

**TO STUDY THE ROLE OF TECHNOLOGY IN BANKING
OPERATIONS WITH SPECIAL REFERENCE TO SELECT
PRIVATE BANKS IN PUNE CITY**

A Thesis

**SUBMITTED TO THE
TILAK MAHARASHTRA VIDYAPEETH PUNE**

**FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY**

In Management

Under the Board of Management Studies



By

**Mr. Yogesh Digambar Shete
(Registration No 15812006249)**

**UNDER GUIDANCE OF
Prof. (Dr.) Shyamkant Shrigiriwar
DEPARTMENT OF MANAGEMENT**

July, 2019

Declaration

I hereby declare that the thesis entitled

“To Study the Role of Technology in Banking Operations with special reference to select Private Banks in Pune City”

completed and written by me has not previously formed the basis for the award of any Degree or other similar title upon me of this or any other Vidyapeeth or examining body.

Place: Pune

Date: June, 2019



Signature of the Student

Mr. Yogesh Digambar Shete

Tilak Maharashtra Vidyapeeth, Pune

Undertaking

I, Yogesh DigambarShete (PRN – 15812006249), am the Ph. D Scholar of the Tilak Maharashtra Vidyapeeth in Management subject. Thesis entitled “To study the role of technology in banking operations with special reference to select private banks in Pune city” under the supervision of Dr.ShyamkantShrigiriwar, Solemnly affirm that the thesis submitted by me is my own work. I have not copied it from any source. I have gone through extensive review of literature of the related published / unpublished research works and the use of such references made has been acknowledged in my thesis. The title and the content of research is original.

I understand that, in case of any complaint especially plagiarism, regarding my Ph.D. research from any party, I have to go through the enquiry procedure as decided by the Vidyapeeth at any point of time. I understand that, if my Ph.D. thesis (or part of it) is found duplicate at any point of time, my research degree will be withdrawn and in such circumstances, I will be solely responsible and liable for any consequences arises thereby. I will not hold the TMV, Pune responsible and liable in any case.

I have signed the above undertaking after reading carefully and knowing all the aspects therein.

Signature:



Address: 584/11 Ekopa Society, Gultekadi, Salisbury Park, Pune 411037

Ph.No. : +91 9890417012

e-mail : yogesh_shete@yahoo.com

Date : 02 July 2019

Place : Pune

CERTIFICATE

This is to certify that the thesis entitled “**To Study the Role of Technology in Banking Operations with special reference to select Private Banks in Pune City**” which is being submitted herewith for the award of the Degree of Vidyavachaspati (Ph.D.) in Management of Tilak Maharashtra Vidyapeeth, Pune is the result of original research work completed by Mr. Yogesh Digambar Shete under my supervision and guidance. To the best of my knowledge,

- embodies the work of candidate himself
- has duly been completed
- fulfils the requirement of the ordinance related to Ph. D. degree of the TMV
- Up to the standard in respect of both content and language for being referred to the examiner.

Place: Pune

Prof. (Dr.) Shyamkant Shrigiriwar

Date: June, 2019

Research Guide

ACKNOWLEDGEMENT

First and foremost I want to thank my guide Dr. Shyamkant Shrigiriwar. It has been an honor to be his Ph.D. student. I appreciate all his contributions of time, ideas, and suggestions to make my Ph.D. experience productive and stimulating.

My eternal cheerleader, my wife Nutan and daughter Mihika, I owe it all to you.

I am grateful to my parents, who have provided me through moral and emotional support in my life & have set high benchmarks for me. I am also grateful to my other family members who have supported me along the way.

And finally, last but by no means least, all my friends who helped me directly and indirectly to get the survey done, sharing their ideas to manage it effectively and ensuring that I get all support and energy to pursue my passion.

Thanks for all your encouragement!

Table of Contents

Chapter No.	Title	Page No.
1	Introduction	
	1.1 Overview of Banking Industry	2
	1.2 Current Scenario	5
	1.3 Trends in Banking Industry	7
	1.4 Geographical Background	9
	1.5 History of Banking in India	10
	1.6 Purpose of Study	15
	1.7 Research Objectives and Research Methodology	15
	1.8 Significance of the Study	16
	1.9 Concepts/Definitions	17
	1.10 Summary	19
1.11 Chapter Scheme	19	
2	Literature Review	
	2.1 Introduction	20
	2.2 Banking Digitization	20
	2.3 RBI and Technology Adoption	35
	2.4 Information Technology in Banking	38
	2.5 Information Technology and Competitive Advantage	43
	2.6 Mobile Banking – Step towards Leverage of Technology	53
	2.7 Retail Banking	55
	2.8 Banking Technology aspects in Other Country	57
	2.9 Technology Context in other than Banking Industry	58
	2.10 Case Study	60
2.11 Summary	63	
3	Research Methodology	
	3.1 Introduction	64
	3.2 Research Methodology	64
	3.3 Research Design	64
	3.4 Research Objectives and Hypotheses	66
	3.5 Data Source	67
	3.6 Sample Design	68
	3.7 Research Instrument	71
	3.8 Pilot Study	72
	3.9 Details about Research Instrument	73
	3.10 Description of Variables	75
	3.11 Data Analysis Procedure	79
	3.12 Assumptions & Limitation	79
3.13 Summary	80	

		Analysis and Findings		
4	4.1	Introduction Demographic Data Presentation	81	
	4.2	Customer	82	
	4.3	Bank Employee Analysis and Interpretation of Ranked Data	86	
	4.4	Customer	89	
	4.5	Bank Employee Analysis and Interpretation of Multiple-Choice Data	95	
	4.6	Customer	103	
	4.7	Bank Employee Hypothesis Testing	106	
	4.8.1	Hypothesis 1	112	
	4.8.2	Hypothesis 2	113	
	4.8.3	Hypothesis 3	114	
	4.8.4	Hypothesis 4	115	
	4.8.5	Hypothesis 5	117	
	4.8.6	Hypothesis 6	118	
	4.9	Findings	122	
	4.9	Summary	125	
			Summary and Conclusion	
	5	5.1	Introduction	126
5.2		Summary	126	
5.3		Conclusions	127	
5.4		Recommendations	129	
5.5		Scope for Further Research	131	
6		Bibliography	132	
7		Annexure		
		Annexure -1: Questionnaire - Customer Questionnaire - Bank Employee		
		Annexure -2 : Paper Published		
		Annexure -3: Plagiarism Report		

List of Tables

Sr. No.	Table No.	Title	Page No.
1	2.1	Competitive Strategy and Role of Information System	44
2	2.2	Sustainable Differentiation Goals for Banks	46
3	3.1	Sample Design	71
4	3.2	Reliability Statistics	73
5	3.3	Description of Questionnaire	73-74
6	3.4	Description of Variable 1 (Hypothesis 6)	77
7	3.5	Description of Variable 2 (Hypothesis 6)	78
8	4.2.1	Customer Survey Response Participation	82
9	4.2.2	Age wise distribution of Customer Participants	83
10	4.2.3	Customer Education	83
11	4.2.4	Customer Occupation	84
12	4.2.5	Customer Association	85
13	4.3.1	Bank Employee Survey Response Participation	86
14	4.3.2	Age wise distribution of Bank Employee Participants	86
15	4.3.3	Bank Employee Education	87
16	4.3.4	Bank Employee Tenure	88
17	4.4.1	Customer Preference from Bank	89
18	4.4.2	Preferred Technology - Customer	90
19	4.4.3	Observation about Technology Changes - Customer	91
20	4.4.4	Technology Issues Faced - Customer	92-93
21	4.4.5	Technology Expectations - Customer	94
22	4.5.1	Observation about technology trend - Bank Employee	95
23	4.5.2	Preferred Technology Method - Bank Employee	96
24	4.5.3	Highlighted Competitive Advantage - Bank Employee	97
25	4.5.4	Reason for Losing the Customer - Bank Employee	98
26	4.5.5	Technology Challenges - Bank Employee	99
27	4.5.6	Observed Technology Changes - Bank Employee	100
28	4.5.7	Technology Issues - Bank Employee	101
29	4.5.8	Measurement of Success - Bank Employee	102
30	4.6.1	Reasons for Closing Bank Account - Customer	103
31	4.6.2	Benefits Associated with Latest Technology - Customer	104
32	4.6.3	Additional Product Purchase - Customer	105
33	4.7.1	Reasons for Closing Bank Account - Bank Employee	106
34	4.7.2	Training Offered - Bank Employee	107
35	4.7.3	Type of Training Offered - Bank Employee	108
36	4.7.4	Benefits Provided by the use of New Technology - Bank Employee	109

37	4.7.5	Decision about using New Technology - Bank Employee	110
38	4.7.6	Reasons for Growth - Bank Employee	111
39	4.8.1	Test Statistics for Hypothesis 1	113
40	4.8.2	Rank Table for Hypothesis 1	113
41	4.8.3	Test Statistics for Hypothesis 2	114
42	4.8.4	Rank Table for Hypothesis 2	114
43	4.8.5	Test Statistics for Hypothesis 3	115
44	4.8.6	Rank Table for Hypothesis 3	115
45	4.8.7	Test Statistics for Hypothesis 4	116
46	4.8.8	Rank Table for Hypothesis 4	116
47	4.8.9	Test Statistics for Hypothesis 5	117
48	4.8.10	One-Sample Test for Hypothesis 6	119
49	4.8.11	Correlation Analysis for Hypothesis 6	120
50	4.8.12	Hypothesis Test Summary for Hypothesis 6	121

List of Figures

Sr. No.	Figure No.	Title	Page No.
1	1.1	Growth of Bank Deposits	7
2	2.1	Digital Strategy Elements	20
3	2.2	Worldwide rise of Digital banking customers by 2020	21
4	2.3	Digital Value Creation	23
5	2.4	Mobile Banking Perspective	26
6	2.5	Low cost transaction through Technology	26
7	2.6	Impact of Technologies on Banking Sector	31
8	2.7	Major Challenges and Driver for Digital Technology	31
9	2.8	CTF Architecture for Banks	37
10	2.9	The Technology Vision of RBI	37
11	2.10	Pre-requisites for Adoption of Technology	38
12	2.11	TAM Model	42
13	2.12	IBM's Banking reference architecture	47
14	2.13	Information Technology for Competitive Strategies	48
15	2.14	Banking sector Tendency about adoption of Cloud Computing	52
16	2.15	AXIX Banks Digital Sphere	62

List of Charts

Sr. No.	Chart No.	Title	Page No.
1	4.2.1	Customer Survey Response Participation	82
2	4.2.2	Age wise distribution of Customer Participants	83
3	4.2.3	Customer Education	84
4	4.2.4	Customer Occupation	84
5	4.2.5	Customer Association	85
6	4.3.1	Bank Employee Survey Response Participation	86
7	4.3.2	Age wise distribution of Bank Employee Participants	87
8	4.3.3	Bank Employee Education	87
9	4.3.4	Bank Employee Tenure	88
10	4.4.1	Customer Preference from Bank	89
11	4.4.2	Preferred Technology - Customer	90
12	4.4.3	Observation about Technology Changes - Customer	91
13	4.4.4	Technology Issues Faced - Customer	93
14	4.4.5	Technology Expectations - Customer	94
15	4.5.1	Observation about technology trend - Bank Employee	95
16	4.5.2	Preferred Technology Method - Bank Employee	96
17	4.5.3	Highlighted Competitive Advantage	97
18	4.5.4	Reason for Losing the Customer - Bank Employee	98
19	4.5.5	Technology Challenges - Bank Employee	99
20	4.5.6	Observed Technology Changes - Bank Employee	100
21	4.5.7	Technology Issues - Bank Employee	101
22	4.5.8	Measurement of Success - Bank Employee	102
23	4.6.1	Reasons for Closing Bank Account - Customer	104
24	4.6.2	Benefits Associated with Latest Technology - Customer	105
25	4.6.3	Additional Product Purchase - Customer	106
26	4.7.1	Reasons for Closing Bank Account - Bank Employee	107
27	4.7.2	Training Offered - Bank Employee	108
28	4.7.3	Type of Training Offered - Bank Employee	109
29	4.7.4	Benefits Provided by the use of New Technology - Bank Employee	110
30	4.7.5	Decision about using New Technology - Bank Employee	111
31	4.7.6	Reasons for Growth - Bank Employee	112
32	4.8.1	Assistance from Bank - Hypothesis 5	118

**To Study the Role of Technology in
Banking Operations with special reference
to select Private Banks in Pune city**

Chapter - 1

INTRODUCTION

Banking industry is one of the strong pillars of Indian Economy. A banking structure hence is expected to be strong to support economic growth and contribute towards the long-term progress of the nation. Banks are most trusted mean for financial services availed by the people. These financial services are complex in nature and required to gain confidence of end user for the use of technology. Along with traditional banking business, banks are providing various services to satisfy needs and demands of all the type of customers. Being customer centric in nature, it is necessary to retain customers by providing them better services. Now a day's technology is playing vital role for delivering services to the customer. The technology brought change in the banking sector from paper-based banking to on line banking. In today's world Customer is King, hence changing ways of delivering financial products and services must be understood and implemented by the banking industry. Relationships with clients, partners and regulators are more complex than ever. The digitization enhances the competitive environment for achieving sustainable growth in this new environment.

Innovation brought changes in technology. These changes created impact on every aspect of human life. Introduction of information technology was one of important aspects in every business. The technological advancement influenced economy and business houses worldwide. Technology is playing major role in information transfer which include access, process, storage and broadcasting of information electronically.

Mr. N Chandrashekar, COO & ED, Tata Consulting Services while addressing CII banking Tech Summit as a chairman emphasized on necessity to adapt new technology in order to bring down the cost of transactions while maintaining the business flow.

Indian Banking industry is fast growing with the use of technology in the form of ATMs, on-line banking, Telephone banking, Mobile banking etc. Use of credit/debit card also increased many folds. The internet banking has changed the face of banking industry which created the major impact on banking relationship. This growth has been strongly supported by the development of in the field of technology. The technology brought paradigm shift in banking operation. It is necessary for banking industry to adopt new technologies along with skilled human resource, well-regulated risk, credit appraisal, treasury management, and product diversification in order to achieve the excellence for competing in global market.

According to Mr. Nair (2006), Information technology has bright future in rural banking. With the help of technology banking industry can reach to vast untapped potential in the rural area.

The Boston Consulting Group in their report “Indian Banking 2020, Making the Decade’s Promise Come True” discussed about huge growth potential for mobile banking. According this report, with the advent of mobile banking, the access to banking facilities could completely get revolutionized over the next decade. Even if 25–30 percent of mobile users have GPRS / 3G activated, there would be 250 million to 300 million customers who would access banking services over the mobile. It is expected that the Indian banking industry to invest significantly in technology innovation to drive next generation framework for transaction banking.

1.1 Overview of Banking Industry

The banking industry in India exhibits a different structure as compared to other economies and it caters to our social, economic, political and geographic characteristic. Indian economy is agriculture driven with a large population and wide diversity. In addition to this the high level of financial illiteracy prevalent in India necessitates the need for emphasis of financial inclusion at all strata of the society. Banks being financial intermediaries provide money in the economy through credit creation and facilitating liquidity. Banks are able to generate credit many times more than the initial deposits they receive from the public subject to regulations relating to cash reserves to be maintained and customers’ cash requirements.

The structure of banking industry in India can be mapped through the functions performed by banks associated with the economy. The structure of the banking industry in this context has to be flexible enough to allow for economic expansion and simultaneously provide stability to the financial system of the economy.

Before the 20th century, lending money was at a high rate of interest, and widely predominant in rural India. With the entry of Joint stock banks and development of Cooperative bank, momentum have taken over a good deal of business from the hands of the Indian money lender.

Generally, co-operative banks are administered by the respective co-operative acts of state governments. After 1st March 1966, all the types of banks are regulated by the RBI after amendment to the Banking Regulation Act 1949. The Reserve Bank is responsible for licensing of banks and branches, and it also regulates credit limits to state co-operative banks on behalf of primary co-operative banks for financing SSI units. The Reserve Bank of India acts as a banker to the Government and maintains the deposit and other business activities of

other banks that have been allowed to operate in the economy. It is also responsible for monetary and credit policies. The prominent role of the Reserve Bank of India as the central bank governs other banking structures in the economy. Reserve Bank of India monitors and controls the entire banking system of the Indian economic activity.

In general, Public sector banks dominate commercial banking structure. State Bank of India and its group and nationalized banks account for largest number of branches across the country and in terms of deposits mobilized and loans sanctioned. Besides they also perform a lead role in the implementation of developmental programs of the government towards rural areas, small borrowers and weaker sections of the society.

The private sector banks also registered significant improvement in their banking activities providing the much-needed competition in the banking sector. The focus of Foreign banks is mainly in urban areas.

Besides the primary function of accepting deposits and lending through loans and advances, banks perform a variety of services such as providing safe custody for the valuables of customers, providing foreign exchange, facilitating transfer of money and providing guarantees and letters of credit.

Investment banks are specialized banks providing investment services to individuals and institutions besides arranging loans, lease and mortgage facilities. They help through corporate advisory services, capital market intermediation, consultancy, market research, broking services and project finance to their clients.

Development banks are established for catering to long term capital needs of business and industry. IFCI, IDBI, IIBI, SFCs provide these facilities. Besides there are national level specialized institutions such as EXIM bank, NHBs, SIDBI, IDFC catering to specific developmental needs of the country.

Co-operative banks are unique that promotes mutual self-help among groups. These are formed for a variety of purposes like credit assistance, business promotion and other developmental activities.

These banks operate at three levels. State co-operative banks are apex banks in the state. District cooperative and primary co-operative banks operate at lower levels rendering localized services.

Further, the acceptance of the Narasimham Committee recommendations by the Government has resulted in transformation of highly over bureaucratized banking system into market driven and extremely competitive one. These recommendations changed face of banking industry drastically.

The banking industry entered into a new phase in which was full of competition from non-banks not only in the domestic market but in the international markets also.

With the emergence of new private banks, the private bank sector has enriched and diversified with focus spread to the wholesale as well as retail banking. The existing banks have wide branch network and geographic spread, whereas the new private banks have massive capital, lean personnel component, the expertise in developing sophisticated financial products and use of state-of-the-art technology. Hence the operational structure of banking in India undergone a profound change. It stimulated the competition which ultimately helped in enhancing the quality and content of banking.

The electronic age has also affected the banking system, leading to very fast electronic fund transfer. However, the development of electronic banking has also led to new areas of risk such as data security and integrity requiring new techniques of risk management.

The growth in the Indian Banking Industry has been quantitative and it is expected to remain the same in the coming years. Based on the projections made in the "India Vision 2020" prepared by the Planning Commission and the Draft 10th Plan, the report forecasts that the pace of expansion in the balance-sheets of banks is likely to decelerate.

Bank assets are expected to grow at an annual composite rate of 13.4 per cent during the rest of the decade as against the growth rate of 16.7 per cent that existed between 1994-95 and 2002-03. It is also expected that there will be large additions to the capital base and reserves on the liability side.

The first phase of financial reforms resulted in the nationalization of 14 major banks in 1969 and resulted in a shift from Class banking to Mass banking. This resulted in to significant growth in the geographical spread over of banks. Every bank had to assign a minimum percentage of their loan portfolio to sectors identified as "priority sectors". In 1970's banking sector was critical source for the growth of manufacturing sector. The next wave of reforms saw the nationalization of 6 more commercial banks in 1980. Since then the number of scheduled commercial banks increased four-fold and the number of bank branches increased eight-fold.

After the second phase of reforms and liberalization of the sector in the early nineties, the rise of private sector bank, the Public-Sector Banks (PSB) s found it extremely difficult to compete with the new private sector banks and the foreign banks. These banks established themselves with the state-of-the-art technology, which help them to provide better service than domestic bank.

In the year 2000, the State Bank of India (SBI) and its 7 associates accounted for a 25 percent share in deposits and 28.1 percent share in credit. The 20 nationalized banks accounted for 53.2 percent of the deposits and 47.5 percent of credit during the same period.

The share of foreign banks (42 Nos), regional rural banks and other scheduled commercial banks accounted for 5.7 percent, 3.9 percent and 12.2 percent respectively in deposits and 8.41

percent, 3.14 percent and 12.85 percent respectively in the credit side.

1.2 Current Scenario

The Indian economy became the fastest growing large economy for FY16. Indian banking sector witnessed sea changes in 2016. Irrespective of being world's fastest growing larger economy the growth of deposits was only 9.1%. There was no reversal of growth bad loans in 2016. India went on replacing existing Rs. 1,000 and Rs.500 currency notes, which was nearly 86% of the total currency in circulation at that time. In order to fight against black money, fake currency and terror financing an aggressive push of digital economy was resulted to leave audit trail behind. The response to Prime Minister Narendra Modi's call, millions of people were seen queuing up at bank branches and ATMs to exchange old notes for new one. The competition was increased due to entry of new banks with the offering of low rate for selling loan and higher interest rate to depositor. State Bank of India propelled into league of world's top 50 bank by assets with merger of its five associated banks with itself. This process boosted risk taking ability and enlargement of bandwidth for lending loans. It has been noticed that gross not performing assets- NPA's of the nationalised bank sequentially dropping down thereby reducing bad loans.

The exchange of notes and steps towards digital economy pushed microfinance institutions (MFIs) and non-banking financial companies (NBFCs) to change their business model for providing better services to the customer. It may include tie up with different kind of banks, digital wallet service provider. This environment provided good opportunity to come with new financial products to serve customer in better and efficient way. The cashless economy showing its footprints for substantial economic growth.

The economy is having relatively sound growth and stable inflation. The economy suffers because of the problems such as a weak investment scenario and comprehensive earnings growth. Being indicator of Indian economy, banking sector had been the reflective of the weak macro-economic variables. The Indian banking system continued to battle falling asset quality issues and the need to maintain capital adequacy in the light of strut bad loans.

The demonetisation gave a big shock to the Indian economy. The one move effectively redefined the Indian economy. The banking sector was the main beneficiary with having access to huge deposits. The banking sector witnessed a balance sheet growth of 7.7 percent in 2015-16 compared to 9.7 percent a year earlier. A high and rising proportion of banks stressed loans, particularly those of public sector banks (PSBs) and a consequent increase in provisioning for non-performing assets (NPAs) continued to weigh on credit growth reflecting their lower risk appetite and stressed financial position. Still, profitability recorded a substantial decline resulting in lower Return on assets (RoA) at 0.3% during the year.

Though the market share of PSB's declined, the ownership in the banking sector remained predominantly with them.

The Reserve Bank of India (RBI) has continued to reduce interest rates. The repo rates stand at 6.25%. Although banks have reduced base rates but not to the same extent. For the full transmission of rates, the RBI has asked banks to follow the marginal cost of funds while setting the base rate.

The Indian economy is now moving towards normality after demonetisation. The central bank will continue to monitor liquidity data and inflation numbers to decide on the next course of action in their monetary policy. The full transmission of reduction in interest rates from the central bank is expected to be passed on by the banks to their customers in the upcoming financial year.

The move towards a cashless economy will incentivize increased digital mode of transactions. The ability of the government to use the database of Aadhaar as unique identifier coupled with Jan Dhan accounts created for the unbanked or people newly under the fold of banks is a huge opportunity for banks to exploit in the near future.

Indian banking industry has recently witnessed the roll out of innovative banking models like payments and small finance banks. RBI's new measures may go a long way in helping the restructuring of the domestic banking industry.

The Indian banking system consists of 27 public sector banks, 26 private sector banks, 46 foreign banks, 56 regional rural banks, 1,574 urban cooperative banks and 93,913 rural cooperative banks, in addition to cooperative credit institutions. Public-sector banks control more than 70 per cent of the banking system assets, thereby leaving a comparatively smaller share for its private peers. Banks are also encouraging their customers to manage their finances using mobile phones.

The Ministry of Finance has lowered the threshold for making electronic payments to suppliers, contractors or institutions from Rs 10,000 (US\$ 150) to Rs 5,000 (US\$ 75), in

order to attain the goal of complete digitisation of government payments. Total banking assets in India is expected to cross US\$ 28.5 trillion in FY25. It can be stated that, continuous increase in profitability, growth in annual credits and declining NPA are good sign for banking sector and its enhancement towards betterment.

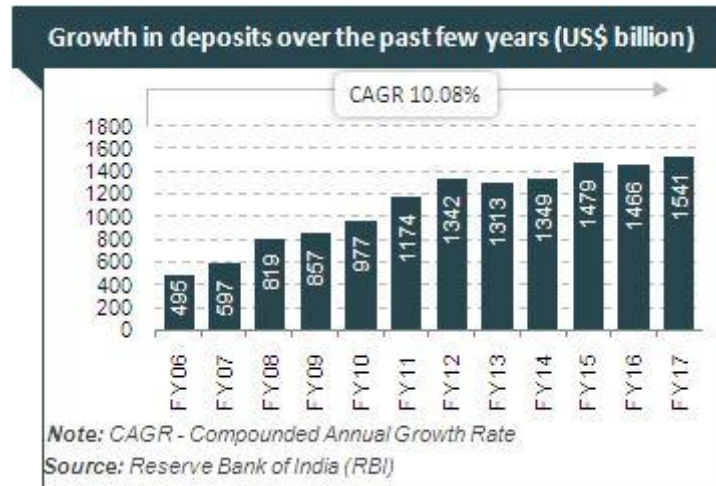


Figure 1.1 Growth of Bank Deposits (Source: <https://www.ibef.org>)

1.3 Trends (Technology) in Banking Industry

Computerization and developments in information technology brought in new trends in banking business. One of the benchmarks of this development is internet banking. This facility enables customers to access their accounts and perform a variety of bank transactions from anywhere. This saves time, cost and paper work for the banks as well as the clients. However, internet banking has inherent risks such as security risk, technology risk and financial frauds. Banks also face legal risk since the jurisdiction in which the bank is operating could be different from its registered place of operation.

Another development in the banking sector is the introduction of virtual banks that do not have any physical presence and all banking operations are in electronic mode. The bank exists on a virtual ground with the internet address as the only link with its customers.

New products have been introduced by the banks to cope with increasing competition and customer needs. They can be categorized into investment-based products and innovative services offered by the banks. Investment products include offer of gold and silver coins, marketing of insurance products and floating of mutual funds, and issue of different types of credit and debit cards. Innovative services include establishing ATM facilities and providing ASBA (Applications Supported by Blocked Accounts) facility to investors applying for initial public offerings of the corporate sector.

Technological developments enable banks to offer electronic fund transfer facility to meet their customer requirements. National electronic fund transfer facility has been created at Mumbai to offer this service.

Over a period, it has been observed that, spending on infrastructure, speedy implementation of various reforms stimulated banking sector growth. Not only this but advancement in the technology ensuring improved services to the customer. The advancement of technology brought mobile banking and internet banking into forefront. Banks like HDFC, ICICI and AXIS bank are exploring option to launch contact less credit and debit cards. This facility will allow user to do transactions without swipe or insert of the card. Thus, upgradation of technology is beneficial for enhancing customer overall experience about banking in turn giving competitive edge for sustainability.

As stated by Marion (2008), Information technology is a medium that has revolutionized banking and everyday bank operations. With all the banking operations at the button click, enabling sophisticated product development and better infrastructure. With the implementation of reliable techniques for controlling of risks banks are now reaching geographically at far distant and diversified markets. Through e-banking services there is significant cost saving in the banking operations. Online banking is becoming cheaper delivery channel for banking transactions. It also indicates that banking services delivery are the profitable channel for banking products. On the other hand, customers are now getting used to new banking technology affairs thereby enjoying freedom from time restrictions. Customers can make withdrawals, deposits and access balances at their own convenience. Because of this there is substantial reduction in queuing in banks allowing banking staff to serve better.

As per Fitzsimmons and Fitzsimmons (1997), adoption of banking technology is giving competitive edge to banking sector considering the facets like creation of entry barriers, enhancement of productivity, and increased revenue generation from new services.

