 degrees of freedom confirming that there exists a correlation among the variables and it was suitable for further analysis.

Table 5.7

Total Variance Explained by Variables of Financial Innovation

Component	Initial Eigen Values		
	Total	% of Variance	Cumulative %
1	5.688	29.934	29.934
2	2.832	14.907	44.841
3	1.090	5.738	50.579

Source: Survey Data

Extraction Method: Principal Component Analysis.

Table 5.7 shows the result of Principal Component Analysis after which three components of financial innovations are identified. The Eigen values of these components are greater than one, and they together explained variance of 50.579 percent. The factor structure developed from EFA has got adequate loading for each factor with minimum chance for cross loading. The first component explains 29.934 percent of variance with Eigen value 5.688. The second component explains 14.907 percent of variance and the Eigen value of this component is 2.832. The third component extracted 5.738 percent of variance with Eigen value 1.090.

Table 5.8 shows the details and component loadings of the three components identified after EFA. The components are 'Product Innovation' with eight items (PD1 to PD8), 'Technological Innovation' with four items (TH1 to TH4) and 'Process Innovation' with seven items (PR1 to PR7).

Table 5.8

Component Loadings of Financial Innovation

Variable	Indicator	Component		
		1	2	3
PD1	Innovative deposit schemes	.687		
PD2	Innovative loan schemes	.717		
PD3	Credit cards	.626		
PD4	Debit cards	.704		
PD5	Smart cards	.642		
PD6	Bancassurance	.630		
PD7	Wealth management services	.645		
PD8	Mobile banking apps	.693		
TH1	Automated Teller Machine		.591	
TH2	Cash Deposit Machine		.743	
TH3	Passbook printing machine		.737	
TH4	Point of Sale machine		.641	
PR1	Simplified authorization procedure			.622
PR2	Internet banking			.581
PR3	Mobile banking			.710
PR4	Real Time Gross Settlement			.620
PR5	National Electronic Fund Transfer			.670
PR6	Immediate Payment Service			.690
PR7	Core Banking Solutions			.707

Source: Survey Data

Extraction Method: Principal Component Analysis.

The result of the principal component analysis is shown in table 5.8. Three components are derived from 24 indicator variables.

The first component which extracted 29.934 percent variance from the total variance is related to the various innovative banking products and so it is named as **'Product Innovation'.** The indicators of this component are 'Innovative deposit schemes', 'Innovative loan schemes', 'Credit cards', 'Debit cards', 'Smart cards', 'Bancassurance', 'Wealth management services' and 'Mobile banking apps'. The next component with four indicators extracted 14.907 percent variance from the total variance.

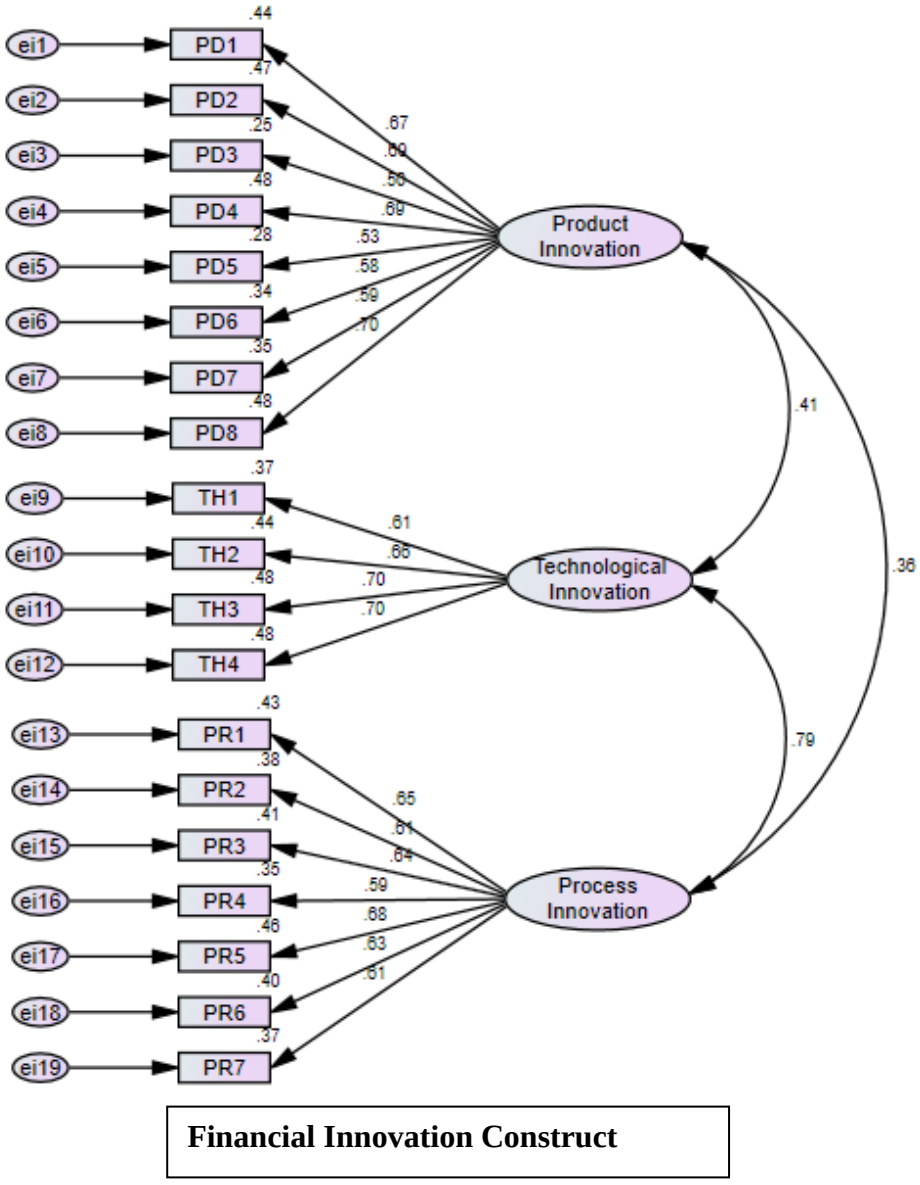
The four indicators are 'Automated Teller Machine', 'Cash Deposit Machine', 'Passbook printing machine' and 'Point of Sale machine' and the component identified is named as **'Technological Innovation'**.

The third component extracted 5.738 percent variance from the total variance and is named as **'Process Innovation'**. The indicators of this component are 'Simplified authorization procedure', 'Internet banking', 'Mobile banking', 'Real Time Gross Settlement', 'National Electronic Fund Transfer', 'IMPS' and 'Core Banking Solutions'.

5.4.2 Confirmatory Factor Analysis – Financial Innovation

After identifying the structure of components, the measurement model of the construct 'Financial Innovation' was tested and confirmed by Confirmatory Factor Analysis using AMOS 20. The confirmatory model of Financial Innovation is shown in the following figure 5.3.

❖ **Confirmatory Model of Financial Innovation**



Financial Innovation Construct

Fig 5.3 Measurement Model of Financial Innovation

Table 5.9

Regression Coefficients- Financial Innovation

Variables			Unstandardised Coefficient(B)	S.E. (B)	Standardisd Coefficient (Beta)	t value	p value
TH4	<---	Technological_Innovation	1.252	.120	.696	10.413	<0.001
TH3	<---	Technological_Innovation	1.218	.117	.695	10.403	<0.001
TH2	<---	Technological_Innovation	1.151	.114	.661	10.068	<0.001
TH1	<---	Technological_Innovation	1.000		.611		
PD4	<---	Product_Innovation	.964	.083	.692	11.599	<0.001
PD3	<---	Product_Innovation	.731	.084	.501	8.743	<0.001
PD2	<---	Product_Innovation	1.016	.088	.685	11.505	<0.001
PD1	<---	Product_Innovation	1.000		.666		
PR4	<---	Process_Innovation	.894	.089	.589	10.039	<0.001
PR3	<---	Process_Innovation	.900	.084	.638	10.739	<0.001
PR2	<---	Process_Innovation	.886	.085	.613	10.388	<0.001
PR1	<---	Process_Innovation	1.000		.654		
PD5	<---	Product_Innovation	.750	.082	.526	9.173	<0.001
PD6	<---	Product_Innovation	.880	.087	.585	10.070	<0.001
PD7	<---	Product_Innovation	.827	.082	.588	10.109	<0.001
PD8	<---	Product_Innovation	1.033	.089	.696	11.651	<0.001
PR5	<---	Process_Innovation	1.019	.090	.679	11.301	<0.001
PR6	<---	Process_Innovation	.911	.085	.635	10.697	<0.001
PR7	<---	Process_Innovation	.894	.086	.611	10.366	<0.001

Source: Survey Data

Table 5.10 shown below indicates the values of model fit indices obtained and the recommended model fit indices.

Table 5.10

Model Fit Indices- Financial Innovation Dimensions

Indices	Value Obtained	Recommended Value of Good Fit
Normed chi- square CMIN/DF	1.350	<3
Root Mean Square Error of Approximation(RMSEA)	.030	<0.05
Comparative Fix Index(CFI)	.995	>0.90
Goodness of Fit Index(GFI)	.952	>0.90
Normed fit Index(NFI)	.976	>0.90
Tucker - Lewis Index(TLI)	.992	>0.90
Incremental Fit Index(IFI)	.995	>0.90

Source: Survey Data

Table 5.10 shows the values of model fit indices like CMIN/DF, RMSEA, CFI, GFI, NFI, TLI, and IFI. It clearly indicates that all the model fit indices obtained are satisfactory with the recommended value of good fit and so the result of CFA confirms the structure of measurement model.

5.4.3 Dimensions of Financial Innovation

The perception of customers regarding the awareness, usage, and satisfaction of financial innovations and its dimensions are analyzed using the mean score and standard deviation. A sector-wise comparison is made to find out the difference between customers of public and private sector with regard to the awareness, usage and satisfaction of financial innovation and its dimensions. For a better understanding, financial Innovations and its three dimensions product innovations, technological innovations and process innovations are divided into three levels based on 'Quartile Deviation'. This is done with the objective of having a clear idea about the perception of customers regarding the awareness, usage, and satisfaction of financial innovations. The three levels are High, Moderate and Low levels.

A. Respondents' Perception Regarding Awareness of Financial Innovation

Before measuring the usage and satisfaction of financial innovation among the customers, it is important to know whether the customers are aware or not about the various financial innovations introduced by the banks. A dimension wise analysis is made to know the awareness of customers towards the financial innovations. Mean score value is used to measure the awareness of public and private sector respondents towards the dimensions of financial innovation. Sector-wise analysis is carried out to know whether there is any significant difference in the awareness of public and private sector customers. Five-point rating scale is used to measure the awareness with the values 5 for 'highly aware', 4 for 'aware', 3 for 'neutral', 2 for 'unaware' and 1 for 'highly unaware'.

a) Awareness of Customers on Product Innovations

Product innovations comprise of not only the new products introduced but also the significant improvement in the established products. The eight product innovations identified in the study are 'innovative deposit schemes', 'innovative loan schemes', 'credit cards', 'debit cards', 'smart cards', 'bancassurance', 'wealth management services' and 'mobile banking apps'. Independent sample t-test is used to test the Null hypothesis set.

The Null hypothesis is set as:

> *H_0: There is no significant difference between public and private sector customers regarding awareness about product innovations.*

Table 5.11

Awareness of Customers on Product Innovation- Sector-wise Comparison

Product Innovations	Sector	Mean	SD	t value	P value	Remarks
Innovative deposit schemes	Public	4.21	.749	1.373	.170	Insignificant
	Private	4.12	.614			
Innovative loan schemes	Public	4.10	.726	.468	.640	Insignificant
	Private	4.13	.629			
Credit cards	Public	4.14	.716	1.581	.115	Insignificant
	Private	4.03	.625			
Debit cards	Public	4.21	.632	3.143	.002	Significant
	Private	4.01	.663			
Smart cards	Public	4.00	.700	.402	.688	Insignificant
	Private	4.03	.675			
Bancassurance	Public	2.69	1.046	3.727	.000	Significant
	Private	3.10	1.147			
Wealth management services	Public	2.62	.958	3.235	.001	Significant
	Private	2.95	1.070			
Mobile banking apps	Public	3.47	.874	3.536	.000	Significant
	Private	3.78	.866			
Product Innovation awareness	**Public**	**29.45**	**4.00**	**1.726**	**.085**	**Insignificant**
	Private	**30.15**	**4.09**			

Source: Survey Data

It is clear from the table 5.11 that in the case of public sector, the mean score value of 'Innovative deposit schemes', 'Innovative loan schemes', 'Credit cards', 'Debit cards', 'Smart cards' and 'mobile banking apps' is above 3. It means that customers of public sector banks are aware of these product innovations. Mean score value reveals that 'Bancassurance' and 'Wealth management services' are the

innovations which the customers of public sector banks are not aware. The customers of private sector banks are aware of every product innovations except for the 'wealth management services'. From the mean score value, it can be inferred that the total product innovation awareness exists in the case of both public and private sector.

The result of independent sample t-test shows that for product innovations like 'innovative deposit schemes', 'innovative loan schemes', 'credit cards' and 'smart cards' there is no significant difference in the awareness between the public and private sector customers. In the case of product innovations like 'debit cards', 'bancassurance', 'wealth management services' and 'mobile banking apps' the Null hypothesis is rejected at 5% level of significance as the calculated t values are greater than 1.96 and the p values are less than .05. That means there is significant difference between the public and private sector customers regarding the awareness about these product innovations.

b) Awareness of Customers on Technological Innovations

Technological innovations identified in the study which aids the implementation of product and process innovations are 'Automatic Teller Machine', 'Cash Deposit Machine', 'passbook printing machine' and 'Point of sale machine'. Awareness of technological innovation among the public and private sector respondents are measured with the help of mean score values and a comparison is made between the two sectors using independent sample t-test. The hypothesis is set as:

H_0: There is no significant difference between public and private sector customers regarding awareness about technological innovations.

Table 5.12

Awareness of Customers on Technological Innovation- Sector-wise Comparison

Technological Innovations	Sector	Mean	SD	t value	p-value	Remarks
Automatic Teller Machine	Public	4.04	.751	1.261	.208	Insignificant
	Private	3.96	.569			
Cash Deposit Machine	Public	4.01	.648	.234	.815	Insignificant
	Private	3.99	.603			
Passbook printing machine	Public	4.07	.694	.666	.506	Insignificant
	Private	4.02	.599			
Point of Sale machine	Public	3.95	.790	.864	.388	Insignificant
	Private	3.89	.607			
Technological Innovation awareness	**Public**	**16.07**	**2.26**	**1.053**	**.293**	**Insignificant**
	Private	**15.86**	**1.47**			

Source: Survey Data

Table 5.12 reveals that the mean score value of both the public and private sector for technological innovation awareness is greater than test value (12) and for all the four components of technological innovations is greater than the test value (3). It indicates that there exists a significant positive variation from the neutral value inferring that the customers are well aware of all technological innovations.

Since the p-value is greater than 0.05, the Null hypothesis is accepted at 5% level of significance stating that there is no significant difference in the awareness of public and private sector customers regarding technological innovations.

C) Awareness of Customers on Process Innovation

Process innovation is the change in the way a product or service is delivered by the bank. The awareness of process innovation is measured using the mean score value and independent sample t-test is employed to make a sector-wise comparison. The hypothesis set for the comparison is as follows

H_0: There is no significant difference between public and private sector customers regarding awareness about process innovations.

Table 5.13

Awareness of Customers on Process Innovations – Sector-wise Comparison

Process Innovations	Sector	Mean	SD	t value	p value	Remarks
Simplified authorization procedure	Public	3.99	.820	.271	.787	Insignificant
	Private	4.01	.634			
Internet banking	Public	4.02	.687	.557	.578	Insignificant
	Private	4.06	.600			
Mobile banking	Public	3.99	.673	1.892	.059	Insignificant
	Private	4.11	.607			
Real Time Gross Settlement	Public	3.93	.803	2.455	.015	Significant
	Private	4.11	.616			
National Electronic Fund Transfer	Public	3.87	.766	2.687	.008	Significant
	Private	4.06	.631			
Immediate Payment Service	Public	3.87	.866	2.605	.010	Significant
	Private	4.07	.635			
Core Banking Solutions	Public	4.00	.685	.981	.327	Insignificant
	Private	4.07	.643			
Process Innovation awareness	**Public**	**27.68**	**3.74**	**2.576**	**.010**	**Significant**
	Private	**28.49**	**2.26**			

Source: Survey Data

Table 5.13 shows the awareness of customers about the different types of process innovations. The mean score value reveals that customers are aware of every process innovation as the mean score value of the total product innovation awareness is

greater than test value (21) and for the components of process innovation are greater than the test value (3). The result is same for public and private banking customers.

The result of independent sample t-test reveals that there is no significant difference between the customers of public and private sector banks with regard to the process innovations like Simplified authorisation procedure', 'Internet banking', 'Mobile banking' and 'Core Banking Solutions' as the calculated t values of these process innovation are less than 1.96 and the p values of these variables are above .05. It means in the case of 'RTGS', 'NEFT' and 'IMPS' the t values are greater than 1.96 and p values are <.05 indicating a significant difference in the awareness of these three process innovations between the two sectors.

- **Level of Awareness:**

Financial innovation and its dimensions are divided into three levels namely 'Low', 'Moderate' and 'High' on the basis of quartile deviation. The norms for determining the levels of awareness are shown in the table 5.14.

Table 5.14

Norms for the Level of Awareness

Innovations	**Level of Awareness**		
	Low	**Moderate**	**High**
Product Innovation	Below 28	28-32	Above 32
Technological Innovation	Below 15	15-17	Above 17
Process Innovation	Below 27	27-30	Above 30
Financial Innovation	**Below 70**	**70-78**	**Above 78**

Source: Survey Data

The level of awareness of financial innovation and its dimensions in public and private sector based on the predetermined norms are shown in table 5.15

Table 5.15

Level of Awareness

Innovation	Public Sector				Private Sector			
	Low	**Moderate**	**High**	**Level**	**Low**	**Moderate**	**High**	**Level**
Product	70 (32.6)	87 (40.5)	58 (26.9)	Moderate	57 (30.8)	47 (25.4)	81 (43.8)	High
Technological	77 (35.8)	41 (19.1)	97 (45.1)	High	80 (43.2)	34 (18.4)	71 (38.4)	Low
Process	83 (38.6)	55 (25.6)	77 (35.8)	Low	57 (30.8)	66 (35.7)	62 (33.5)	Moderate
Financial Innovation	**63 (29.3)**	**87 (40.5)**	**65 (30.2)**	**Moderate**	**42 (22.7)**	**93 (50.3)**	**50 (27.0)**	**Moderate**

Source: Survey Data

Table 5.15 gives a clear idea about the level of awareness of customers regarding the financial innovations and its dimensions. The awareness level of most of the customers (40.5%) about the product innovation is at a moderate level in the case of the public sector. In the case of the private sector, the awareness of majority of customers about product innovations (43.8%) is at a high level. When the technological innovation is considered, 45.1% of the public sector banking customers has high level of awareness and majority (43.2%) of the private sector banking customers have low level of awareness. In the case of the third dimension, process innovation most of the public sector customers (38.6%) show a low level of awareness and 35.7 % of private sector customers shows a moderate level of awareness. When the financial innovation is taken as a whole, most of the customer's awareness level is at moderate level in the case of both public and private sector.

B. Respondents Perception Regarding Usage of Financial Innovation

After measuring the awareness of financial innovation, it is important to measure the usage of financial innovation among the customers. A dimension wise analysis is made to know the usage of customers towards the financial innovations. Mean score

value is used to measure the usage of public and private sector respondents towards the dimensions of financial innovation. Sector-wise analysis is carried out to know whether there is any significant difference in the usage of public and private sector customers. Five-point rating scale is used to measure the usage of financial innovation with the values 5 for 'always', 4 for 'very often', 3 for 'sometimes', 2 for 'rarely' and 1 for 'never'.

a) Usage of Product Innovations

Mean score value reveals the usage of product innovation among the customers of public and private sector banks. The eight product innovations identified in the study are 'innovative deposit schemes', 'innovative loan schemes', 'credit cards', 'debit cards', 'smart cards', 'bancassurance', 'wealth management services' and 'mobile banking apps'. Independent sample t-test is used to test the Null hypothesis set.

H_0: There is no significant difference between public and private sector customers regarding usage of product innovations.

Table 5.16

Usage of Product Innovation- Sector-wise Comparison

Product Innovations	Sector	Mean	SD	t value	p value	Remarks
Innovative deposit schemes	Public	3.60	.654	1.842	.066	Insignificant
	Private	3.72	.632			
Innovative loan schemes	Public	2.96	.796	.451	.652	Insignificant
	Private	3.00	.853			
Credit cards	Public	2.23	1.239	3.888	.000	Significant
	Private	2.70	1.135			
Debit cards	Public	3.79	.635	2.884	.004	Significant
	Private	3.58	.805			

Smart cards	Public	2.13	1.294	.946	.345	Insignificant
	Private	2.25	1.317			
Bancassurance	Public	2.12	1.333	2.016	.045	Significant
	Private	1.86	1.194			
Wealth management services	Public	2.03	1.355	.409	.683	Insignificant
	Private	2.09	1.270			
Mobile banking apps	Public	2.54	.879	5.603	.000	Significant
	Private	3.08	1.035			
Product Innovation usage	**Public**	**21.40**	**5.39**	**1.734**	**.084**	**Insignificant**
	Private	**22.27**	**4.52**			

Source: Survey Data

Table 5.16 shows that in the case of public sector, the mean score of only two product innovations is greater than test value 3. They are innovative deposit schemes (3.60) and debit cards (3.79). As far as private sector is concerned, innovative deposit schemes(3.72) shows the highest mean score and the least one is bancassurance. Mean score of the total product innovation for both public and private sector is less than the test value (24).

Independent sample t-test reveals that there is a significant difference between the public and private sector customers in the usage of product innovations like credit cards, debit cards, bancassurance and mobile banking apps. Here the Null hypothesis is rejected at 5 % level of significance as the p values of these variables are below .05 and the calculated t values are above 1.96. In the case of all other product innovations, there is no significant difference in the usage between public and private sector customers.

b) Usage of Technological Innovations

Technological innovations are interconnected components or machines which aids the implementation of product and process innovations. Usage of technological innovation among the public and private sector respondents are measured with the help of mean score values and a comparison is made between the two sectors using independent sample t-test. The Null hypothesis is set as:

H_0: There is no significant difference between public and private sector customers regarding the usage of technological innovations.

Table 5.17

Usage of Technological Innovations- Sector-wise Comparison

Technological Innovations	Sector	Mean	SD	t value	p value	Remarks
Automatic Teller Machine	Public	4.04	.669	7.673	.000	Significant
	Private	3.50	.738			
Cash Deposit Machine	Public	3.96	.819	4.677	.000	Significant
	Private	3.60	.716			
Passbook printing machine	Public	3.98	.776	5.929	.000	Significant
	Private	3.53	.723			
Point of Sale machine	Public	3.78	.965	2.948	.000	Significant
	Private	3.51	.795			
Technological Innovation usage	**Public**	**15.75**	**2.38**	**7.157**	**.000**	**Significant**
	Private	**14.14**	**2.08**			

Source: Survey Data

Table 5.17 clearly shows that all the four technological innovations are used by the customers as the mean score value of ATM, CDM, Pass book printing machine and Point of Sale machine are greater than the test value (3). The mean score value for the total technological innovation usage is greater than test value (12). The result is similar for both public and private sector.

Since the p-value of technological innovations and its components are less than 0.05 and the calculated t values are above 1.96 as shown in the table 5.17 the Null hypothesis is rejected at 5% level of significance indicating a significant difference in

the usage of financial innovation between the customers of the public and private sector.

c) Usage of Process Innovation

Process innovation identified in the study are 'simplified authorization procedure', 'internet banking', 'mobile banking', 'Real Time Gross Settlement', 'National Electronic Fund Transfer', 'Immediate Payment Service' and 'Core Banking Solutions'. Table 5.18 shows the usage of product innovation measured in terms of mean score and the result of independent sample t-test used for sector-wise comparison.

H_0: There is no significant difference between public and private sector customers regarding the usage of process innovations.

Table 5.18

Usage of Process Innovations – Sector-wise Comparison

Process Innovations	Sector	Mean	SD	t value	p value	Remarks
Simplified authorisation procedure	Public	3.81	.960	4.114	.000	Significant
	Private	3.44	.826			
Internet banking	Public	3.98	.761	6.866	.000	Significant
	Private	3.42	.870			
Mobile banking	Public	3.89	.850	7.382	.000	Significant
	Private	3.26	.847			
Real Time Gross Settlement	Public	3.89	.872	5.464	.000	Significant
	Private	3.43	.825			
National Electronic Fund Transfer	Public	3.90	.851	6.062	.000	Significant
	Private	3.37	.912			
Immediate Payment Service	Public	3.83	.919	5.014	.000	Significant
	Private	3.37	.912			
Core Banking Solutions	Public	3.83	.805	5.152	.000	Significant
	Private	3.40	.855			
Process Innovation usage	**Public**	**27.13**	**4.74**	**8.289**	**.000**	**Significant**
	Private	**23.69**	**3.33**			

Source: Survey Data

Table 5.18 makes it clear that the customers of both public and private sector banks use all the components of process innovation as the mean score of process innovation is greater than test value (21) and the mean score value of its components is greater than the test value (3). Result of the independent sample t-test shown in the table makes it clear that there is a significant difference in the usage of all the components of process innovations between the two sectors. Since the p-value of all the components are less than 0.05 the stated hypothesis is rejected.

- **Level of Usage**

To know the exact usage level of the customers, financial innovations and its dimensions are divided into three levels. Based on the quartile deviation, low, moderate and high level was determined. The norms for determining these levels are shown in the table 5.19.

Table 5.19

Norms for the Level of Usage

Innovations	**Level of Usage**		
	Low	**Moderate**	**High**
Product Innovation	Below 19	19-23	Above 23
Technological Innovation	Below 14	14-17	Above 17
Process Innovation	Below 23	23-29	Above 29
Financial Innovation	**Below 58**	**58-67**	**Above 67**

Source: Survey Data

The level of usage of financial innovation and its dimensions in public and private sectors are shown in the table 5.20.

Table 5.20

Level of Usage

Innovation	Public Sector				Private Sector			
	Low	**Moderate**	**High**	**Level**	**Low**	**Moderate**	**High**	**Level**
Product	84 (39.1)	22 (10.2)	109 (50.7)	High	40 (21.6)	17 (9.2)	128 (69.2)	High
Technological	36 (16.7)	94 (43.7)	85 (39.5)	Moderate	91 (49.2)	79 (42.7)	15 (8.1)	Low
Process	25 (11.6)	97 (45.1)	93 (43.3)	Moderate	90 (48.6)	80 (43.2)	15 (8.1)	Low
Financial Innovation	**33 (15.3)**	**101 (46.9)**	**81 (37.7)**	**Moderate**	**88 (47.6)**	**69 (37.3)**	**28 (15.1)**	**Low**

Source: Survey Data

From the table 5.20, it is clear that in the case of public sector, the usage level of financial innovation (46.9%) is at a moderate level. While the dimensions are considered, product innovations (50.7%) shows a high level of usage, when the other two dimensions technological innovations (43.7%) and process innovations (45.1%) shows a moderate level of usage. In the private sector, financial innovation (47.8%) shows a low level of usage. Most of the respondent's usage is at high level in the case of product innovations (69.2%) and low in the case of technological (49.2%) and process innovations (48.6%).

C. Respondents Perception Regarding Satisfaction of Financial Innovation

After measuring the awareness and usage, the satisfaction of the customers towards the financial innovation is measured. It is important to measure the satisfaction to fully understand the perception of customers about financial innovation. A dimension wise analysis is made and the mean score value is used to measure the satisfaction of public and private sector respondents towards the dimensions of financial innovation.

Sector-wise analysis using independent sample t-test is carried out to know whether there is any significant difference in the satisfaction of public and private sector customers. Five-point rating scale is used for the measurement with the values 5 for 'Highly satisfied', 4 for 'Satisfied', 3 for 'Neutral', 2 for 'Dissatisfied' and 1 for 'Highly dissatisfied'.

a) Satisfaction of Customers on Product Innovations

The eight product innovations identified in the study are 'innovative deposit schemes', 'innovative loan schemes', 'credit cards', 'debit cards', 'smart cards', 'bancassurance', 'wealth management services' and 'mobile banking apps'. Mean score value reveals the satisfaction of product innovation among the customers of public and private sector banks and independent sample t-test is used to test the Null hypothesis set.

H_0: There is no significant difference between public and private sector customers regarding satisfaction of product innovations.

Table 5.21

Satisfaction of Customers on Product Innovations- Sector-wise Comparison

Product Innovations	Sector	Mean	SD	t value	p-value	Remarks
Innovative deposit schemes	Public	3.85	.759	3.403	.001	Significant
	Private	3.60	.709			
Innovative loan schemes	Public	3.85	.807	3.218	.001	Significant
	Private	3.62	.624			
Credit cards	Public	3.37	.723	1.559	.120	Insignificant
	Private	3.48	.730			
Debit cards	Public	3.88	.697	3.030	.003	Significant
	Private	3.68	.670			

Smart cards	Public	3.52	.754	.048	.962	Insignificant
	Private	3.52	.652			
Bancassurance	Public	3.47	.796	.849	.397	Insignificant
	Private	3.41	.687			
Wealth management services	Public	3.50	.773	1.472	.142	Insignificant
	Private	3.39	.600			
Mobile banking apps	Public	3.79	.802	3.275	.001	Significant
	Private	3.55	.633			
Product Innovation Satisfaction	**Public**	**29.24**	**4.52**	**2.513**	**.012**	**Significant**
	Private	**28.25**	**3.02**			

Source: Survey Data

Table 5.21 reveals that the mean score value of product innovation satisfaction is above test value (24) and for the components of product innovations are above the test value (3). This indicates that the customers are satisfied with all the components of product innovations. The result is similar for both the public and private sector.

The result of the independent sample t-test indicates that for the product innovations like innovative deposit schemes, innovative loan schemes, debit cards and mobile banking apps the Null hypothesis is rejected at 5 % level of significance as the p-value of these variables are less than .05 and the calculated t value are greater than 1.96. In the case of credit cards, smart cards, bancassurance and wealth management services there exists no significant difference in the satisfaction between the public and private customers.

b) Satisfaction of Customers on Technological Innovations

Four technological innovations namely (1) Automatic Teller Machines, (2) Cash Deposit Machines, (3) Passbook printing machines and (4) Point of Sale terminals are identified in the study. Mean score value is used for the measurement of satisfaction towards technological innovation and independent sample t-test is employed to make a sector-wise analysis. Descriptive statistics and result of independent sample t-test are shown in the table 5.22.

Table 5.22

Satisfaction of Customers on Technological Innovation-Sector-wise Comparison

Technological Innovations	Sector	Mean	SD	t value	p-value	Remarks
Automatic Teller Machine	Public	3.92	.729	4.359	.000	Significant
	Private	3.62	.658			
Cash Deposit Machine	Public	3.86	.833	3.042	.003	Significant
	Private	3.63	.640			
Passbook printing machine	Public	3.90	.840	2.920	.004	Significant
	Private	3.68	.643			
Point of Sale machine	Public	3.90	.845	3.631	.000	Significant
	Private	3.62	.674			
Technological Innovation satisfaction	**Public**	**15.58**	**2.72**	**4.599**	**.000**	**Significant**
	Private	**14.55**	**1.52**			

Source: Survey Data

It is clear from the table 5.22 that the customers are satisfied with all the four technological innovations as the mean score values of them are above the test value (3) and the calculated t values are greater than 1.96. The mean score values of the technological innovations in the case of public sector are 'Automatic Teller Machine'(3.92), 'Cash Deposit Machine' (3.86) 'Passbook printing machine' (3.90) and 'Point of Sale machine' (3.90). In the case of private sector, the mean score values are 'Automatic Teller Machine'(3.62), 'Cash Deposit Machine' (3.63) 'Passbook printing machine' (3.68) and 'Point of Sale machine' (3.62). Since the p-value of the all the components of technological innovations are below 0.05, it is clear that there is significant difference between the customers of public and private sector regarding the satisfaction of these technological innovations.

c) Satisfaction of Customers on Process Innovations

Satisfaction of the seven process innovations identified in the study is measured using the mean score values. Independent sample t-test is used to make a sector-wise comparison between the customers of public and private sector banks regarding the satisfaction towards process innovation. The result of the same is given in the table 5.23

Table 5.23

Satisfaction of Customers on Process Innovations - Sector-wise Comparison

Process Innovations	Sector	Mean	SD	t value	p value	Remarks
Simplified authorisation procedure	Public	3.97	.776	4.722	.000	Significant
	Private	3.62	.674			
Internet banking	Public	3.99	.736	5.035	.000	Significant
	Private	3.64	.628			
Mobile banking	Public	4.00	.690	5.573	.000	Significant
	Private	3.63	.640			
Real Time Gross Settlement	Public	3.96	.763	5.169	.000	Significant
	Private	3.58	.671			
National Electronic Fund Transfer	Public	4.03	.729	5.725	.000	Significant
	Private	3.62	.682			
Immediate Payment Service	Public	4.03	.703	5.235	.000	Significant
	Private	3.67	.655			
Core Banking Solutions	Public	4.01	.710	5.176	.000	Significant
	Private	3.65	.676			
Process Innovation satisfaction	Public	27.98	3.94	7.803	.000	Significant
	Private	25.42	2.28			

Source: Survey Data

Mean score values and the calculated t values given in the table 5.23 clearly indicates that the customers are satisfied with all the process innovations. Mean score values of all the components of process innovations are above the test value (3) and the calculated t values of them are greater than 1.96. This shows a significant positive variation from the neutral value. While the total process innovation satisfaction is considered, the mean score value of the public sector is 27.98 and private sector is 25.42, both above the test value 21.

The result of the independent sample t-test reveals that in the case of all the variables of process innovation the Null hypothesis is rejected at 5% level of significance as the p-value for all the variables are below .05 and the calculated t values are above 1.96. That means there exists a significant difference in the satisfaction of process innovation between public and private sector customers.

- **Level of Satisfaction**

To get a better understanding of the satisfaction of the customers regarding the financial innovation and its dimensions, three levels are determined based on the predetermined norms. The levels are low, moderate and high and these levels are determined on the basis of quartile deviation. The norms are shown in the table 5.24.

Table 5.24

Norms for the Level of Satisfaction

Innovations	Level of Satisfaction		
	Low	Moderate	High
Product Innovation	Below 27	27-31	Above 31
Technological Innovation	Below 14	14-16	Above 16
Process Innovation	Below 25	25-29	Above 29
Financial Innovation	Below 67	67-76	Above 76

Source: Survey Data

The satisfaction level of the customers in the public and private sector customers are shown in the table 5.25

Table 5.25

Level of Satisfaction

Innovation	Public Sector				Private Sector			
	Low	**Moderate**	**High**	**Level**	**Low**	**Moderate**	**High**	**Level**
Product	44 (20.5)	82 (38.1)	89 (41.4)	High	57 (30.8)	100 (54.1)	28 (15.1)	Moderate
Technological	44 (20.5)	40 (18.6)	131 (60.9)	High	91 (49.2)	41 (22.2)	53 (28.6)	Low
Process	33 (15.3)	84 (39.1)	98 (45.6)	High	95 (51.4)	77 (41.6)	13 (7.0)	Low
Financial Innovation	41 (19.1)	86 (40.0)	88 (40.9)	High	77 (41.6)	96 (51.9)	12 (6.5)	Moderate

Source: Survey Data

Most of the respondents of public sector banks have high level of satisfaction in the financial innovation (40.9%) and the customers of private sector banks have moderate level of satisfaction (51.9%). Product innovation tends to create a high level of satisfaction for the customers of public sector (41.4%) where the customers of private sector have a moderate level of satisfaction on product innovations (54.1%).

As far as technological innovations are concerned, customers of public sector (60.9%) have high level of satisfaction and customers of private sector have low level of satisfaction (49.2%). Same is the case of process innovation, where 45.6% of the respondents of public sector have high level of satisfaction and 51.4% respondents of the private sector have low level of satisfaction.

5.4.4 Age-wise Comparison of Perception towards Financial Innovation

The context of the study demands an age wise comparison of the perception towards financial innovation. The categories of age used in the study are 18-25, 25-50 and Above 50. Perception as stated earlier, is measured in terms of awareness, usage and satisfaction. Separate analysis is carried out for the public and private sector.

A) Awareness of Customers on Financial Innovation

a) Public Sector

One way ANOVA is used to compare the awareness of the three categories of age group in the public sector and the hypothesis is set as follows:

> *H_0: There is no significant difference in the awareness of financial innovation among different age groups in the public sector*

The result of the one way ANOVA is shown in the table 5.26.