Increased competition, various types of risks involved in financial transactions posing financial innovation to offer new products and services to suit for different circumstances of financial systems. These financial innovations are the outcome of Government regulations, tax policies, globalization, liberalization, privatization, integration with the international financial market along with increasing risk in the domestic financial market. Technology has made it possible to deliver services throughout the banking network, providing instant updates for checking accounts and rapid movement of money or stock transfers.

Thus, it can be stated that, technology has become driving strategy for the banking industry. In order to remain in the race and retain the customer, it has become necessary for banks to adopt new technology like artificial intelligence (AI), Application Programming Interface (API) and the Block Chain. The companies are exploring newer technology options for advancing their business model. Hilary Johnson (2017), rightly mentioned in his article that, in response to new competitive landscape, banks are striving to think two or three steps beyond the offerings they currently provide to corporate customers.

1.4 Geographic Background

Pune is the 8th largest metropolis in India. One of the leading cities in India today, Pune is a blend of rich culture, heritage and modernization. Pune also boasts several education institutes in India such as National Defence Academy, IUCAA, NCL, FTII. Pune also has academic banking institutions such as Symbiosis School of Banking management, MITCON Institute of Management which offers careers in Banking & financial services. Pune has National Institute of Bank Management (NIBM), which is a premier institution in banking consultancy and research. It offers various training programs to banking professionals.

Pleasant climate and proximity to Mumbai makes Pune an ideal choice of living and business. The city is also known for its various cultural activities and job opportunities that migrants and students from all over India and abroad.

Pune has well-established manufacturing, and forging industries since the 1950-60s. Pune is one of the major IT hubs of India, and a home to many web design companies. All most all business sectors are well established in Pune. It is leading to healthier economy of Pune. Hence financial sector also getting stronger day by day. Now Banks in Pune are engaged into various financial services through more than 500 branches of different banks. It includes State bank of India along with its associate banks, Bank of India, Bank of Maharashtra, Union bank of India, Oriental bank of commerce, Bank of Baroda and Vijaya bank operate through various branches. In addition to nationalized commercial banks, Pune also has branches of Multinational banks and private Indian banks which includes HDFC bank, ICICI Bank, Yes Bank, Kotak Mahindra Bank etc... Along with a good network of banks and ATMs, investment banking also taking shape along with Mumbai and Bangalore.

Pune has now become a hot destination for back offices of global banks. Being striking destination for bank's in-house centre, city has become hub for Citibank, Deutsche Bank, Barclays, Credit Suisse, BNY Mellon over a period. This has also created better opportunity for the people who are striving to work in finance domain.

Thus, overall growth with respect to network of banks & branches, technology up gradation leading Pune right destination for banking sector in India.

1.5 History of Banking in India

Bank of Hindustan established in 1770 by Alexander & Co., an English agency house in Calcutta. This was the first Indian bank, which was failed in 1782. Then East India Company established Bank of Bengal in 1800, followed by Bank of Bombay in 1840 and Bank of Madras in 1843. In 1921 these banks amalgamated to form Imperial Bank of India. In 1955 State Bank of India Act was passed and Imperial bank was taken over by State Bank of India

Journey Form Ancient Banking to Modern Banking

The root of banking lies in ancient past. From the ancient time banking system was concurred. The community named ‘Seths’, ‘Shroff’, ‘Sahukar’ and ‘Mahajans’ were famous for banking business. These people used to do business from lending small amount of money to loaning money for the bigger businesses.

Vedic literature having evidences of money lending as a side business, The Vaishya community was known for banking business in this era. In the second or third century A. D. Manu – the Hindu Jurist, used to do money transactions like deposits and advances and also laid down rules relating to rates of interest as a charge of money dealings. During the Buddhist time banking system decentralized. Brahmins and Kshatriyas also started taking interest in banking. At this time, banking became more systematic. Shresthis were more influential as a royal treasurer.

During the Mughal period bankers were engaged in profitable business of money exchange. The native banker played important role in lending money and financing for commerce and foreign trade. ‘Sheth’s were respected in the community as important citizens. They were involved in money business from place to place and collection of money mainly carried out by Hundis The concept of Hundi accepted everywhere as a mode of exchange of Money.

In 17th century, as British traders established in India, Banking took new mode. The developments in transport, communication and trades lead to collapse of native bankers and their banking system. The East India company became instrumental in banking.

In 1770, Bank of Hindustan was founded by M/s. Alexander and Company followed by The Bengal Bank and Central Bank of India in 1785. The other banks like Bank of Bombay and Bank of Madras were started functioning from 1840 and 1843 respectively. The Paper Currency Act was passed in 1862. By this act the right of the note issue was taken away from the established banks. There were serious deficiencies in banking system. Lack of coordination was main issue. The various problems related to banking were came into picture

during banking crises of 1913 to 1917. In the 1921, with the great efforts, Bank of Hindustan, Bank of Bombay and Bank of Madras merged in to a single bank with the name – Imperial Bank of India. This bank was authorised to manage public debt. and Government balances but right of issuing note was not with this bank. The currency issuing authority was continued to be with Government of India. The Imperial Bank of India was become nationalized bank in 1955 under the SBI Act.

Afterword numerous banks were established in the wake of Swadeshi movement. To name few

- Punjab National Bank Ltd. - 1895
- Bank of India Ltd. – 1906
- Canara Bank Ltd. – 1906
- Indian Bank Ltd. – 1907
- Bank of Baroda Ltd. – 1908
- Central Bank of India – 1911

The banking industry witnessed so many downfalls during last 100 years. There were series bank crises observed 1913-17, 1939-45 and 1948-53. The last crisis was due to Indo-Pak partition. The Royal Commission on Indian currency and finance recommended that a Central Bank should be started in India so as to perfect her credit and currency organization. The constitutional and reforms law was made during 1927 to 1933. It was enforced from 6th march 1934. In due course, Reserve bank of India was started functioning from 1st April 1935. Then banking regulatory act was passed in 1949.

Banking After Independence

First Phase (1948-1969): Though Indian government took major steps in Indian Banking Sector Reform; it was still observed like British style banking system. The banks were mostly located in the major cities. Financial Activities of the banks in this phase were confined to the export of Tea, Jute Sugar and Textile. Around 55 banks closed or liquidated in 1949 because of Indo-Pak partition. Though some efforts made to regularise the banking system, not much attention provided by the Indian policy makers.

Second Phase (1969-1990): This phase can be identified as period establishment of major banks in India. Form 1st July 1955, Imperial Bank of India transformed into State Bank of India as it was taken over by SBI. At that time, The State Bank of India were having 7 subsidiaries banks which includes State Bank of Hyderabad, State Bank of Mysore, State Bank of Bikaner, State Bank of Indore, State Bank of Patiala, State Bank of Saurashtra and State Bank of Travancore.

From 1st February, 1969, amendment in banking regulation act was carried to balance out advances share for all the types of industries including large, medium and small-scale industries. The next important step was nationalization of major banks. In 1969, 14 banks were nationalised followed by addition of 6 more banks in 1980. These banks were –

- The Central Bank of India Ltd.
- The Bank of India Ltd.
- The Punjab National Bank Ltd.
- The Bank of Baroda Ltd.
- The United Commercial Bank Ltd.
- The Canara Bank Ltd.
- The United Bank of India Ltd.
- The Dena Bank Ltd.
- Syndicate Bank Ltd.
- The Union Bank of India Ltd.
- The Allahabad Bank Ltd.
- The Indian Bank Ltd.
- The Bank of Maharashtra Ltd.
- The Indian Overseas Bank Ltd.

And six more were

- The Andhra Bank Ltd.
- The Corporation Bank Ltd.
- The New Bank of India Ltd.
- The Oriental Bank of Commerce Ltd.
- The Punjab & Sind Bank Ltd.
- The Vijaya Bank Ltd.

All these banks were having deposits more than Rs. 50 Crore. There was some regularization observed due to nationalized banking still there were problems related to competency, competition, overstaffing, inefficiencies and NPAs etc.

Third Phase (1991-2002): This period can be treated as period of Economic Reform. Due to formation of LPG Policy (Liberalization, Privatization and Globalization Policy) smoother phase of Indian banking was initiated. This also affected micro economic system. Reserve Bank of India and Dr. Man Mohan Singh formulated budget policy and given constructive suggestions. As per guideline, public sector is important though development of this segment have various problems. The door was opened to Foreign banks. The focus was on giving

satisfactory services to customer. The formation of ATM stations, Phone Banking and Net Banking started taking shape. More importance was given to time than money which was really need of an hour.

Private Bank

In 1993, as per RBI guideline new private sector banks started functioning in India. On 2nd April, 1994, the first private sector bank came into operation as per policy guidelines was the UTI Bank Limited with its registered office at Ahmedabad. As stated by as of now 9 private sector banks were functional and extended their spread over across India. It includes

- HDFC Bank
- ICICI Bank
- AXIS Bank
- YES Bank
- DCB Bank
- IndusInd Bank
- Kotak Mahindra Bank
- IDFC Bank
- Bandhan Bank of Bandhan Financial Services

These are scheduled commercial banks. The performance of commercial bank is measured by deposits and advances. It was observed that, from the year 200 to 2009, overall deposits of these banks increased from 852 thousand crores to 4063 thousand crores.

Thus, the Indian financial system become more flexible. It faced crises due to external microeconomics collisions. The main reasons were flexible exchange rate rules, high foreign reserves and not fully convertible capital account. The bank and their customers also have limited foreign exchange experience.

Banking Today

According to Reserve Bank of India (RBI), India's foreign exchange (Forex) reserves have scaled to fresh record high of \$409.366 billion as on December 2017. This is mainly due to Foreign direct investment. During FY06–17, deposits grew at a CAGR of 12.03 per cent and reached 1.54 trillion by FY17. As the number of working populations is increasing day by day the spending as well as investment pattern posing pressure on baking and related services. Housing and personal finance is at leading position. Rural banking is witnessing growth. Technology penetration is increasing a, total number of ATMs in India increased to 207,402 & is further expected to double over next few years. Digitization allowing bank to do volumes transactions with less man power and reduced cost. It has become necessary to

improve operational efficiency of Mobile, Internet banking & extension of facilities at ATM stations. Technology advancement yet to experience by banking sector to have end to end experience with customer to get more competitive advantage. There is huge scope in the area of delivery of services to reach at untapped population. The transition of the Indian banking sector towards cashless economy is creating more opportunities of technology investments into digital payments infrastructure. It is expected that there will be more spending on artificial intelligence (AI) and blockchain for effective digital transformation. As stated by Moutusi Sau (2017), Principal Research Analyst at Gartner in first day of symposium in Goa, "Devices spending in the Indian banking sector will grow the fastest at 20 per cent in 2017, followed by IT services at 15.8 per cent" clearly indicate intentions of banking sector about technology advancement to gain competitive advantage.

1.6 Purpose of Study

The current banking scenario clearly highlight that adoption of latest technology is essential for becoming market leader. How to take leverage of advance technology and move ahead is debatable topic. Every bank must be having its own strategy for acquiring new technology and look forward.

The purpose of the study is to gather inputs from the customers on their preferences of using technology channels, their views on ease of using it. This study would also help to capture bank employee feedback, challenges faced by the staff and observations on increase in revenue and customer satisfaction by adopting new technology.

This research work is focused on understanding what is role of technology in banking sector especially in the case private banks. It is about knowing about gaining competitive advantage by accepting and implementing technology in their business and its impact on customer

This study would also identify certain behavioural challenges and feedback which may be useful for banks to modify or alter their strategy to win customer confidence as well as create a differentiator to their offerings.

The scope of the study covers 5 Private banks located in Pune city.

Not only bank employees but customers of these banks were also part of this study. As both of them are using technology, it become necessary to understand their views about usage of technology and its implications.

1.7 Research Objectives and Research Methodology

Research objectives are framed as follows for the present study.

1. To identify preference of customer as well as bank staff in technology usage.

2. To understand the challenges faced by customers and bank staff while using technology in operations.
3. To understand gap between promised services and benefits received by the customer by the use of technology for banking operations.
4. To identify weather technology strategy helps in managing business growth

This research work is based on both Primary and secondary data. The primary data is collected through questionnaire survey. The data collected from both bankers and customers. The sources of secondary data include books, magazines, articles and web references.

1.8 Significance of the Study

Technology is one of the important facets for the accomplishment business objectives. Banking sector is in the phase of adopting newer technologies to gain competitive advantage. Though, banks are trying to improve customer satisfaction by accepting sophisticated option, it has become crucial to understand customers views and expectations for the same. Banks are looking forward for offering innovative and cost-effective solutions to the end user at the same time it cannot be predicted that, these solutions are easily accepted and used by the end user. The factors like ease in use, training need for understanding the technology and its effective implementation, and cost incurred by both – the bank and the customer plays important role in decision making.

The common observation is that banks are implementing the technology features to stay comparative i.e. to say "We also offer new technology solution" however this is not necessarily giving them an edge to attract and retain customers and improve overall profitability or agencies.

Banks are using technology since years. Its use has been predominantly in the area of gaining internal operation and process improvement along with cost reduction. This study expected to provide insight about customer's perspective to view technology changes, ability to cope up with the changes and challenges faced while using technology. The study aimed at understanding customer perspective on preferences on using operations technology. This study will also help to understand the aspect on how to leverage technology for better outcomes (customers and bank)

1.9 Concepts/Definitions

- i. **Bank** - As stated in Investopedia, “A bank is a financial institution licensed to receive deposits and make loans.”

A bank is a financial institution that accepts deposits from the public and creates credit. – Wikipedia

It is an establishment authorized by a government to accept deposits, pay interest, clear checks, make loans, act as an intermediary in financial transactions, and provide other financial services to its customers. – Business Directory

- ii. **Nationalized Bank** - Nationalised bank are those banks which are governed by the RBI and Regulation act of 1949.

In 1949, during the early years of the country’s independence, India’s central bank, the RBI (Reserve Bank of India) became the first bank to be nationalised. This was an important move since the RBI would soon become the regulatory authority for banking in India.

- iii. **Private Bank** - A private bank is a type of financial organization that offers specialized financial advice and wealth management services to protect, grow and manage the financial wealth of the wealthy or high net-worth clients of the organization.

It is a valued added banking service in comparison to traditional banking that offers more sophisticated products and more personalized customer service.

- iv. **Customer** - A person who has a bank account in his/her name and for whom the banker undertakes to provide the facilities as a banker is considered to be a customer.

To establish a customer the following requirements must be fulfilled: -

- Bank account may be savings, current or fixed deposit must be operated in his name by making necessary deposit of money.
- The dealing between the banker and customer must be of the nature of banking business.

- v. **Reserve Bank of India (RBI)** - The Reserve Bank of India (RBI) is the central bank of India, which was established on April 1, 1935, under the Reserve Bank of India

Act. The Reserve Bank of India uses monetary policy to create financial stability in India, and it is charged with regulating the country's currency and credit systems.

RBI regulates loans offered by banks and non-banking financial institutions to government entities, businesses, and consumers and controls the availability of funds in the financial system for credit.

- vi. **CAGR** - The compound annual growth rate (CAGR) is a useful measure of growth over multiple time periods. It can be thought of as the growth rate that gets you from the initial investment value to the ending investment value if you assume that the investment has been compounding over the time period. CAGR is a better measure of an investment's return over time.
- vii. **Artificial Intelligence (AI)** - It is the simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using the rules to reach approximate or definite conclusions), and self-correction.
- viii. **Application Programming Interface (API)** – It is a software intermediary that allows two applications to communicate with each other.
- ix. **Block Chain** – As defined by Dan and Alex Tapscott (2016) in their book – Blockchain Revolution, the blockchain is an incorruptible digital ledger of economic transactions that can be programmed to record not just financial transactions but virtually everything of value. It functions as a decentralized database that is managed by computers belonging to a peer-to-peer (P2P) network.
- x. **Competitive Advantage** – As per business directory, competitive advantage is A superiority gained by an organization when it can provide the same value as its competitors but at a lower price, or can charge higher prices by providing greater value through differentiation.

Competitive advantages are attributed to a variety of factors, including cost structure, brand, quality of product offerings, distribution network, intellectual property and customer support.

1.10 Summary

This chapter covered introduction of the research topic. Some studies were cited as a reference for the support of the study. Then overview of banking industry was given in order to understand banking industry in depth with respect to current banking aspects. Brief discussion was done about research objectives, significance of the study followed by important definitions. The next chapter will talk about literature related to present study.

1.11 Chapter Scheme

This research study spread over five chapters.

Chapter I – INTRODUCTION: It is about introduction of the topic considered for the study. It familiarises with the banking sector in detail about its development. It also briefs about research objectives, potential contribution of the study in the body of knowledge.

Chapter II – LITERATURE REVIEW: It discourses the review of the related literature. It includes related aspects from similar types of studies and it also talks about the theoretical concepts and various technological facets which are supporting and provided guideline to present study.

Chapter III – RESEARCH METHODOLOGY: It is about research design and various aspects like research objectives, research hypotheses. It also deals with sample design, research instrument and statistical technique used for analysis of data.

Chapter IV – ANALYSIS AND INTERPRETATION: The details of analysis and its interpretation converses in this chapter. The hypotheses testing, and accomplishment of research objectives is shown with statistical analysis.

Chapter V – CONCLUSION: The summary of findings, its implication, recommendation and scope for future study are the main points of this concluding chapter.

BIBLIOGRAPHY: List of Referred Books, Articles, Thesis and Web reference.

Chapter - 2

LITERATURE REVIEW

The previous chapter discoursed introductory aspects of the research study. This section will discuss relevant studies related to banking sector, technology consideration and its advantages.

2.1 Introduction

The Indian banking sector is fairly evolved over a period. It is ripened in terms of products and services provided to the customer. Banks are taking efforts to provide satisfactory services by adopting new technologies. ATM, Net Banking, Mobile banking has become day today affair for the customers. Though bank system is facing the challenges with stiff competition and advancement of technology, the services provided by banks have become easier and more convenient. The new technologies are creating value and helping in managing customer relationship in better manner. The effectiveness of services matters with ease in use and timely results. The banks gaining competitive advantage with such unique selling propositions.

2.2 Banking Digitization

A report published by McKinsey & Company (2014), Digital Banking in Asia - Winning approaches in a new generation of financial services discussed about digitization of banking sector in length of eight chapter. It covers various aspects like Digital banking in Asia, Digital Sales enablement, Unlocking customer value with advanced data and analytics, Making the digital bank work end to end: Digitizing the operating processes, Gearing the IT engine for digital banking, Scaling up your cybersecurity response, Organizing your bank to capture digital opportunities and Creating a seamless customer experience – an interview with Westpac New Zealand’s digital-banking head, Simon Pomeroy.

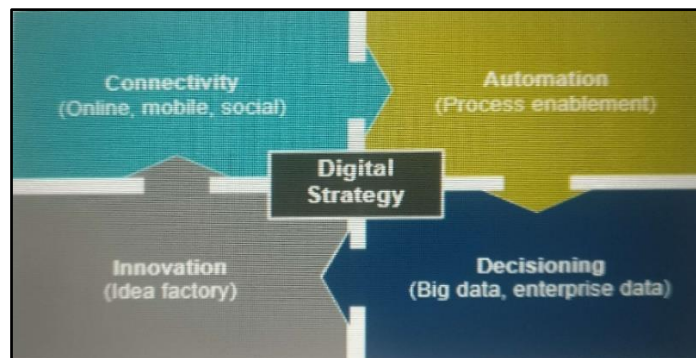


Figure 2.1: Digital Strategy Elements

(Source: Digital Banking in Asia - McKinsey & Company (2014))

In the case of banking digitization innovation, automation, connectivity and decision making are the main elements. It was shown right way in the figure on the previous page. In general, digital banking includes mobile and internet banking. Not only new products and services but also sophisticated, low cost investment and digitally enabled sales force process are also aspects of digital phenomenon.

In the first section, report talked about status of digital banking in Asia. Use of mobile banking, ATM is now common in Asia. Mainly younger customers are preferring digital banking channels for the various banking requirements. Four important swings witnessed by the Asian customers – Incremental usage of Digital banking operations, Shift towards on line or mobile banking, Customer multichannel decision drive (from decision related to purchase of products till getting after sales services), and digitized sale. It is necessary that digital strategy should be integral part of overall business strategy. The digital strategy able to give new digital preposition to end user. It is suggested that, the existing business model must support digital adaptation by improvising distribution channel mix thereby reducing cost, automation to reduce administrative and operational cost, Use of cloud computing and development by enhancement of IT spending. This will be helpful for increasing effectiveness of banking. It was stated that, banks able to provide enriched customer view through improved value related to customer insight and analytics. The digitally sound banking should use smart tools, innovative product choices and providing direct channels for customers self-service. It is predicted that by 2020, digital banking customers in India may rise up to 450 million.

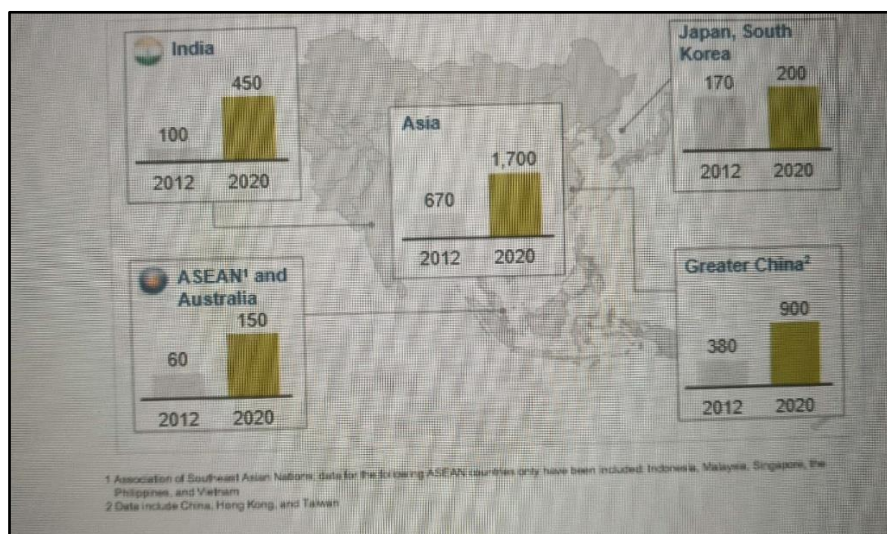


Figure 2.2: Worldwide rise of Digital banking customers by 2020
(Source: Digital Banking in Asia - McKinsey & Company (2014))

The digitization needs to be incorporated in Sales also. Sales through mobile tools included digitally enabled pricing optimization, technology driven payment solutions and reward system for sales force.

Digitization also extended to customer especially in three types – second generation entrepreneurs, upper-middle class customer and Gen -Y customers. Digital needs of these customers are varied according to their age group. It should be tackled smartly by the banks. The addition to the groups is SME, who are in requirement of fair banking support. It is mentioned that, “SMEs will eventually become the norm and will be looking to use a digital-banking platform designed to serve their needs.”

The digital banking is not restricted to mobile or internet banking, it is very much required that bank should adopt suitable business model and position itself strategically to gain strategic advantage to remain in the competition.

Mainly three models were suggested in said study. The models were as follows.

1. Product Focused, Branch Centric Model – Based on digital strategy to be followed keeping eye on broader customer base in all the market segments.
2. Multi-Channel, Client Centric Model – Expected to follow digital leadership strategy. Basically, aimed for techno savvy customer with higher share value and low serving cost.
3. Self-Directed, Digital Centric Model – A model with innovative digital strategy with lesser physical presence and low cost for customer acquisition and service.

It is evident that, consumer behaviour is changing day by day on the basis of change in technology. It is indispensable for banks to build robust digital platform for the customers. It is to be noted that banks can do many things, such as widening customer’s digital experience, strategic use of data to expand customer base and rethinking of branch with digital mission.

The percentage of digital literacy is increasing day by day in Asia. Bank Customers preferring digital technology approach for availing financial services and products. Technology also innovating with a speed thereby declining mobile device cost, reduction in the cost of internet and rapid development of multi-faceted software. This has opened up new avenues for banking sales force. Thus, technology created positive impact where by bankers need to think their sales models and change digital strategy as well.

Bank can create value with help of distinctive set of treadles. These treadles are shown in following figure.

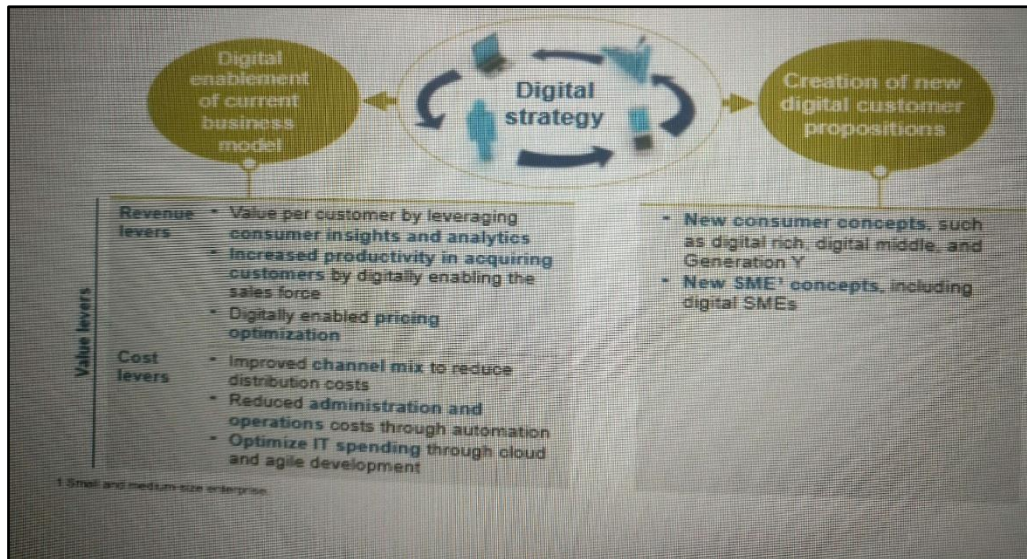


Figure 2.3: Digital Value Creation

(Source: Digital Banking in Asia - McKinsey & Company (2014))

Digitization through information technology is not similar to automation, it adds value to the process. Even retail banking is growing with advance data and analytics (ADA) along with normal banking. ADA is useful for optimization of spending, better decision making in the case of risk management, targeting customer and improvisation in services offered. With this way banks may focus of creating value for the customer by adopting new ways. The report mentioned certain ways for the same. These ways are as follows –

- Creating Customer Centric Experience – Right product and right services in order to achieve better customer satisfaction.
- Developing tailored as well as multichannel capabilities for providing world class services through various means such as video, chat, in person contact etc.
- Simplicity in product offering – Expected to provide simplified product or services rather than everything in one bunch.
- Simplification in end-to-end processes – Optimization of process by identifying potential customer needs.

According to McKinsey’s study almost 75% of the banking processes are automated and banks are invested lots of money in technology advancement.

It will absolutely be going to help banks to gain competitive advantage, because of the use of information technology.

In the next part of report, it is expected that, Asian bank can move ahead with organized and inclusive approach by redesigning digital future. It may include processes like centralization,

outsourcing, lean transformation and offshoring. It can be possible with working on prototype, creating technology building blocks for intensive and repeated processes.

It emphasized that to become precise digital banking enabler, banks need to build on basic capabilities, those are a business- technology organization, continuous solutions process, next generation infrastructure, simplified technology ecosystem and advanced analytics and data management.

Information technology incorporate IT operating model, in right sense business technology operating model which start with plan, then design followed by build and finally run. It is stated that IT to be a part of all business decisions, able to give digital insights to shape overall banking strategy. Banks can create digital lab with in legacy to report directly to CIO. It is predictable to make quicker integration between information technology and operations for speedy process through digitization.