Table 5.26

Awareness of Customers on Financial Innovation in Public Sector : Age-wise Comparison

Perception	Age group	Mean	SD	F value	p value	Remark
Awareness of Financial Innovation	18-25	61.46	22.77	5.266	.006	Significant
	25-50	62.17	23.30			
	Above 50	38.55	27.33			

Source: Survey Data

Result of one way ANOVA illustrates the difference among the various age groups regarding the awareness of financial innovation in the public sector. Since the p value is less than 0.05 the Null hypothesis is rejected at 5% level of significance. As there is significant difference in the awareness of financial innovation among different age groups, a post hoc test is carried out to identify the awareness of which age group differs significantly. Scheffe test for multiple comparison is used for this purpose. The result of the post hoc test is given in the table 5.27.

Table 5.27

Post-hoc Test with regard to Age and Awareness of Financial Innovation- Public Sector

Age interval (I)	Age interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-.70816	4.16896	.986
	50 and above	22.91608*	7.99361	.018
25-50	18-25	.70816	4.16896	.986
	50 and above	23.62424*	7.29130	.006
50 and above	18-25	-22.91608*	7.99361	.018
	25-50	-23.62424*	7.29130	.006

Source: Survey Data

The result of the scheffe post hoc test shown in the table 5.27 clearly indicates that the financial innovation awareness of the age group 'above 50' differs with the age groups '18-25' and '25-50'. There is no difference in the awareness of financial innovation between the age groups '18-25' and '25-50'.

b) Private Sector

The three categories of age group '18-25', '25-50' and 'Above 50' of the private sector respondents is compared to know the difference in their perception regarding awareness of financial innovation. One way ANOVA is the tool employed to arrive at the results and the hypothesis is set as follows:

> *H_0: There is no significant difference in the awareness of financial innovation among different age groups in the private sector*

The result of the one way ANOVA is shown in the table 5.28

Table 5.28

Awareness of Customers on Financial Innovation in Private Sector : Age-wise Comparison

Perception	Age group	Mean	SD	F value	p value	Remark
Awareness of Financial Innovation	18-25	63.32	23.03	16.004	.000	Significant
	25-50	63.17	22.63			
	Above 50	34.50	26.12			

Source: Survey Data

The difference among the various age groups regarding the awareness of financial innovation in the private sector is shown in the table 5.28. The hypothesis is rejected at 5% level of significance as the p value is less than 0.05. The significant difference in the awareness of financial innovation among different age groups demands a post hoc test to be carried out to make multiple comparisons. Scheffe test for multiple comparisons is used to identify the awareness of which age group differs significantly. The result of the scheffe post hoc test is given in the table 5.29

Table 5.29

Post-hoc Test with regard to Age and Awareness of Financial Innovation – Private Sector

Age interval (I)	Age interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	.14724	4.10165	.999
	50 and above	28.81818*	5.88555	.000
25-50	18-25	-.14724	4.10165	.999
	50 and above	28.67094*	5.19728	.000
50 and above	18-25	-28.81818*	5.88555	.000
	25-50	-28.67094*	5.19728	.000

Source: Survey Data

Table 5.29 shows the result of the scheffe post hoc test and it clearly indicates that there is no difference in the awareness of financial innovation between the age groups '18-25' and '25-50'. The age group 'above 50' significantly differs with the age groups '18-25' and '25-50' with regard to the awareness of financial innovation.

B. Usage of Financial Innovation

a) Public Sector

The usage of financial innovation among the different age groups of public sector respondents is compared by the statistical test one way ANOVA. The hypothesis set for this purpose is stated as:

> *H_0: There is no significant difference in the usage of financial innovation among different age groups in the public sector*

Table 5.30 shows the result of one way ANOVA used to make age wise comparison regarding usage of financial innovation.

Table 5.30

Usage of Financial Innovation in Public Sector: Age-wise Comparison

Perception	Age group	Mean	SD	F value	p value	Remark
Usage of Financial Innovation	18-25	54.82	18.77	4.960	.008	Significant
	25-50	55.32	19.38			
	Above 50	36.36	21.28			

Source: Survey Data

Result of the one way ANOVA indicates that there is significant difference in the usage of financial innovation among respondents of different age groups in the public sector. Since the p value is less than 0.05 the Null hypothesis is rejected at 5% level

of significance and so it is necessary to make a multiple comparison to identify the usage of which groups have a significant difference. The result of the scheffe post hoc test for multiple comparisons s shown in the table 5.31

Table 5.31

Post-hoc Test with regard to Age and Usage of Financial Innovation- Public Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-.50070	3.44853	.990
	50 and above	18.45688*	6.61225	.022
25-50	18-25	.50070	3.44853	.990
	50 and above	18.95758*	6.03130	.008
50 and above	18-25	-18.45688*	6.61225	.022
	25-50	-18.95758*	6.03130	.008

Source: Survey Data

Result of the scheffe post hoc test for multiple comparisons. Post hoc test reveals that there is significant difference in the usage of financial innovation between the age groups '18-25' and 'above 50' and also with the age groups '25-50' and 'above 50'. The respondents of age groups '18-25' and '25-50' are not having any significant difference in their usage of financial innovations.

b) Private Sector

One way ANOVA is the statistical test employed to know whether there exists any significant difference among the three categories of age group '18-25', '25-50' and 'Above 50' of the private sector respondents in their perception regarding usage of financial innovation.

H_0: There is no significant difference in the usage of financial innovation among different age groups in the private sector

The result of the one way ANOVA is shown in the table 5.32.

Table 5.32

Usage of Financial Innovation in Private Sector: Age-wise Comparison

Perception	Age group	Mean	SD	F value	p value	Remark
Usage of Financial Innovation	18-25	50.68	16.56	16.356	.000	Significant
	25-50	52.27	17.74			
	Above 50	30.21	16.79			

Source: Survey Data

Since the p value is less than 0.05 the hypothesis is rejected at 5% level of significance indicating that there is significant difference among the various age groups regarding the usage of financial innovation in the private sector.

The significant difference in the usage of financial innovation among different age groups demands a post hoc test to be carried out to make multiple comparisons. Scheffe test for multiple comparisons is used to identify the usage of which age group differs significantly. The result of the scheffe post hoc test is given in the table 5.33

Table 5.33

Post-hoc Test with regard to Age and Usage of Financial Innovation – Private Sector

Age interval (I)	Age interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-1.58314	3.06822	.875
	50 and above	20.47348*	4.40266	.000
25-50	18-25	1.58314	3.06822	.875
	50 and above	22.05662*	3.88779	.000
50 and above	18-25	-20.47348*	4.40266	.000
	25-50	-22.05662*	3.88779	.000

Source: Survey Data

Table 5.33 shows that the age group 'above 50' significantly differs with the age groups '18-25' and '25-50'regarding the usage of financial innovation. The age groups '18-25' and '25-50' are not having any significant difference.

C. Satisfaction of Financial Innovations

a) Public Sector

The three categories of age group '18-25', '25-50' and 'Above 50' of the public sector respondents is compared to know the difference in their perception regarding satisfaction of financial innovation. One way ANOVA is the tool employed to arrive at the results and the hypothesis is set as follows:

H_0: There is no significant difference in the satisfaction of financial innovation among different age groups in the public sector

The result of the one way ANOVA is shown in the table 5.34.

Table 5.34

Satisfaction of Customers on Financial Innovation in Public Sector: Age-wise Comparison

Perception	Age group	Mean	SD	F value	p-value	Remark
Satisfaction of Financial Innovation	18-25	61.31	22.59	4.989	.008	Significant
	25-50	62.28	21.82			
	Above 50	40.55	24.82			

Source: Survey Data

Age wise comparison regarding the satisfaction of financial innovation in the public sector is shown in the table 5.34. The hypothesis is rejected at 5% level of significance as the p-value is less than 0.05. Since there is a significant difference in the satisfaction of financial innovation among different age groups, a post hoc test is to be carried out to make multiple comparisons. Scheffe test for multiple comparisons

is used to identify the satisfaction of which age group differs significantly. The result of the scheffe post hoc test is given in the table 5.35.

Table 5.35

Post-hoc Test with regard to Age and Satisfaction of Financial Innovation – Public Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-.97110	3.93602	.970
	50 and above	20.76224*	7.54698	.024
25-50	18-25	.97110	3.93602	.970
	50 and above	21.73333*	6.88390	.008
50 and above	18-25	-20.76224*	7.54698	.024
	25-50	-21.73333*	6.88390	.008

Source: Survey Data

From the result of scheffe post hoc test for multiple comparisons, it is clear that there is no difference in the satisfaction of financial innovation between the age groups '18-25' and '25-50'. The age group 'above 50' significantly differs with the age groups '18-25' and '25-50'.

b) Private Sector

The satisfaction of financial innovation among the different age groups of private sector respondents is compared by the statistical test one way ANOVA. The hypothesis set for this purpose is stated as:

H_0: There is no significant difference in the satisfaction of financial innovation among different age groups in the private sector

Table 5.27 shows the result of one way ANOVA used to make age wise comparison regarding satisfaction of financial innovation.

Table 5.36

Satisfaction of Customers on Financial Innovation in Private Sector: Age-wise Comparison

Perception	Age group	Mean	SD	F value	p value	Remark
Satisfaction of Financial Innovation	18-25	57.77	19.46	18.255	.000	Significant
	25-50	58.70	19.58			
	Above 50	32.46	20.56			

Source: Survey Data

Result of the one way ANOVA indicates that there is there is significant difference in the satisfaction of financial innovation among respondents of different age groups in the private sector. Since the p-value is less than 0.05 the Null hypothesis is rejected at 5% level of significance and so it is necessary to make a multiple comparisons to identify the satisfaction of which groups have a significant difference. The result of the scheffe post hoc test for multiple comparison s shown in the table 5.37

Table 5.37

Post-hoc Test with regard to Age and Satisfaction of Financial Innovation-Private Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-.92813	3.47961	.965
	50 and above	25.31439*	4.99297	.000
25-50	18-25	.92813	3.47961	.965
	50 and above	26.24252*	4.40907	.000
50 and above	18-25	-25.31439*	4.99297	.000
	25-50	-26.24252*	4.40907	.000

Source: Survey Data

Post hoc test reveals that there is significant difference in the satisfaction of financial innovation between the age groups '18-25' and 'above 50' and '25-50' and 'above 50'. The respondents of age groups '18-25' and '25-50' are not having any significant difference in their satisfaction towards financial innovations.

5.4.5 Area-wise Comparison of Perception towards Financial Innovation

The area of residence of the respondents influences their perception towards financial innovation. So it is highly relevant in the context of the study to make an area wise comparison of the perception towards financial innovation. The categories of area used in the study are Rural, Semi-urban and Urban. Awareness, Usage and Satisfaction are the measures of perception in the study and separate analysis is done for the public and private sector.

A. Awareness of Customers on Financial Innovation

a) Public Sector

Three categories of area of residence of the public sector respondents are compared using one way ANOVA to know the difference in their awareness towards financial innovation. The hypothesis is set as follows:

> *H_0: There is no significant difference in the awareness of financial innovation among public sector respondents of different residential area*

The result of the one way ANOVA is shown in the table 5.38

Table 5.38

Awareness of Customers on Financial Innovation in Public Sector : Area-wise Comparison

Perception	Area of residence	Mean	SD	F value	p value	Remark
Awareness of Financial Innovation	Rural	53.54	26.79	13.844	.000	Significant
	Semi-urban	65.36	19.95			
	Urban	70.68	14.76			

Source: Survey Data

Table 5.38 shows that there is significant difference in the awareness of financial innovation among the public sector respondents of different residential area. Since the p value is less than 0.05 the Null hypothesis is rejected at 5% level of significance. The significant difference in the area-wise awareness of financial innovation calls for a post hoc test. Scheffe post hoc test is carried out to identify the awareness of the respondents of which area differs significantly.

Table 5.39

Post-hoc Test with regard to Area of Residence and Awareness of Customers on Financial Innovation- Public Sector

Area of residence (I)	Area of residence (J)	Mean Difference (I-J)	Std. Error	P value
Rural	Semi-urban	-11.82362*	4.14689	.019
	Urban	-17.13997*	3.33293	.000
Semi-urban	Rural	11.82362*	4.14689	.019
	Urban	-5.31635	4.31106	.469
Urban	Rural	17.13997*	3.33293	.000
	Semi-urban	5.31635	4.31106	.469

Source: Survey Data

The result of the scheffe post hoc test shown in the table 5.30 clearly indicates that the financial innovation awareness of the public sector respondents of rural area differs with the semi-urban and urban area. There is no significant difference in the awareness of financial innovation between respondents of semi-urban and urban area.

b) Private Sector

The area of residence of the private sector respondents is classified into three categories 'rural', 'semi-urban' and 'urban'. A comparison is made to know the difference in their perception regarding awareness of financial innovation. One way ANOVA is the tool employed to arrive at the results and the hypothesis is set as follows:

H_0: There is no significant difference in the awareness of financial innovation among the private sector respondents of different residential area

Table 5.40 shows the result of the one way ANOVA

Table 5.40

Awareness of Customers on Financial Innovation in Private Sector: Area-wise Comparison

Perception	Area of residence	Mean	SD	F value	p value	Remark
Awareness of Financial Innovation	Rural	46.46	27.83	5.937	.003	Significant
	Semi-urban	60.08	25.79			
	Urban	59.75	24.49			

Source: Survey Data

Table 5.40 shows that there is significant difference in the awareness of financial innovation among the private sector respondents of different residential area. Since the p-value is less than 0.05 the Null hypothesis is rejected at 5% level of

significance. The significant difference in the area-wise awareness of financial innovation demands a post hoc test. Scheffe post hoc test is carried out to identify the awareness of the respondents of which area differs significantly.

Table 5.41

Post-hoc Test with regard to Area of Residence and Awareness of Customers on Financial Innovation- Private Sector

Area of residence (I)	Area of residence (J)	Mean Difference (I-J)	Std. Error	P value
Rural	Semi-urban	-11.82362*	4.14689	.019
	Urban	-17.13997*	3.33293	.000
Semi-urban	Rural	11.82362*	4.14689	.019
	Urban	-5.31635	4.31106	.469
Urban	Rural	17.13997*	3.33293	.000
	Semi-urban	5.31635	4.31106	.469

Source: Survey Data

The result of the scheffe post hoc test shown in the table 5.41 clearly indicates that the financial innovation awareness of the public sector respondents of rural area differs with the semi-urban and urban area. There is no significant difference in the awareness of financial innovation between respondents of semi-urban and urban area.

B. Usage of Financial Innovation

a) Public Sector

One way ANOVA is used to compare the three categories of residential area of the public sector respondents with regard to the usage of financial innovation. The hypothesis set for this purpose is stated as:

H_0: There is no significant difference in the usage of financial innovation among public sector respondents of different residential area

Table 5.33 shows the result of one way ANOVA used to make area wise comparison regarding usage of financial innovation.

Table 5.42

Usage of Financial Innovation in Public Sector: Area-wise Comparison

Perception	Area of residence	Mean	SD	F value	p-value	Remark
Usage of Financial Innovation	Rural	48.18	21.60	13.887	.000	Significant
	Semi-urban	57.69	17.66			
	Urban	62.45	12.75			

Source: Survey Data

Result of the one way ANOVA indicates that there is significant difference in the usage of financial innovation among the public sector respondents of different residential area. Since the p value is less than 0.05 the Null hypothesis is rejected at 5% level of significance and so it is necessary to make a multiple comparison to identify the usage of which groups have a significant difference. The result of the scheffe post hoc test for multiple comparison s shown in the table 5.43.

Table 5.43

Post-hoc Test with regard to Area and Usage of Financial Innovation- Public Sector

Area of residence (I)	Area of residence (J)	Mean Difference (I-J)	Std. Error	P value
Rural	Semi-urban	-9.51049*	3.43412	.023
	Urban	-14.27273*	2.76007	.000
Semi-urban	Rural	9.51049*	3.43412	.023
	Urban	-4.76224	3.57008	.412
Urban	Rural	14.27273*	2.76007	.000
	Semi-urban	4.76224	3.57008	.412

Source: Survey Data

Table 5.43 shows the result of the scheffe post hoc test for multiple comparisons. Post hoc test reveals that there is significant difference in the usage of financial innovation between the respondents of rural and semi-urban area and also between respondents of urban and rural area. The respondents of 'semi-urban' and 'urban area' are not having any significant difference in their usage of financial innovations.

b) Private Sector

One way ANOVA is the statistical test employed to know whether there exists any significant difference among the three categories of area of residence 'Rural', 'Semi-urban' and 'Urban' of the private sector respondents in their perception regarding usage of financial innovation.

H_0: There is no significant difference in the usage of financial innovation among the private sector respondents of different residential area

The result of the one way ANOVA is shown in the table 5.44

Table 5.44

Usage of Financial Innovation in Private Sector: Area-wise Comparison

Perception	Area of residence	Mean	SD	F value	p value	Remark
Usage of Financial Innovation	Rural	40.73	20.49	4.472	.013	Significant
	Semi-urban	48.05	17.64			
	Urban	49.94	18.99			

Source: Survey Data

Since the p value is less than 0.05 the hypothesis is rejected at 5% level of significance indicating that there is significant difference among the various

categories of residential area regarding the usage of financial innovation in the private sector.

The significant difference in the usage of financial innovation among different residential area demands a post hoc test to be carried out to make multiple comparisons. Scheffe test for multiple comparisons is used to identify the usage of which area differs significantly. The result of the scheffe post hoc test is given in the table 5.45

Table 5.45

Post-hoc Test with regard to Area and Usage of Financial Innovation – Private Sector

Area of residence (I)	Area of residence (J)	Mean Difference (I-J)	Std. Error	P value
Rural	Semi-urban	-7.32160	3.74807	.151
	Urban	-9.20910*	3.24369	.019
Semi-urban	Rural	7.32160	3.74807	.151
	Urban	-1.88750	3.90917	.890
Urban	Rural	9.20910*	3.24369	.019
	Semi-urban	1.88750	3.90917	.890

Source: Survey Data

Table 5.45 shows that there is significant difference in the usage of financial innovation between the customers of rural area and urban area. The p value indicates that there is no significant difference in the usage between the other two groups i.e. between rural and semi urban & semi-urban and urban.