McKinsey team thrown light emergence of Next-generation infrastructure (NGI) – an inclusive transformation option for CIO. NGI incorporated with latest technology which provides highly sophisticated service delivery platform. It relies on cloud computing thereby advancement in operation efficiencies at the same time supporting existing and new business needs and demands.

Obliviously with technology there comes security concern. It is pointed out that security assessment should be done on the basis of importance of asset that need protection from the point of view of banking strategy. It is necessary to form a policy in such way that for every critical asset, an access profile should be developed for the better protection of data and its use.

It is very much necessary that banks must decide their business model based on digitization concept. It may be related to penetration in distinguished market segment or may be for expansion at different geographical locations. Banks should look into existing digital capabilities and then decide for future digital journey

Banks may catch hold on digital opportunities through dedicated assigned digital team (SWAT – as mentioned in the report) or digital group with clear directives. This team expected to come with disruptive ideas and effective, efficient execution of the same by understanding evolving digital customer needs.

The other option is to have shared digital center of excellence across multiple business unit or banks set up separate innovation center for the fulfilment of digital requirements.

This will help in creating digital culture in the organization which will also help in finding out right talent at right place to facilitate banking operations.

But it is to be noted that, information technology is just enabler and banking is about relationship with human touch.

In line with the above discussion a report published in September 2010 by Boston Consulting Group (BCG) in collaboration with Federation of Indian Chambers of Commerce and Industry (FICCI) and Indian Banks' Association (IBA) provides rays of hope for Stronger Indian Banking Industry. The article namely, "Indian Banking 2020 Making the Decade's Promise Come True" divided into three parts. First part was about Indian Banking 2020: Opportunities and Challenges. The second part was related to Financial Inclusion: Rising up to the Nation's Expectations. The third part was focused on Restoring the People Advantage in the Public Sector i.e. about human resource in banking industry.

The report agrees that banks in India shown remarkable growth with respect to profitability and performance. Ten major trends were highlighted by the report out of which two important trends were - The number of branches to grow 2X; ATMs to grow 5X and Mobile banking to see huge growth and will redefine transaction banking paradigm. It shows that cutting-edge technology will be definitely benefitted for the growth of Indian Banking sector. Though alternatives channels are available, ATM will be always critical channel for banking transactions. According to the report, "there is a requirement of at least 40,000–50,000 additional branches and 160,000– 190,000 additional ATMs in the coming decade." Again, it is expected that, "Indian banking industry to invest significant attention in technology innovation to drive next generation framework for transaction banking."

On the basis of this, it is expected that Indian Banks should pay more attention towards technology innovation and invest wisely for the same. It is stated that, the bank with international standing will move ahead in the competition and off course it will be possible through use of advanced technology. In the case of Banker's expectations survey, the explosive growth of mobile banking is main aspects pointed out in the said report. Financial inclusion is another growth driver for banking industry in India. This must be backed by innovative business model which must be because of technology upgradation. It will allow real time banking transaction with low cost. It is pinpointed that, there is low penetration of internet and broadband in India compare to other country. But beginning of mobile banking will change the face of Indian banking. This is shown in following exhibit.

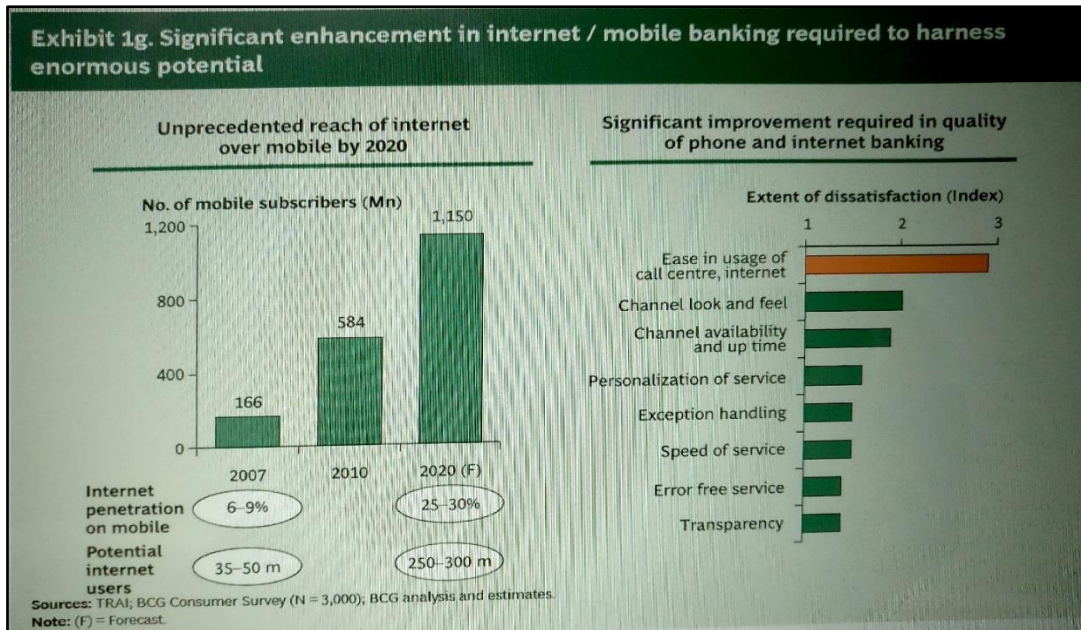


Figure 2.4: Mobile Banking Perspective (Source: BCG Survey – September 2010)

The BCG report found two major challenges for banking sector in India. The first one is the exclusion of customer who are just above bottom of the pyramid. The second is reduction of cost. Both of the challenges can be overcome through the use of appropriate technology. For this active finance literacy is must as stated in the report. The financial literacy campaign essential not only for external customer but also for internal customer. How technology will lower cost of banking operation is shown in following figure.

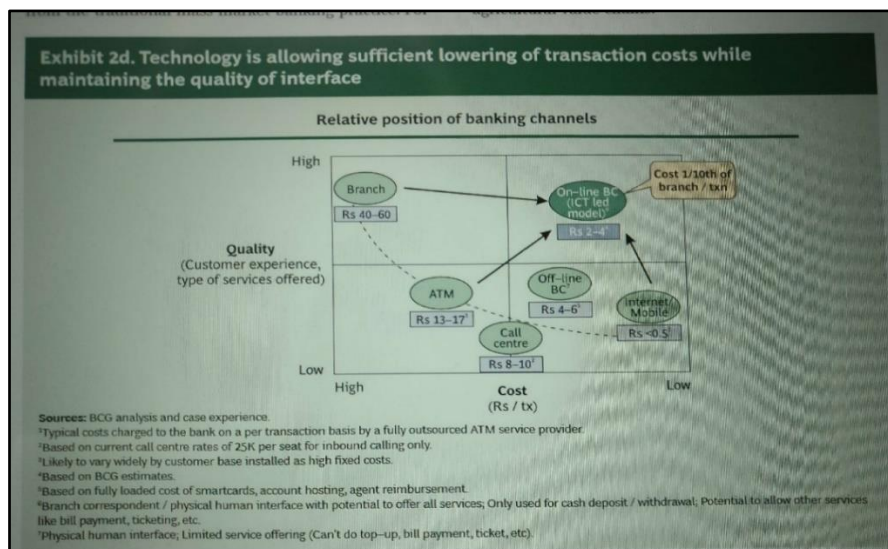


Figure 2.5: Low cost transaction through Technology
(Source: BCG Survey – September 2010)

In the third of the section about Human resource emphasizes use of technology for capturing the details in order to identify potential successors to critical positions as well as identification of the optimal solution within the array of constraints such as banking policy,

personal preference, career plan of the individual, succession planning for critical positions, recommendation of career forums, and business priorities etc. Thus, BCG report clearly indicates the leverage of technology in the banking sector in coming decade.

EY and Indian Banking Association (2014) published report on “Banking on Technology - Perspectives on the Indian Banking Industry” which based on The Award-winning articles contributed by various banks. This report covers eight banking aspects namely – Banking on Technology, Internet banking, Business Intelligence, Customer management, Risk management and information security, Technology in training and eLearning, Financial inclusion, Mobile Banking and Payment.

About banking on Technology, report states that due to launch of ATM, mobile banking, kiosks, and internet banking the technology gap between public sector bank and private bank is lessened. Eventually technology leveraged for gaining competitive advantage. The banks offerings become more robust to provide right solutions to the customers as per their requirement. Banks are taking initiatives like channel migration to accommodate the customer who are not technology savvy or still not able to access the data because of lack of infrastructure like internet. Above mentioned are the main reason for low adoption rate of mobile or on-line banking. It is necessary to change consumer behaviour and mould for accepting the new changes for better customer service. Changing consumer expectation along with addition of financial inclusion pushed for more use of mobile payment. Internet Mobile Payment Service (IMPS) has been well received by the customer. It is essential to promote mobile banking in the non-banking population even if they are not having smart phone. This will help for increase in spread over and will result in business growth.

It is also pointed out that, RBI issued guidelines for the use of technology for improving risk management practices. Information technology is emerging as enabler for enhance banking services. Banks must focus on structuring internal data and able create linkage between structured and unstructured data for better business perspectives.

Linking of Aadhaar with banking system, improved banking digitization, digital payment system establishing financial ecosystem. The report points out that, “Aadhaar has also led the Government of India, the RBI and the banks to rollout out the physical financial infrastructure such as ATMs, branches, micro-ATMs and BC network to unbanked areas.”

Over a period, banks are increasing their investment in technology. The technology definitely going to play major role in giving better customer experience with reduced cost and distinguish revenue model.

Internet banking is all about digital transformation. The world class banking experience may be possible with –

- Defining suitable business model
- Transforming customer experience
- Customer adoption through enterprise data
- More emphasis on internet banking
- Education front desk staff

Next steps towards more technology integration is use of business intelligence. Banks now realized importance of Business intelligence and analytics to give good customer experience. Organization of Data, data quality may become part of Business intelligence for all the types of bank. Information technology is the backbone for it. Business intelligence and information technology together able to provide differentiated customer experience in terms of better servicing, efficient risk management by reducing frauds, creating and providing varied products as per varied customer needs.

Better Customer experience can also possible through multichannel facilities to support SMS, email, chat and social media etc.

Natural extension to use of information technology is security of data. In India data privacy and protection of data reached at pick point. With the use advance technology like cloud computing, mobile computing for banking it has become necessary to enhance risk management mechanism to fight against sophisticated malware or hacker's attacks.

The use of information technology in the case of banking also extended for training and learning perspective for their staff. eLearning or internet portal may be used as a virtual class rooms, discussion forum or may chatting platform for education and sharing experience. Thus, with the influence of technology efficiency of banking staff may increase for delivering better customer experience.

The financial inclusion in India is budding stage. The opportunity for this is provided by enhanced use of banking technology, mobile banking, growing urbanization and increasing middle class people. Financial services are now on fingertips due to information technology. It is possible due to reach of technology, convenience in use and low-cost delivery. Still there are obstacles for enablement of financial inclusion like fear of use of technology, lack of customer education, lack of clear value propositions for government and individual and Gaps between access and use. These obstacles may be overcome by understanding of customers

using data, narrowing the gap between access and use of technology and creating interpretability of technology and payment.

Mobile banking is most used banking technology. It is necessary to consider mobile as a strategic channel for delivering banking services across the India. It is possible through identification of high potential customer, understanding needs of customer, providing differential offering through better delivery mechanism by the use of appropriate technology. The focus of mobile banking should be on implementation mobile wallet, improving usability, good engagement experience, providing location based personalized banking services and more importantly proximity of payment. For this it is necessary for the banks to empower their employees with mobile phones.

Leveraging on mobile banking, banks able to make a new business model in order to serve changing customer base and their need. Mobile technology is the next generation tool which is definitely going to play critical role in banking system.

Technology can intervene in the development of new products related various payment options. ATM system made money transaction easy for the customer. Services such as fund transfer, bill payments, service payment and bill desk payment new era of banking offerings. It was mentioned in the report that, “EY believes that the opportunity for contactless payments will emerge in the future; however, consumer awareness, merchant awareness, and the POS infrastructure are all required, to build a successful business case.”

Many of the banks now launched their own platform for mobile banking services. Mobile payment options such as IMPS led to customer convenience for payment transactions.

It is expected that banks should focus to attract more and more customer to take leverage of technology to fulfil their banking services needs with reduced cost and more customer convenience.

Automation of manual processes, a centralized integrated system and straight-through processing (STP) has become essential for achieving operational excellence. The visibility of banks payment values chain enhances with the help of STP with reduced cost and time.

It is expected that; Indian Banks should offer world class banking experience to that customer by giving secured and risk-free transaction. It can be possible by the use of cutting-edge technology in payments.

Thus EY- ABA report clearly indicates that importance of technology for the banks to gain competitive advantage. Its intervention expected to increase with reduced risks and reduction in time and cost.

India in 2014 Creating Value with Speed and Quality: The New Imperative - An annual review of key macroeconomic and sectoral trends Produced by the Accenture Institute for High Performance – talked trends and opportunity in Banking sector as a one of the part sectoral analysis. It was stated looking as money laundering and number of financial scandals, RBI tighten the norms to reduce the banking risk. Banks are expected to upgrade their technology to avoid such frauds. The report quotes that, “Banks want to upgrade to modern tools that can help them analyse real-time data to predict fraud or illegal activities.”. The digitization can be further extended for household payments like payment of school fees, Medical payments etc. The RBI introduce GIRO system for the same.

The growth of banking sector, Expansion of Foreign Bank in India will pose challenge for Indian Public as well as private banks. Information technology will definitely be going to play crucial role for the survival and better banking experience.

NASCCOM report (2017) on “Enterprise Digital Transformation – Evaluation Indian Enterprises’ Digital Readiness evaluated, analysed and forecasted about digital readiness in various sectors. Digitization in India mainly focused on Customer and operational process improvisation. Talking about Banking Sector it was noted that, till 2014 the more focus was on Core banking, now it is shifted to cashless and digital banking. The technology helped banks for data management with minimal effort and human resource. Mobile banking channelized leveraging of various technology which includes cloud computing. The digital banking in revolutionary transition phase brought new concepts like digital signature, face and fingerprint recognition, biometric inputs etc. It also helped in establishing and improving digital payment system.

Mobile banking and cashless are now buzzwords in banking system still security concern is main issue in technology adoption. Social media platform is now popular for getting in touch with customer to know expectation for better customer experience. Database is generally maintained on internal database and cloud computing is adopted for email and human resource management.

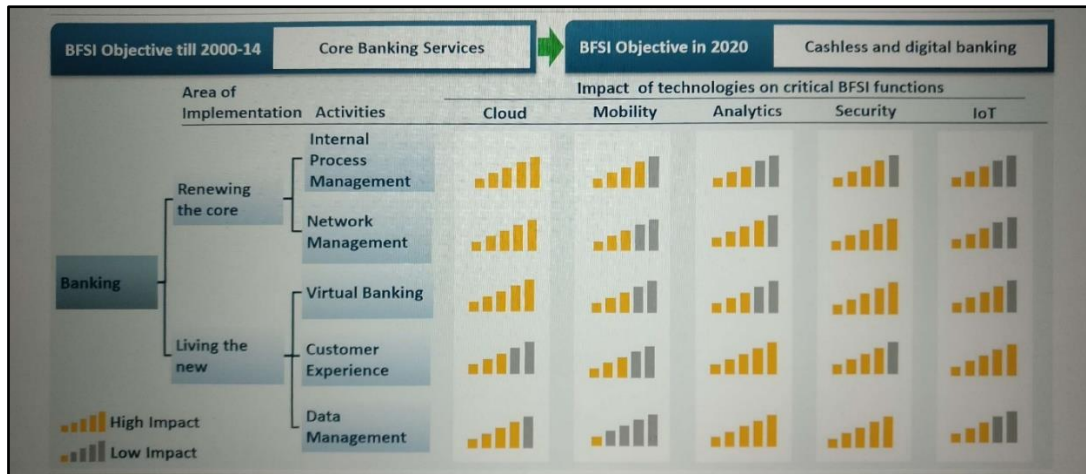


Figure 2.6: Impact of Technologies on Banking Sector

(Source: NASCCOM Report (2017))

Further Analytics and big data storage may create demand for safer cloud computing in future. The major drivers and challenges in implementing digital were shown in following figure.

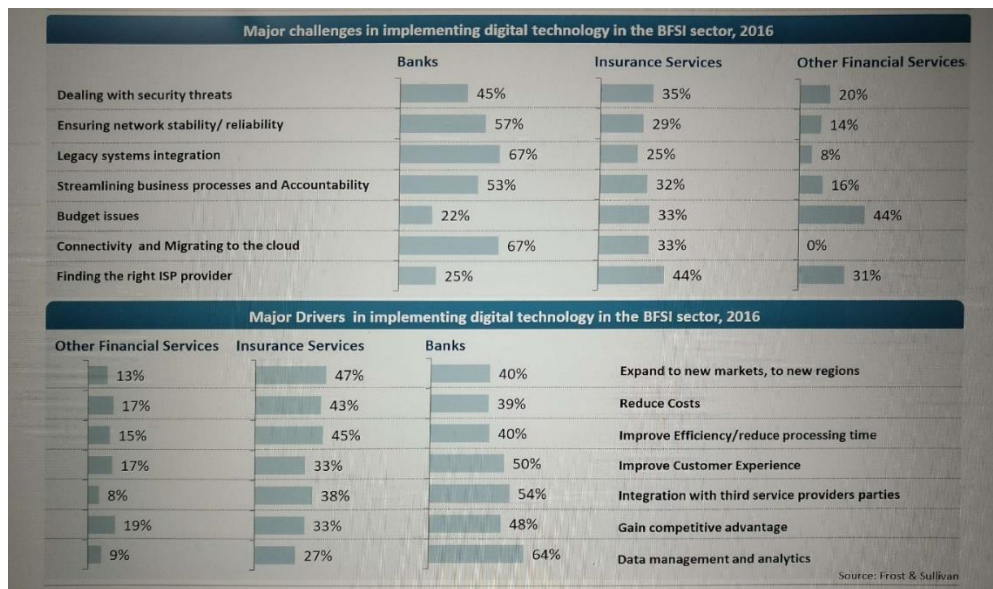


Figure 2.7: Major Challenges and Driver for Digital Technology

(Source: NASCCOM Report (2017))

The above diagram clearly indicates that in the case of banks, third party integration for the services followed by gaining competitive advantage is the major force behind technology acceptance. The main challenges include legal system integration and ensuring stable and reliable network service. It has been stressed that there is need to invest more in information technology to gain competitive advantage.

The research article, “Do We Really Need to Adopt Electronic Banking? talked about how electronic banking created competitive environment. Zaid Al-Baghdadi, Dr. S.A.M. Rizvi,

and Dr. Halima Sadia Rizvi (2011) rightly pointed out benefits of electronic banking. According to them, there were two important aspects associated with such type of banking. The first one was better banking and responsiveness to the changing market scenario and other was related to monetary measures i.e. gaining profit through electronic banking system. It can be stated that, internet banking may be substitute for the ATM or phone banking due to perceived benefits such as user-friendliness, time saving, and at user's disposal. Internet allowed banks to enhance their brand image, reduced transaction cost and better response to the market demand. Author further highlighted implications of electronic banking. It includes internet banking is complementary to other banking channels. It is expected that banks should use capabilities of internet banking fullest to make their operation more reliable. This definitely going to help the bank to gain competitive edge.

Sunita Agrawal and Ankit Jain (2011) discussed in their research paper, "Technological Advancement in Banking Sector in India: Challenges Ahead" about banking innovation such as credit and debit card, retail banking, ATM, ECS, NEFT and RTGS etc. The banking sector is the one which is affected by technology and the main reason behind acquiring new technology is the changing demand and expectations of the customer. This had led to financial innovations reflected in terms of new products and services. The mobile banking, internet banking, ATM etc. now at the door step of the customer. In order to survive in fierce competition, it has become essential to do fundamental transformation in banking which happened due to information technology revolution. Due to technology, now spread over of banking services enlarged throughout the various branches of the banks thereby providing instant updates about accounts, money transfer and stock transfer etc.

The advancement in banking sector posed some of the challenges. It includes managing technology and management of network. The critical part is positioning of product, ensuring smoother banking transaction between the branches of banks. The performance in retail banking also one of the challenges. On the one side technology is key role in banking operations and on the other hand it has become necessary for the banks to deliver cost effective product and services which should stand apart customer expectations. This will definitely outsmarting banking industry. According to Reshu and Swati Sharma (2014), in the modern economy, banks are going to play pivotal role. In the case of growth of Indian banking sector, the growth will possible through enhanced payment system like ATM, net banking and mobile banking along with financial inclusion.

Electronic banking is one of the innovative steps toward banking digitization. Dr. Roshan Lal and Dr. Rajani Saluja (2012), in the research paper "E-Banking: The Indian Scenario" studied

how Indians are accepting this innovation. Information technology is playing vital role in E-Banking. It has given new dimension to banking industry. Though Indian banks are taking serious effort for adoption of technology, on the other side the challenges like penetration in rural area and expected growth rate is still to be resolved. This secondary data based analytical research used report on Trends and Progress of Banking in India published by Reserve Bank of India, Mumbai for the basis of the study. The report concluded that, “E-Banking in India is still in nascent stage.” It should reach to masses especially young generation is in acceptance of E- banking concept needs to be nurtures for the same. The report ends with positive note that, E- banking will not remain only at acceptance level but also will flourish as an important mode for banking transactions.

In continuation with above thought process Shilpa Khandelwal (2012), discussed about, “E Banking Innovations: Trends in India”. According to her, information technology is the key factor that contributed to exponential growth of banking sector. Though Indian banks were late in adoption of technology, global technology changes in banking forced Indian banking to go through vivid changes in the case of technology adoption. This research pointed out need of customer centric information technology infrastructure for sustainability and growth. It also identified following features considering future technology aspects. The features are –

- Branch Technology – For providing better services to the customer through integrated channel.
- Internet Banking – For self-directed customer.
- Mobile Banking – For Mobile User – Service at their fingertips.
- Business Intelligence – For providing Personalised and Customized Banking Services to customer.

Salim Al-Hajri (2005) highlighted in their research study, “Internet Technology Adoption in the Banking Industry” that, the customers are main constraining factor in the case of internet technology adoption. It is important to maintain meaningful relationship with the customer but internet security will be always concerned that needs to be taken care.

In the article, “Redefining E-Banking from Bankers’ Perspectives by Prof. Dr. Baral S. K. (2012) made an effort to understand Banker’s viewpoints about use and benefits of E-Banking. In his secondary research, it was pointed out that E-banking improved relation between bank and customer. Banks are using tools such as print media, internet, SMS and television to create awareness about E-Banking. It was stated that, frequency of usage emphasizes on e-Banking. It necessary that internet banking should become need of the hour.

The study related to Banking industry environment done by Siddharatha S. Bhardwaj and Dev Kumar (2014) in their study, “Environmental Scanning by Banks in India: A Comparative Study”. This empirical considered ten different environmental facets for the study. These facets were –

- i. Economic Environment
- ii. Political Environment,
- iii. Socio-Cultural Environment
- iv. Legal Environment
- v. Technological Environmental
- vi. Natural Environment
- vii. Competitor Environment
- viii. Supplier Environment
- ix. Customer Environment
- x. International Environment.

The primary data was collected from 63 managers from SBI, 69 managers from PNB and 74 managers from ICICI bank. The judgemental and convenient sampling method is adopted for choosing the respondent and questionnaire survey was done. The analysis about technological environment indicated that, banking operation modernized due to technology. It is inevitable to accept new technology to remain in the competition.

Doctoral work by Joshua A. J. (2009) on the topic, “Adoption of Technology-Enabled Banking Self-Services: Antecedents and Consequences” is about use of technology without intervention of bank employees. It is termed as Self-Service Technologies or SSTs (Meuter, M.L et al., 2000). This exploratory study by considering nine banks. The samples collected were as follows - four were from the public sector (State Bank of India, Canara Bank, Syndicate Bank and Corporation Bank), three were from the private sector (ICICI Bank, HDFC Bank and AXIS Bank) and two were from the foreign bank group (Citi Bank and ABN Ambro Bank). Both Probability and non-probability sampling used for selection of samples. Survey- questionnaire as well as focused group technique used for collecting data. The statistical tools such as the weighted means, independent sample t-test and one-way ANOVA test were used to test the differences in adoption levels of the electronic banking channels among various demographic categories, respondents belonging to different bank groups and cities.

The thesis pinpoints that, ATM was the most used channel by the banking customer compare to other channels like internet or on-line banking, mobile banking etc. All the types of

banking adopted latest information technology aspects to reach to customer by providing banking services to their door steps. The thesis also highlights that, “the customers tend to use the various banking services delivery modes in a complimentary way and each electronic banking channel has its own peculiarities.”

2.3 RBI and Technology Adoption

“Report on trend and progress of banking in India 2015-16” published by Reserve Bank of India pointed out the fact that, the retail sector witnessed influence of technology during the year 2015-16. Actually, technology has become game changer in the form of cost-effective means finance and there by supporting financial inclusion. The mobile banking advanced by introduction of UPI (Unified Payments Interface) which was launched in August 2016. It is expected that this move will give high degree of dissemination to mobile banking in India.

The web-based data base CFR (Central Fraud Registry) was another technology aspect became operational from January 2016 for dealing with banking frauds. This searchable database containing data of Fraud form last 13 years. This step will help banks to identify and decrease the frauds and take informed business decisions. It can be stated that RBI is also advancing by keeping in pace with technology for better operational efficiency.

In the article “Capitalize on Regulatory Change: Moving Beyond Compliance” the authors Walter Bohmayr, Peter Neu, Michael Grebe and et. al. discussed in detail about How Banks can take advantage of the technology to Capitalize on Regulatory Change. It emphasised on the fact that, banks should develop a more accurate reading of the capital and liquidity implications of their business strategies as well as product portfolios. It is necessary to upgrade data gathering, models and calculation engines, and reporting capabilities for the use of enhanced technology in various banking operations. It was also expressed that with the single transaction, the access should be given to all portfolio data with various levels like business unit level, at overall bank level etc. The CTF framework (Compliance-Transparency-Forecast) was discussed in detail which will provide link between the business and IT requirements beyond banking compliances.

The compliances provide baseline for what needs to be done as a part of banking sector. It includes - adhere to regulatory figures and ratios, implementing the essential risk-management processes and regulatory reporting. In the case of IT requirement for the compliance part, it is necessary to identify and define data for doing various banking calculations and creating reports accordingly.

In the case of transparency, it is just adhering new regulatory norms for making banking operation more transparent. Therefore, in IT context it is required that, it should be integrated reporting architecture and ensure technical as well as organizational flexibility.

It is expected that; banks should develop scenarios to understand how certain events might affect key economic and regulatory figures in the case of forecasting. It will help bank to look forward by considering various risk aspects.

In order to do this, bank needs to identify areas for improvement and innovate it for the better perspective with the help of CTF. Banks should adopt IT infrastructure with open approach to make significant enhancement in their business. It will definitely lead to a more focused, and efficient use of financial resources, which in turn will become an important source of competitive advantage.

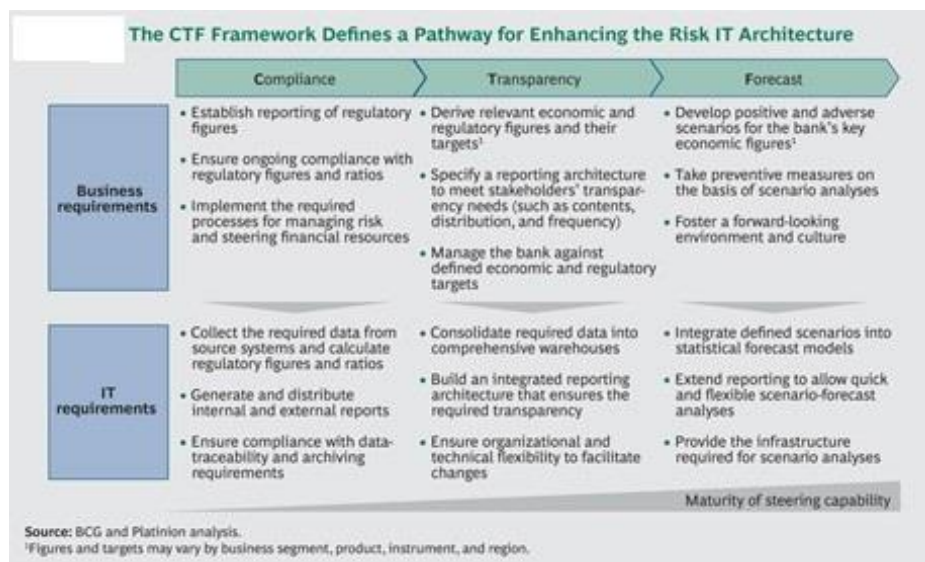


Figure 2.8: CTF Architecture for Banks (Source: <https://www.bcgperspectives.com>)

A presentation on “Recent Technological Developments in Indian Banking” by Vepa Kamesam, Deputy Governor, Reserve Bank of India sheds light on an initiative taken by RBI for technology adoption and expectation from various banking aspects. RBI looking beyond core banking and want to use technology for improving internal processes. It may beneficial for Pervasive branch network, Global Operations, Complex credit calculations and Innovative Risk Management. It is expected that; technology should help in preventing frauds and disturbances to financial stability. Information technology may be help for better currency management. IT can instrumental in simplification of difficult and complex task for effective implementation of monetary policy. The extension to this is improving in various

functionalities such as Electronic Trading System, RTGS, Secured Netting Systems and Continuous linked settlement. The deputy governor also presented technology vision of RBI.

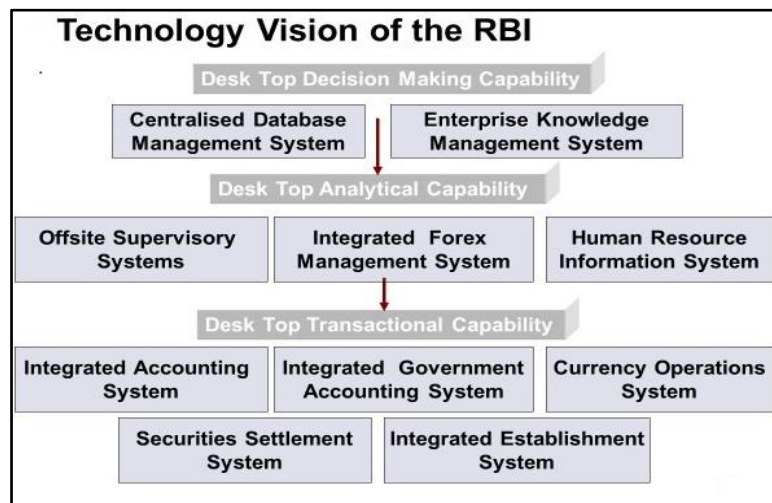


Figure 2.9: The Technology Vision of RBI (Source: <https://www.rbi.org.in>)

Technology mission aimed at better and faster transaction along with advanced analytical, decision making capabilities in secured environment. He assured that, RBI is a mediator between Banker and Government. There are some per-requisites for adopting technology vision which are given in the following diagram. Technology is better channel for distribution of information – in order to reach to end user.

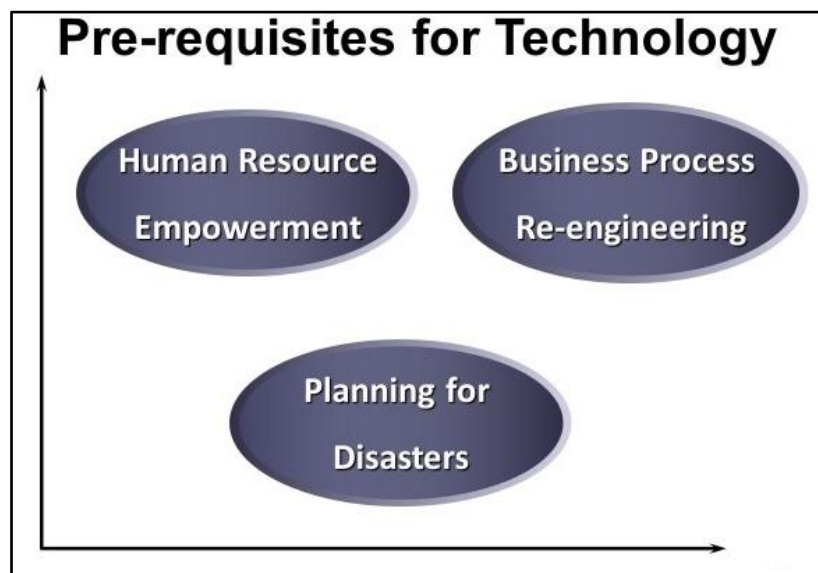


Figure 2.10: Pre-requisites for Adoption of Technology (Source: <https://www.rbi.org.in>)

Not only internal process but multi-channelled delivery for better customer possible through information technology. It can be grouped under two types.

1. For Banking Customer – Interactive Voice Response, Dispensing Machines for Coin and Notes, ATM etc.

2. For Banks and Financial Institutions – A secured Web server for communication and faster payment and settlements.

Thus, it can be stated that, RBI is also taking concrete steps towards digital banking for better tomorrow.

2.4 Information Technology in Banking

“A Comparative Study of Banking Services and Customer Satisfaction in Public, Private and Foreign Banks” carried out by Surabhi Singh and Renu Arora (2011) is based on the premises of technology in banking sector. The author selected banks which were providing at least five IT enabled services to the customer. These banks were from the five zones in Delhi. The study talked about various traditional and IT enable services provided by the bank and its relation with customer satisfaction. The analysis indicates that, customers are hesitant about using IT enabled services due to lack awareness and security reason.

Dr. Bimal Anju and Deepika (2012), in their research paper discussed about linkage between investment in technology and profitability of banks. According to authors, “the Improved Technology and the huge Investment in Technology leads the Indian Banking Industry to the new highs but on the other hand cut throat competition forces it to strike balance between the Expenditures and the Income.” It can be stated that, investment in technology showing positive impact on profitability of banks which contributes to competitive advantage. This paper also quotes two important decisions taken by Reserve Bank of India (RBI) in 1990.

The First was the prescription of compulsory usage of technology in full measure by the new private sector banks as a precondition of the license. The Second was about the establishment of an exclusive research institute for banking technology institute for development and Research in Banking Technology. This highlights that the first important step was taken by RBI in 1190 for technology development and adoption by recognized its importance in banking industry in India.

The traditional banking is becoming very old concept as communication means are advanced due to internet. This has opened door for new type of services by using internet. It includes internet banking, mobile banking and so on. At present, there are almost 1billion mobile users in India. It is up to individual bank to invest in technology, align their business processes in order to get tuned with customer with the help new technology in order to sustain in the competitive environment. While using advance technology, there are some challenges faced by banking industry. The Research paper titled “Mobile Banking in India: Practices, Challenges and Security Issues” by Vishal Goyal, Dr. U. S. Pandey, Sanjay Batra (2012), talked about challenges and security issues related to mobile banking. The various challenges

faced by banking sector are economic, regulatory and demographic. That needs to be tackled properly to carefully for increasing customer base. On the same line issues like use of secured Wireless Application Protocol (WAP), risk involved in authentication, SMS spoofing attack, virus attack and risk with digital signature required to be handle on priority basis to gain confidence of customers who are using mobile banking. The article ends with positive note that, “numerous solutions have been tried and failed but the future is promising with potential new technology innovations.” It again highlights the use of technology for better and effective banking operations.

The use of information technology in banking has two folds. First is for communication and other is for business process and its connectivity. Ms. Archana Sharma (2011), in her exploratory research namely “Mobile Banking as Technology Adoption and Challenges” concludes that, mobile phones have immense potential of conducting financial transactions thus leading the financial growth with lot of convenience and much reduced cost.

She expects that mobile banking reach to common man. This penetration will be possible through the efforts put forth by all the stakeholders like Regulators, Government, telecom service providers and mobile device manufactures. She also pointed out that, looking at cut throat competition and pressure to reduce the expenses, banks have to make informed decision on resource allocation so that it will be beneficial for both i.e. for bank as well as customers. She thinks that mobile banking should not be compare with internet banking or other electronic banking. This research was carried out in Ghaziabad in U.P., India and in all 100 respondents participated in the Mobile banking survey. By using same data, the researcher Ms. Archana Sharma along with Dr. Vineet Kansal (2012) further studied consumer adoption about mobile banking and the factors influencing the adoption of mobile banking in India. The research paper states that, the technology can become effective strategic tool in order to get competitive edge. Bank must focus on internal process and information technology can be used across all the banking functionalities in order to smoothen the banking operations. The authors considered following three factors in order to understand adoption and challenges of M- Banking. These factors were – Access Problem, Dissatisfaction with regards to service provider and inability to provide knowledge – this is mainly due to complications in the system. The authors concluded that, though mobile banking emerged as advance options for internet banking, it the rate of adoption is not in pace with technology advancement. According to researchers “Technology based electronic delivery medium does not constitute service offering and creates value alone, but service content has to function properly and the way of usage has to be known.”

It is clearly indicative that, banking system can take advantage of new technology provided the system able to provide services by creating awareness for effective use of technology and its benefits.

Thyaga Raju N (2016), in his article, “Impact of Information Technology (It)on The Banking Sector” stated that, ‘Internet has emerged as an important medium for delivery of banking products and services.’ An internet changed face of banking technology as well as expectations of the customers. He also focused on challenges faced by banks due to use of information technology. It includes business challenges which is mainly related to retaining customers and market share. The other type of challenge is business challenge which is about management of technology, business risk and security.

A various trends and recent development in banking sector discussed by Prof. M.C. Sharma and Abhinav Sharma (n.d.) in the research work titled, “Role of Information Technology in Indian Banking Sector”. The trends quoted are outsourcing, integration, partnership, distinctive edge, IT as profit center, prospering down market, leading to downsizing, and getting competitive intelligence. The recent developments highlighted in the article are internet, SWIFT (Society for Worldwide Inter-Bank Financial Telecommunications – used for sophisticated message transmission), ATM, Cash Dispenser, Electronic clearing service, and Net banking. According to authors, though there is good awareness and gratitude about IT, a giant thrust required to establish the IT infrastructure in effective manner.

The paper by Bindiya Tater, Manish Tanwar, and Krishna Murari (2011) on “Customer Adoption of Banking Technology in Private Banks of India” throws light on perception of private banks customer towards adoption of banking technology. Descriptive statistic was used to analyse the data. Four major bank’s (ICICI Bank, HDFC Bank, AXIS Bank, INDUSIND Bank) customers from Rajasthan were considered for the study. Out of 500 responses 403 valid responses were considered for analysis. The structured questionnaire method used for data collection. A questionnaire was consisting of four parts -

Part 1: Demographic profile of the Respondents,

Part 2: Customer’s account profile of the Respondents,

Part 3: Personal Characteristics of customers with different banking services, and

Part 4: Characteristic and usefulness of different banking services.

Four banking technology was selected for understanding adoption of banking technology. It includes ATM, branch banking, internet banking, and mobile banking. The analysis shows that ATM was the most adopted banking technology with regards to privacy, confidentiality, security, real time access and accuracy in transaction record along with ease in use. The

perception about adoption technology changes with the age. Youngster are more adoptable to technology as they find it more comfortable and user friendly. There is significant relationship between age, gender, qualification, income and adoption of banking technology. It was also found that, there is a significant relation between benefits of banking services and increasing use of banking technology.

Internet banking latest technological innovation in banking industry. The research paper titled, “Internet Banking Adoption in an Emerging Economy: Indian Consumer’s Perspective” by Rahmath Safeena, Hema Date and Abdullah Kammani (2011) talked about the factors influencing the consumer’s adoption of internet banking in India. In the first part, paper provided information about internet banking in India. Internet banking has become important digital channel of communication for most of the banks. Lack of awareness about online transaction, security, lack of user friendliness or lack of facilities in online banking are major concerns in the case of internet banking. This study considered following aspects about internet banking – perceived usefulness, perceived ease of use and perceived risk. The respondents were students of various educational institutes from Mumbai. Convenient sampling method used for collecting data through distributed questionnaire among the students. Total sample size was 116 and SPSS 12 was used to analyse the data. The results of the analysis were indicative that perceived usefulness and perceived ease in use was positively associate with adoption of internet banking in the case of students while perceived risk showed negative association about internet banking adoption. It can be stated that though banking customer are adopting internet banking due to flexibility, ease in use still risk associated with internet banking hold back banking customers for restricted use of the same. A different type of study carried out by Rupanjali Nath, Kanika T Bhal, and Geetika T Kapoor (2013) about adoption of technology by the banking employee. Employee acceptance and usefulness of technology plays important role in the increased spread over of banking technology. The study was carried out the employees from Banks in Delhi. Davis’ Technology Acceptance Model (TAM) (1989) provided basis for the study.

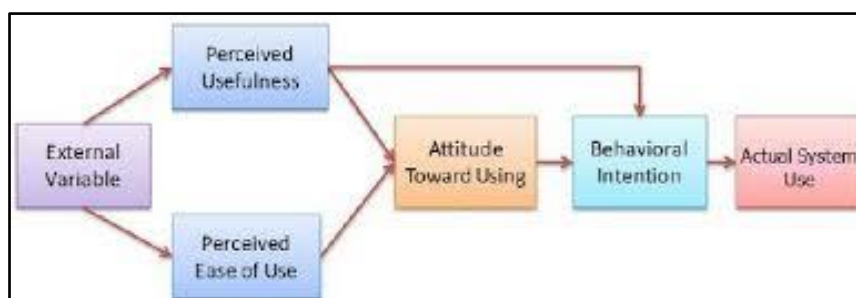


Figure 2.11: TAM Model (Source: Vikalpa (2013), Volume 38(4))

These employees were from State Bank of India, Union Bank, Bank of India, ICICI Bank, and Axis Bank) situated in the National Capital Territory (NCT) Delhi. The researchers considered following technology adoption factors along with social influence, computer self-efficacy and technological facility. These factors include customer perception, customers attitude towards e-banking and their satisfaction level. In all 238 banks employee responded for questionnaire survey from the banks selected for the study. Structural Equation Modelling (SEM) procedures were used for data analysis. This research showed that, the TAM variables positively influence the intention and usage behaviour through perceived usefulness and perceived ease in use along with social influence and technological facility which in turn gives competitive edge to the banking industry.

2.5 Information Technology and Competitive Advantage

According to Baltzan and Phillips (2010) competitive advantage can be define as ‘a product or service that an organization’s customers value more highly than similar offerings from its competitors.’ It is necessary for every organization to stay ahead always in the dynamic business environment. One of the ways to remain in the competition is reinvent, update your technology aspects on regular basis. J. Xu and M. Quaddus (2013) discussed same thing in the book namely ‘Managing Information Systems’. Following table shows how information system can play vital role in gaining competitive advantage.

Competitive Strategy	Roles of Information Systems
Cost Leadership	Organizations can use information systems to fundamentally shift the cost of doing business (Booth, Roberts & Sikes 2011) or reduce the cost so business processes or/and to lower the cost so customers or suppliers, i.e., using online business to consumer & business to business models, e-procurement systems to reduce operating costs.
Differentiation	Organizations can use information systems to develop differentiated features or/and to reduce competitors’ differentiation advantages, i.e., using online live chatting systems and social networks to better understand and serve customers; using technology to create intermediaries to offer value-added service and improve customers’ stickiness to your website/business(Booth, Roberts, and Sikes 2011); applying advanced and established measures for online operations to offline practices(i.e. more accurate and systematic way so measuring

	efficiency and effectiveness of advertising)(Manyika2009).
Innovation	Organizations can use information systems to identify and create (or assist in creating) new products and services or/and to develop new/niche markets or/and to radically change business processes via automation (i.e., using digital modelling and simulation of product design to reduce the time and cost to the market (Chui & Fleming 2011). They also can work on new initiatives of establishing pure online businesses/operations. At the same time, the Internet and telecommunications networks provide better capabilities and opportunities for innovation. “Combinational innovation” and Open innovation are two good examples. There are a large number of component parts on the networks that are very expensive or extremely different before the establishment of the networks, and organizations could combine or recombine components/parts on the networks to create new innovations (Manyika 2009). Meanwhile everyone is connected via personal computers, laptops and other mobile devices through cabled Internet or wireless networks or mobile networks, there are plenty of opportunities to co-create with customers, external partners and internal people.
Growth (including mergers and acquisitions)	Organizations can use information systems to expand domestic and international operations or/and to diversify and integrate into other products and services, i.e., establishing global intranet and global operation platform; establishing omni-channel strategy to gain growth (omni-channel strategy looks at leveraging advantages of both online (or digital) and offline (or non-digital) channels) (Rigby 2011).
Strategic Alliance	Organizations can use information systems to create and enhance relations with partners via applications, such as developing virtual organizations and inter-organizational information systems.

Table No. 2.1: Competitive Strategy and Role of Information System

(Source: Management Information Systems: J. Xu and M. Quaddus)

This table reflects the influence of technology in business world. The author further discussed about use of information technology in business value chain. The value chain concept was

put forth by Michel Porter, it recognizes an organisation as a chain, or series, of processes, and it classified an organization's activities into two categories: primary activities (i.e., inbound logistics, operations, sales and marketing, customer service, and outbound logistics) and secondary/support activities (i.e., administration, human resources, technology, procurement). As mentioned in the book, information system can be better contributor for each activity in the value chain. Even this support can be extended for interaction with outside world like for managing supply chain within and outside organization. Information system can be useful for interaction with other companies, for making strategic alliances. The customer can be connected better way through digital media. Organization can have healthier relation with customer by providing value added services by the use of information technology. It can be result into better cooperation and collaboration, which will help any organization to sustain in the dynamic business environment. According to author it is to be noted that, "Accountability of information systems projects should be applied to both information systems and business parts in the organisation" in order to outsmarting in the business world.

'Core Banking Modernization' was very well explained in IBM financial services-point of view (2011). This report shown road map for modernization of banking with the due help of information technology. According this report, it is necessity to change in approach about creating and delivering banking products and services. The digitization must be adopted by selecting and implementing information technology infrastructure. Banks can choose optimal and customized solution in order to gain flexibility and efficiency in the banking operations. It was highlighted that, modernization of banks possible through customization at various level of banking operations. The most important aspect is fulfilment of customer expectations and satisfaction. One of the key imperatives mentioned in the given article was 'Re-thinking business, operating models and technology architecture' It also emphasized that, for improvising reliability and business quality it is necessary to modernize current core banking system through simplified information technology environment. This will be key for innovation and growth for the banks.

Capability	Success Metric
Enabling smarter commerce through the flexible, focused and fast delivery of customer-centric capabilities and compelling,	Improved customer insight, customer retention, and increased share of wallet

customized risk-adjusted offers	
Enabling efficient and effective operations	Improved cost-to-income ratio and higher return on equity
Providing modern product management capabilities that create and maintain flexible products and product bundles more effectively	Time-to-market
Leveraging customer profitability to create relationship pricing	Accepted versus rejected offers, cross-sell ratios of banking products per customer
Enabling improved risk insight and regulatory compliance	Improved transparency to real-time risk and required risk-based provisioning of working capital
Creating an adaptable business model and supporting technology architecture. These can improve collaboration with other parties and enable better synergies from mergers, acquisitions and divestitures.	Return on capital, increase revenue and reduced operating cost

Table No. 2.2: Sustainable Differentiation Goals for Banks

(Source: IBM Financial Services – Point of View (2011))

The above table shows Capabilities and Success matrix for banking industry which can be enabled through IT for achieving competitive advantage. The reports mentioned six important principles for core banking modernization. Out of which three principles highlight use of information technology. These principles were as follows:

1. Based on a program roadmap and governance policy jointly developed by business and IT leadership.
2. Committed to achieve a modular architecture linking business processes with IT capabilities in a way that dramatically increases agility and reliability.
3. Architected on an optimized infrastructure that can evolve with proven technology innovations.

IBM had suggested reference architecture for core banking modernization with help of information technology. It is also suggested that, technology and business hand in hand will help in decision making process. With appropriate analysis, the existing banking system can be aligned and modified with the use of technology.

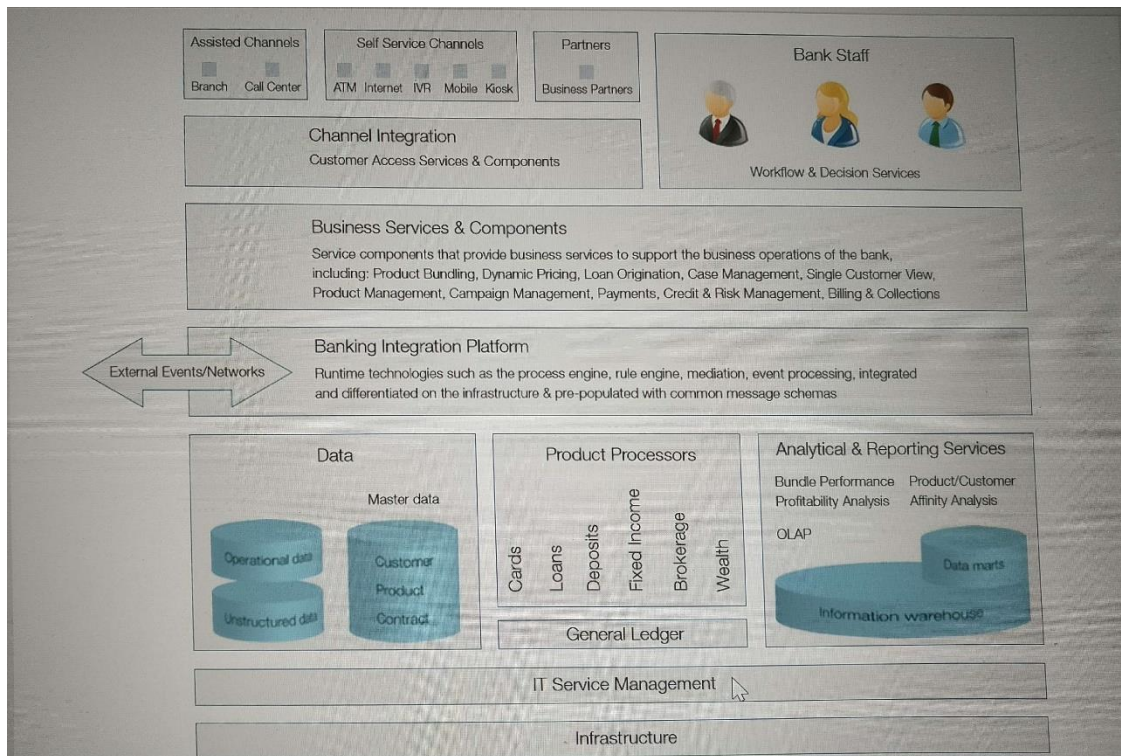


Figure 2.12.: IBM's Banking reference architecture

(Source: IBM Financial Services – Point of View (2011))

E- banking is the buzz world in the current business environment. Information technology provided basis for growth for E- banking. It simplified banking operation effectively so that end user can use the banking facility at their convenience. It has provided competitive edge to the baking sector. This point was briefly discussed in the paper titled “E-Banking: Challenges and Opportunities in India” by N. Jamaluddin (2013) in the 23rd International Business Research Conference held in Melbourne, Australia. He talked about evolution of various E-banking means like RTGS, NEFT, ECS, ATM, Credit Card and Debit Card followed by Internet Banking and Mobile Banking. Mobile banking has immense potential through which banks can deliver their service to the customer at their fingertips. According to him, “Information technology has played a vital role in the advancement of banking system” but only information technology may not be sufficient for the growth, there is also requirement of capable personnel to use the technology to improve performance and gain competitive advantage. Author further stated that marketing mix technology is going to be challenge for banking industry in future.

In the article “Competitive Advantage with Information Systems”, it had been rightly described about how information systems helps in gaining competitive advantage. The discussion is based on Porter’s Five Force model and Value Chain Model. According to the

author, information technology may play important role in the case of five business strategies. The strategies are as follows:

1. Cost Leadership – Market leader as a low-cost producer.
2. Differentiation Strategy – Differentiated product line as compared to competitor.
3. Innovation Strategy – Doing Business by new way.
4. Growth Strategy – Expanding Business by various ways.
5. Alliance Strategy – Linkage with customer, competitor, suppliers and other company for growth.

Banks can also adopt one of the strategy or combination of two or more strategy for their growth in the competitive environment. How information technology can support for realizing these strategies is well explained in the following table.

Basic Strategies in the Business Use of Information Technology	
Lower Costs	<ul style="list-style-type: none"> • Use IT to substantially reduce the cost of business processes. • Use IT to lower the costs of customers or suppliers.
Differentiate	<ul style="list-style-type: none"> • Develop new IT features to differentiate products and services. • Use IT features to reduce the differentiation advantages of competitors. • Use IT features to focus products and services at selected market niches.
Innovate	<ul style="list-style-type: none"> • Create new products and services that include IT components. • Develop unique new markets or market niches with the help of IT. • Make radical changes to business processes with IT that dramatically cut costs, improve quality, efficiency, or customer service, or shorten time to market.
Promote Growth	<ul style="list-style-type: none"> • Use IT to manage regional and global business expansion. • Use IT to diversify and integrate into other products and services.
Develop Alliances	<ul style="list-style-type: none"> • Use IT to create virtual organizations of business partners. • Develop interenterprise information systems linked by the Internet and extranets that support strategic business relationships with customers, suppliers, subcontractors, and others.

Figure 2.13: Information Technology for Competitive Strategies

(Source: <http://www4.comp.polyu.edu.hk/~csajaykr/CA.pdf>)

Impact of Information technology can enhance banking operation to new heights with the help of five competitive strategies. The competitive advantage may be achieved through –

- Widening market, reducing differences in way you reach the customer with the information technology i.e. competition is mainly due to price only.
- Business Processing by using Information technology there by reducing sales workforce and lessening in entry barrier.
- Creation of new product or services with the help of information technology.

- Procurement over internet may results in dropping suppliers bargaining power. It may also impact on intermediaries.
- And it will enhance bargaining power of customer, which may turn the business situation.

Thus, this article clearly indicates that banks can do better by the influence of information technology in order to outsmart itself.

The white paper (2012) on “Modernize or Fail: The Modernization Challenges Facing Banks, and the Technology Implications” published Oracle Financial Services nicely explains need of modernization through information technology. It had given warning that if bank don’t modernize itself, then should be ready to face failures. The paper divided into five parts – the challenges bank facing today, the need to update business strategies, the need to update operating models, technology implications of bank modernization and call to action - modernize or fail.

In the first part, the necessity of competitiveness was stressed followed by customer centric approach. Bank needs to create ways and means to serve customer which may include more attentive service, managing customer information properly, increased operational efficiency, provision of multiple delivery channel and fetching new products and services. This is possible through IT.

It had been stated that, there is requirement to change overall retail strategy and banking experience where technology can contribute for delivering better services to the customer. Alignment of online banking, mobile banking, ATM needs to be done but still direct banking is playing vital role in creating and maintaining brand image. Hence it is crucial to modernize both front and back office operations. It is expected that; bank must review all the banking processes coupled with information technology and its software. The paper highlights that, “There are two key stages in IT modernization: the first is to integrate the legacy systems and software; the second is to devise new IT architectures, buy in or create new software and embrace innovations such as cloud computing.” To add on this bank being multi-channel delivery preposition it is necessary consider integrated distribution strategy approach for all banking services.

In the fourth part which talked about implication of banking modernization, the criticality of revision and upgradation of existed software and information technology architecture accentuated. This white paper identified five software categories to be considered by the banks.