C. Satisfaction of Customers on Financial Innovations

a) Public Sector

The three categories of area of residence ‘rural’, ‘semi-urban’ and ‘urban’ of the public sector respondents is compared to know the difference in their perception

regarding satisfaction of financial innovation. One way ANOVA is the tool employed to arrive at the results and the hypothesis is set as follows:

H_0: There is no significant difference in the satisfaction of financial innovation among the public sector respondents of different residential area

The result of the one way ANOVA is shown in the table 5.46

Table 5.46

Satisfaction of Customers on Financial Innovation in Public Sector: Area-wise Comparison

Perception	Area of residence	Mean	SD	F value	p value	Remark
Satisfaction of Financial Innovation	Rural	54.40	24.92	12.332	.000	Significant
	Semi-urban	65.82	19.67			
	Urban	69.62	14.91			

Source: Survey Data

Area wise comparison regarding the satisfaction of financial innovation in the public sector is shown in the table 5.46. The hypothesis is rejected at 5% level of significance as the p value is less than 0.05. Since there is a significant difference in the satisfaction of financial innovation among respondents of different residential area, a post hoc test is to be carried out to make multiple comparisons. Scheffe test for multiple comparisons is used to identify the satisfaction of customers from which area differs significantly. The result of the scheffe post hoc test is given in the table 5.47

Table 5.47

Post-hoc Test with regard to Area and Satisfaction of Customers on Financial Innovation – Public Sector

Area of residence (I)	Area of residence (J)	Mean Difference (I-J)	Std. Error	P value
Rural	Semi-urban	-11.41647*	3.94793	.017
	Urban	-15.21934*	3.17302	.000
Semi-urban	Rural	11.41647*	3.94793	.017
	Urban	-3.80286	4.10423	.652
Urban	Rural	15.21934*	3.17302	.000
	Semi-urban	3.80286	4.10423	.652

Source: Survey Data

From the result of scheffe post hoc test for multiple comparisons, it is clear that there is no significant difference in the satisfaction of financial innovation between the customers of semi-urban area and urban area. P values shown in the table 5.38 reveals that there is significant difference in the satisfaction of financial innovation between the customers of rural area and semi-urban area & rural area and urban area.

b) Private Sector

The satisfaction of financial innovation among the different residential area of private sector respondents is compared by the statistical test one way ANOVA. The hypothesis set for this purpose is stated as:

> *H_0: There is no significant difference in the satisfaction of financial innovation among the private sector respondents of different residential area*

Table 5.48 shows the result of one way ANOVA used to make area wise comparison regarding satisfaction of financial innovation among the customers of private sector banks.

Table 5.48

Satisfaction of Customers on Financial Innovation in Private Sector: Area-wise Comparison

Perception	Area of residence	Mean	SD	F value	p value	Remark
Satisfaction of Financial Innovation	Rural	44.80	24.26	4.876	.009	Significant
	Semi-urban	54.82	21.46			
	Urban	55.51	21.05			

Source: Survey Data

Result of the one way ANOVA indicates that there is there is significant difference in the satisfaction of financial innovation among respondents of different residential in the private sector. Since the p-value is less than 0.05 the Null hypothesis is rejected at 5% level of significance and so it is necessary to make a multiple comparisons to identify the satisfaction of customers from which area has a significant difference. The result of the scheffe post hoc test for multiple comparisons is shown in the table 5.49.

Table 5.49

Post-hoc Test with regard to Area and Satisfaction of Customers on Financial Innovation- Private Sector

Area of residence (I)	Area of residence (J)	Mean Difference (I-J)	Std. Error	P value
Rural	Semi-urban	-10.02253	4.36779	.075
	Urban	-10.71316*	3.78001	.020
Semi-urban	Rural	10.02253	4.36779	.075
	Urban	-.69063	4.55553	.989
Urban	Rural	10.71316*	3.78001	.020
	Semi-urban	.69063	4.55553	.989

Source: Survey Data

Table 5.49 shows the result of the scheffe post hoc test for multiple comparisons. Post hoc test reveals that there is significant difference in the satisfaction of financial innovation only between the customers of ‘rural’ and ‘urban’ area.

Conclusion

This chapter makes an analysis of demographic profile of the respondents and the reason considered by them when selecting a particular bank. The chapter also gives the result of a comparison made between the perception of public and private sector respondents in terms of their awareness, usage and satisfaction on the dimensions of financial innovation. The result shows that there is no significant difference in the perception of public and private sector respondents in their awareness on product and technological innovation and there exist a significant difference between the two sectors in their awareness on process innovations. In the case of usage, significant difference exits between the two sectors in the usage of technological and process innovations. The result also reveals that significant difference exist in thesatisfaction of public and private sector respondents on the three dimensions of financial innovation. Next chapter delas with the analysis on the dimensions of customer satisfaction and the research model analysis.

AMRITHA. N.P “FINANCIAL INNOVATIONS IN INDIAN BANKING INDUSTRY: AN EVALUATION OF INNOVATIVENESS AND FINANCIAL PERFORMANCE OF SELECTED BANKS”. THESIS. DEPARTMENT OF COMMERCE AND MANAGEMENT STUDIES, UNIVERSITY OF CALICUT, 2018.

Chapter 6

Effect of Financial Innovation on Customer Satisfaction

- ***Introduction***
- ***Dimensions of Customer Satisfaction***
  - ✓ ***Exploratory Factor Analysis***
  - ✓ ***Confirmatory Factor Analysis***
- ***Perception of Customers on Dimensions of Customer Satisfaction***
  - ***Sector- wise Comparison***
  - ***Age-wise Comparison***
  - ***Area- wise Comparison***
- ***Research Model Analysis***
- ***Conclusion***

Chapter 6

Effect of Financial Innovation on Customer Satisfaction

6.1 Introduction

The previous chapter analysed the perception of customers on the three dimensions of financial innovation. Now the effect of financial innovations on the customer satisfaction is to be analysed. For this first an analysis is to be carried out on the dimensions of customer satisfaction. Mean score value, Quartile Deviation, One sample t test, Independent sample t test, One way ANOVA, Exploratory Factor Analysis and Confirmatory Factor Analysis are the measures and tools used for this. To measure the effect of financial innovation on customer satisfaction, a model is developed with Structural Equation Modeling using the software Amos 20. The present chapter is divided in to two sections. Section A covers the Dimensions of customer satisfaction and section B deals with the research model analysis.

Section A

6.2 Analysis of Customer Satisfaction and its Dimensions

Customer satisfaction can be experienced in a variety of situations and connected to both goods and services. It is well established that satisfied customers are the key to the long term success of any organisation. It is a global issue that affects all organizations, regardless of its size, whether profit or non-profit, local or multinational. There is a substantial body of empirical literature that establishes the benefits of customer satisfaction for firms. Studies done in the area shows that customer satisfaction is a multi-dimensional and multiple- scale variable. The researcher has identified the following variables to measure the construct ‘Customer Satisfaction’.

1. Tangibility
2. Reliability
3. Efficiency
4. Accuracy
5. Security
6. Customer Service

'Customer Satisfaction' construct was taken as the dependent variable in the study and contained 35 items after content and face validity through experts opinion. In order to explore the dimensions of customer satisfaction construct, Exploratory Factor Analysis (SPSS 20) have been done. After identifying the dimension structure, it need to be confirmed using Confirmatory Factor Analysis (AMOS 20).

6.2.1 Exploratory Factor Analysis:

The indicator variables related to Customer Satisfaction construct are subjected to an exploratory factor analysis to identify the dimension structure, i.e. to test whether the factors extracted are similar to the dimensions proposed in the study. The analysis was conducted by using the software SPSS 20 and the result of the analysis is depicted in the table 6.1

Table 6.1

KMO and Bartlett's Test- Customer Satisfaction

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.947
Bartlett's Test of Sphericity	Approx. Chi-Square	7750.378
	Df	595
	Sig.	.000

Source: Survey Data

Table 6.1 elucidate the result of KMO and Bartlett's Test of Sphericity. KMO statistic is used to test sampling adequacy of data. It indicates the proportion of variance in the variables that might be caused by underlying factors. The result shows that the Kaiser-

Meyer-Olkin Measure of Sampling Adequacy was 0.947 which is 'marvellous level' as described by Gaskin, 2014 and 'meritorious level' as described by Kaiser, 1974. Bartlett's Test of Sphericity is a statistical test for the presence of correlations among the variables. It was significant ($p<0.001$) with a chi-square value of 7750 with 595 degrees of freedom confirming the goodness of data for further analysis.

Table 6.2 describes the result of Principal Component Analysis after which six components of customer satisfaction are identified with Eigen value greater than one.

Table 6.2

Total Variance Explained by Variables of Customer Satisfaction

Component	Initial Eigen Values		
	Total	% of Variance	Cumulative %
1	12.255	35.015	35.015
2	2.931	8.375	43.390
3	2.451	7.003	50.394
4	1.920	5.487	55.880
5	1.558	4.452	60.332
6	1.358	3.881	64.213

Source: Survey Data

Extraction Method: Principal Component Analysis.

Table 6.2 illustrates the total variance explained by the components of customer satisfaction. The factor structure developed from EFA has got adequate loading for each factor with minimum chance for cross loading. The exploratory maximum likelihood factor analysis identified 6 components with Eigen value greater than 1, together explained over variance of 64.213 percent. The first component explains 35.015 percent of variance with an Eigen value of 12.255. The second factor explains 8.375 percent variation with Eigen value 2.391. The next 7.001 percent of variance is explained by the third component. (Eigen value 2.451). 5.487 percent and 4.452 percent variances are explained by the fourth and fifth components respectively. Eigen values of these components are 1.920 and 1.558. Sixth and the last component explained 3.881

percent variance with Eigen value 1.358. Thus the EFA resulted in reducing the 35 indicator variables into six components.

Table 6.3 specify the details of each factor along with component loadings. The factors identified are 'Tangibility' with seven indicators (T1 to T7), 'Reliability' with five indicators (R1 to R5), 'Efficiency' with five indicators (E1 to E5), 'Accuracy' with six indicators (A1 to A6), 'Security' with six indicators (S1 to S6) and 'Customer Service' with six indicators (C1 to C6).

Table 6.3

Component Loadings of Customer Satisfaction

Variable	Indicator	Component					
		1	2	3	4	5	6
T1	Latest equipment and technology	.775					
T2	Access to the bank branch	.727					
T3	Sufficient number of ATMs	.810					
T4	Cash counting machines	.776					
T5	Number of service counters	.774					
T6	Visual appeal of information materials (Pamphlets, danglers, brochures at the branch)	.779					
T7	Guide signs indicating as to which counters offer which services	.738					
R1	The site does not hang or malfunction before the transaction is put through		.748				
R2	Information provided on the bank's website		.826				

R3	Up to date content		.829				
R4	Process of transactions		.807				
R5	Range of products and services provided		.826				
E1	Prompt response to the request of customers			.601			
E2	Faster log in facility			.703			
E3	Performance of Plastic cards(ATM, Debit/Credit)			.705			
E4	Transfer of Funds(NEFT, RTGS, Quick Transfer, IMPS)			.755			
E5	Clearing Services(ECS-Credit/Debit)			.665			
A1	Problem-solving through instant information				.631		
A2	Bank insists on error-free transaction records				.701		
A3	Electronic Bill payments				.611		
A4	Fairness of service charges				.644		
A5	Accurate promises about the services delivered				.721		
A6	Confirmation of services ordered				.639		
S1	Security for ATMs					.666	
S2	Online filling of personal or transaction data					.662	
S3	Protection of banking transactions					.698	
S4	Privacy / Confidentiality of the bank.					.652	

S5	Care in collection and maintenance of personal information					.735	
S6	Instructions on the website					.727	
C1	Customer friendly environment at Bank						.711
C2	Customer feedback services						.731
C3	Capable of solving complaints adequately						.738
C4	Brochures to educate new users						.742
C5	Special services for the elders and disabled						.741
C6	Convenient hours of operation (24 X7)						.718

Source: Survey Data

Extraction Method: Principal Component Analysis.

The result of the principal component analysis is represented in table 6.3 and it yielded six components from 35 indicator variables. The first component which extracts 35.015 percent of the total variance includes seven indicators i.e. 'Latest equipment and technology', 'Access to the bank branch', 'Sufficient number of ATMs', 'Cash counting machines', 'Number of service counters', 'Visual appeal of information materials' and 'Guide signs indicating as to which counters offer which services'. They are commonly named as **'Tangibility'**.

The second component extracted 8.375 percent variance with five indicators namely 'The site does not hang or malfunction before the transaction is put through', 'Information provided at the bank's website', 'Up to date content', 'Process of transactions' and 'Range of products and services provided'. This component is called as **'Reliability'**.

The third component with next higher factor loadings extracted 7.003 percent variance from the total variance. 'Prompt response to the request of customers', 'Faster log in

facility', 'Performance of Plastic cards (ATM, Debit/Credit)', 'Transfer of Funds (NEFT, RTGS, Quick Transfer, IMPS)' and 'Clearing Services (ECS-Credit/Debit)' are the five indicators included in the third component and is named **'Efficiency'**.

The fourth component of the construct 'Service Quality' which extracted 5.487 percent from the total variance is named **'Accuracy'**. It includes six indicators, 'Problem solving through instant information', 'Bank insists on error-free transaction records', 'Electronic Bill payments', 'Fairness of service charges', 'Accurate promises about the services delivered' and 'Confirmation of services ordered'.

The next component is related to the security of the innovative banking practices and hence it is named as **'Security'**. Six statements are included in the fifth component, they are 'Security for ATMs', 'Online filling of personal or transaction data', 'Protection of banking transactions', 'Privacy / Confidentiality of the bank', 'Care in collection and maintenance of personal information' and 'Instructions on the website'. These statements together extracted 4.452 percent from the total variance.

The sixth and last component was comprised of six statements regarding the services provided to the customers. Hence it is named as **'Customer Service'**. 'Customer friendly environment at Bank', 'Customer feedback services', 'Capable of solving complaints adequately', 'Brochures to educate new users', 'Special services for the elders and disabled' and 'Convenient hours of operation (24 X7)' are the six indicators which extracted 3.881 percent from the total variance.

6.2.2 Confirmatory Factor Analysis- Customer Satisfaction

Confirmatory Factor Analysis 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 latent constructs. Figure 6.1 shows the confirmatory model of Customer Satisfaction.

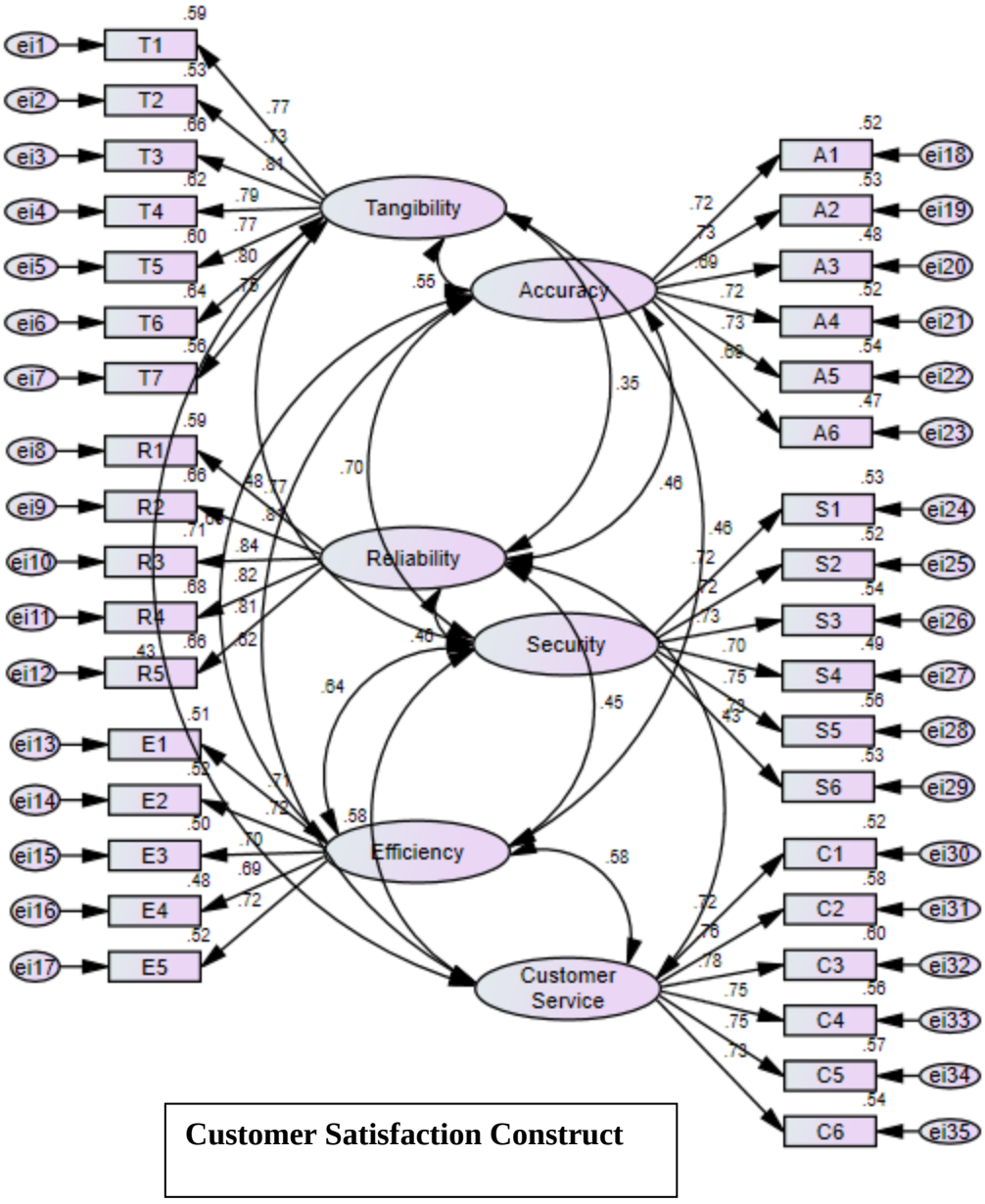


Fig 6.1 Measurement Model of Customer Satisfaction

Table 6.4

Regression Coefficients- Customer Satisfaction

Variables			Unstandardised Coefficient(B)	S.E. (B)	Standardised Coefficient (Beta)	t value	p-value
R4	<---	Reliability	1.052	.061	.823	17.241	<0.001
R3	<---	Reliability	1.182	.067	.841	17.675	<0.001
R2	<---	Reliability	1.174	.069	.814	17.028	<0.001
R1	<---	Reliability	1.000		.768		
R5	<---	Reliability	1.083	.064	.814	17.019	<0.001
T4	<---	Tangibility	1.017	.061	.789	16.605	<0.001
T3	<---	Tangibility	1.105	.064	.811	17.138	<0.001
T2	<---	Tangibility	.908	.060	.731	15.164	<0.001
T1	<---	Tangibility	1.000		.771		
T5	<---	Tangibility	1.007	.062	.775	16.243	<0.001
S4	<---	Security	1.025	.077	.703	13.295	<0.001
S3	<---	Security	1.069	.077	.732	13.828	<0.001
S2	<---	Security	1.054	.077	.723	13.659	<0.001
S1	<---	Security	1.000		.725		
S5	<---	Security	1.058	.075	.747	14.119	<0.001
A4	<---	Accuracy	1.122	.083	.722	13.517	<0.001
A3	<---	Accuracy	1.008	.078	.690	12.933	<0.001
A2	<---	Accuracy	1.052	.077	.727	13.604	<0.001
A1	<---	Accuracy	1.000		.719		
A5	<---	Accuracy	1.104	.081	.732	13.710	<0.001
E4	<---	Efficiency	.929	.074	.695	12.578	<0.001
E3	<---	Efficiency	.947	.074	.704	12.735	<0.001
E2	<---	Efficiency	.978	.075	.718	12.967	<0.001
E1	<---	Efficiency	1.000		.713		