Core Banking, Direct Banking, Data Management, Business Intelligence and Analytics, and Customer Relationship Management. It is important to provide 24 X 7 automated banking with reduced cost and increased efficiency. There is necessity of Service Oriented Architecture (SOA) which should work on multiple channels such as POS, ATMs, internet and mobile banking. IT infrastructure along with software should be integrated with GRC framework thereby increasing visibility of compliance, risk, legal, internal audit, and finance for monitoring organization adherence in line with laws applicable to the banking systems. The technology may also useful in confirming financial regulations supporting for banking operations which attracts penalties for non-compliance such as anti-money laundering, fraud detection and prevention, KYC and capital market trading etc.

An intervention of technology is anticipated in customer centric approach. It may be implemented in the various formats.

1. 360-degree customer relationship for enhanced customer experience.
2. Identification of Customer before the start of conversation – Computer Telephony Integration (CTI)
3. Managing and maintain critical customer information.
4. Preserving histories of all the interactions with the customers
5. A module to store and manage customer economical profile for ready reference.
6. Workflow Management – includes email management and service analytics etc.
7. Facility to provide transactional functionality and operational control and streamlining of the same with easy to use interface.
8. Centralization of business processes and operational information through server there by managing all banking operation efficiently.
9. Use of advance technology for lowering cost and refining IT responsiveness.
10. Business Intelligence for various analysis, related report generation, predictive modelling and alerts.

The Cloud can be better replacement for traditional in-house banking which easily integrate internal as well as external processes. The improvement through information technology may possible in all the areas of banking including CRM, supply chain management, financial planning, ERP and Human resources also.

It is clearly pinpointed that; modernisation of banking industry is possible and fruitful with proper understanding of technology implications and right choice of IT infrastructure. In addition to that it is required to adopt Service Oriented Architecture (SOA) to integrate all banking applications. The key to implement SOA is incorporating IT architecture within it.

Another angle of technology in the case of banking industry is cloud computing which is discoursed in the white paper discussed above. Mr. V. Sai Raghu Yogendra (2013), second year MBA student of School of Management Studies, University of Hyderabad thrown light on adoption of cloud computing in banking sector in India. In the summer internship project titled. “Strategies for Cloud Computing Adoption for the Indian Banking Industry” he deeply studied various aspects about cloud computing and its benefits for banking industry in India. The author also suggested the road map for adopting cloud computing technology for betterment of banking services in order to gain competitive advantage.

As defined by National Institute of Standards and Technology, “Cloud Computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g. networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or cloud provider interaction”.

As discussed in the paper, important characteristics of the cloud computing are –

- On Demand Service
- Broad Network Accesses
- Rapid Elasticity
- Measured Services
- Resource Pooling

The banking services coupled with above mentioned characteristics certainly complimenting overall banking operations. The flexibility, reduced hardware, improvement in performance and pay based on uses are the additional features of cloud computing which will be added advantage for banking sector. But the main concern is security. The cloud computing offers opportunities for banks to build a more flexible, nimble and customer-centric business model that can drive profitable growth along with information technology currently used by the banks. Even data security concern or data privacy can be handled more appropriately with the help of cloud computing with more consistency and automation in security data with reduced cost. The inclination of banks towards adoption of cloud computing is neatly given in following figure by the author.

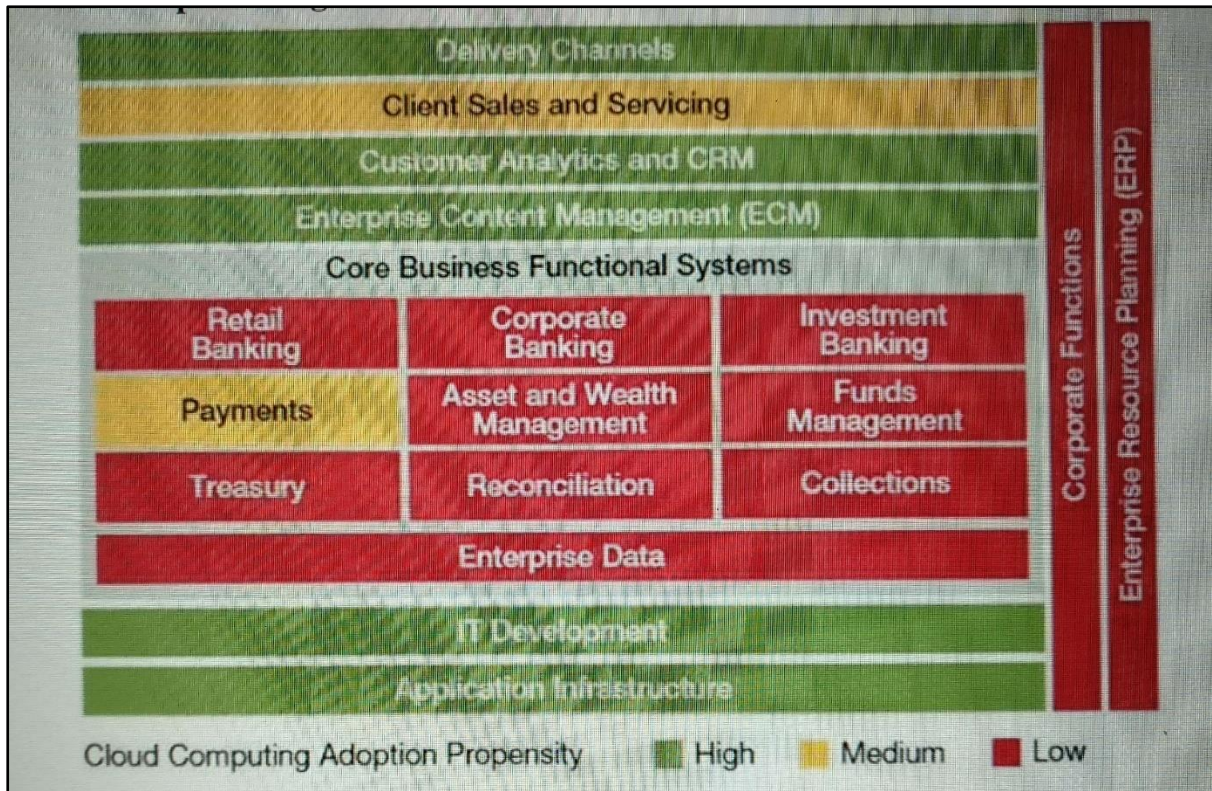


Figure 2.14: Banking sector Tendency about adoption of Cloud Computing

(Source: <http://www.idrbt.ac.in>)

Thus, the advantage lies in more quickness in banking, cost saving, increased speed and responsiveness, deployment of shared intelligence for better decision making, eliminating delays in various banking operations there by achieving greater customer satisfaction and edge over the other. Author further added the area that can be considered for the cloud computing were customer relationship management, infrastructure and information technology development for the better banking perspectives. The cloud computing is more suitable option for the mobile banking which may lead to further enhancement for more readily establishing connection with the customer. Micro banking and tokenization through cloud computing absolutely going enrich financial services.

The basis for this study was Technology-Organization- Environment (TOE) framework. The interviews of the banking authority were conducted to carry out the study. This research concluded with a note that, cloud, virtualization and business intelligence solutions are becoming more and more significant over a period. High customization due to IT, security threats, cost saving and banking regulation all together posing challenges. The solution form all these concerns is Cloud computing for sustainable growth of banking industry in India.

2.6 Mobile Banking – Step towards Leverage of Technology

Currently mobile banking is in thriving stage. How mobile banking becoming part of banking customer is discussed in the research titled, “A Study of Adoption Behaviour of Mobile Banking Services by Indian Consumers”. This study was carried out by Nitin Nayak, Vikas Nath & Nancy Goel in 2014. It throws light on the factors that influence the adoption behaviour of mobile banking services on Indian banking customers. The article pin points following exclusive features of Mobile banking stated by Tiwari, Buse and Herstatt (2006).

- Ubiquity
- Immediacy,
- Localization,
- Instant Connectivity
- Proactive Functionality
- Simple Authentication Procedure

These features add uniqueness to mobile banking. The author reviewed TRA (Theory of Reasoned Action), TAM (Technology Acceptance Model), TPB (Theory of Planned Behaviour), IDT (Innovation Diffusion Theory) and UTUAT (Unified Theory of Acceptance and Use of Technology Model) for understanding adoption behaviour. According to TAM (Davis (1986), “attitude of the user towards the acceptance of new technology or information system is determined by perceived usefulness and perceived ease of use.” while IDT (Rogers 2003) talks about innovations that offer a more relative advantage, compatibility, simplicity, trialability, and observability will be adopted much faster as compare to others. In sum this secondary data-based research points out that, in the case of technology innovation such as mobile banking, its adoption will be possible by increasing awareness and fulfilling expectations of end user which will give competitive advantage to the banks.

The case study of EKO mobile banking was discussed in the research paper “Effects of Mobile Banking on the Savings Practices of Low Income Users - The Indian Experience” by Mani A. Nandhi (2012) from Jesus and Mary College, University of Delhi, India. The author discussed five case studies of use of EKO banking in and around Delhi area. The study throws the light on the effects of EKO mobile banking on the savings behaviour and practices of low-income users in the metropolis of Delhi. The results were indicative that, the low-income mobile banking (EKO) user thinks that EKO is a strong substitute to many informal savings mechanisms as well as a bank account. This is shows growth prospects for mobile banking even in the case of lower income group in India. The research was carried by survey and interview of 160 mobile (EKO) user in three parts (West, South and East) part of Delhi.

The researcher also took interview of key officers and field managers of EKO and 170 retail agents for cross validation of information gathered from user. The focus group discussion was carried with nonusers of mobile banking. Thus, it can be stated that mobile banking has great potential for financial empowerment in the lower income group also.

Prerna Sharma Bamoriya and Dr. Preeti Singh (2012), in the research paper on “Mobile Banking in India: Barriers in Adoption and Service Preferences”, concluded that, security in mobile banking and acquainting customer with use of mobile banking, mobile banking services can be utilized properly. This cross-sectional descriptive study used questionnaire method for collecting data. 100 responses of banking customer from Indore were gathered and analysed with the help of SPSS 17 software. The analysis shown that, mobile banking is more apt as compare to traditional banking. The identified barriers to mobile banking were security, network availability, followed by insufficient operational guidance and cost per transaction. It had been also observed that, customer generally use mobile banking for review rather than financial transactions.

This is era of mobile banking and banking customer are taking most out of it. This was finding of the research work carried out by Sunil Kumar Mishra and Durga Prasad Sahoo (2013). The researcher done work based on secondary data. The main source was the survey conducted by ACI Worldwide. It shows that there is tremendous increase in mobile banking user worldwide. Out of 10 Indians 8 were preferred to use mobile banking for transactions. It was also observed that at least 90% of banking customers who are using technology through which they are availing mobile banking services. Thus, mobile banking has become important channel for the banking customer there by saving time of bank executives. This time can be effectively used for achieving operational excellence.

The research work on “Technology Adoption and Indian Consumers: Study on Mobile Banking” by Rahmath Safeena, Hema Date, Abdullah Kammani, and Nisar Hundewale (2012) highlights that, majority customers are accepting mobile banking because of ease in use and usefulness of using the technology. Autor referred that, the conjunction of mobile communications and distributed networked computing has provided the basis for the development of mobile banking. The data was collected by using questionnaire method from 56 respondents. The questionnaire was designed to understand customer intention about the use of mobile banking. The no probability – convenient sampling method was used to select respondents. It was observed that security and privacy was two main issues for adoption of mobile banking. Perceived usefulness, ease of use and consumer awareness has positive

impact on the intention to adopt mobile banking. These factors emerged as important factors related to adoption of mobile banking.

2.7 Retail Banking

“Retail Banking 2020 Evolution or Revolution?” A report by PWC(US) says that, Customer expectations, technological capabilities, regulatory requirements, demographics and economics will be reshaping banking industry in coming years. This research was based on the following aspects namely - global instability, demographic change, technological change, social and behavioural change, the rise and interconnectivity of the emerging markets, the rise of state-directed capitalism and the war for natural resources.

It is expected that banking industry to be more agile, open and ready to explore new options for better future. The report identified six major imperatives for the banks –

1. Developing a customer-centric business model
2. Distribution Optimization
3. Simplifying business and operating models
4. Gaining an information advantage
5. Enabling innovation, and the capabilities required to foster it
6. Proactively managing risk, regulations and capital

For the fulfilment of all above mentioned imperatives information technology will be backbone for the banking industry. Technology will be main enabler to bring change in the industry by enhancement in services with reduced cost and innovation will be buzz word. It is stated that, “Competitive reach is no longer determined by branch networks, rather by banking licences, technology and advertising budgets”

For Better customer service, there will be need of customer-centric business model which must be based on two vital things. First is digitization and second is balance automation with human touch – where information technology will be playing leading role. The next requirement in banking revolution will be in the branch banking and need of optimization of distribution networks. For better distribution technology intervention is necessary. With increasing customer expectations, the use of technology is at its peak. Hence moulding existing network and aligning with changing customer expectation and economic realities will help bank to sustain in the competitive environment. The expected business model should be simpler to operate. The research believes that an information technology will be game changer for the banking industry in coming year. The competitive advantage through information technology will be possible in customer experience, underwriting and pricing, technology enabled operations, risk management and cost management. Thus, innovative

service provider, though small banking player may become leader due techno-savvy approach.

The reports point out that, “Innovation is the single most important factor driving sustainable top- and bottom-line growth in banking.” The bank needs to develop this environment and retain their talent for the same. Bank needs to have agile product and technology development skills to lead in the market. Enhancement of risk and capital management is also highlighted in the said report. In the end note, it was expected that, bank must decide the path to go in the right direction by deciding how to face the challenges.

“Innovation in Retail Banking” by Efma and EdgeVerve Systems Limited (2016) discussed about emerging banking models and how technology intervention driving banking industry. About 158 respondents participated in online survey representing more than 56 countries around the world.

This research again highlights that banking digitization is happening at high speed, it is necessary to look into use of information technology for end to end process for better customer experience. The digitization is providing opportunities for innovations which will help banks to have competitive advantages. The technology change in terms of changing APIs, use of artificial intelligence and block chain will create impact on banking industry. How much invest in the technology innovation? Will be crucial point for the banks. The firm strategies need to develop about technological innovation considering advantages against spending in security/risk management.

2.8 Banking Technology aspects in Other Country

The research about “The Challenges of Creating Sustainable Competitive Advantage in the Banking Industry in Kenya” based on secondary data carried out by Dorothy Mghoi Mnjala (2014). His work was based on following sources competitive advantage:

- Differentiation – Differentiated customer service
- Low Cost Strategy – Low Operational Cost
- Capability – Transformation of resources to gain competitive advantage
- Positive Reputation – Positive reputation between firm and its stakeholders create better impact
- Learning Organization – Availing Opportunities with respect to diverse operational environment indicates ability to compete with other firms.

This study discusses the fact that though there is innovation in the product or service of Banks in Kenya, it is necessary that to advance in competitive advantage, to ensure that the

process of rolling out the product is to be pre-planned to cater for any unexpected events that can occur during the process.

Technology is playing important role in innovation process. This innovation includes electronic commerce, enhanced use of internet banking, real time data availability, mobile banking and other banking innovations. It is necessary that banking industry should commit themselves for technology up gradation on full scale for their growth and become more competitive.

Basheer Abbas Al-alak, Saeed (M.Z) A. Tarabieh (2011) studied how competitive advantage and organizational performance gained through customer orientation, innovation differentiation and market differentiation. This research was done for Jordanian banking industry. Around 227 respondents including general manger, deputy general manager, assistant general manager and executive participated from 16 Jordanian banks. The relationship between customer orientation, innovation differentiation, market differentiation and their impact towards organizational performance was analysed with the help of confirmatory factor analysis (CFA) and a structural equation modelling (SEM). The result showed that, competitive advantage achieved both innovation differentiation and market differentiation. Market differentiation is the main focus of customer orientation. It may include 24 hours service by bank, SMS baking, internet banking and mobile banking etc. All these are part of innovation differentiation. Thus, it can be stated that, technology provides basis for either market differentiation or innovation differentiation to gain competitive advantage.

The research work on” Mobile Banking Adoption: An Examination of Technology Acceptance Model and Theory of Planned Behaviour” in UAE carried out by Mohamed Gamal Aboelmaged and Tarek R. Gebba (2013). They used Technology Acceptance Model (TAM) and Theory of Planned Behaviour (TPB) for understanding adoption of Mobile banking in UAE. Around 119 bank customers properly responded to questionnaire survey. The analysis showed that, attitude and subjective norms were creating impact on adoption of mobile banking which part of user behaviour. It also reflects the awareness about mobile banking. Perceived usefulness of mobile banking appeared not so important parameter and again behavioural control insignificantly affect mobile banking adoption.

Catarina Figueira and Joseph Nellis (2007) discussed in their research paper titled “Banking Efficiency in Non-Core Eu Countries - A Comparative Analysis of Portugal and Spain” about how technology impacted on the growth of banks in Non-Core EU countries. The finding depicted that the only factor which contributed for enhancing performance of bank in 1990,

was technology. There was greater dispersion in the performance of bank, which adopted and responded more positively and productively for adoption and efficient use of technology. The data considered for the study spread extracted from 1992 to 2003. Bank statements, Balance sheets were mainly used as data source. Data Envelopment Analysis (DEA) and Malmquist Index (based on the concept of total factor productivity (TFP)) used for data analysis.

2.9 Technology Context in other than Banking Industry

It is interesting to watch the technology trends in other industries or other relative facets. It gives idea about what is happening in other industries as compared to banking sector and how benefits or issues tackled at various stages in the case of leveraging technology concerned.

Research paper “Information Technology Adoption and Assimilation: Towards a Research Framework for Service Sector SMEs” authored Sylvestre Uwizeyemungu, Louis Raymond (2011) suggested frame work for IT adoption and assimilation for SMEs in service sector. Constructed on secondary data, this research work points out that, in the knowledge-based economy information technology is going to play vital role. Its impact cannot be ignored. It also high light that organizational factor plays important role in adoption and assimilation information technology in the case SMEs in service sector. The study suggests that, the manger should analyse situation of organization then go for introducing IT implementation. Thus, it can be stated the technology has become integral part of success of any type of organization.

eBay is another good example for the better use of technology and getting competitive advantage for the business. Edward T. Chen (2005) described about eBay is evolved through information technology adoption. It was mentioned that ‘eBay created a developer program for businesses and individuals, for modest user fees, to incorporate “eBay” technology and functionality in to their personal or business applications using eBay components.’ The technology and information system are an integral part of eBay business strategy. eBay established type of ‘marketplace’ by providing stable information platform with the help of technology with the concept like ‘chatrooms’, ‘bulletin’ and ‘email’. eBay completely absolutely going ahead compare to its nearest competitors by the effective use of latest technology.

The study by Pinar Irlayici Cakmak and Elcin Tas (2012), about gaining Competitive advantage in Turkish Contractor Firms narrated that, there is need to create awareness about strategic use of information technology for gaining competitive advantage. The research was carried out for 73 registered Turkish firm with Turkish Contractors Association (TCA). Questionnaire Survey method used for collecting data. The conclusion points out that, IT was

mainly used for getting correct and quick information. The use of IT is mostly at operational level only which create impact on Firm's technical front as well as financial aspects. This paper quotes two hurdles for use of IT – first is continuous training to the employee for understanding and better use of technology and secondly upgradation of software and hardware as per need. Hence it can be stated that, IT in the case of Turkish Contractor firm mainly used as support system for their function aspects.

2.10 Case Study:

ICICI Bank

The Industrial Credit and Investment Corporation of India Limited (ICICI) was established in 1955. It was initiative of World Bank, the Government of India, and representatives of Indian industry, with the purpose of creating a development financial institution for providing medium-term and long-term project financing to Indian businesses. ICICI was listed on the New York Stock Exchange through an issue of American Depository Shares.

ICICI was among the first Indian companies to raise funds from international markets. ICICI bank is the major foreign fund provider to the Indian Industry and also the first Indian institution to receive ADB loans.

To expand into international market, ICICI management frame the strategies under the guidance of Ms. Lalita Gupte (Former Head of Technology Group ICICI). ICICI identified international banking as a key opportunity for catering cross-border need of customer while strengthening the domestic market by offering products at international level.

In order to expand the business internationally, the sophistication in set up was expected. Setting a physical out let and paying variable cost for maintenance was costly option. This situation initiated a further step towards technology adoption. The ICICI adopted technology as a solution to provide its product and services internationally. It set up internet portal for NRI for cross-border money transfer. The other important aspects were use of technology for remittance business. ICICI spent about 10 million USD as an initial cost for technology investment and this is incremental as years to come as company is expanding its spread over in more than seven countries.

In order to set technology platform, it was necessary -

- To Choose right platform from the point of view of expansion and adoption by customer.
- To collaborate platform with correspondents like exchange house, foreign banks etc.
- To provide 27 X 7 service for the various banking transactions including remittance.
- Need of skilled human resource to use this platform.

All these issues were successfully tackled by ICICI technology team along with its Operational and International Business Group.

e.g. For every transaction, a SWIFT code is generated and that is then passed on to the Finacle Core. Instead of a one to one transaction, ICICI Bank accumulates all the remittances and carries out a bulk transaction at one go. The SWIFT message with remittance details from the correspondents, the core banking system (Finacle) of ICICI Bank, foreign exchange rate system, and the NEFT system then processes and clear the data for completion of a transaction and receipt of money (INR) is generated at ICICI Bank in Mumbai. All these functionalities are automated providing 24 X 7 connectivity and productive hours.

In order to maintain operationally excellence, the technology forum used to hold in every quarter, where members from both operations and technology group use discuss about various issues and challenges in the banking operations. Now it is organized for every month. The Finacle Customer Relationship Management system helps the operations group to lodge their requirements/complaints to the technology group and the daily. Management Information System (MIS) further aids the dialogue process between operations and technology groups.

ICICI Bank was ranked first among the private sector banks in ET 500, The Economic Times' list featuring top 500 Indian companies. This achievement was not possible without technology vision.

AXIS Bank

The Bank was promoted in 1993, jointly by Specified Undertaking of Unit Trust of India (SUUTI) (then known as Unit Trust of India), Life Insurance Corporation of India (LIC), General Insurance Corporation of India (GIC), National Insurance Company Ltd., The New India Assurance Company Ltd., The Oriental Insurance Company Ltd. and United India Insurance Company Ltd. It started its operation in 1994.

Axis Bank is the third largest private sector bank in India. The customer base includes Large and Mid-Corporates, MSME, Agriculture and Retail Businesses.

The AXIS bank report – Progress on (2015) talked about digital initiatives by the banks in length. AXIS bank is pioneer in providing high quality digital products and services to cater various needs of customer from different segments. The innovation in technology adoption led AXIS bank to make available hassle-free services to its customer. It also focused on providing unique banking experience.

The AXIS bank launched the unique products and processes like LIME, 24X7 instant Personal Loan, new tablet-based Loan Origination System, FxConnect Mobile for its corporate customers.

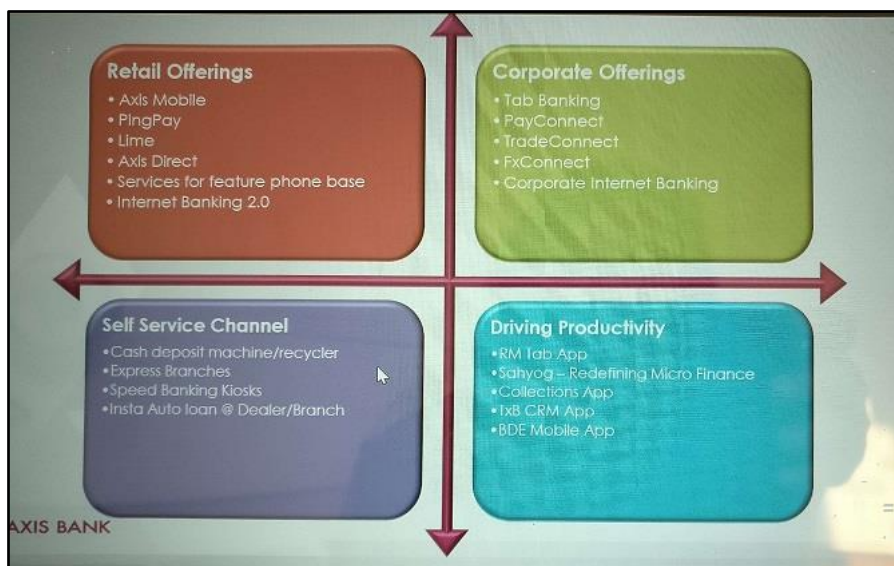


Figure 2.15: AXIX Banks Digital Sphere (Source: AXIS bank – Progress on (2015))

To serve better, automation of branches was on top priority. This helped bank to maximize utilization of the branch footprint with improved staff productivity, reduced errors, and improved customer experience. In addition to this, the Bank has centralized account opening process to achieve economies of scale and reduce logistics costs and time taken in shipping documents to a central location. The CASA, the single uniform imaging-based workflow solution for account opening was employed.

In order to provide end-to-end digital solution, AXIS banks deals in following way for different functionalities.

1. Customer engagement – Facility of digital transactions and services
2. Sales Team – A digital tool to enhance sale productivity.
3. Operations – Paperless, STP to reduced TAT, complaints and risk
4. Customer acquisition – Facility of direct on-line sale and Big data for cross sale
5. Employee Engagement – A digital tool to employee productivity
6. Digital Disruption – For digital leadership

A variety of mobile APPs launched by AXIS bank to serve all the types of customer. AXIS mobile APPs ranked as Best in India by Forrester Research (2015). AXIX Bank's internet platform is having more than 130 features. It is the first bank to provide all the eight services live at the same time. These services are – Mini Statement, Balance Enquiry, Fund Transfer using mobile number and MMID, Fund transfer using account number and IFSC, Generate OTO, Generate MMID, Generate MPIN and Change MPIN.

Along with going digital, bank is also taking care of security and risk management practices as per the guideline of RBI. As a part of this process, a separate security solution is implemented to provide safe and secure banking experience. the Bank has also complied with the Payment Card Industry Data Security Standards (PCI DSS) for card acquiring infrastructure to protect card related data.

The speed banking – the self-service banking Kiosks reduced customer queue at branches, instant and Easy transactions. By getting feedback from the banking customer, bank is utilizing time and resources for innovation in products and services through the use of information technology.

2.11 Summary

This chapter covered a theoretical background of the study. This help researcher to strength the view about his research work. This section tried to find out adoption and usage of technology i.e. information technology helping banks to gain competitive advantage. It also talked about the views of various renowned banking institutions about technology adoption. Customer perspective was also understood through various studies and finally case studies were discussed related banking and role played by technology for providing innovative services to the customers.

Next chapter is about research methodology considered for the study.

Chapter - 3

RESEARH METHODOLGY

3.1 Introduction

The earlier chapters dealt with introduction of the research topic followed by literature review. Both the chapters highlighted importance of usage of technology in banking for gaining competitive advantage. It also emphasizes the standing of selected research topic and its contribution for the banking sector.

As per Research Governance Framework for Health and Social Care, 2nd edition, (2005), “Research can be defined as the attempt to derive generalisable new knowledge by addressing clearly defined questions with systematic and rigorous methods.

This chapter will talk about research methodology adopted for carrying out said research so as to fulfilled objectives of this study.

3.2 Research Methodology

The research methodology deals with research design, understanding the research problem, sampling procedure, research instrument and defining test/s to be used for analysing data.

Once the research problem is identified, it provides basis for defining objectives and hypotheses to be tested to draw conclusion. It is also helpful for selection of research instrument to be used for the study.

This study is aimed at finding out what is role of technology in banking sector in order to gain competitive advantage. Banks are now much more focused on establishing technology quotient. The research questions may be framed as follows.