E5	<---	Efficiency	.961	.074	.723	13.043	<0.001
C4	<---	Customer_Service	1.100	.078	.750	14.181	<0.001
C3	<---	Customer_Service	1.186	.081	.777	14.686	<0.001
C2	<---	Customer_Service	1.170	.081	.764	14.450	<0.001
C1	<---	Customer_Service	1.000		.720		
C5	<---	Customer_Service	1.155	.081	.754	14.257	<0.001
T6	<---	Tangibility	1.115	.066	.798	16.817	<0.001
T7	<---	Tangibility	.981	.063	.751	15.648	<0.001
A6	<---	Accuracy	.972	.075	.687	12.876	<0.001
S6	<---	Security	1.022	.074	.731	13.816	<0.001
C6	<---	Customer_Service	1.079	.078	.732	13.843	<0.001

Source: Survey Data

Table 6.5 illustrates the model fit indices of the measurement model along with the recommended value of good fit

Table 6.5

Model Fit Indices-Customer Satisfaction

Indices	**Value Obtained**	**Recommended Value of Good Fit**
Normed chi- square CMIN/DF	1.243	<3
Root Mean Square Error of Approximation(RMSEA)	.025	<0.05
Comparative Fix Index(CFI)	.982	>0.90
Goodness of Fit Index(GFI)	.911	>0.90
Normed fit Index(NFI)	.915	>0.90
Tucker - Lewis Index(TLI)	.980	>0.90
Incremental Fit Index(IFI)	.982	>0.90

Source: Survey Data

The measurement model of the construct 'Customer Satisfaction' was tested and confirmed by Confirmatory Factor Analysis using AMOS 20. Table 6.1 shows the model fit indices of CFA like CMIN/DF, RMSEA, CFI, GFI, NFI, TLI and IFI. Confirmatory Factor Analysis confirms the structure of measurement scales as all the fit indices are satisfactory.

6.2.3 Dimensions of Customer Satisfaction

The perception of respondents regarding the customer satisfaction and its dimensions are analyzed using the mean score and standard deviation. One sample t-test is employed for this. A sector-wise comparison using independent sample t-test is carried out to find out the difference between customers of public and private sector banks with regard to the dimensions of customer satisfaction. Six dimensions of customer satisfaction are divided into three levels based on 'Quartile Deviation'. This is done with the objective of having a clear idea about the perception of customers regarding the various dimensions of customer satisfaction. The three levels are High, Moderate and Low levels.

A. Respondents Perception Regarding Dimensions of Customer Satisfaction

Perception of respondents regarding dimensions of customer satisfaction is measured on a rating scale of five points with values 5 for 'Highly satisfied', 4 for 'Satisfied', 3 for 'Neutral', 2 for 'Dissatisfied' and 1 for 'Highly dissatisfied'. Satisfaction of customers is measured by comparing the mean score value with the test value. One sample t-test is employed for this and it is carried out separately for the public and private sector. The test value is different for every dimension as the computed value of the statements from each of the dimensions is taken for the analysis. Sector-wise analysis is done to know whether there is any significant difference in the perception of public and private sector respondents towards dimensions of customer satisfaction.

a) Public Sector

Perception of public sector respondents towards dimensions of customer satisfaction is illustrated in table 6.6.

Table 6.6

Perception of Respondents towards Dimensions of Customer Satisfaction – Public Sector

Dimensions	Mean	SD	t value	p-value	Test value
Tangibility	27.62	5.43	17.901	.000	21
Reliability	19.13	4.16	14.533	.000	15
Efficiency	19.81	3.29	21.417	.000	15
Accuracy	23.88	3.99	21.561	.000	18
Security	23.55	4.53	17.973	.000	18
Customer Service	23.43	4.55	17.521	.000	18

Source: Survey Data

Table 6.6 interprets that in the case of public sector, the mean score values of all the six dimensions of customer satisfaction is above their test value. One sample t-test result shows p values less than 0.05 indicating a significant positive variation from the neutral value for all the dimensions. It means that the customers of public sector banks are satisfied with the various dimensions of customer satisfaction.

b) Private Sector

Perception of private sector respondents towards the dimensions of customer satisfaction is represented in table 6.7

Table 6.7

Perception of Respondents towards Dimensions of Customer Satisfaction – Private Sector

Dimensions	Mean	SD	t value	P value	Test value
Tangibility	28.24	4.78	20.25	.000	21
Reliability	19.81	4.04	16.168	.000	15
Efficiency	20.39	2.87	25.537	.000	15
Accuracy	25.36	3.08	32.460	.000	18
Security	25.05	2.52	38.076	.000	18
Customer Service	24.55	3.54	25.162	.000	18

Source: Survey Data

From the table 6.7 make it clear that, the mean score values of all the dimensions are above their test values. Result of one sample t test in the private sector shows mean score values which significantly vary from their test value as the p values are less than 0.05. That means the customers of private sector banks are satisfied with the various dimensions of customer satisfaction.

c) Dimensions of Customer Satisfaction: Sector-wise Comparison

The perception of customers of public and private sector banks may differ. A sector-wise comparison is done to identify if there is any significant difference between the customers of public and private sector banks regarding dimensions of customer satisfaction. Independent sample t-test is employed to test the Null hypothesis set.

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

The result of independent sample t-test is given in table 6.8.

Table 6.8

Dimensions of Customer Satisfaction: Sector-wise Comparison

Dimensions	Sector	Mean	SD	t value	p-value	Remarks
Tangibility	Public	27.62	5.43	1.204	.229	Insignificant
	Private	28.24	4.78			
Reliability	Public	19.13	4.16	1.650	.100	Insignificant
	Private	19.81	4.04			
Efficiency	Public	19.81	3.29	1.847	.066	Insignificant
	Private	20.39	287			
Accuracy	Public	23.88	3.99	4.089	.000	Significant
	Private	25.36	3.08			
Security	Public	23.55	4.53	4.004	.000	Significant

	Private	25.05	2.52			
Customer Service	Public	23.44	4.55	2.688	.007	Significant
	Private	24.55	3.54			
Customer Satisfaction	**Public**	**137.43**	**19.93**	**3.400**	**.001**	**Significant**
	Private	**143.39**	**14.12**			

Source: Survey Data

In the case of overall customer satisfaction, the p-value of .001 indicates that there is a significant difference in the perception of public and private sector respondents. Hence the Null hypothesis is rejected at 5% level of significance. The mean perception score of the private sector (143.39) is more than the private sector (137.43).

As far as the other dimension 'Accuracy' (Public- 23.88, Private- 25.36), 'Security' (Public- 23.55, Private-25.05) and 'Customer Service' (Public- 23.44, Private-24.55) is concerned, mean perception score of the private sector is more than the public sector. The p values of these dimensions which is less than 0.05 lead to the rejection of Null hypothesis at 5 % level of significance. It means there is a significant difference in the perception of public and private sector respondents with regard to these three dimensions of customer satisfaction.

The result of independent sample t-test shown in table 6.8 reveals that there is no significant difference in the perception of public and private sector respondents regarding the dimensions 'Tangibility', 'Reliability' and 'Efficiency'. Since the p-value of these dimensions is greater than 0.05 the Null hypothesis is accepted

- **Level of Customer Satisfaction and its Dimensions**

Customer Satisfaction and its dimensions are divided into three levels i.e. Low, Moderate and High levels based on Quartile Deviation. This is done with the object of stating the perception of respondents toward the dimensions of the customer satisfaction in a more clear and easy to understand manner. The norms for determining the level of customer satisfactions is depicted in table 6.9.

Table 6.9

Norms for Level of Customer Satisfaction

Dimensions	Level of Satisfaction		
	Low	**Moderate**	**High**
Tangibility	Below 28	28-31	Above 31
Reliability	Below 18	18-22	Above 22
Efficiency	Below 19	19-22	Above22
Accuracy	Below 24	24-27	Above 27
Security	Below 24	24-27	Above 27
Customer Service	Below 23	23-26	Above 26
Customer Satisfaction	Below 137	137-150	Above 150

Source: Survey Data

Table 6.10 reveals the frequency and percentage of level of customer satisfaction and its dimension on the basis of the norms detailed in table 6.9.

Table 6.10

Level of Customer Satisfaction

Dimensions	Public Sector				Private Sector			
	Low	**Moderate**	**High**	**Level**	**Low**	**Moderate**	**High**	**Level**
Tangibility	81 (37.67)	70 (32.56)	64 (29.77)	Low	56 (30.27)	79 (42.70)	50 (27.02)	Moderate
Reliability	72 (33.49)	61 (28.37)	82 (38.14)	High	38 (20.54)	45 (24.32)	102 (55.14)	High
Efficiency	63 (29.30)	61 (28.37)	91 (42.33)	High	41 (22.16)	29 (15.68)	115 (62.16)	High
Accuracy	88 (40.93)	71 (33.02)	56 (26.05)	Low	42 (22.70)	58 (31.35)	85 (45.95)	High
Security	88 (40.93)	70 (32.56)	57 (26.51)	Low	56 (30.27)	81 (43.78)	48 (25.95)	Moderate
Customer Service	67 (31.16)	72 (33.49)	76 (35.35)	High	35 (18.92)	66 (35.68)	84 (45.41)	High
Customer Satisfaction	**74 (34.42)**	**85 (39.53)**	**56 (26.05)**	**Moderate**	**35 (18.92)**	**86 (46.49)**	**64 (34.59)**	**Moderate**

Source: Survey Data

Table 6.10 elucidates the level of customer satisfaction and its dimensions among the customers of public and private sector banks. When the total customer satisfaction construct is concerned, most of the respondents from public (39.53%) and private (46.49%) sector show a moderate level of satisfaction.

Majority of public sector respondents have a low level of satisfaction on the dimensions tangibility (37.67%), accuracy (40.93%) and security (40.93%) and a high level of satisfaction towards the dimensions reliability (38.14%), efficiency (42.33%) and customer service (35.35%).

In the case of private sector, most of the respondents have a moderate level of satisfaction on the dimensions tangibility (42.70%) and security (43.78%) and a high level of satisfaction on the dimensions reliability (55.14%), efficiency (62.16%), accuracy (45.95%) and customer service (45.41%).

6.2.3 Dimensions of Customer Satisfaction: Age-wise Comparison

The study demands an age-wise comparison of the customer satisfaction and its six dimensions. The categories of age used in the study are 18-25, 25-50 and Above 50. Perception is measured in terms of satisfaction and separate analysis is carried out for the public and private sector.

a) Public Sector

Table 6.11 states the result of one way ANOVA which is used to compare the dimensions of customer satisfaction among the three categories of age group in the public sector and the hypothesis is set as follows:

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

Table 6.11

Dimensions of Customer Satisfaction in the Public Sector : Age-wise Comparison

Dimensions	Age group	Mean	SD	F value	p-value	Remarks
Tangibility	18-25	25.79	7.46	15.609	.000	Significant
	25-50	28.59	4.96			
	Above 50	36.00	.00			
Reliability	18-25	17.38	5.66	35.058	.000	Significant
	25-50	18.71	4.56			
	Above 50	6.55	.52			
Efficiency	18-25	18.54	4.64	46.624	.000	Significant
	25-50	19.19	4.23			
	Above 50	6.54	.52			
Accuracy	18-25	22.74	4.66	4.977	.008	Significant
	25-50	23.98	3.77			
	Above 50	20.45	5.22			
Security	18-25	21.61	6.32	42.552	.000	Significant
	25-50	22.67	5.85			
	Above 50	6.00	.00			
Customer service	18-25	21.87	5.49	2.943	.055	Insignificant
	25-50	23.74	4.29			
	Above 50	25.45	.522			
Customer Satisfaction Total	**18-25**	**127.95**	**23.43**	**18.012**	**.000**	**Significant**
	25-50	**136.88**	**19.96**			
	Above 50	**101.00**	**5.744**			

Source: Survey Data

The result of the one way ANOVA shows the difference among the public sector respondents of various age groups in their perception towards dimensions of customer satisfaction. Since the p values of customer satisfaction and its dimensions except for the

customer service dimension are less than 0.05, the Null hypothesis is rejected at 5% level of significance. For the customer service dimension, the Null hypothesis is accepted as the p-value is greater than 0.05. As there is a significant difference in the perception among the respondents of different age groups for customer satisfaction and its five dimensions namely tangibility, reliability, efficiency, accuracy and security, it is necessary to know the exact difference among the groups. Scheffe post hoc test is employed for this multiple comparisons. The result of the post hoc test is given below.

1. Tangibility

The perception of public sector respondents differs among the three categories of age groups with regard to the dimension 'tangibility'. The result of pair wise comparison is shown in the table 6.12.

Table 6.12

Post-hoc Test with regard to 'Tangibility Dimension' in Public Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-2.79301*	.95870	.016
	50 and above	-10.20513*	1.83822	.000
25-50	18-25	2.79301*	.95870	.016
	50 and above	-7.41212*	1.67671	.000
50 and above	18-25	10.20513*	1.83822	.000
	25-50	7.41212*	1.67671	.000

Source: Survey Data

The result of post hoc test indicates that in the case of tangibility dimension, the perception of the respondents of age group 18-25 differs with the age groups 25-50 and Above 50. Similarly, the perception of other groups also differs significantly.

2. Reliability

As far as the dimension 'reliability' is concerned, the perception of respondents in three categories of age groups has a significant difference. To find out the exact difference a post hoc test is done and the result is given in the table 6.13.

Table 6.13

Post-hoc Test with regard to 'Reliability Dimension' in Public Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-1.32448	.83333	.285
	50 and above	10.83916*	1.59784	.000
25-50	18-25	1.32448	.83333	.285
	50 and above	12.16364*	1.45746	.000
50 and above	18-25	-10.83916*	1.59784	.000
	25-50	-12.16364*	1.45746	.000

Source: Survey Data

Result of the scheffe post hoc test reveals that in the case of reliability dimension, there is a significant difference in the perception between the customers of age groups 18-25 and Above 50 and also between the age groups 25-50 and Above 50. There is no significant difference in the perception among the customers of age groups 18-25 and 25-50 as the p-value is greater than 0.05.

3. Efficiency

Table 6.14 demonstrates the result of scheffe post hoc test for multiple comparisons. Post hoc test is carried out to know exactly the respondents of which age groups differ in their perception towards the efficiency dimension.

Table 6.14

Post-hoc Test with regard to 'Efficiency Dimension' in Public Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-.65548	.74906	.682
	50 and above	11.99301*	1.43626	.000
25-50	18-25	.65548	.74906	.682
	50 and above	12.64848*	1.31007	.000
50 and above	18-25	-11.99301*	1.43626	.000
	25-50	-12.64848*	1.31007	.000

Source: Survey Data

From the result of post hoc test, it is clear that there is a significant difference in the perception of the respondents between the age groups 18-25 and Above 50 and also between the age groups 25-50 and Above 50. Between the customers of age groups 18-25 and 25-50, there is no significant difference in their perception towards efficiency dimension as the p-value is greater than 0.05.

4. Accuracy

The result of one way ANOVA reveals that there exists a significant difference in the perception towards accuracy dimension among public sector respondents of different age groups. To measure the exact difference, a pair wise comparison is done using scheffe post hoc test. The result of post hoc test is demonstrated in the table 6.15

Table 6.15

Post-hoc Test with regard to 'Accuracy Dimension' in Public Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-1.23823	.71692	.227
	50 and above	2.28904	1.37463	.252
25-50	18-25	1.23823	.71692	.227
	50 and above	3.52727*	1.25385	.021
50 and above	18-25	-2.28904	1.37463	.252
	25-50	-3.52727*	1.25385	.021

Source: Survey Data

When the accuracy dimension is concerned, there exists a significant difference in the perception between the customers of age groups 25-50 and above 50. P values of other age groups i.e. between age groups 18-25 and 25-50(p-value- .227) and also between the groups 25-50 and above 50 (p-value- .252) reveal that there is no significant difference in their perception.

5. Security

Security dimension is perceived differently by the public sector respondents of different age group as the p-value is less than 0.05. This calls for a post hoc test to measure exactly the perception of which age group differs. Result of the scheffe post hoc test is shown in the table 6.16.

Table 6.16

Post-hoc Test with regard to 'Security Dimension' in Public Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-1.05128	1.03299	.597
	50 and above	15.61538*	1.98067	.000
25-50	18-25	1.05128	1.03299	.597
	50 and above	16.66667*	1.80665	.000
50 and above	18-25	-15.61538*	1.98067	.000
	25-50	-16.66667*	1.80665	.000

Source: Survey Data

Result of the post hoc test clearly indicates that there is significant difference in the perception between the respondents of age groups 18-25 and Above 50 and also between the age groups 18-25 and 25-50. Between the age groups 18-25 and 25-50, there is no significant difference in the perception as the p-value is greater than 0.05.

6) Customer Satisfaction

For the total customer satisfaction, post hoc test is done to make an inter group comparison. The result of post hoc test is given in the table 6.17.