1. Does banking customer are preferring to use banking technology?
2. Whether adoption of technology by the customer is as per expectation of banker?
3. Does technology is really playing vital role in the case of Banking system?
4. Does application of new technology create positive impact on business growth?

3.3 Research Design

According to Kerlinger (1910), “Research design is the plan and structure of investigation so conceived as to obtain answer to research questions. The plan is the overall scheme or program of the research. A structure is the framework.”

Research design provides basis for research frame work so as to study the relations between the variables considered for the study.

There are two basic approaches to research.

1. Experimental Research – It is scientific research where one or more independent variables can be manipulated or controlled.
2. Non-Experimental Research – In this type of research, nature of the independent variables is such that it can't be manipulated. Researcher does not have direct control on independent variables.

Research Design also decides research types.

1. Exploratory Research - It explores the research area and they do not attempt to offer final solution to the problem.
2. Conclusive Research - It provide final and conclusive answers to research questions.

Based on purpose of study, research can be divided into two types.

1. Fundamental/ Basic Research – It is carried out for enhancing body of knowledge.
2. Applied Research – It is carried out for addressing, solving the problems.

On the broader perspective, the research can be classified into two groups.

- Quantitative Research
- Qualitative Research

Quantitative Research - It refers to the systematic experiential investigation of any phenomena via statistical, mathematical or computational techniques. The main purpose of quantitative research is to develop and employ mathematical models, theories and/or hypotheses pertaining to phenomenon.

Quantitative research is generally made using scientific methods, which can include:

- The generation of models, theories and hypotheses
- The development of research instruments and methods for measurement
- Experimental control and manipulation of variables
- Collection of experimental data
- Exhibiting and analysis of data
- Appraisal of results

Qualitative Research - It is research which deals with phenomenon that are difficult or impossible to quantify mathematically. e.g. beliefs, meanings, attributes, and behaviour etc.

Qualitative researchers aim to gather an in-depth understanding of human behaviour and the reasons that direct such behaviour.

The qualitative method investigates the why and how of decision making along with what, when and where.

Thus, the current research is non-experimental, conclusive research. In the initial stage exploratory research was basis for investigation of similar types of studies. It was also helpful for deciding objectives of the study. These studies were addressing to Banking digitization, Mobile banking, Relevance and challenges related to use of Information Technology in Banking Sector, Retail Banking and Information Technology and Competitive advantage etc. On the basis of exploration of data i.e. literature review, research instrument was designed to collect primary data. The research instrument used for this study was questionnaire survey. The interview was also conducted to get additional inputs for the study.

The researcher collected data by survey method to test the hypotheses and drawn conclusion on the basis of analysis.

This research is also classified as quantitative research as data from large sample size is collected to appraise the results.

3.4 Research Objective and Hypothesis

Research objective and research hypothesis are backbone of the research.

Research objective indicates what researcher want to do. Research Objective can be treated as subset of research questions. It helps to find out what research aiming at to find out at the end of study. Research objectives are expected to be specific and measurable. Research objective helps to develop hypothesis. Research hypothesis can be proved or disproved.

In the case of both i.e. Research objective and hypothesis, they possess specific population. This population is linked with explicit independent as well as dependent variable/s.

For the current research work following research objectives are formulated which provided direction to the study.

Research Objectives:

1. To identify preference of customer as well as bank staff in technology usage.
2. To understand the challenges faced by customers and bank staff while using technology in operations.
3. To understand gap between promised services and benefits received by the customer by the use of technology for banking operations.
4. To identify weather technology strategy helps in managing business growth.

Based on research objectives, research hypotheses formulated which were as follows.

Research Hypothesis:

1. There is a difference in the perceptions of customers considering technology used by the banks.

2. There is a difference in the perceptions of the bank employees regarding the technology challenges faced by them in banking operations.
3. There is a difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations.
4. There is a difference in the perception of customers with respect to issues they have faced in using banking technology.
5. There is an association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality.
6. There is a correlation between adoption of technology with business growth.

3.5 Data Source

This study used both the data sources i.e. primary data and secondary data for the collection of data.

The secondary data was collected mainly with the help of

- Articles published by various authorities related to the topic consider for the study.
- Published research paper in various conference proceedings, national and international journals which are linked with the topic such as acceptance of information technology in banking by bankers as well as customers, banking technology framework, mobile banking and retail banking etc.
- Relevant information collected from RBI report and website.
- Data collected from website of banks considered for the study
- The topic related info gathered from various websites and unpublished studies.

The primary data was collected through a sample survey using structured pre-tested questionnaire. The questionnaire was tested in the pilot study. In all 5 private banks from Pune region selected for the survey. It included both bankers and customer. The valid bankers' responses were 283 and in the case of Customers it was 437 nos. Thus, in all 720 valid filled questionnaires were utilized for analysis of data.

Private Banks covered for the study were as follows:

- Axis Bank - 4050 branches and 11000+ ATM's
- HDFC Bank - 5103 branches, 13000+ ATM's
- Kotak Mahindra Bank – 1369 branches, 2100+ ATM's
- ICICI Bank - 4867 branches and 14300+ ATM's
- YES Bank - 1150 branches and 1800+ ATMs

3.6 Sample Design

Sample Design refer to a plan for obtaining sample from given population. It made up of two elements –

- a. Sampling Method
- b. Sampling Calculation

The sample design is depending upon the survey objectives and the type of respondents participating in survey.

Sampling Method: Sampling method refers to the rules and procedures by which some of the elements from the population are selected as a sample. Some common sampling methods are simple random sampling, stratified sampling and cluster sampling etc.

The sample represent whole population. The conclusion drawn after research can be generalised or applied to the population considered for the study.

Sampling Calculation: This is an estimation process for sample calculation. Different methods are used for sampling calculation based on sampling techniques. e.g. the formula for computing a mean score with a simple random sample is different from the formula for computing a mean score with a stratified sample.

Steps for Sample Design

Defining Universe or Population: The universe consists of all elements which may be part of survey for carrying out research study. It is a collection or set of entities, items, or quantities from which a representative sample is drawn for doing analysis. These entities are grouped together on the basis of common or defining characteristics or features.

Sampling Frame: It is a list of every element that researcher wants to study. It is list of all the elements extracted from the population.

Sampling Unit: A part or section of population selected for research in order to carry out analysis for drawing conclusion. It acts as sample for whole group.

Sampling Technique: The sample is chosen from the population and is used to represent the population. Researchers use sampling techniques to select the participants for their sample. The idea behind selecting a sample is to be able to generalise your findings to the whole population.

The sampling methods are broadly divided into two types:

1. Probability Sampling – In this method, the probability of each person or thing being part of the sample is known.

The probability sampling involves following methods:

- a. Simple Random Sampling – All the elements have equal chance for selection.

- b. Systematic Sampling – It starts randomly and proceed with selection of every k^{th} element from the population. $K = \text{Population Size}/\text{Sample Size}$
 - c. Stratified Sampling – When population consist of number of various types of group, this method is used. This group treated as ‘strata’. From each strata sample are selected randomly.
 - d. Cluster Sampling – It is also called as multistage sampling. Here sample areas are decided in the first stage and then in the second stage sample is chosen from each area considered for the study.
2. Non-probability Sampling – This is method where, it is not possible to say what is the probability of any particular member of the population being selected for the study. It involves the selection of elements based on assumptions regarding the population of interest, assumptions regarding the population of interest, which forms the criteria for selection.

The non-probability sampling involves following methods:

- a. Purposive or judgemental Sampling – In this method, sample is selected with some purpose.
- b. Quota Sampling – Here population is divided into mutually exclusive group and then judgemental sampling technique is used to select the sample.
- c. Snowball Sampling – This is method of identifying someone who meets the who meets the criteria for inclusion in the study.
- d. Convenience Sampling – Here the sample being drawn from the part of the population which is convenient for the researcher.
- e. Accidental Sampling – In this case researcher collect data from anyone from any place.

For this research the sample design is as follows

Universe: Bankers and Banking Customer

Sampling Frame: Banks and Customer from Pune

Sampling Unit: Private Bank – 5 Nos. – AXIS Bank, HDFC Bank, Kotak Mahindra Bank, ICICI Bank and YES Bank and their Customers

Sampling Technique – Simple Random Sampling – In order to cover all the type of customers and bankers as a respondent for the study.

Sample Size: Generally large size helps in drawing precise answer for the study. The sample size depends on what you are measuring and the size of the error that you're prepared to accept.

Sample size calculated by using following formula –

$$\text{Sample Size (N)} = (\text{Z-score})^2 * (\text{Std. Dev} * (1 - \text{StdDev})) / (\text{Margin of Error})^2$$

Where,

- Z-Score is the z-value is found from statistical tables and depends on the confidence interval chosen for the study. Commonly used intervals are 90%, 95% and 99%. The Z score related given confidence intervals are 1.65, 1.96, and 2.33 respectively.
- Std. Dev - It is estimate of standard deviation of the population given the range. It is generally considered as 0.5.
- Margin of Error – It is the error which researcher want to accept. It may be considered as +/- 5%

By considering above formula, the sample size is 384 Nos. including both the types of responses i.e. bankers and customers.

The sample size determination also supported by following aspects -

Population of Pune as per census data is 34,04,888 nos. The bankers and customers of the age 18 years and above considered to be 77% of the population. Then banker is of 1,000 nos. and Customers may be considered as 26,18,000 nos. On the basis of this, bankers' sample size should be 278 and customer's sample size should be 384.

Researcher gathered in all 726 responses where 289 are bankers and 437 are customers.

	Description	Customer	Bank Employee
Population (Above 18 years @ 77% of Total Population)	26,18,000	1,000	
Expected Sample Size	384	278	

Sampling Technique	Simple random sampling	Simple random sampling	
Sample Unit	Customers in Pune	Bank Employees in Pune	
	Actual Sample Size	437	289

Table 3.1: Sample Size

3.7 Research Instrument

The questionnaire survey was used as main research instrument for this study. After doing extensive literature review and discussion with prospective respondents the questionnaire was designed and developed.

Unstructured Interview method was also adopted to get input for this study. The discussion was mainly revolved around the topic of this study.

The research instrument i.e. questionnaire was defined separately for bankers and banking customers. Based on literature review and pilot study questionnaire was finalized to collect the data.

Validity and Reliability of the Research Instrument

The validity of instrument is mainly related to the interpretation of what a scale actually measures while reliability refers to consistency or repeatability of the measurement. (Spector (1997)).

For the quantitative analysis, Questionnaire survey has been always suitable instrument for gathering responses.

Validity of the Instrument: The survey instrument that was used has a forty-year application and has been applied in several different industries (Kovach 1987).

It is expected that; research objectives should be covered and must be converted into clear questions which will extract meaningful response from the respondent. A self-administered questionnaire was prepared to get appropriate response as a large sample size needed to be tapped.

Safeena R., Date H, and Kammani A. (2010) collected data from 116 responses from internet banking user. The respondents were students of various institute from Mumbai. Convenience sampling method was used. Each question was framed using five-point Likert scale. The study was carried out for analyzing “Internet Banking Adoption in an Emerging Economy: Indian Consumer’s Perspective”.

The study about, “Customer Adoption of Banking Technology in Private Banks of India” by Tater B., Tanwar M., and Murari K. (2011) carried out by using questionnaire survey method. A simple random sampling and convenience sampling method used for collection of data. The questionnaire was divided into four parts – Demographic information of the respondents, Customer’s account profile of the respondents, Personal Characteristics of customers with different banking services, and Characteristic and usefulness of different banking services.

The data was collected from 500 bank customers and a five-point Likert scale used in the structured questionnaire for collecting responses. The 403 valid questionnaire data were tabulated and analyzed for hypothesis testing.

Bamoriya P. S. and Dr. Singh P (2012) carried out research on “Mobile banking in India: Barriers In adoption and Service preferences” used structured questionnaire consisted with a 5-point Likert scale with 40 variables. In all data of 100 respondents were collected from bank customer form Indore. For data collection purposive sampling was implemented and data was analyzed for outliers using SPSS 17.

An exploratory research on “Mobile Banking as Technology Adoption and Challenges: A Case of M-Banking in India” by Sharma A. and Dr. Kansal V. (2012), collected data using questionnaire from user and non-user of mobile banking who were Businessmen, servicemen, professionals, students etc. Around total 100 respondents from Ghaziabad participated in the mobile banking research.

Above study shows that, questionnaire is the most suitable and valid research instrument for current quantitative research.

Reliability of the Instruments:

For checking reliability of data gathered through questionnaire, Cronbach alpha test was carried out. Cronbach’s alpha is considered as measure of scale reliability. Internal consistency of questionnaire, is well tested with the help of Cronbach alpha test. It shows how closely related a set of items are as a group. If Cronbach alpha is greater than 0.7 then reliability is acceptable.

Reliability Statistics

Cronbach's Alpha	N of Items
.773	30

Table 3.2: Reliability Statistics

The above clearly indicates that questionnaire is reliable for analysing data for hypothesis testing related to current research.

3.8 Pilot Study

The developed questionnaire was pretested for checking the readability and unambiguousness of the questionnaire. The pilot study was carried out for 50 bank customers and 10 bankers. On the basis of feedback received from respondents required changes were in the questionnaire. The corrections mainly related to some of the wordings and instructions provided.

Thus, it can be noted that, Questionnaire is reliable as well as valid research instrument for the study.

3.9 Details about Research Instrument –

A separate questionnaire was prepared for banking customer and bankers. In both the cases, the questionnaire was divided into five parts.

Part A: Demographic information of Respondent

Part B: Customer preference about usage of technology

Part C: Training for the use of technology and feedback

Part D: Technology Changes Observed during period 2011-2015

Part E: Growth Prospective related to new technology

Detail description about questionnaire

Part	For Banker	For Banking Customers
Part A: Demographic information of Respondent	Name, Age, Gender, Education, No. of years of association with the current bank and previous bank/s Current Designation	Name, Age, Gender, Education, Occupation, Name of the bank, No. of year association with bank and name of the other bank/s
Part B: Customer preference about usage of technology	Observation about technological trend with reference to customer, Perceived Competitive advantage, Challenges faced due to technology adoption, Expectation from customer about usage of new technology	Why customer is preferring the bank, The most frequently used method for banking transaction, Ease of using modern technology vis-à-vis traditional, Requirement to Upgrade in current accessories for the use of banking

		technology
Part C: Training for the use of technology and feedback	Training for the use of new technology, Types of training frequency of training program, Showcasing new technology adoption and mechanism to deal with customer complaint and Internal talent search	Training/ Assistance for using new technology from the bank, Showcasing the technology adaption and its benefits, Feedback on technology uses and communication from the bank
Part D: Technology Changes Observed during period 2011-2015	Observed technological changes and issues, Decision related to adoption of technology and % spending on technology	Observation about technological changes, Issues related to usage of technology and expectation from bank with respect to technological aspects.
Part E: Growth Prospective related to new technology	Reason for growth, Achievement of Objectives due to increased use of technology, Demonstrated Growth vis-a vis investment in technology, Growth in Revenue due to technology adoption,	Growth in the form of increased customer base and additional purchase of product in view of new technology adoption by the bank.

Table 3.3: Description of Questionnaire

Overall 500 questionnaires were distributed among banking customers and 400 questionnaires were distributed among bankers. Simple random sampling technique used for selecting respondents. Respondents were salaried individual, businessmen, retired person, students and housewife. In the case of banks, all the types of staff with various designations were the respondents. It included Front desk staff, Bank Officer and Bank Manager.

Out of 500 distributed questionnaires, 400 responses were received (80%). From the bankers 250 responses were received out of 400 (62.5%). In all 650 valid responses were considered for data analysis in the respective category.

In case of unstructured interview process, research interacted with 20 customers and 5 bankers for getting inputs. The conversation was about adoption of technology by the customers and bankers. The other aspect of the conversation was comparison of technology adoption by the banks considered for the study.

3.10 Description of Variables

Statistical Hypothesis

Hypothesis:1

H0: There is no difference in the perceptions of customers considering technology used by the banks.

H1: There is a difference in the perceptions of customers considering technology used by the banks.

The hypothesis was tested with Friedman chi-square test. The outcome of first hypothesis verified by using rank table about customer consideration for the usage of technology. The parameter related to ranking table are – Internet Banking, Personal visit, Mobile Banking, Family Members, Call Center and ATM.

Hypothesis:2

H0: There is no difference in the perceptions of the bank employees regarding the technology challenges faced by them in banking operations.

H1: There is a difference in the perceptions of the bank employees regarding the technology challenges faced by them in banking operations.

The hypothesis was tested in the similar line by applying Friedman chi-square test. The outcome of second hypothesis verified by using rank table about customer consideration for the challenges faced for the technology usage. The parameter related to ranking table are – No. of Customer/Queries, Delay in access IT system, Access for Multiple System, Reliable IT System, Limited IT knowledge.

Hypothesis:3

H0: There is no difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations.

H1: There is a difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations.

The Friedman chi-square test used for testing the hypothesis. The support for the acceptance of this hypothesis the ranking of following parameters was considered. The parameters are - Internet Banking, Personal visit, Mobile Banking, Family Members, Call Center and ATM.

Hypothesis:4

H0: There is no difference in the perception of customers with respect to issues they have faced in using banking technology.

H1: There is a difference in the perception of customers with respect to issues they have faced in using banking technology.

One more time, the Friedman chi-square test used for testing the hypothesis. The support for the acceptance of this hypothesis the ranking of following parameters was considered. The parameters are - Unavailability of Website/ Server, SMS/ OTP Notification, ATM Issue, Waiting Time for Attendant, System Performance, Technology Cost, Complicated Paperwork for Technology usage consent, Forced Adoption, Hacking/ Mis-use and Account Protection Mechanism.

Hypothesis:5

H0: There is no association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality.

H1: There is an association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality.

The Chi-Square test of contingency used for testing the hypothesis. The support for the acceptance of this hypothesis, the aspects considered are - assistance provided by bank staff for highlighting benefits of adoption of technology and benefits advertised put into reality

Hypothesis:6

H₀: There is no association between adoption of technology and business growth.

H₁: There is positive association between adoption of technology and business growth.

List of variables identified for this hypothesis are mentioned below:

Variable 1			
Adoption of Technology			
Customer Responses		Bank Employee Responses	
Likert Scale Response	Description	Likert Scale Response	Description

B3 (V1V2C1)	Cost/Time Saving by Technology	B3 (V1B1)	Customer Preference for Technology Vs Traditional Methods
B4 (V1C2)	Switching Due to Technology	B8 (V1B2)	Enquiry about Bank Planning to Roll out New Technology
B8 (V1C3)	Upgradation for Technology Adoption	B9 (V1B3)	Customer Need for Upgradation for Technology Adoption
C2 (V1C4)	Need of Assistance		
Rank/ Multiple Choice	Description	Rank/ Multiple Choice	Description
B1	Customer Preference for Bank	B1	Trend Observed
B2	Technology Used by Customer	B2	Uses of Technology by Customer
D1	Top 5 Technology Changes	D1	Top 5 Technology Changes
D3	Top 5 Expectations from Bank		

Table 3.4: Description of Variable 1 (Hypothesis 6)

Variable 2			
Growth of Bank/Business Growth			
Customer Responses		Bank Employee Responses	
Likert Scale Response	Description	Likert Scale Response	Description
B3 (V1V2C1)	Cost/Time Saving by	D4 (V2B1)	% of Spending on

	Technology		Technology Initiatives
		E1(V2B2)	Demonstration of Growth and Investment for Technology
		E3 (V2B3)	Objectives Achievement Through Technology
		E4 (V2B4)	Cross Selling of Products due to Technology
		E5(V2B5)	Growth due to Technology Adoption
Rank/ Multiple Choice	Description	Rank/ Multiple Choice	Description
E1	Additional Product Purchase	B2	Uses of Technology by Customer
		B4	Competitive Advantage
		D3	Measurement of Success
		E6	Reasons for Growth

Table 3.5: Description of Variable 2 (Hypothesis 6)

3.11 Data Analysis Procedure

All together 720 responses were checked and segregated as per type of questions asked. It includes – Demographic Data, the data related to Ranked or Multiple-choice questions and data collected with the help of Likert Type questions.

Hypothesis testing is mainly based on Likert type questions supported by ranked or multiple-choice questions. Analysis is carried out by using chi square test and also establishing Correlation then followed by Nonparametric Testing by using SPSS.

3.12 Assumptions & Limitation

Assumptions are realistic expectation which are something researcher believe to be true. These are accepted principles without any proof. It was assumed that all the respondents are using banking technology and they know basics of usage. Utmost care was taken while designing questionnaire in order to receive appropriate response by the respondents. It was expected that participants in the questionnaire survey should understand and fill it properly in all respects.

It was also assumed that, the banks considered for the study are adopted new technology and using it appropriately to serve the customers. The cooperation from all the type of respondents was expected for the support of the said study.

Limitations of the Study

The study was restricted to 5 Private banks only. The banks were from Pune region only.

Though large sample size was taken for preciseness of the study, it may be possible that it is not representing universe at fullest extent.

Getting responses in time was another constraint. Time consumed for gathering all the responses was high as compared what was planned.

Some of the bankers were reluctant for filling questionnaire or for the interaction.

There may be possibility of having biased or responses with central tendency, which creates impact on analysis.

However, to overcome the limitations and maintain the effectiveness of research work sincere efforts were put.

3.13 Summary

This chapter discussed about research design in detail. It was followed by information about research objective and research hypothesis framed for the study. Further sample design process was discoursed in depth followed by conversation about research instrument in detail. The statistical hypotheses statements were outlined. Descriptions of variables related hypothesis given in detail. Assumption and limitations were stated for the current study.

Next chapter will talk about analysis and findings based the research methodology discussed in this chapter.

Chapter - 4

ANALYSIS AND FINDINGS

1.1 Introduction

The first chapter gave introduction about the topic selected for the doctoral study. The second chapter explored the background about the topic and highlighted evidences about need and support related to selected topic. The previous chapter shared the information about the way the objective of the study and tools used to collect the primary data which was useful for further analysis and drawing conclusion on that basis.

This part mainly focused on achievement of objectives and hypothesis testing.

The Objectives framed for the studies were as follows: -

1. To identify preference of customer as well as bank staff in technology usage.
2. To understand the challenges faced by customers and bank staff while using technology in operations.
3. To understand gap between promised services and benefits received by the customer by the use of technology for banking operations.
4. To identify weather technology strategy helps in managing business growth

Research Hypothesis tested were mentioned below

1. There is a difference in the perceptions of customers considering technology used by the banks.
2. There is a difference in the perceptions of the bank employees regarding the technology challenges faced by them in banking operations.
3. There is a difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations.
4. There is a difference in the perception of customers with respect to issues they have faced in using banking technology.
5. There is an association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality.
6. There is a correlation between adoption of technology with business growth

This analysis is divided into two parts: Both Customers and Employees data analysed and

- I. Demographic Data Presentation
- II. Analysis
 - A. Analysis of Ranked Data
 - B. Analysis of Multiple-choice Data
 - C. Hypothesis Testing

The Description of variables is already presented in previous chapter. The same is used for hypothesis testing. Mainly Likert Scale data used for hypothesis testing supported by ranked and multiple -choice data.

I. Demographic Data Presentation

4.1 Customer

1. **Customer - Gender:** In all 437 responses were gathered. The representations were both male and female. The statistics of participation in the customer survey was as follows:

Gender	No. of Responses	Percent (%)
Female	134	30.7
Male	303	69.3
Total	437	100.0

Table 4.1.1: Customer Survey Response Participation

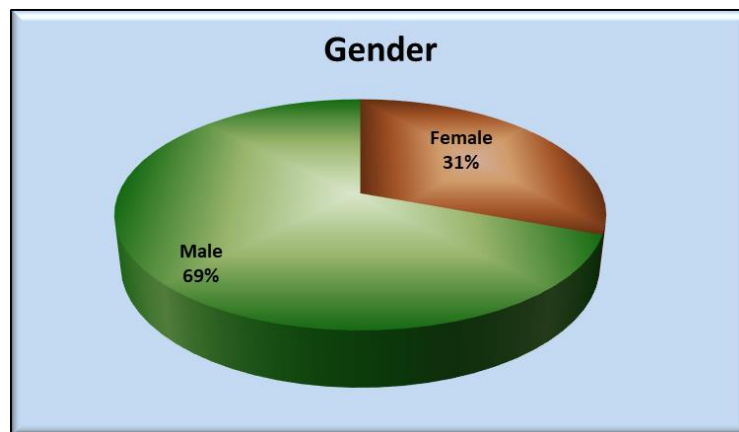


Figure 4.1.1: Customer Survey Response Participation

Interpretation: In all 134 Female and 303 Male were part of the Customer Survey.

2. **Customer - Age:** Following table shows Age wise distribution of the customers who participated in survey for this study.

Age Group	No. of Responses	Percent (%)
-----------	------------------	-------------

Less than 25	56	12.8
25 to 35	160	36.6
35 to 45	160	36.6
45 to 60	51	11.7
Above 60	10	2.3
Total	437	100.0

Table: 4.1.2: Age wise distribution of Customer Participants

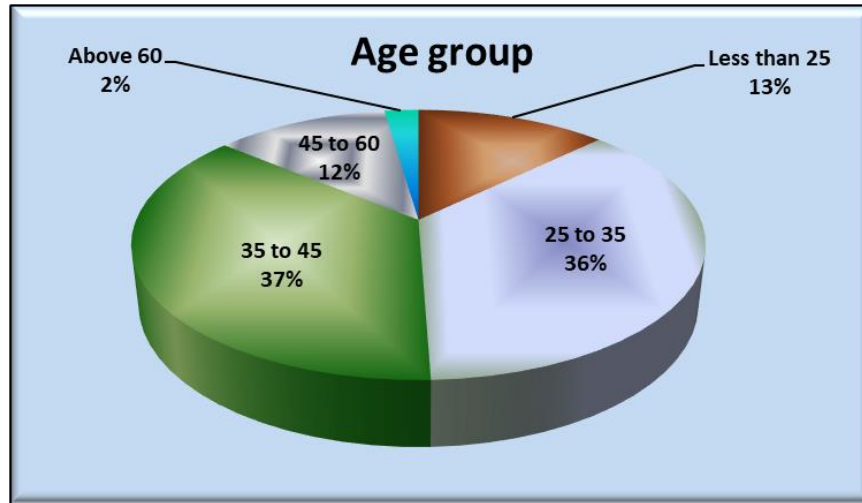


Figure 4.1.2: Age wise distribution of Customer Participants

Interpretation: The pie chart indicates that most of customers were of the age between 25 to 35 years and 35 to 45 years. In all 73% of customers were from age 25 – 45 years considering both age group together.

3. Customer Education: The Customer from all the categories participated in survey. The categories were Uneducated, Under Graduate, Graduate and Post Graduate.

Education	No. of Responses	Percent (%)
Uneducated	3	.7
Under Graduate	47	10.8
Graduate	166	38.0
Post Graduate	221	50.6
Total	437	100.0

Table 4.1.3: Customer Education

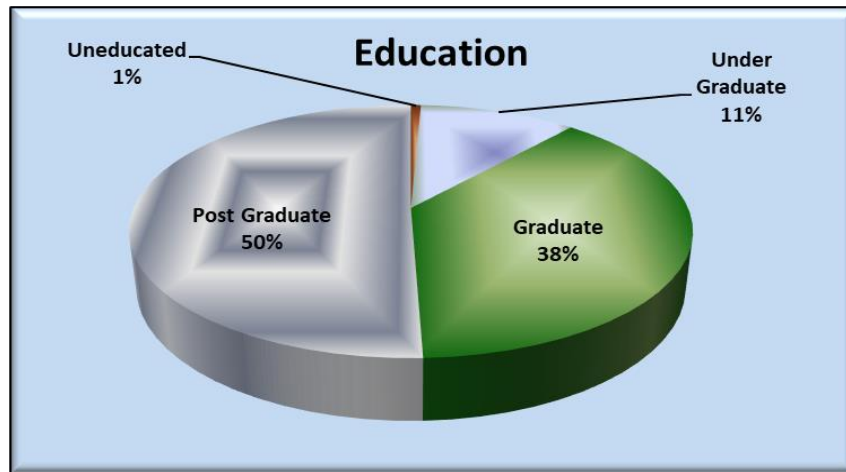


Figure 4.1.3: Customer Education

Interpretation: Above chart shows that, 50% of the respondents were post graduate followed by 38% graduate respondents. Only 1% respondents were not educated.

4. Customer Occupation: The customers who contributed in this survey were grouped under following occupations – Retired, Salaried, Self Employed, Students, Unemployed.

Occupation	No. of Responses	Percent (%)
Retired	9	2.1
Salaried	300	68.6
Self employed	65	14.9
Student	35	8.0
Unemployed	28	6.4
Total	437	100.0

Table 4.1.4: Customer Occupation

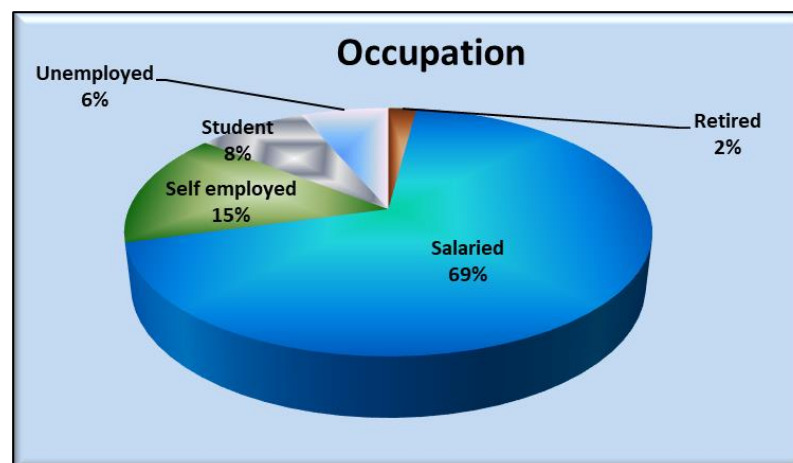


Figure 4.1.4: Customer Occupation

Interpretation: 69% of the respondents were salaried whereas only 15% of the respondents were self-employed and 8% students, who were part of this study.

5. Customer Association with Bank: This is about since how many years, customer is having bank account with existing bank. The alternatives framed for grouping the data were Less than 5 years, 5 to 10 years, 10 to 15 years, 15 to 20 years and more than 20 years.

Account with Existing Bank	No. of Responses	Percent
Less than 5 years	151	34.6
5 to 10 years	144	33.0
10 to 15 years	93	21.3
15 to 20 years	39	8.9
More than 20 Years	10	2.3
Total	437	100.0

Table 4.1.5: Customer Association

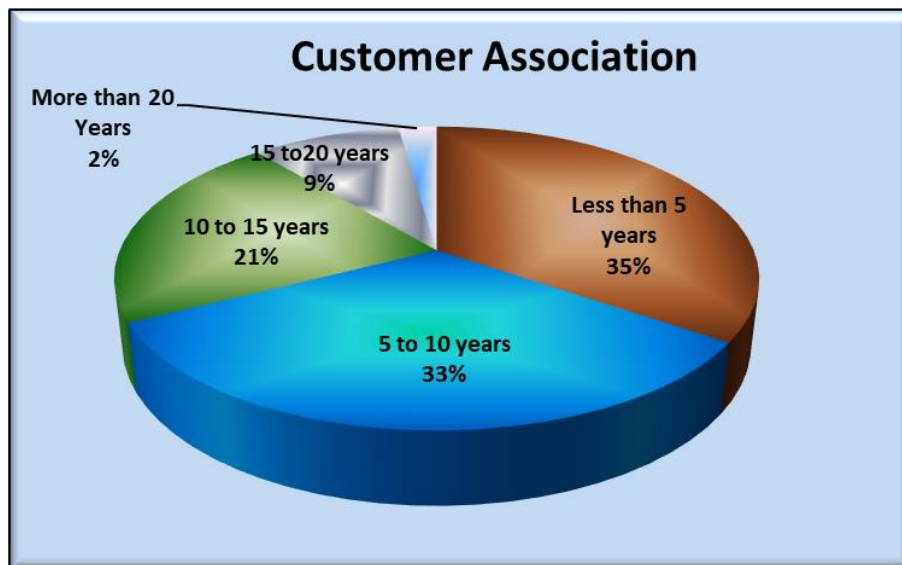


Figure 4.1.5: Customer Association

Interpretation: Above figure shows that, the customer association with their existing bank is varied. 35% of the respondents were having less than 5 years association with their current bank while 33% of the respondents belongs to the category 5 to 10 years. Only 2% of the customer respondents having more than 20 years of association with their current bank. The other responses were from 10 to 15 years and 15 to 20 years are 21% and 9% respectively.

4.2 Bank Employee

1. **Bank Employee – Gender:** In the case of Bank Employee altogether 289 valid responses were considered for the study. The gender wise bifurcation is given below.

Gender	No. of Responses	Percent (%)
Female	48	16.6
Male	241	83.4
Total	289	100.0

Table 4.2.1: Customer Survey Response Participation

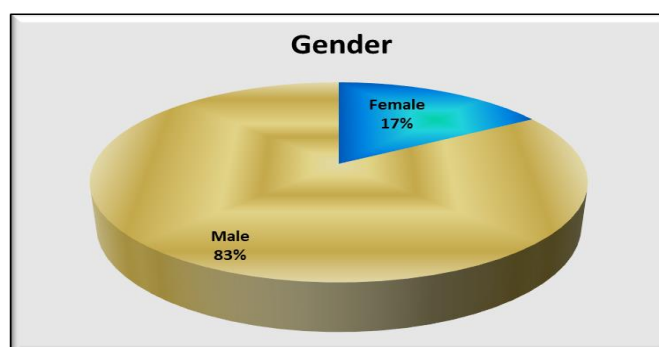


Figure 4.2.1: Customer Survey Response Participation

Interpretation: The pie chart shows that, from the bank employees respondents 16.6% were female and 83.4% were male.

2. **Bank Employee – Age:** The age categories were same as customer respondents.

Age Group	No. of Responses	Percent (%)
Less than 25	29	10.0
25 to 35 years	183	63.3
35 to 45 years	58	20.1
45 to 60 years	19	6.6
Total	289	100.0

Table 4.2.2: Age wise distribution of Bank Employee Participants

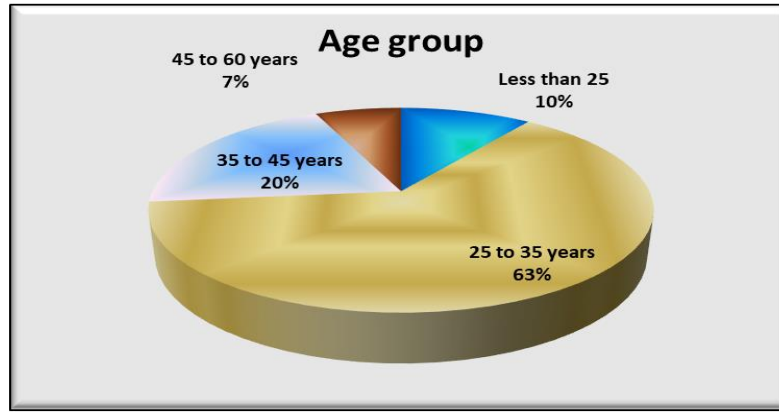


Figure 4.2.2: Age wise distribution of Bank Employee Participants

Interpretation: In the case of bank employee almost 63% of the employees were from the age group 25 to 35 years, while 20% of the employees were of the age between 35 to 45. The participants from the age group less than 25 years were 10% and 7% were from the age group 45 to 60 years.

3. Bank Employee Education: The education aspects of bank employee are divided into two types namely Graduate and Post Graduate.

Education	No. of Responses	Percent (%)
Graduate	77	26.6
Post Graduate	212	73.4
Total	289	100.0

Table 4.2.3: Bank Employee Education

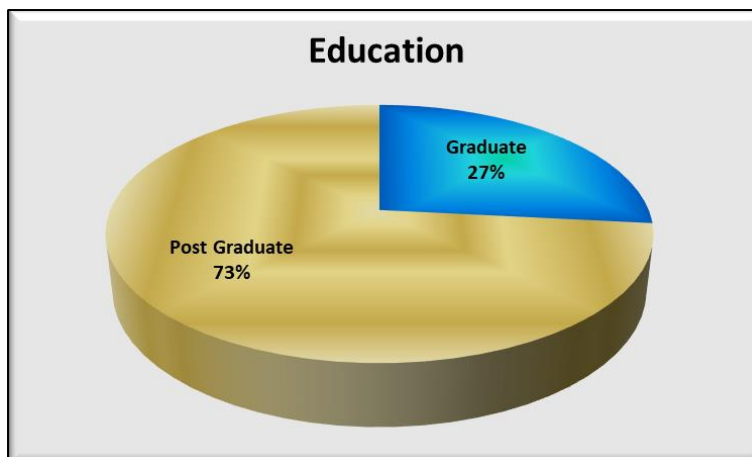


Figure 4.2.3: Bank Employee Education

Interpretation: From the Bank employee respondents 73% were Post Graduate and 27% were Graduates. It can be stated that Bank Employees who participated in the study were well educated.

4. Tenure of Employee with Current Bank: This shows the no. of years association of the bank employee with the current bank.

Tenure of service with the bank	No. of Responses	Percent (%)
Less than 5 Years	183	63.3
5 to 10 Years	29	10.0
10 to 15 Years	48	16.6
15 to 20 Years	29	10.0
Total	289	100.0

Table 4.2.4: Bank Employee Tenure

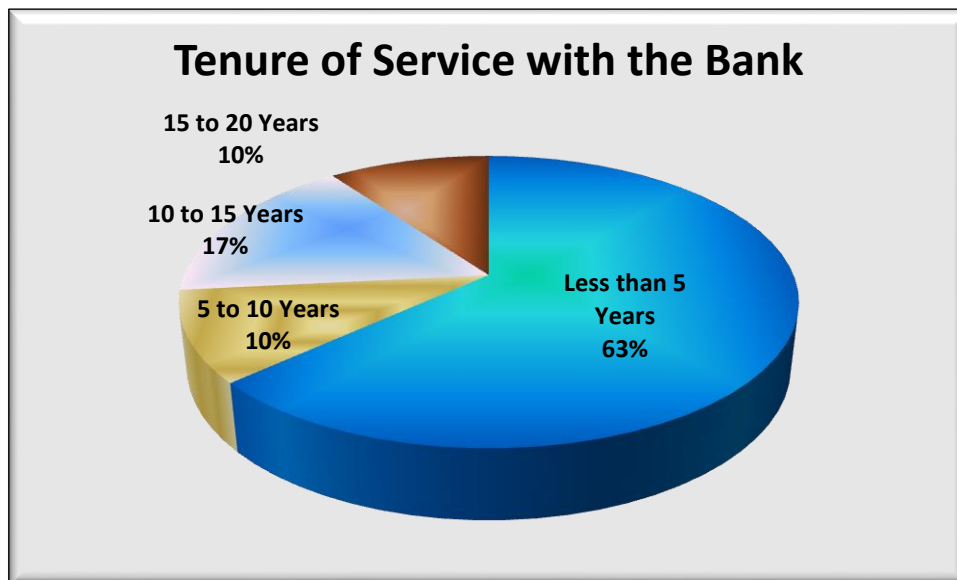


Figure 4.2.4: Bank Employee Tenure

Interpretation: The pie chart shows that about 63% of the employees were from the category who are associated with current bank, less than 5 years followed by 17% of the employees were associate between 10 to 15 years. There are 10% of the employees were from both the categories i.e. from 5 to 10 years and 15 to 20 years.

II. Analysis

A. Analysis and Interpretation of Ranked Data

4.3 Customer

- 1. Customer Preference from Bank:** It is about understanding, what should bank have from the customer perspective.

As a customer my preference from bank is to have....	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Latest technology to save time and better experience	167	126	95	47	48
%	38.2	28.8	21.7	10.8	11.0
Best customer service	150	164	91	52	34
%	34.3	37.5	20.8	11.9	7.8
Best interest rates / products / Benefits	61	92	140	93	59
%	14.0	21.1	32.0	21.3	13.5
Branch location close to my home	47	31	58	128	119
%	10.8	7.1	13.3	29.3	27.2
Friendly staff who can assist me with all my queries	12	24	53	117	177
%	2.7	5.5	12.1	26.8	40.5

Table 4.3.1: Customer Preference

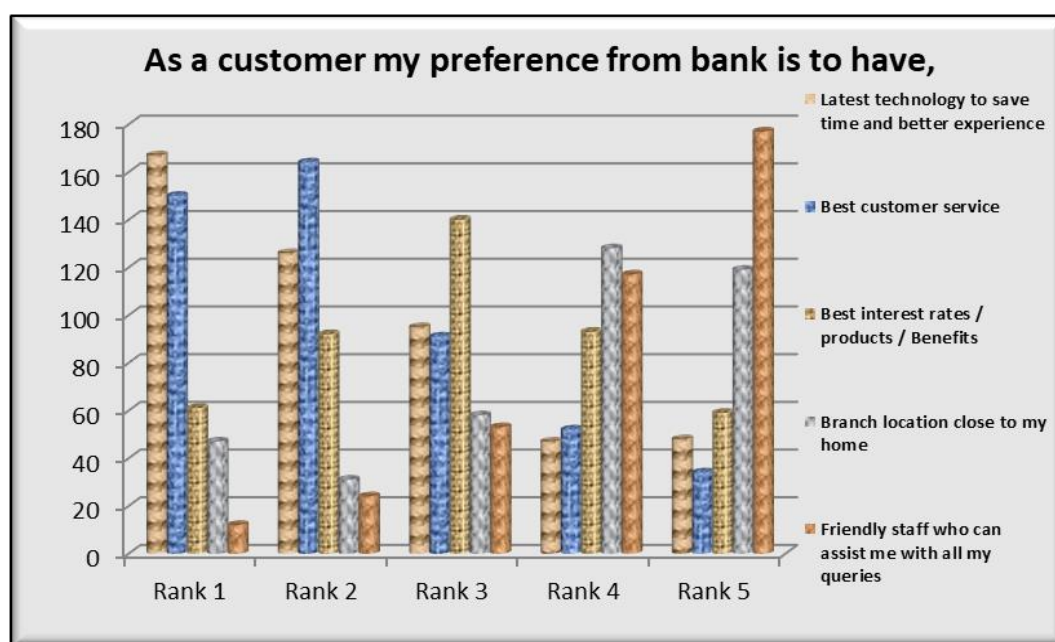


Figure 4.3.1: Customer Preference

Interpretation: Above bar chart clearly indicated that, Bank must have Latest Technology to save time and better experience as this expectation ranked one. The next expected aspect is Best Customer Service which is ranked two followed by Best Interest Rate/Products/Benefits, Branch Location close to home and then Friendly Staff assistance ranked third, fourth and fifth respectively.

2. Preferred Technology: This question gives insight about preferred technology for banking operations.

As a customer, which is the most used technology method?	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6
Internet banking	196	121	62	74	40	25
%	44.9	27.7	14.2	16.9	9.2	5.7
Personal visit	34	69	90	115	110	67
%	7.8	15.8	20.6	26.3	25.2	15.3
Mobile banking	76	118	99	70	56	40
%	17.4	27.0	22.7	16.0	12.8	9.2
Through family members	4	20	41	52	133	134
%	0.9	4.6	9.4	11.9	30.4	30.7
Through call centre	0	8	50	94	82	158
%	0.0	1.8	11.4	21.5	18.8	36.2
ATM	127	101	95	32	16	13
%	29.1	23.1	21.7	7.3	3.7	3.0

Table 4.3.2: Preferred Technology

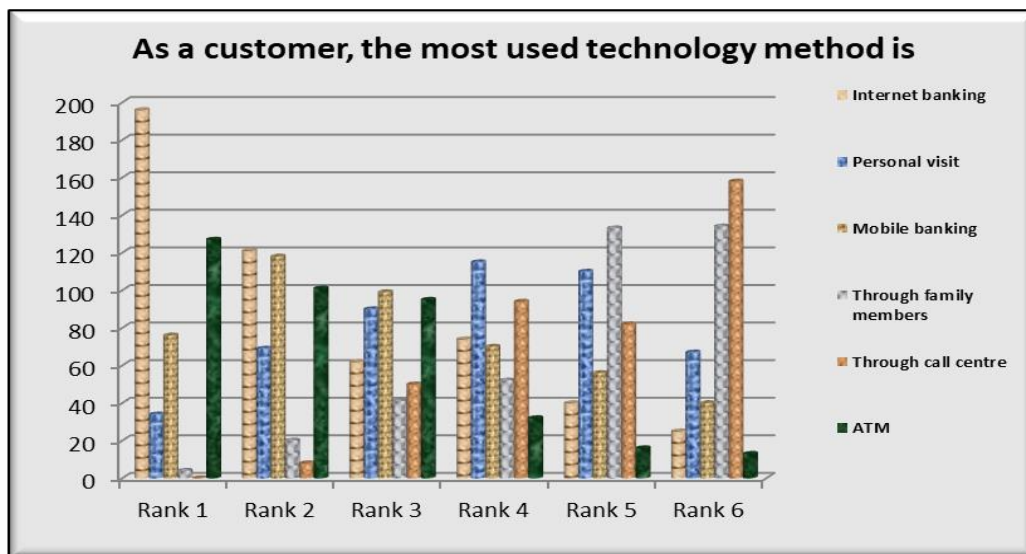


Figure 4.3.2: Preferred Technology

Interpretation: It can be stated that, Internet banking is most preferred mode of banking transactions as it is ranked one and two. In the rank one position, second preferred way is ATM. In the second rank position other preferred option is mobile banking. Personal visit ranked four followed by through family members and through call centre which are ranked 5th and 6th respectively.

3. Observation about Technology Changes: This parameter describes the technology changes observed by the Customers with respect to banking operations.

What are the top 5 technology changes you have observed in the last 4 years the bank (2011- 2015)	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Banking through phone banking / call centre	12	20	51	45	270
%	2.7	4.6	11.7	10.3	61.8
Debit & Credit card acceptance and usage	54	161	113	89	45
%	12.4	36.8	25.9	20.4	10.3
Increased ATMs & ability to use other ATMs	170	58	67	95	74
%	38.9	13.3	15.3	21.7	16.9
Internet Banking for all banking needs	77	120	70	129	10
%	17.6	27.5	16.0	29.5	2.3
Mobile apps for banking transactions	124	78	136	79	38
%	28.4	17.8	31.1	18.1	8.7

Table 4.3.3: Observation about Technology Changes

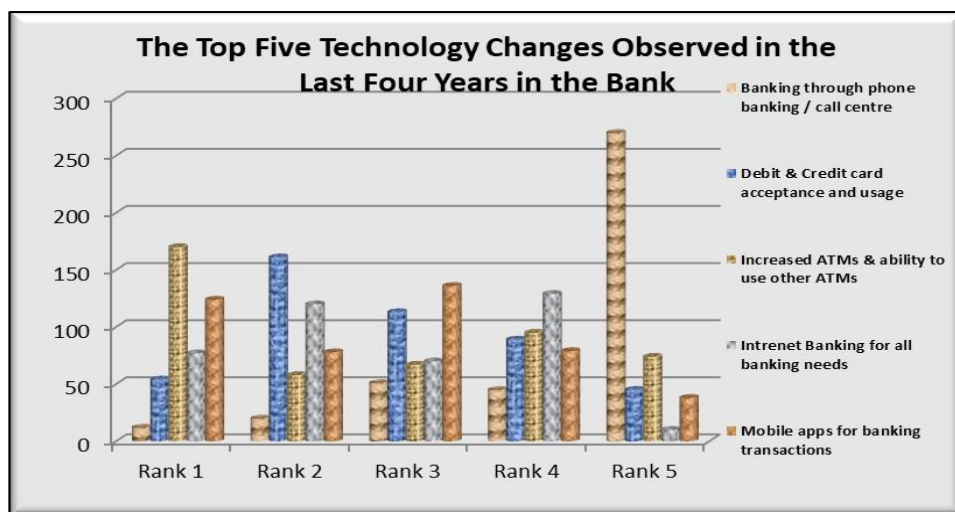


Figure 4.3.3: Observation about Technology Changes

Interpretation: At rank 1 position, Increased ATM and ability to use other ATM is the most observed technological change while at rank 2, Debit and Credit card acceptance and usage is observed technological change. In the case of rank 3 and 4, the observed technological changes in last fours are Mobile apps for banking transactions and Internet Banking for all banking needs respectively. Banking through phone banking/call centre is last ranked technological change observed by the customers.

4. Technology Issues Faced: This data is about the technological issues faced by the customers during last four years.

What are the top 10 technology issues you have faced in the last 4 years with the bank (2011- 2015)	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Rank 7	Rank 8	Rank 9	Rank 10
ATM machine issue	111	76	74	51	50	46	38	40	35	29
%	25.4	17.4	16.9	11.7	11.4	10.5	8.7	9.2	8.0	6.6
Complicated paperwork	44	28	38	38	44	48	86	41	23	13
%	10.1	6.4	8.7	8.7	10.1	11.0	19.7	9.4	5.3	3.0
Cost of using new technology	23	33	42	31	54	90	42	21	21	24
%	5.3	7.6	9.6	7.1	12.4	20.6	9.6	4.8	4.8	5.5
Force to learn new technology, no choice given	14	15	27	29	33	39	61	104	39	43
%	3.2	3.4	6.2	6.6	7.6	8.9	14.0	23.8	8.9	9.8
Fraud, hacking, mis- use of account	13	16	15	24	27	37	45	56	115	49
%	3.0	3.7	3.4	5.5	6.2	8.5	10.3	12.8	26.3	11.2
Lack of laws and pain in cases of tech. mis-use	13	15	13	21	16	29	26	42	70	140
%	3.0	3.4	3.0	4.8	3.7	6.6	5.9	9.6	16.0	32.0
Long waiting time to talk with customer executive	65	68	49	84	55	20	31	20	7	14
%	14.9	15.6	11.2	19.2	12.6	4.6	7.1	4.6	1.6	3.2

SMS/OTP not working	40	84	59	61	33	46	47	53	57	33
%	9.2	19.2	13.5	14.0	7.6	10.5	10.8	12.1	13.0	7.6
Staff indicating system performance issue	29	52	60	54	82	49	22	14	12	16
%	6.6	11.9	13.7	12.4	18.8	11.2	5.0	3.2	2.7	3.7
Website not working	85	50	60	44	43	33	39	46	58	76
%	19.5	11.4	13.7	10.1	9.8	7.6	8.9	10.5	13.3	17.4

Table 4.3.4: Technology Issues Faced

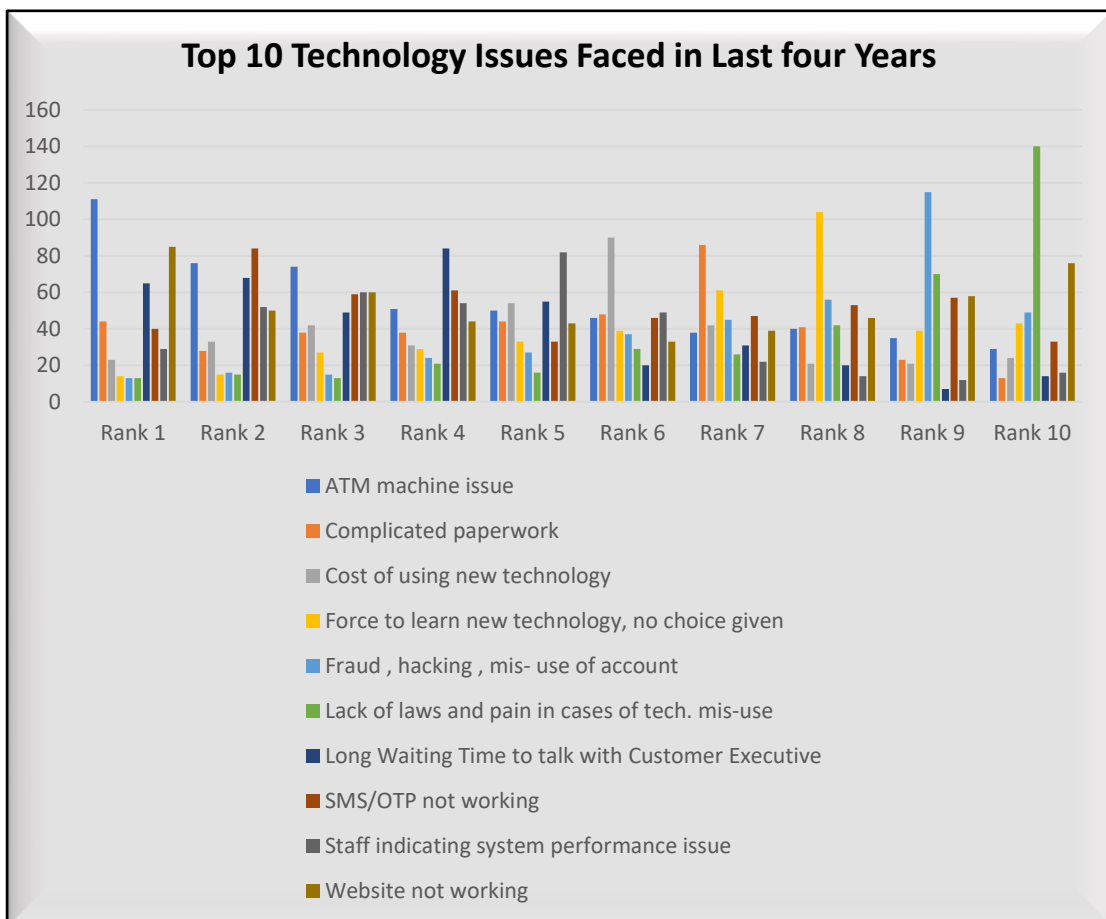


Figure 4.3.4: Technology Issues Faced

Interpretation: The technology issues faced during last four years by the customers from rank 1 to rank 10 are ATM machine issue, STP/OTP not working, again ATM machine issue, Long waiting time to talk with customer executive, Staff indicating system performance issue, Cost of using new technology, Complicated paperwork, Force to learn new technology,

no choice given, Fraud, hacking, mis-use of account and last ranked option is Lack of laws and pain in cases of technology mis-use.