Table 6.17

Post-hoc Test with regard to 'Customer Satisfaction' in Public Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-8.93613*	3.59794	.048
	50 and above	26.94872*	6.89873	.001
25-50	18-25	8.93613*	3.59794	.048
	50 and above	35.88485*	6.29261	.000
50 and above	18-25	-26.94872*	6.89873	.001
	25-50	-35.88485*	6.29261	.000

Source: Survey Data

The result of scheffe post hoc test depicted in the table 6.17 demonstrates that in the case of 'Customer Satisfaction', there is significant difference in the perception between respondents of age groups 18-25 and 25-50, 18-25 and Above 50 and also between the groups 25-50 and Above 50.

b) Private Sector

One way ANOVA is used to compare the dimensions of customer satisfaction among the three categories of age group in the private sector and the hypothesis is set as follows:

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

Table 6.18

Dimensions of Customer Satisfaction in the Private Sector: Age-wise Comparison

Dimensions	Age group	Mean	SD	F value	p-value	Remarks
Tangibility	18-25	29.7273	2.53683	6.343	.002	Significant
	25-50	27.8547	5.16498			
	Above 50	30.9167	2.84248			
Reliability	18-25	20.2045	4.26222	10.575	.000	Significant
	25-50	17.9487	5.64136			
	Above 50	13.6250	7.55739			
Efficiency	18-25	20.1136	3.49229	13.046	.000	Significant
	25-50	18.7863	5.31236			
	Above 50	13.5000	7.35438			
Accuracy	18-25	25.8864	2.08222	6.308	.002	Significant
	25-50	25.0427	3.48493			
	Above 50	22.3333	7.62528			
Security	18-25	24.7727	4.54366	15.038	.000	Significant
	25-50	22.8205	6.34173			
	Above 50	15.8333	10.07220			
Customer service	18-25	24.4545	3.01511	.560	.572	Insignificant
	25-50	24.4359	3.67279			
	Above 50	25.2500	3.41671			
Customer Satisfaction	**18-25**	**145.1591**	**12.06753**	**10.990**	**.000**	**Significant**
	25-50	**136.8889**	**20.67515**			
	Above 50	**121.4583**	**26.68981**			

Source: Survey Data

Table 6.18 depicts the result of the one way ANOVA which shows the difference among the private sector respondents of various age groups in their perception towards

dimensions of customer satisfaction. Since the p values of customer satisfaction and its dimensions except for the customer service dimension are less than 0.05, the Null hypothesis is rejected at 5% level of significance. For the customer service dimension the Null hypothesis is accepted as the p-value is greater than 0.05. Scheffe post hoc test is employed for the multiple comparisons as there is significant difference in the perception among the respondents of different age groups towards customer satisfaction and five of its dimensions namely tangibility, reliability, efficiency, accuracy and security.

The result of scheffe post hoc test is given below.

1) Tangibility

Result of one way ANOVA reveals that there exists a significant difference in the perception towards tangibility dimension among private sector respondents of different age groups. To measure the exact difference, a pair wise comparison is done using scheffe post hoc test. The result of post hoc test is demonstrated in the table 6.19.

Table 6.19

Post-hoc Test with regard to 'Tangibility Dimension' in Private Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-2.79301*	.95870	.016
	50 and above	-10.20513*	1.83822	.000
25-50	18-25	2.79301*	.95870	.016
	50 and above	-7.41212*	1.67671	.000
50 and above	18-25	10.20513*	1.83822	.000
	25-50	7.41212*	1.67671	.000

Source: Survey Data

The result of scheffe post hoc test depicted in the table 6.19 demonstrates that in the case of tangibility dimension, there is significant difference in the perception between respondents of age groups 18-25 and 25-50, 18-25 and Above 50 and also between the groups 25-50 and Above 50.

2) Reliability

The perception of private sector respondents differs among the three categories of age groups with regard to the dimension 'reliability' as the p-value is less than 0.05. A post hoc test is carried out to know the perception of which age groups differs significantly. The result of pair wise comparison using scheffe post hoc test is shown in the table 6.20.

Table 6.20

Post-hoc Test with regard to Reliability Dimension' in Private Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-1.32448	.83333	.285
	50 and above	10.83916*	1.59784	.000
25-50	18-25	1.32448	.83333	.285
	50 and above	12.16364*	1.45746	.000
50 and above	18-25	-10.83916*	1.59784	.000
	25-50	-12.16364*	1.45746	.000

Source: Survey Data

When the reliability dimension is concerned, there exists a significant difference in the perception between the customers of age groups 18-25 and above 50 and also between the age groups 25-50 and above 50. P values of the age group 18-25 and 25-50(p-value-.285) reveal that there is no significant difference in their perception.

3) Efficiency

As far as the dimension 'efficiency' is concerned, the perception of respondents in three categories of age groups has a significant difference. To find out the exact difference a post hoc test is done and the result is given in the table 6.21.

Table 6.21

Post-hoc Test with regard to 'Efficiency Dimension' in Private Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-.65548	.74906	.682
	50 and above	11.99301*	1.43626	.000
25-50	18-25	.65548	.74906	.682
	50 and above	12.64848*	1.31007	.000
50 and above	18-25	-11.99301*	1.43626	.000
	25-50	-12.64848*	1.31007	.000

Source: Survey Data

From the table 6.21, it is clear that in the case of efficiency dimension, the perception of the respondents of age group 18-25 differs with the age group Above 50. There is also a significant difference in the perception of respondents between age groups 25-50 and Above 50. P value of .682 in the case of the age groups 18-25 and 25-50 indicates that there is no significant difference between their perceptions.

4) Accuracy

When the accuracy dimension is concerned, the result of one way ANOVA indicates that there exists a significant difference in the perception among the customers of various age groups. So a post hoc test is carried out to know exactly the perception of which age group is different.

Table 6.22

Post-hoc Test with regard to 'Accuracy Dimension' in Private Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-1.23823	.71692	.227
	50 and above	2.28904	1.37463	.252
25-50	18-25	1.23823	.71692	.227
	50 and above	3.52727*	1.25385	.021
50 and above	18-25	-2.28904	1.37463	.252
	25-50	-3.52727*	1.25385	.021

Source: Survey Data

Table 6.22 reveals the result of scheffe post hoc test which shows there is a significant difference in the perception of customers between the age groups 25-50 and Above 50. There is no significant difference in the other two cases, i.e. between the respondents of age groups '18-25 and 25-50' and '18-25 and above 50'.

5) Security

The perception of private sector respondents differs among the three categories of age groups with regard to the dimension 'security'. The result of pair wise comparison is shown in the table 6.23.

Table 6.23

Post-hoc Test with regard to 'Security Dimension' in Private Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-1.05128	1.03299	.597
	50 and above	15.61538*	1.98067	.000
25-50	18-25	1.05128	1.03299	.597
	50 and above	16.66667*	1.80665	.000
50 and above	18-25	-15.61538*	1.98067	.000
	25-50	-16.66667*	1.80665	.000

Source: Survey Data

Table 6.23 illustrates the result of post hoc test which clearly indicates that the perception of customers towards the security dimension differs between the age groups '18-25 and Above 50' and '25-50 and Above 50'. The p-value of .597 makes it's clear that there is no significant difference in the perception between the age groups '18-25 and 25-50'.

6) Customer Satisfaction

The significant difference in the perception towards the total customer satisfaction among the respondents of different age groups calls for a post hoc test to be carried out. The result of scheffe post hoc test is shown in the table 6.24

Table 6.24

Post-hoc Test with regard to 'Customer Satisfaction' in Private Sector

Age Interval (I)	Age Interval (J)	Mean Difference (I-J)	Std. Error	P value
18-25	25-50	-8.93613*	3.59794	.048
	50 and above	26.94872*	6.89873	.001
25-50	18-25	8.93613*	3.59794	.048
	50 and above	35.88485*	6.29261	.000
50 and above	18-25	-26.94872*	6.89873	.001
	25-50	-35.88485*	6.29261	.000

Source: Survey Data

The result of post hoc test depicted in the table 6.24 elucidates that there is a significant difference in the perception between respondents of age groups '18-25 and 25-50', '18-25 and Above 50' and also between the groups '25-50 and Above 50'

6.2.4 Area- wise Comparison: Dimensions of Customer Satisfaction

The context of the study calls for an area wise comparison of the customer satisfaction and its six dimensions. The categories of area of residence used in the study are rural, semi-urban and urban. Perception is measured in terms of satisfaction and separate analysis is carried out for the public and private sector.

a) Public Sector

The result of one way ANOVA, which is used to compare the dimensions of customer satisfaction among the three categories of residential area in the public sector is demonstrated in the table 6.25 and the hypothesis is set as follows:

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

Table 6.25

Dimensions of Customer Satisfaction in the Public Sector: Area-wise Comparison

Dimensions	Area of residence	Mean	SD	F value	p-value	Remarks
Tangibility	Rural	29.0101	6.20483	.884	.415	Insignificant
	Semi-urban	27.7692	4.68739			
	Urban	28.1039	5.60212			
Reliability	Rural	16.6364	5.90823	4.820	.009	Significant
	Semi-urban	18.8462	4.21488			
	Urban	18.8961	4.88711			
Efficiency	Rural	17.2121	5.83842	5.607	.004	Significant
	Semi-urban	19.4103	3.38509			
	Urban	19.4935	4.22282			
Accuracy	Rural	23.9697	3.49184	1.055	.350	Insignificant
	Semi-urban	23.5897	4.03092			
	Urban	23.0649	4.79950			
Security	Rural	19.7576	8.06237	7.373	.001	Significant
	Semi-urban	22.7692	5.00243			
	Urban	23.4416	5.16693			
Customer service	Rural	23.3838	4.48514	1.023	.361	Insignificant
	Semi-urban	22.7692	4.79288			
	Urban	24.0000	4.36192			
Customer Satisfaction	**Rural**	**129.9697**	**20.63950**	**2.444**	**.089**	**Insignificant**
	Semi-urban	**135.1538**	**21.42003**			
	Urban	**137.0000**	**22.88817**			

Source: Survey Data

Area wise comparison regarding the dimensions of customer satisfaction in the public sector is shown in the table 6.25. P values of .089 for the total customer satisfaction, .415 for tangibility dimension, .350 for accuracy dimension and .361 for customer service dimension elucidates that the perception of respondents from different residential area does not differ in these cases. For the dimensions reliability, efficiency and security the hypothesis are rejected at 5% level of significance as the p values are less than 0.05. For these dimensions, there is a significant difference in the perception among respondents of different residential area. So a post hoc test is to be carried out to make multiple comparisons. Scheffe test for multiple comparisons is used to identify the perception of respondents from which area differs significantly. The result of the scheffe post hoc test is given in the table 6.26.

1) Reliability

The perception of public sector respondents differs among the three categories of residential area with regard to the dimension 'reliability'. The result of pair wise comparison is shown in the table 6.26.

Table 6.26

Post-hoc Test with regard to 'Reliability Dimension' in Public Sector

Area of residence (I)	Area of residence (J)	Mean Difference (I-J)	Std. Error	P value
Rural	Semi-urban	-2.20979	.99829	.089
	Urban	-2.25974*	.80235	.020
Semi-urban	Rural	2.20979	.99829	.089
	Urban	-.04995	1.03781	.999
Urban	Rural	2.25974*	.80235	.020
	Semi-urban	.04995	1.03781	.999

Source: Survey Data

From the table 6.26, it is clear that in the case of reliability dimension, the perception of the respondents from the rural area and urban area differs significantly. With the P value of .089 and .999 between the 'rural and semi-urban' and 'semi-urban and urban,' it can be interpreted that there is no significant difference between the perceptions in both the cases.

2) Efficiency

Table 6.27 demonstrates the result of scheffe post hoc test for multiple comparisons. Post hoc test is carried out to know exactly the public sector respondents from which area differ in their perception towards the efficiency dimension.

Table 6.27

Post-hoc Test with regard to 'Efficiency Dimension' in Public Sector

Area of residence (I)	Area of residence (J)	Mean Difference (I-J)	Std. Error	P value
Rural	Semi-urban	-2.19814	.93011	.064
	Urban	-2.28139*	.74754	.010
Semi-urban	Rural	2.19814	.93011	.064
	Urban	-.08325	.96693	.996
Urban	Rural	2.28139*	.74754	.010
	Semi-urban	.08325	.96693	.996

Source: Survey Data

The result of the post hoc test elucidates that there is a significant difference in the perception towards efficiency dimension between the respondents from the rural and urban area. The test also reveals that the perception of respondents between the other two groups doesn't differ. P value of the three groups is .064(Rural and Semi-urban), .010(Rural and Urban) and .996(Semi-urban and Urban).

3. Security

The dimension security is perceived differently by the public sector respondents of the different residential area as the p-value is less than 0.05. This calls for a post hoc test to measure exactly the perception of respondents from which area differs significantly. Result of the scheffe post hoc test is shown in the table 6.28.

Table 6.28

Post-hoc Test with regard to 'Security Dimension' in Public Sector

Area of residence (I)	Area of residence (J)	Mean Difference (I-J)	Std. Error	P value
Rural	Semi-urban	-3.01166	1.25554	.059
	Urban	-3.68398*	1.00910	.002
Semi-urban	Rural	3.01166	1.25554	.059
	Urban	-.67233	1.30524	.876
Urban	Rural	3.68398*	1.00910	.002
	Semi-urban	.67233	1.30524	.876

Source: Survey Data

From the result of the post hoc test, it can be interpreted that there is a significant difference in the perception towards security dimension between the respondents of rural and urban area. P value of .059 and .876 makes it clear that there is no difference in the perception between the respondents of 'rural and semi-urban' and 'semi-urban and urban'.

b) Private Sector

One way ANOVA is the statistical test employed to know whether there exists any significant difference among the three categories of residential are 'Rural', 'Semi-urban' and 'Urban' of the private sector respondents in their perception towards customer

satisfaction and its dimensions. The result of one way ANOVA is demonstrated in the table 6.29.

Table 6.29

Dimensions of Customer Satisfaction in the Private Sector: Area-wise Comparison

Dimensions	Area of residence	Mean	SD	F value	p-value	Remarks
Tangibility	Rural	28.2963	5.06074	2.943	.055	Insignificant
	Semi-urban	30.2250	3.17432			
	Urban	28.2500	4.44365			
Reliability	Rural	16.6420	6.33504	4.059	.019	Significant
	Semi-urban	18.1500	6.26160			
	Urban	19.4063	4.78662			
Efficiency	Rural	17.3827	6.46639	3.816	.024	Significant
	Semi-urban	18.1250	5.58013			
	Urban	19.9063	3.93083			
Accuracy	Rural	25.1358	3.85601	.309	.735	Insignificant
	Semi-urban	24.5250	5.13903			
	Urban	24.8125	3.79170			
Security	Rural	20.7407	8.18654	4.780	.009	Significant
	Semi-urban	22.6000	7.24940			
	Urban	24.3125	4.57694			
Customer service	Rural	24.5926	3.31955	2.158	.118	Insignificant
	Semi-urban	25.4000	1.48151			
	Urban	23.9531	4.39852			
Customer Satisfaction	**Rural**	**132.7901**	**22.31295**	**2.833**	**.061**	**Insignificant**
	Semi-urban	**139.0250**	**20.01728**			
	Urban	**140.6406**	**19.12977**			

Source: Survey Data

Table 6.29 depicts the result of the one way ANOVA which shows the difference among the private sector respondents from different residential area in their perception towards

dimensions of customer satisfaction. Since the p values of the dimensions reliability, efficiency and security are less than 0.05, the Null hypothesis is rejected at 5% level of significance. For the dimensions, tangibility, accuracy, customer service and for the total customer satisfaction, the Null hypothesis is accepted as the p-value is greater than 0.05. Scheffe post hoc test is employed for making multiple comparisons of the dimensions with significant difference in their perception.

1) Reliability

Table 6.30 demonstrates the result of scheffe post hoc test for multiple comparisons. Post hoc test is carried out to know exactly the private sector respondents from which residential area differ in their perception towards the reliability dimension.

Table 6.30

Post-hoc Test with regard to 'Reliability Dimension' in Private Sector

Area of residence (I)	Area of residence (J)	Mean Difference (I-J)	Std. Error	P value
Rural	Semi-urban	-1.50802	1.12639	.410
	Urban	-2.76427*	.97481	.020
Semi-urban	Rural	1.50802	1.12639	.410
	Urban	-1.25625	1.17481	.566
Urban	Rural	2.76427*	.97481	.020
	Semi-urban	1.25625	1.17481	.566

Source: Survey Data

In the case of reliability dimension, there is significant difference in the perception between the customers from rural and urban area. The result of post hoc test also reveals that there is no significant difference in the perception between the customers of other two groups, i.e. 'rural and semi-urban' and 'semi-urban and urban'

2. Efficiency

The dimension efficiency is perceived differently by the private sector respondents of different residential area as the p-value is less than 0.05. This calls for a post hoc test to measure exactly the perception of respondents from which area differs significantly. Result of the scheffe post hoc test is shown in the table 6.31.

Table 6.31

Post-hoc Test with regard to 'Efficiency Dimension' in Private Sector

Area of residence (I)	Area of residence (J)	Mean Difference (I-J)	Std. Error	P value
Rural	Semi-urban	-.74228	1.06552	.785
	Urban	-2.52353*	.92213	.025
Semi-urban	Rural	.74228	1.06552	.785
	Urban	-1.78125	1.11132	.279
Urban	Rural	2.52353*	.92213	.025
	Semi-urban	1.78125	1.11132	.279

Source: Survey Data

From the result of the post hoc test it can be interpreted that there is significant difference in the perception towards efficiency dimension between the respondents of rural and urban area. P value of .785 and .279 makes it clear that there is no difference in the perception between the respondents of 'rural and semi-urban' and 'semi-urban and urban'.

3) Security

When the security dimension is concerned, the result of one way ANOVA indicates that there exists a significant difference in the perception between the customers from different residential area. So a post hoc test is carried out to know exactly the perception of respondents from which area is different. Scheffe post hoc test for multiple comparisons is used for this purpose.

The result of the scheffe post hoc test is illustrated in the table 6.32.

Table 6.32

Post-hoc Test with regard to 'Security Dimension' in Private Sector

Area of residence (I)	Area of residence (J)	Mean Difference (I-J)	Std. Error	P value
Rural	Semi-urban	-1.85926	1.33849	.383
	Urban	-3.57176*	1.15837	.010
Semi-urban	Rural	1.85926	1.33849	.383
	Urban	-1.71250	1.39602	.473
Urban	Rural	3.57176*	1.15837	.010
	Semi-urban	1.71250	1.39602	.473

Source: Survey Data

From the table 6.32, it is clear that in the case of security dimension, the perception of the respondents from the rural area and urban area differs significantly. With the P value of .383 and .473 between the 'rural and semi-urban' and 'semi-urban and urban' it can be interpreted that there is no significant difference between the perceptions in both the cases.

Section B

6.3 Research Model Analysis

In the present research work, the researcher has made an attempt to analyse the influence of financial innovation on customer satisfaction. Structural Equation Modeling using Partial Least Square was used for the analysis**.** Structural Equation Modeling (SEM) is a combination of Confirmatory Factor Analysis and Path Anaysis. Since the study required the hypothesized model to be tested for the best- fit of the data, SEM was considered appropriate analysis method. The hypothesis set to examine how the financial innovation influences the satisfaction of the customers is as follows:

H_0: There is no significant relationship between financial innovation and customer satisfaction.

6.3.1 Proposed Research Model

In order to analyse the effect of financial innovation on customer satisfaction, the researcher proposed the following research model.

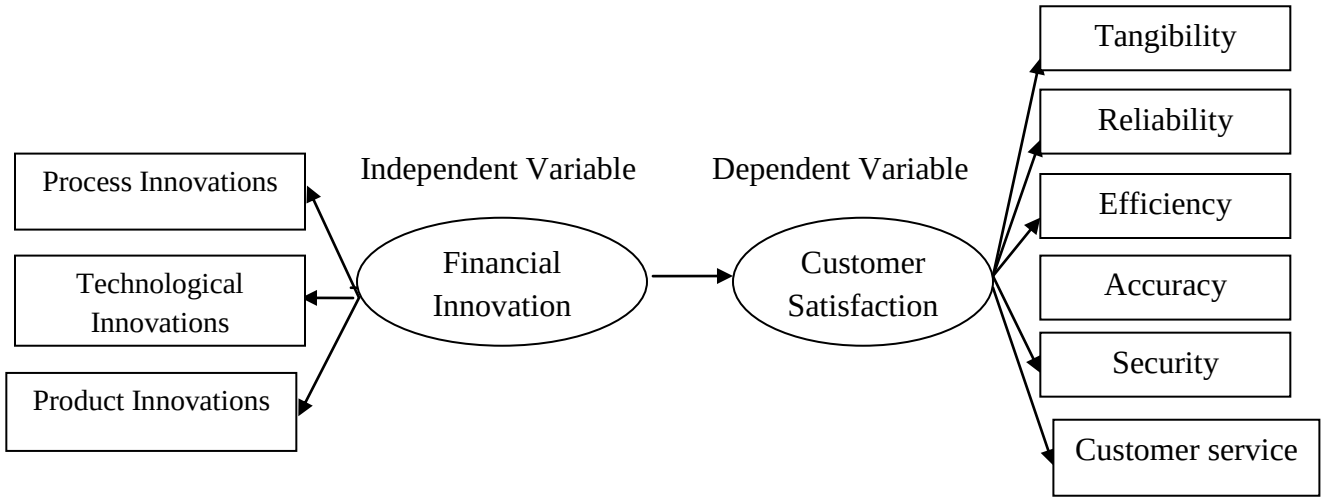


Fig 6.2 Proposed Research Model

6.3.2 Research Model

The influence of financial innovation on customer satisfaction is shown in the figure 6.3. SEM is the combination of structural model and measurement model. The measurement model of financial innovation is shown in fig 5.3 of the previous chapter and the measurement model of customer satisfaction is shown in fig 6.1.

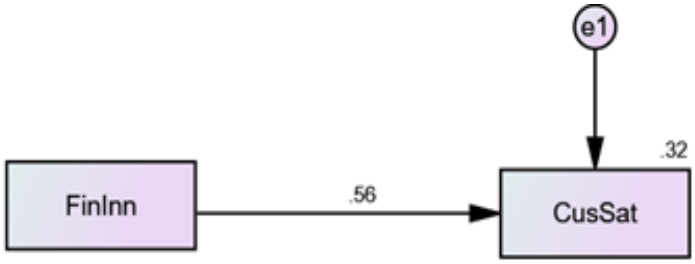


Fig 6.3 Research Model

Table 6.33 illustrates the model fit indices of the SEM model along with the recommended value of good fit

Table 6.33

Model Fit Indices-Research Model

Indices	Value Obtained	Recommended Value of Good Fit
Normed chi- square CMIN/DF	1.147	<3
Root Mean Square Error of Approximation(RMSEA)	.017	<0.05
Comparative Fix Index(CFI)	.964	>0.90
Goodness of Fit Index(GFI)	.984	>0.90
Normed fit Index(NFI)	.958	>0.90
Tucker - Lewis Index(TLI)	.962	>0.90
Incremental Fit Index(IFI)	.964	>0.90

Source: Survey Data

Table 6.33 shows the model fit indices like CMIN/DF, RMSEA, CFI, GFI, NFI, TLI and IFI. SEM confirms the structure of the model as all the fit indices are satisfactory.

The result of hypothesis testing using the statistical tool Structural Equation Modeling is shown in table 6.34

Table 6.34

Result of Hypothesis Testing: Research Model

Hypothesis	β value	P value	Result
H_0: There is no significant relationship between financial innovation and customer satisfaction	.56	<.01	Reject H0

The relationship between financial innovation and customer satisfaction shows a beta value 0.56 and it is significant at 5% level ($p<.01$). That means financial innovation has a significant influence on customer satisfaction.

Conclusion

This chapter deals with the analysis on the dimensions of customer satisfaction. Six dimensions of 'Customer Satisfaction' were explored and confirmed after conducting Exploratory Factor Analysis and Confirmatory Factor Analysis. The result of the analysis shows that respondents of public and private sector banks are satisfied with all the dimensions of customer satisfaction. The Structural Model developed using SEM proves that financial innovation has a significant influence on customer satisfaction. Hence it can be concluded that financial innovation has a significant influence on customer satisfaction. By providing innovative financial products, process and technological innovations to the customers, banks can satisfy the customers, which will result in retaining the existing customers and in attracting prospective customers.

AMRITHA. N.P “FINANCIAL INNOVATIONS IN INDIAN BANKING INDUSTRY: AN EVALUATION OF INNOVATIVENESS AND FINANCIAL PERFORMANCE OF SELECTED BANKS”. THESIS. DEPARTMENT OF COMMERCE AND MANAGEMENT STUDIES, UNIVERSITY OF CALICUT, 2018.

Chapter 7

Summary, Findings and Recommendations

- ***Introduction***
- ***Summary of Research***
- ***Findings of the Study***
- ***Recommendations***
- ***Conclusion***
- ***Areas for Further Research***

Chapter 7

Summary, Findings and Recommendations

7.1 Introduction

This chapter deals with a brief summary of the research followed by important findings which are drawn from the data analysis. The recommendations are also stated in this chapter which is made by the researcher in the light of findings derived from the study. A summary of observations made out of the study is presented as a conclusion and further areas for research are also stated in the chapter.

7.2 Summary of Research

The research study titled "Financial Innovations in Indian Banking Industry: An Evaluation of Innovativeness and Financial Performance of Selected Banks" was undertaken to study the impact of financial innovations on the Indian banking sector. The study investigated the effect of bank innovations on the financial performance of public and private sector banks in India. Indian banking sector has emerged as one of the strongest drivers of India's economic growth. Banks are not just the store house of the county's wealth but are reservoirs of resources necessary for economic development. The revolutionary impact brought in Indian banking sector through the financial innovation is irresistible. Financial Innovation enhances choices to the customers and creates new markets for the banks. It has enabled the 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.

The most important aspect of financial innovation is customer satisfaction. Innovation in banking focuses mainly on technology which will offer better banking products and services and there by leads to increased customer satisfaction. In the current day economic scenario, innovativeness has become a major factor in influencing

customers. Banks looking to restore consumer confidence will need to focus on products most relevant to current customer needs. However, in a time of increased regulatory reform and mounting cost pressures, banks are being challenged to innovate in creative, yet cost-effective ways. The key for banks is not only to spend money on developing new products, rather spend time on redesigning tools and existing products to address consumers' most basic financial needs. Banks achieve competitive advantage through acts of innovation. They approach innovation in its broadcast sense, including new products, technologies and new ways or process of doing things.

The study specifically tried 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?

The study has been taken up with the following objectives

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.

The methodology adopted for the study is descriptive in nature. The required data has been collected both from secondary and primary sources. To measure the status of financial innovation in the selected banks an index was developed by the researcher with the help of existing literature and based on the opinion of the experts. 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). To assess the effect of Financial Innovation on the Financial Performance of banks econometrics procedures was employed by the researcher. The major tools used are Unit Root Test, Cointegration analysis, Vector Error Correction Model and Granger causality/Block Exogeneity test. Primary data was collected using purposive sampling method. Two public sector banks and two private sector banks have been selected as sample of banks and the data was collected from 480 customers. The data collected has been analysed based on the set objectives by making use of statistical tools which include Mean, Percentage, Standard deviation, Quartile Deviation, One sample t-test, Independent Sample t-test, One way ANOVA, Scheffe post hoc test, Exploratory Factor Analysis, Confirmatory Factor Analysis and Structural Equation Modeling.

After the analysis, the research report has been prepared in seven chapters

- The first chapter started 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 of 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 gives an account of the dimension of customer satisfaction and it also presents the model showing the effect of financial innovation on customer satisfaction.
- This chapter happens to be the seventh chapter which is the concluding chapter. The present chapter deals with a summary of the study, findings, recommendations, conclusion and area for further research.

7.3 Findings of the Study

Major findings of this study are summarised below. It is categorised into two main sections (1) Findings from the analysis of secondary data and (2) Findings from the analysis of primary data.

7.3.1 Findings from the Analysis of Secondary Data

1. The Financial Innovation Index constructed for all the four banks selected for the study for the period April 2011 to March 2017 shows that the status of financial innovation has more than trebled during this period. The pattern of the financial innovation shows a continuously increasing trend during the period. This implies that banking transactions are more or less moving towards a technology-oriented mode**.**

2. From the Unit Root Test, it is found that all the variables used in the econometric analysis are difference stationary and are integrated series of first order. It is also found that, as the variables are integrated of the same order these can be used for testing for cointegration.

3. From the Johansen system test for cointegration, it is found that there is one cointegration relationship between the variables, i.e. between FII and DEP, FII and ADV, FII and ROA and FII and ROE. This is applicable in the case of all the four banks.

4. Vector Error Correction Model (VECM) indicates that financial innovations have a significant impact on the deposits, advances, Return on Assets and Return on Equity of the banks. In the case of productivity, the impact of financial innovation is more on the deposits than advances and in the case of profitability, the impact is more on Return on Assets than Return on Equity.

5. It is found that the variable financial innovation granger causes deposits, advances, Return on Assets and Return on Equity.

7.3.2 Findings from the Analysis of Primary Data

The findings from the analysis of primary data are presented in the aspects (1) Demographic profile of the respondents, (2) Reason for selecting the bank, (3) Dimensions of Financial Innovation, (4) Dimensions of Customer Satisfaction and (5) Effect of Financial Innovation on Customer Satisfaction.

- **Demographic Profile of the Respondents**

From the analysis of the demographic profile of the respondents, the following findings were derived.

1. Demographic profile of the respondents shows that most of the respondents are customers of public sector banks (52.8 %) and 46.2% of the respondents are customers of private sector banks.

2. It is found that the majority of the respondents are male (56.2%).

3. The respondents of the banks are maximum in the age group of 25-50 years (70.4%) followed by 18-25 years (20.8%) and Above 50 years (8.8%).

4. Most of the respondents are post graduates (48.8%) followed by graduates (38.5%), Under Graduates (9.2%), Professionals (2.5%) and matriculates (1%).

5. Majority of the respondents are private employees (43.8%) and retired people constitute the least (4.8%).

6. It is found that most of the respondents are residing in rural area (45%). Urban area constitutes 35.3 % of the respondents followed by semi-urban with 19.7%.

7. The annual income of the respondents falls maximum in the range of ₹ 2, 00,000 to 5, 00,000 (69.5%) followed by 19.5% in the range below ₹ 2, 00,000 and 11% having above ₹ 5, 00,000.

8. Most of the respondents were having an association with their banks between 3 to 10 years (60%), followed by 25% respondents having an association of below 3 years and 15% having a relationship with their bank for more than 10 years.

- **Reason for Selecting the Bank**

1. Public Sector

Among the six factors identified as the reasons for selecting a bank, the customers of public sector banks consider 'confidentiality of transaction' (.81) as the most important reason. This means that public sector banks offer more confidentiality to the transactions of the customers and this attracts the customers towards them. The next important reason is 'facilities available with the bank (.80), which shows customers are very much concerned about the facilities offered by the bank and they focus on the facilities provided by the bank while making a decision to open a bank account. Convenient banking is the necessity of every generation and that's why convenience (.79) is ranked third on the basis of its beta value. Proximity (.78) is ranked fourth and low transaction cost (.77) is ranked fifth on the basis of their regression coefficients. The factor 'customer friendliness' with the lowest beta value (.28) indicates that the customers of public sector banks least considers 'customer friendliness' as a reason for selecting a bank.

2. Private Sector

It is found that the customers of private sector banks give priority to the 'facilities available with the bank' as a reason for selecting a bank. It indicates private sector banks provide more facilities to the customers and therefore this factor attracts the customers. The next dominating factors are convenience (.53), proximity (.53), 'confidentiality of transactions' (.52) and 'customer friendliness' (.47). 'Low transaction cost' (.44) exhibits the low regression coefficient making it the least considered factor as a reason for selecting a bank. This indicates that the transaction cost of banking in private sector is more.

❖ **Dimensions of Financial Innovation**

1. From the result of the Exploratory Factor Analysis, three dimensions of financial innovation are identified. They are named product innovations, technological innovations and process innovations on the basis of their characteristics.

2. The dimensions explored were confirmed using Confirmatory Factor Analysis. The result CFA of financial innovation shows that the model is fit with adequate values of model fit indices.

3. Awareness of Financial Innovation:

- Product Innovation

From the mean score value, it is found that the customers of public sector banks are aware of product innovations like 'Innovative deposit schemes', 'Innovative loan schemes', 'Credit cards', 'Debit cards', 'Smart cards' and 'mobile banking apps'. 'Bancassurance' and 'Wealth management services' are the product innovations which the customers of public sector banks are not aware. The customers of private sector banks are aware of every product innovations except for the 'wealth management services'. Altogether total product innovation awareness exists in the case of both public and private sector.

From the sector-wise comparison made, it is found that there is no significant difference in the awareness between the public and private sector customers with regard to the product innovations like 'innovative deposit schemes', 'innovative loan schemes', 'credit cards' and 'smart cards'. Awareness of public and private sector customers differ in the case of product innovations like 'debit cards', 'bancassurance', 'wealth management services' and 'mobile banking apps'.

- Technological Innovation

It is found that the customers are well aware of all the four technological innovations. Sector-wise comparison shows that there is no significant difference in the awareness of public and private sector customers regarding technological innovations.

- Process Innovation

It is observed that customers are aware of every process innovation. It is found that there is no significant difference between the customers of public and private sector banks with regard to the process innovations like Simplified authorisation procedure', 'Internet banking', 'Mobile banking' and 'Core Banking Solutions'. In the case of 'RTGS', 'NEFT' and 'IMPS' there is a significant difference in the awareness between the two sectors.

- Level of Awareness

The researcher has identified the three levels of awareness regarding the financial innovations and its dimensions. The awareness level of most of the public sector customers about the product innovation is at a moderate level. When the technological innovation is considered, it is found that the public sector banking customers have high level of awareness. Process innovation awareness of public sector customers is at low level. In the case of the private sector, the awareness of majority of customers about product innovations is at a high level. Majority of the private sector banking customers have low level of technological innovation awareness and a moderate level of process innovation awareness. When the financial innovation is taken as a whole, most of the customer's awareness level is at moderate level in the case of both public and private sector.

- Age- wise Comparison

It is found that there is a difference among the customers of various age groups regarding the awareness of financial innovation. The result of the pair wise comparison clearly indicates that the financial innovation awareness of the age group 'above 50' differs with the age groups '18-25' and '25-50'. There is no difference in the awareness of financial innovation between the age groups '18-25' and '25-50'. The result is similar for both public and private sector.

- Area- wise Comparison

The analysis of the study reveals that there is a significant difference in the awareness of financial innovation among the respondents of different residential area. Result of the scheffe post hoc test clearly indicates that the financial innovation awareness of the respondents of rural area differs with the semi-urban and urban areas. There is no significant difference in the awareness of financial innovation between respondents of semi-urban and urban area. The finding is applicable to both public and private sector.

4. Usage of Financial Innovation:

- Product Innovation

It is found that public sector customers mostly use the product innovations like innovative deposit schemes (3.60) and debit cards (3.79). As far as private sector is concerned, innovative deposit schemes (3.72) shows the highest mean score and the least one is bancassurance. Mean score of the total product innovation for both public and private sector is less than the test value (24).

From the analysis, it is revealed that there is a significant difference between the public and private sector customers in the usage of product innovations like credit cards, debit cards, bancassurance and mobile banking apps. In the case of all other product innovations, there is no significant difference in the usage of public and private sector customers.

- Technological Innovation

Mean score value reveals that the customers of both public and private sector banks use all the four technological innovations. While ATM (4.05) is used more by the customers of public sector, customers of private sector mostly use CDM (3.96). Sector-wise comparison indicates a significant difference in the usage of financial innovation between the customers of the public and private sector.

- Process Innovation

It is found that the customers of both public and private sector banks use process innovation and its components. Result of the sector-wise comparison makes it clear that there is a significant difference in the usage of all the components of process innovations between the two sectors. While internet banking is the process innovation mostly used by

public sector customers, customers of private sector banks prefer to use the process of simplified authorisation procedure more.

- Level of Usage

In the case of public sector, the usage level of financial innovation (46.9%) is at a moderate level. While the dimensions are considered, product innovations (50.7%) shows a high level of usage, when the other two dimensions technological innovations (43.7%) and process innovations (45.1%) shows a moderate level of usage. In the private sector, financial innovation (47.8%) shows a low level of usage. Most of the respondent's usage is at high level in the case of product innovations (69.2%) and low in the case of technological (49.2%) and process innovations (48.6%).

- Age- wise Comparison

It is found that there is significant difference in the usage of financial innovation among respondents of different age groups. The result of the scheffe post hoc test for multiple comparisons reveals that there is significant difference in the usage of financial innovation between the respondents of age groups '18-25' and 'above 50' and also with the age groups '25-50' and 'above 50'. The respondents of age groups '18-25' and '25-50' are not having any significant difference in their usage of financial innovations. The finding derived from age wise comparison is similar for both public and private sector.

- Area- wise Comparison

It is observed that there is significant difference in the usage of financial innovation among the public and private sector respondents of different residential areas. The result of multiple comparisons s shows that there is significant difference in the usage of financial innovation between the age groups '18-25' and 'above 50' and also between the groups '25-50' and 'above 50'. The respondents of age groups '18-25' and '25-50' are not having any significant difference in their usage of financial innovations.

5. Satisfaction of Financial Innovation:

- Product Innovation

It is recognised that the customers of public and private sector banks are satisfied with all the components of product innovations. Mean score value of usage of product innovation is 29.24 for public sector and 28.25 for private sector with a maximum score of 35. Sector-wise comparison shows that for the product innovations like innovative deposit schemes, innovative loan schemes, debit cards and mobile banking apps there is significant difference in the satisfaction of product innovation. In the case of credit cards, smart cards, bancassurance and wealth management services there exists no significant difference in the satisfaction between the public and private customers.

- Technological Innovation

From the mean score value it is discovered that customers are satisfied with all the four technological innovations. The mean score values of the technological innovations in the case of public sector are 'Automatic Teller Machine'(3.92), 'Cash Deposit Machine' (3.86) 'Passbook printing machine' (3.90) and 'Point of Sale machine' (3.90). In the case of private sector, the mean score values are 'Automatic Teller Machine'(3.62), 'Cash Deposit Machine' (3.63) 'Passbook printing machine' (3.68) and 'Point of Sale machine' (3.62). Since the p-value of the all the components of technological innovations is below 0.05, it is clear that there is significant difference between the customers of public and private sector regarding the satisfaction of these technological innovations.

- Process Innovation

It is found that the customers are satisfied with process innovation and its components. The mean score value of the public sector is 27.98 and private sector is 25.42, both above the test value 21. The result of the sector-wise comparison reveals that in the case of all the variables of process innovation, there exists a significant difference in the satisfaction of process innovation between public and private sector customers.

- Level of Satisfaction

Three levels of satisfaction are determined based on the predetermined norms. The levels are low, moderate and high and these levels are determined on the basis of quartile deviation. It is found that most of the respondents of public sector banks have high level

of satisfaction in the financial innovation (40.9%) and the customers of private sector banks have moderate level of satisfaction (51.9%).

Product innovation tends to create a high level of satisfaction for the customers of public sector (41.4%) where as the customers of private sector have a moderate level of satisfaction on product innovations (54.1%). As far as technological innovations are concerned, customers of public sector (60.9%) have high level of satisfaction and customers of private sector have low level of satisfaction (49.2%). Same is the case of process innovation, where 45.6% of the respondents of public sector have high level of satisfaction and 51.4% respondents of the private sector have low level of satisfaction.

- Age- wise Comparison

The age wise comparison reveals that there is significant difference in the satisfaction of public and private sector respondents of different age groups. The result of scheffe post hoc test for multiple comparisons shows that there is no difference in the satisfaction of financial innovation between the age groups '18-25' and '25-50'. The age group 'above 50' significantly differs from the age groups '18-25' and '25-50'.

- Area- wise Comparison

Area wise comparison regarding the satisfaction of financial innovation in the public and private sector shows that there is a significant difference in the satisfaction of financial innovation among different age groups.

In the case of public sector, it is found that there is no significant difference in the satisfaction of financial innovation between the customers of semi-urban area and urban area. Satisfaction of financial innovation differs significantly between the customers of rural area and semi-urban area & rural area and urban area.

In the case of private sector there is significant difference in the satisfaction of financial innovation only between the customers of 'rural' and 'urban' area.

- **Dimensions of Customer Satisfaction**

1. Six dimensions of Customer Satisfaction namely 'Tangibility', 'Reliability', 'Efficiency', 'Accuracy', 'Security' and 'Customer service' are identified through Exploratory Factor Analysis.

2. Confirmatory Factor Analysis confirmed the measurement model with adequate model fit indices and factor loadings.

3. It is found that the respondents of public and private sector banks are satisfied with the various dimensions of customer satisfaction.

4. Sector-wise analysis reveals that there is significant differences in the perception of public and private sector customers regarding customer satisfaction and some of its dimensions.

- In the case of overall customer satisfaction, there is a significant difference in the perception of public and private sector respondents. The mean perception score of the private sector (143.39) is more than the private sector (137.43).
- As far as the other dimension 'Accuracy' (Public- 23.88, Private- 25.36), 'Security' (Public- 23.55, Private-25.05) and 'Customer Service' (Public- 23.44, Private- 24.55) is concerned, mean perception score of the private sector is more than the public sector.
- The result of independent sample t-test shows that there is no significant difference in the perception of public and private sector respondents regarding the dimensions 'Tangibility', 'Reliability' and 'Efficiency'.

5. Three levels of dimensions of customer satisfaction, namely low, moderate and high are determined using quartiles. The following findings were derived from the frequency and percentage analysis

- It is found that most of the respondents from public (39.53%) and private (46.49%) sector show a moderate level of satisfaction towards the construct 'Customer Satisfaction'.
- Majority of public sector respondents have a low level of satisfaction on the dimensions tangibility (37.67%), accuracy (40.93%) and security (40.93%) and a high level of satisfaction towards the dimensions reliability (38.14%), efficiency (42.33%) and customer service (35.35%).
- In the case of private sector, most of the respondents have a moderate level of satisfaction on the dimensions tangibility (42.70%) and security (43.78%) and a

high level of satisfaction on the dimensions reliability (55.14%), efficiency (62.16%), accuracy (45.95%) and customer service (45.41%).

6. Age wise comparison in the public and private sector shows that there is a significant difference among the respondents of various age groups regarding their perception towards customer satisfaction and most of its dimensions.

- In the case of tangibility dimension, there is significant difference in the perception between respondents of age groups 18-25 and 25-50, 18-25 and Above 50 and also between the groups 25-50 and Above 50.
- When the reliability dimension is considered, there exists a significant difference in the perception between the customers of age groups 18-25 and above 50 and also between the age groups 25-50 and above 50. P values of the age groups 18-25 and 25-50(.285) reveal that there is no significant difference in their perception.
- For the efficiency dimension, it is proved that there is a significant difference in the perception of the respondents between the age groups 18-25 and Above 50 and also between the age groups 25-50 and Above 50. Between the customers of age groups 18-25 and 25-50, there is no significant difference in their perception towards efficiency dimension.
- It is found that in the case of accuracy dimension, only the perception of respondents t between the age groups 25-50 and Above 50 differs. There is no significant difference in the other two cases, i.e. between the respondents of age groups '18-25 and 25-50' and '18-25 and above 50'.
- Security dimension is perceived differently by the respondents of age groups 18-25 and Above 50 and also by the age groups 18-25 and 25-50. Between the age groups 18-25 and 25-50, there is no significant difference in the perception.
- In the case of customer service dimension, there is no significant difference in the perception of respondents among the three categories of age groups.
- For the construct 'Customer Satisfaction', there is a significant difference in the perception between respondents of age groups 18-25 and 25-50, 18-25 and Above 50 and also between the groups 25-50 and Above 50.

7. Area wise comparison in the public and private sector shows that there is a significant difference among the respondents of the different residential area regarding their perception towards customer satisfaction and some of its dimensions.

- In the case of the construct customer satisfaction and three of its dimensions namely, tangibility, accuracy and customer service, there is no significant difference in the perception of respondents from different residential area.
- It is found that for the other three dimensions namely reliability, efficiency and security only the perception of the respondents from the rural area and urban area differs significantly. There is no significant difference in the perception between the respondents of other two groups, i.e. 'rural and semi-urban' and 'semi-urban and urban'.

❖ **Effect of Financial Innovation on Customer Satisfaction**

The Structural Model developed using SEM proves that financial innovation has a significant influence on customer satisfaction. By providing innovative financial products, process and technological innovations to the customers, banks can satisfy the customers, which will result in retaining the existing customers and in attracting prospective customers.

7.4 Recommendations

Financial Innovation would go a long way in increasing the satisfaction of customers and improving the profitability and productivity of banks. Based on the study findings the researcher gives recommendations which can be adopted for betterment of the financial sector through the creation of a more innovative environment for the bank's operations. These include;

- ❖ Innovation is one of the most important dynamics which enables firms to achieve high level of competitiveness both in the national and international market. Thus, how to promote and sustain an improved innovation capability should be the key focus area of the top managers of the commercial banks as well as the regulatory agents of the sector.
- ❖ Proper measures should be taken by the banks to monitor the financial innovations introduced. This could be done by:

- ✓ Setting up a team of senior -level managers with the responsibility of examining periodically the effect of financial innovations on the performance of banks and on the satisfaction of customers.
- ✓ Banks should receive the help of external independent firms consisting of experts in the field of finance, marketing etc for reviewing the financial innovations introduced by them as well as the innovations introduced by other banks, nationally and internationally.

❖ A standardized measuring tool and parameters should be introduced by the regulatory authority for assessing the impact of financial innovations. Then only there could be a consistency in evaluating the effectiveness of financial innovation and its impact on banks and customers.

❖ The study also recommends that firms should create enabling environment for the employees to be innovative in their operations in order to take its competitive advantage through creation of innovative services leading to increased financial performance, customer satisfaction and growth of the sector.

❖ In the process of making a detailed analysis of the reason for selecting a particular by a customer, it is observed that customers of public sector banks least considers 'customer friendliness' as a reason for selecting a bank. Public sector banks can excel in customer friendliness by the following ways.

- ✓ Banking staffs have to be trained to handle the customers in a polite and well-mannered way at bank counters.
- ✓ Banks should provide time bound services to the customers.
- ✓ Banks should improve the working of help desks, call centres.
- ✓ Making the website of the banks more customer friendly.

In the case of private sector banks, 'transaction cost' was the least considered factor that attracts the customers. So it is suggested that the private sector banks should minimize the cost of transactions.

❖ The awareness of customers towards the product innovation is found at a moderate level in both public and private sector banks. Specifically, the customers are not aware of the product innovations like 'bancassurance' and 'wealth

management services'. So it is suggested that the customers should be provided more awareness of these products.

- Special attention should be given to the customers of age group 'above 50' and to the customers of 'rural area' in provision of services and in providing awareness about financial innovations which will lead to the increase in usage and satisfaction of the customers of these specific groups. Financial deepening and development through financial innovation are only possible if it is reaching every facet of the society. This can be done by:
  - ✓ Introducing need-based schemes for customers since all the customers are not homogenous in their requirements.
  - ✓ Providing awareness through the modes which are reachable to them.
- Financial Innovations are not exempted from challenges. Security is a major concern and hindrance in the way of financial innovations which can lead to reputation risk among banks and loss of confidence by the customers. In order to increase the security of innovative banking transactions the following methods can be adopted.
  - ✓ Create enhanced and effective security systems which can detect, control, prevent and manage fraud incidents in each and every innovation channel.
  - ✓ Installation of more biometric ATMs which will help in the eradication of frauds at ATM counters. This will also be advantageous to the disabled, illiterate and aged customers.
- As the financial innovation has significant impact on the profitability and productivity of banks, it is recommended to invest more in innovative banking. This may be in the form of:
  - ✓ Technology transfers from developed economies - It should be encouraged in order to promote the adoption of world-class innovations.
  - ✓ Investment in Research and Development to develop more products, process and technology which are unique and first of its kind.
- Since the financial performance is the most extremely explicit and valid focus among the other performance dimensions, financial innovativeness information should be available particularly for regulatory and advisory bodies for guidance of

the commercial banks to employ the strategies leading to their innovativeness for increased profitability and productivity.

7.5 Conclusion

The present status of Financial Innovation in Indian banks is quite encouraging as revealed by the study. Financial Innovation has a significant impact on the financial performance of banks. The study has identified three major dimensions of financial innovation namely product, technological and process innovation, and six dimensions of customer satisfaction namely tangibility, reliability, efficiency, accuracy, security and customer service. Customers of public sector banks consider the confidentiality of the transaction as the important reason for selecting a bank. Customer friendliness is the least considered factor in their bank selection. Private sector banks attract their customers with the facilities provided by them. It is the transaction cost which bothers the customers. Customers are not aware of the product innovations like wealth management services and bancassurance. Though security is identified as a major threat in the way of financial innovation, it is found that financial innovations have significant effect on the customer satisfaction.

7.6 Areas for Further Research

1. Impact of financial innovation on the Insurance industry.
2. The effectiveness of Capital market innovations.
3. Innovative strategies and management practices of banks.
4. Marketing practices regarding innovative banking.
5. Challenges in the implementation of financial innovation

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Appendix

Questionnaire

(Customer)

Respected Sir/Madam,

I, Amritha.NP, am a research scholar at DCMS, University of Calicut. My research topic is "Financial Innovations in Indian Banking Industry: An Evaluation of Innovativeness and Financial Performance of Selected Banks". The information provided by you will be kept confidential and will be used for academic purpose only. Please spare a few minutes to contribute your valuable opinion to the study.

SECTION A:

General Information

1. Name of the customer …….

(Please put tick mark in the desired column)

2. Gender:

   Male ☐ Female ☐

3. Name of your bank:

   a. State Bank of India ☐

   b.Canara Bank ☐

   c. Federal Bank ☐

   d. HDFC Bank ☐

4. Age in years:

   a. 18-25 ☐

   b. 25-50 ☐

   c. 50 & Above ☐

5. Educational Qualification:

   a. Matriculate ☐

   b. Under Graduation ☐

   c. Graduation ☐

   d. Post Graduation ☐

   e. Professional ☐

6. Occupation:

   a. Government Employment ☐

   b. Private Employment ☐

   c. Self Employment ☐

   d. Business ☐

   e. Student ☐

7. Area of residence:

   Rural ☐ Semi-urban ☐ Urban ☐

8. Annual Income:

   Below ₹ 2, 00,000 ☐ ₹ 2, 00, 000- 5, 00,000 ☐ Above ₹ 5, 00,000 ☐

9. Your association with the bank in years:

   Up to 3 years ☐ 3 to 10 Years ☐ Above 10 Years ☐

SECTION: B

I. Could you mention the reason for selecting this bank?

(1 for Strongly Disagree, 2 for Disagree, 3 for Neutral, 4 for Agree, 5 for Strongly Aware)

Factors	1	2	3	4	5
Convenience					
Proximity					
Customer Friendliness					
Low transaction cost					
Facilities available with the bank					
Confidentiality of transactions					

II. Please state the awareness level about the following innovative banking practices of your bank (1 for highly unaware, 2 for unaware, 3 for neutral, 4 for aware, 5 for highly aware)

INNOVATIONS	1	2	3	4	5
PRODUCT INNOVATIONS					
Innovative deposit schemes					
Innovative loan schemes					
Credit cards					
Debit cards					
Smart cards					
Bancassurance					
Wealth management services					
Mobile banking apps					
TECHNOLOGICAL INNOVATIONS					
Automated Teller Machine					
Cash Deposit Machine					
Passbook printing machine					
Point of Sale machine					
PROCESS INNOVATIONS					
Simplified authorization procedure					
Internet banking					
Mobile banking					
Real Time Gross Settlement					
National Electronic Fund Transfer					
IMPS					
Core Banking Solutions					

III. Please state the usage level of the following innovative banking practices of your bank (1 for never, 2 for rarely, 3 for sometimes, 4 for very often, 5 for always)

INNOVATIONS	1	2	3	4	5
PRODUCT INNOVATIONS					
Innovative deposit schemes					
Innovative loan schemes					
Credit cards					
Debit cards					
Smart cards					
Bancassurance					
Wealth management services					
Mobile banking apps					
TECHNOLOGICAL INNOVATIONS					
Automated Teller Machine					
Cash Deposit Machine					
Passbook printing machine					
Point of Sale machine					
PROCESS INNOVATIONS					
Simplified authorization procedure					
Internet banking					
Mobile banking					
Real Time Gross Settlement					
National Electronic Fund Transfer					
IMPS					
Core Banking Solutions					

IV. Please state the satisfaction level of the following innovative banking practices of your bank (1 for Highly dissatisfied, 2 for Dissatisfied, 3 for Neutral, 4 for Satisfied 5 for Highly satisfied)

INNOVATIONS	1	2	3	4	5
PRODUCT INNOVATIONS					
Innovative deposit schemes					
Innovative loan schemes					
Credit cards					
Debit cards					
Smart cards					
Bancassurance					
Wealth management services					
Mobile banking apps					
TECHNOLOGICAL INNOVATIONS					
Automated Teller Machine					
Cash Deposit Machine					
Passbook printing machine					
Point of Sale machine					
PROCESS INNOVATIONS					
Simplified authorization procedure					
Internet banking					
Mobile banking					
Real Time Gross Settlement					
National Electronic Fund Transfer					
IMPS					
Core Banking Solutions					

V. Please state at what level you are satisfied with the following dimensions of banking services (1 for Highly dissatisfied, 2 for Dissatisfied, 3 for Neutral, 4 for Satisfied, 5 for Highly satisfied)

Sl.No	Statements	1	2	3	4	5
A	**TANGIBILITY**					
1	Latest equipment and technology					
2	Access to the bank branch					
3	Sufficient number of ATMs					
4	Cash counting machines					
5	Number of service counters					
6	Visual appeal of information materials (Pamphlets, danglers, brochures at the branch)					
7	Guide signs indicating as to which counters offer which services					
B	**RELIABILITY**					
1	The site does not hang or malfunction before the transaction is put through					
2	Information provided at the bank's website					
3	Up to date content					
4	Process of transactions					
5	Range of products and services provided					
C	**EFFICIENCY**					
1	Prompt response to the request of customers					
2	Faster log in facility					
3	Performance of Plastic cards(ATM, Debit/Credit)					
4	Transfer of Funds(NEFT, RTGS, Quick Transfer,IMPS)					
5	Clearing Services(ECS-Credit/Debit)					
D	**ACCURACY**					

1	Problem solving through instant information					
2	Bank insists on error-free transaction records					
3	Electronic Bill payments					
4	Fairness of service charges					
5	Accurate promises about the services delivered					
6	Confirmation of services ordered					
E	**SECURITY**					
1	Security for ATMs					
2	Online filling of personal or transaction data					
3	Protection of banking transactions					
4	Privacy / Confidentiality of the bank.					
5	Care in collection and maintenance of personal information					
6	Instructions on the website					
F	**CUSTOMER SERVICE**					
1	Customer friendly environment at Bank					
2	Customer feedback services					
3	Capable of solving complaints adequately					
4	Brochures to educate new users					
5	Special services for the elders and disabled					
6	Convenient hours of operation (24 X7)					

VI. Suggestions

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