5. Technology Expectations: This indicates the top 5 expectations from the bank by the customers.

My top 5 expectations from Bank are	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Frequent training & ease of procedures	15	23	46	132	177
%	3.4	5.3	10.5	30.2	40.5
Quick service using technology - passbook update, transfers, deposits etc.	110	120	113	71	29
%	25.2	27.5	25.9	16.2	6.6
Services at minimum cost	82	65	53	74	118
%	18.8	14.9	12.1	16.9	27.0
Timely maintenance of ATM & other facilities	159	100	82	71	66
%	36.4	22.9	18.8	16.2	15.1
Timely upgrade of technology	71	129	143	89	47
%	16.2	29.5	32.7	20.4	10.8

Table 4.3.5: Technology Expectations

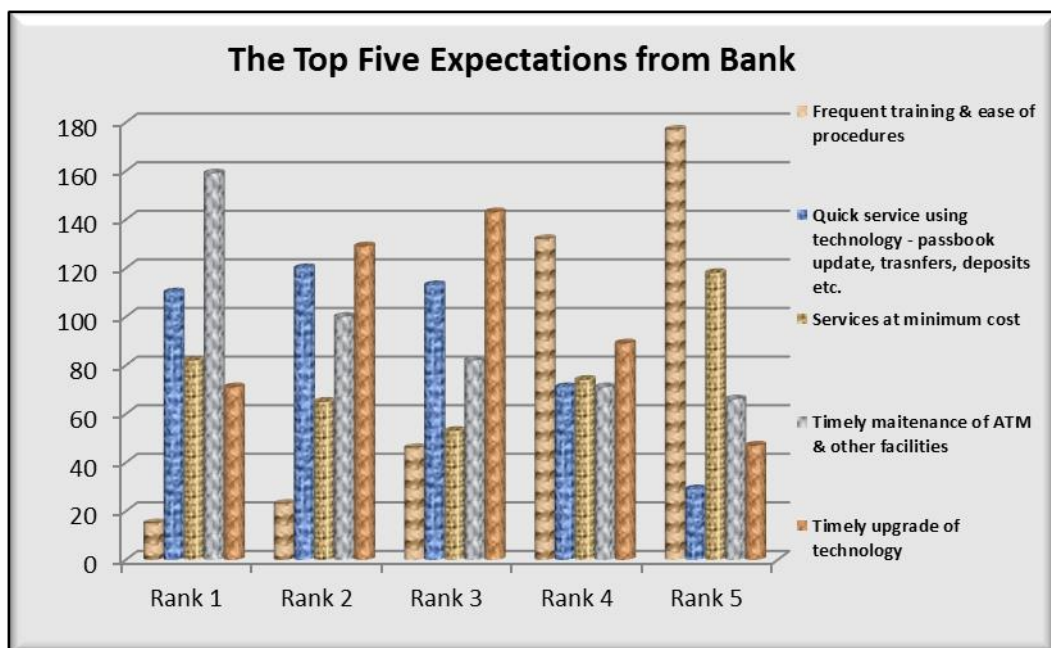


Figure 4.3.5: Technology Expectations

Interpretation: The customers are expecting timely maintenance of ATM and other facilities at first place followed by Timely upgrade of technology at second place and third place. Frequent training and ease of procedures is at fourth and fifth place. Quick Service using technology – passbook, update, transfer, deposits etc. and Service at minimum cost is also expected by the customers.

4.4 Bank Employee

1. Technology Trend Observed: The responses reflect the bank employees’ opinion about technology preference from customers point of view.

As a Bank staff, what trend have you observed from customers as their preference?	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Latest technology to save time and quality of service	58	31	66	76	52
%	20.1	10.7	22.8	26.3	18.0
Best customer service	48	34	88	46	67
%	16.6	11.8	30.4	15.9	23.2
Best interest rates / products	131	49	38	35	30
%	45.3	17.0	13.1	12.1	10.4
Branch location close to their home	47	96	34	53	53
%	16.3	33.2	11.8	18.3	18.3
Friendly staff who can assist with all queries	44	91	39	53	56
%	15.2	31.5	13.5	18.3	19.4

Table 4.4.1: Observation about technology trend

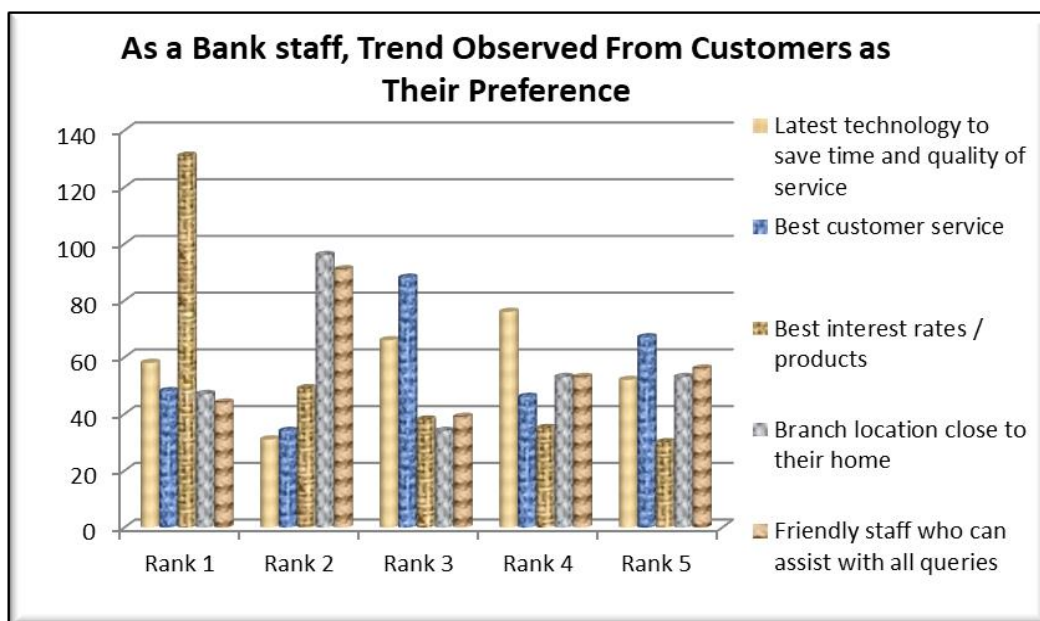


Figure 4.4.1: Observation about technology trend

Interpretation: The chart shows that, Best interest rate/product attract customer for the banking operation as it ranked one. The second ranked preference is Branch location followed by Best customer service at third and fifth rank. Latest technology for saving time and quality service is ranked fourth.

2. Preferred Technology Method: This question displays top six technology methods adopted by the customers for banking operations.

What are the top 6 technology methods used by the customer?	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6
Internet banking	19	57	88	36	81	2
%	6.6	19.7	30.4	12.5	28.0	0.7
Personal visit	14	211	41	2	14	1
%	4.8	73.0	14.2	0.7	4.8	0.3
Mobile banking	89	8	35	84	17	50
%	30.8	2.8	12.1	29.1	5.9	17.3
Through family members	59	7	62	83	70	2
%	20.4	2.4	21.5	28.7	24.2	0.7
Through call centre	48	8	27	33	59	108
%	16.6	2.8	9.3	11.4	20.4	37.4
ATM	88	10	34	32	22	97
%	30.4	3.5	11.8	11.1	7.6	33.6

Table 4.4.2: Preferred Technology Method

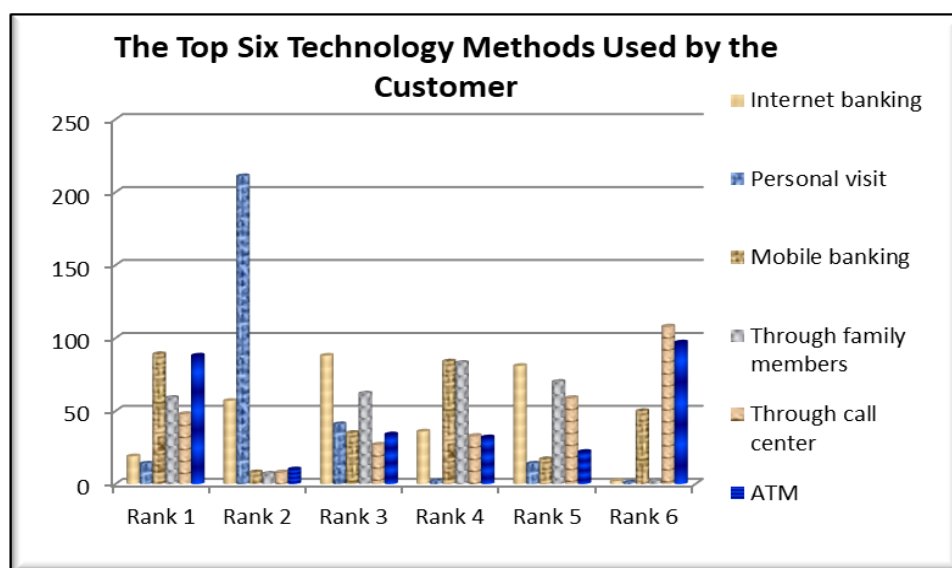


Figure 4.4.2: Preferred Technology Method

Interpretation: Above data clearly represent that, mobile banking as well as ATM technology is ranked one by the respondents. But rank 2 position personal visit is major trend while internet banking is at rank 3. Again, mobile banking together with banking operation through family members are at rank 4. Internet banking is again at rank 5th followed by use of call center is at 6th position.

3. Competitive Advantage: These are the responses of bank employees about the competitive advantages highlighted by the customers.

What is the competitive advantage highlighted by the customers to you?	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6
Latest technology & ease of using	16	198	5	1	63	1
%	5.5	68.5	1.7	0.3	21.8	0.3
Competitive products / rates	14	73	179	0	17	1
%	4.8	25.3	61.9	0.0	5.9	0.3
Customer service	208	10	23	23	0	20
%	72.0	3.5	8.0	8.0	0.0	6.9
Location advantage	34	8	38	204	0	0
%	11.8	2.8	13.1	70.6	0.0	0.0
Offers / Gifts / additional benefits	21	7	23	23	177	33
%	7.3	2.4	8.0	8.0	61.2	11.4
Any other	28	8	19	19	2	208
%	9.7	2.8	6.6	6.6	0.7	72.0

Table 4.4.3: Highlighted Competitive Advantage

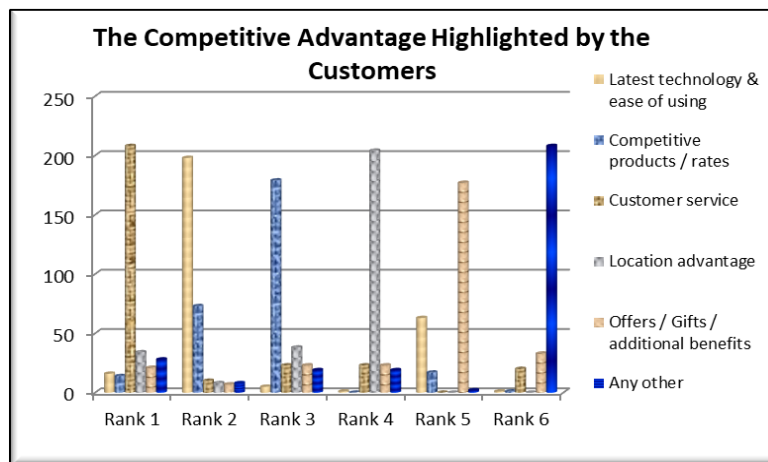


Figure 4.4.3: Highlighted Competitive Advantage

Interpretation: The above bar chart depicts that; customer service is the one which provides competitive advantage to the bank as it ranked first. Latest technology and ease of using ranked second. Competitive products and location of the bank are ranked 3rd and 4th ranked respectively while offers by bank, gifts or additional benefits ranked fifth for gaining competitive advantage.

4. Reasons for Losing Customer: This information tries to find out possible cause of losing the customer from bank employees' point of view.

What are the typical top 5 reasons of losing the customer?	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Competitors with better technology offerings	34	99	87	24	34
%	11.8	34.3	30.1	8.3	11.8
Minimum Balance requirement	35	52	48	73	70
%	12.1	18.0	16.6	25.3	24.2
Change of job / location	60	35	64	61	58
%	20.8	12.1	22.1	21.1	20.1
Fear / issues flagged in the media about the bank	71	50	41	60	56
%	24.6	17.3	14.2	20.8	19.4
Lack of service	90	51	40	51	46
%	31.1	17.6	13.8	17.6	15.9

Table 4.4.4: Reason for Losing the Customer

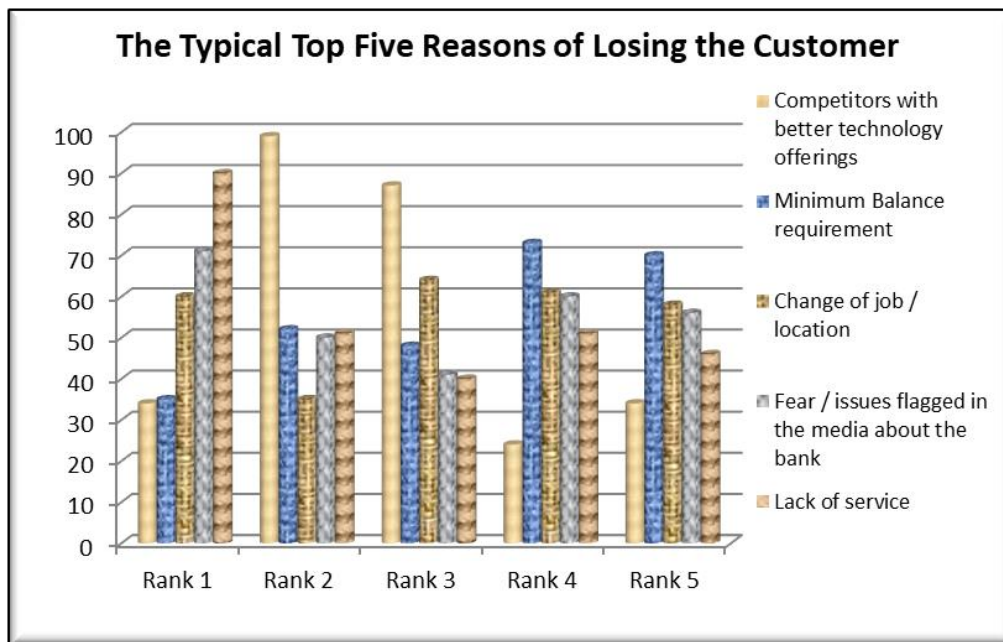


Figure 4.4.4: Reason for Losing the Customer

Interpretation: The most important reason for losing the customer is Lack of Services which is ranked one followed by competitor with better technology offerings as it ranked second and third also. At rank 4th and 5th position the main reason is minimum balance requirement of specific bank.

5. Technology Challenges: The day-to-day technology challenges faced by bank employees are highlighted here.

What are the typical top 5 day to day technology challenges you face?	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Volume of customers and queries	63	100	70	20	26
%	21.8	34.6	24.2	6.9	9.0
Delays in accessing the IT system to resolve queries	38	48	57	62	74
%	13.1	16.6	19.7	21.5	25.6
Accessing multiple systems / menu to resolve the queries	52	45	53	65	64
%	18.0	15.6	18.3	22.5	22.1
Availability & Reliability of IT systems	53	51	57	61	57
%	18.3	17.6	19.7	21.1	19.7
Limited knowledge of various IT systems while handling queries	82	45	48	59	45
%	28.4	15.6	16.6	20.4	15.6

Figure 4.4.5: Technology Challenges

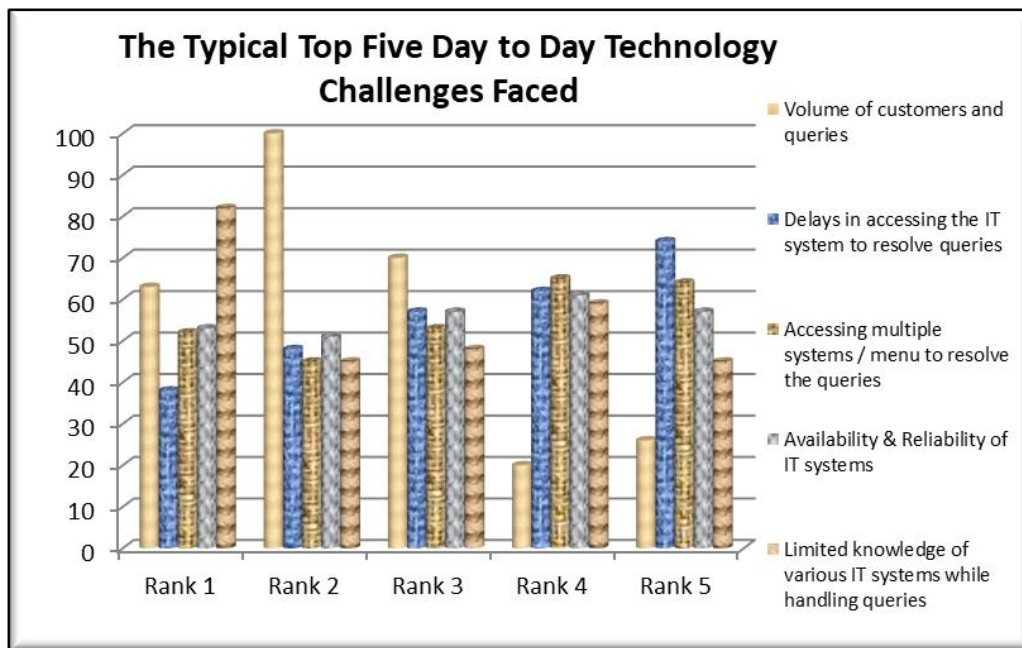


Figure 4.4.5: Technology Challenges

Interpretation: The above graph shows that; limited knowledge of various IT systems is the main hurdle for the use of technology in day-to-days banking. In the second rank and third rank position, the challenge is to handle volume of customers and queries. At the fourth ranking except volume of customers and queries all other alternatives are major, which includes limited knowledge of various IT systems followed by delays in accessing IT system to resolve queries and availability and reliability of IT system. In the 5th rank position delays in accessing IT system to resolve queries is one of technology challenge faced by bank employees.

6. Observation about Technology Changes: Bank employee’s observation about technology changes noted here.

What are the top 5 technology changes you have observed in the last 4 years the bank (2011- 2015)	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Increased ATMs and ability to use ATM of other banks	74	65	74	64	2
%	25.6	22.5	25.6	22.1	0.7
Debit and Credit card acceptance and usage	124	45	54	15	41
%	42.9	15.6	18.7	5.2	14.2
Mobile apps for Banking transactions	50	55	45	62	67
%	17.3	19.0	15.6	21.5	23.2
Internet banking facility to perform all day to day transactions easily	48	55	45	58	73
%	16.6	19.0	15.6	20.1	25.3
Banking through call centers	31	64	50	55	79
%	10.7	22.1	17.3	19.0	27.3

Table 4.4.6: Technology Challenges

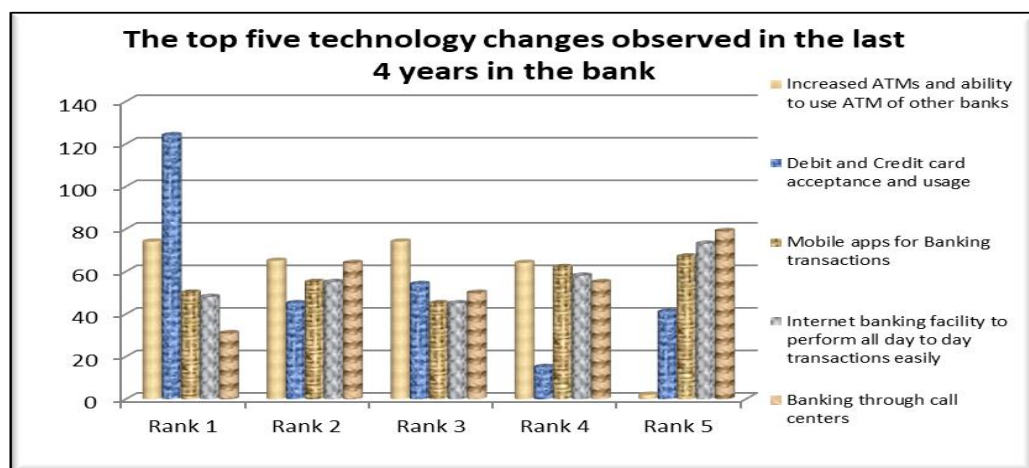


Figure 4.4.6: Technology Challenges

Interpretation: Above graph shows that; Debit and Credit Card acceptance and usage is most sought technology change observed during 2011-2015. In the second, third and fourth rank, increased ATM and ability to use ATM of other banks is the observed technology change followed by Banking through call centers ranked 5th position.

7. Observation about Technology Issues: The technology issues observed during 2011-2015 are illustrated in the following data.

What are the top 5 technology issues you have observed in the last 4 years with the bank (2011- 2015)	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Website / server not available for internet banking	21	38	97	25	101
%	7.3	13.1	33.6	8.7	34.9
SMS / OTP notifications not working on time	69	44	25	93	51
%	23.9	15.2	8.7	32.2	17.6
ATM machine issues, impacting various transactions	120	51	33	41	37
%	41.5	17.6	11.4	14.2	12.8
Long wait time to speak to customer service executive	53	44	95	50	40
%	18.3	15.2	32.9	17.3	13.8
Systems not working at branch / staff indicating system performance issues	43	114	33	51	41
%	14.9	39.4	11.4	17.6	14.2

Table 4.4.7: Technology Issues

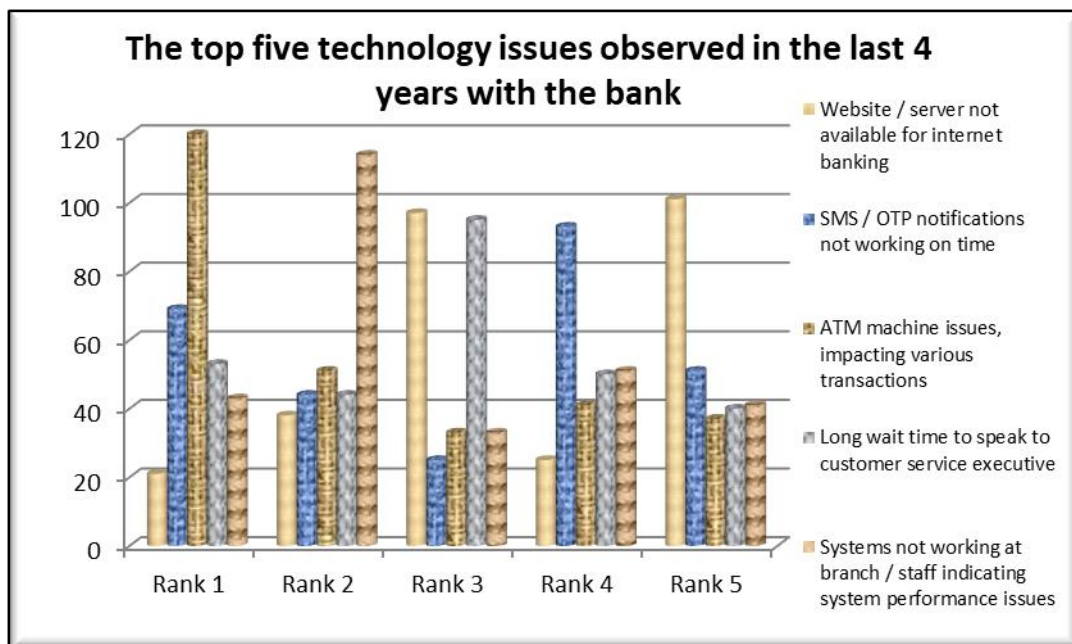


Figure 4.4.7: Technology Issues

Interpretation: ATM machine issues impacting banking transaction is the highest ranked issue followed by System not working at branch/staff indicating system performance issue. At the 3rd rank place Website / Server not available for internet banking is the major issue. In the 4th and 5th ranking place the issues are SMS/OTP notification not working on time and again Website / Server not available for internet banking respectively.

8. Measurement of Success: This demonstrate how bank success can be measured according to bank employees.

How is your success measured?	Ran k 1	Ran k 2	Ran k 3	Ran k 4	Ran k 5	Ran k 6
Growth of revenue	149	66	16	11	32	3
%	51.6	22.8	5.5	3.8	11.1	1.0
Growth of number of customers	13	55	2	2	75	130
%	4.5	19.0	0.7	0.7	26.0	45.0
Increase in customer satisfaction	43	138	33	30	3	30
%	14.9	47.8	11.4	10.4	1.0	10.4
Identification of new / innovative products	48	17	176	31	4	1
%	16.6	5.9	60.9	10.7	1.4	0.3
Being 100% compliant with the process and policies	41	8	22	25	135	46
%	14.2	2.8	7.6	8.7	46.7	15.9
Growth in Technology adoption of customers	36	16	21	154	3	47
%	12.5	5.5	7.3	53.3	1.0	16.3

Table 4.4.8: Technology Issues

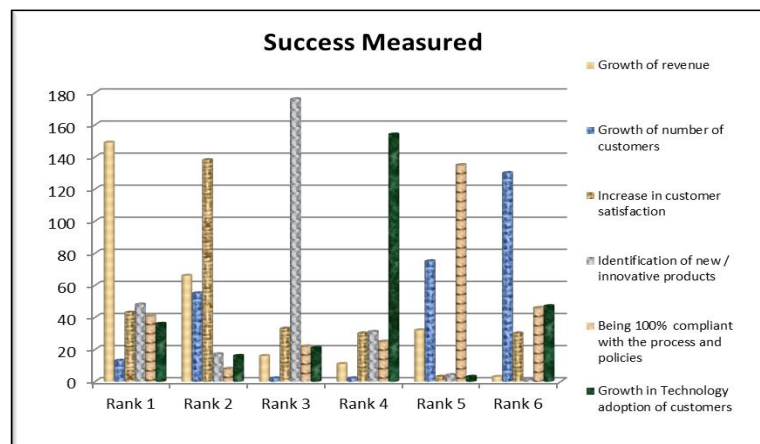


Table 4.4.8: Technology Issues

Interpretation: Growth of Revenue is the highest rank indication of Success followed by Increase in Customers. At 3rd and 4th rank, Identification of new/innovative products and Growth in technology adoption of customers are placed respectively. Being 100% compliant with the process and policies is placed at 5th position while at the lowest rank i.e. rank 6th, Growth of number of customers is placed.

B. Analysis and Interpretation of Multiple-Choice Data

4.5 Customer

1. Reasons for Closing Bank Account: This parameter describes the reasons for closing bank account considering technology aspects.

Have you closed relationship with any bank due to following / lack of technology offering?	Frequency	Percent
Out dated technology / Lack of upgrade i.e. no internet banking, no assistance over phone etc.	105	24.0
Frequent technology issues hampering customer services e.g. website not working, net banking issues, call centre delays	73	16.7
Higher cost of technology offerings e.g. fees for using mobile banking	82	18.8
Other	242	55.4

Table 4.5.1: Reasons for Closing Bank Account

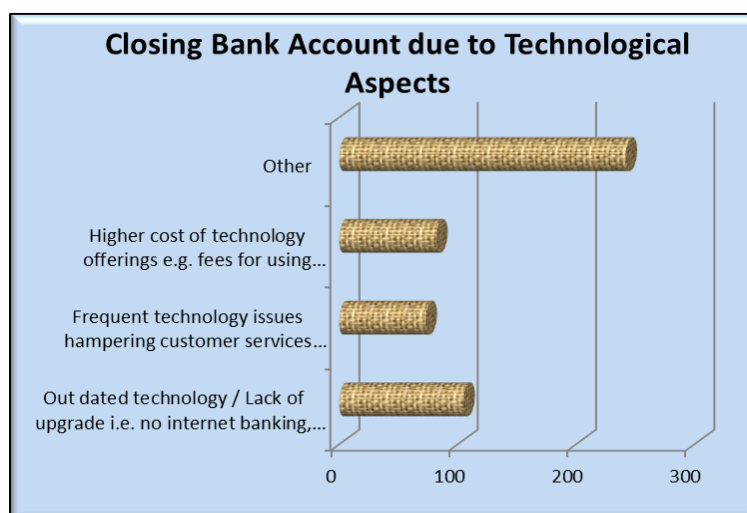


Figure 4.5.1: Reasons for Closing Bank Account

Interpretation: Above Bar Chart clearly indicate that other than technology is the main reason to close the relationship with bank. Second most mentioned reason is Outdated technology followed by Higher cost of technology offerings and then Frequent technology issues is the last aspect to close the bank account.

2. Benefits Associates with Latest Technology: This variable gives insight about the benefits received by the customer due to adoption of latest technology by the bank.

Which benefits do you receive associated with using latest technology?	Frequency	Percent
Priority service	300	68.6
Fee waivers	78	17.8
Improved credit facility	38	8.7
Special gifts	36	8.2
Free upgrade facility to products	65	14.9
Additional discounts	78	17.8
Bonus points	164	37.5

Table 4.5.2: Benefits Associated with Latest Technology

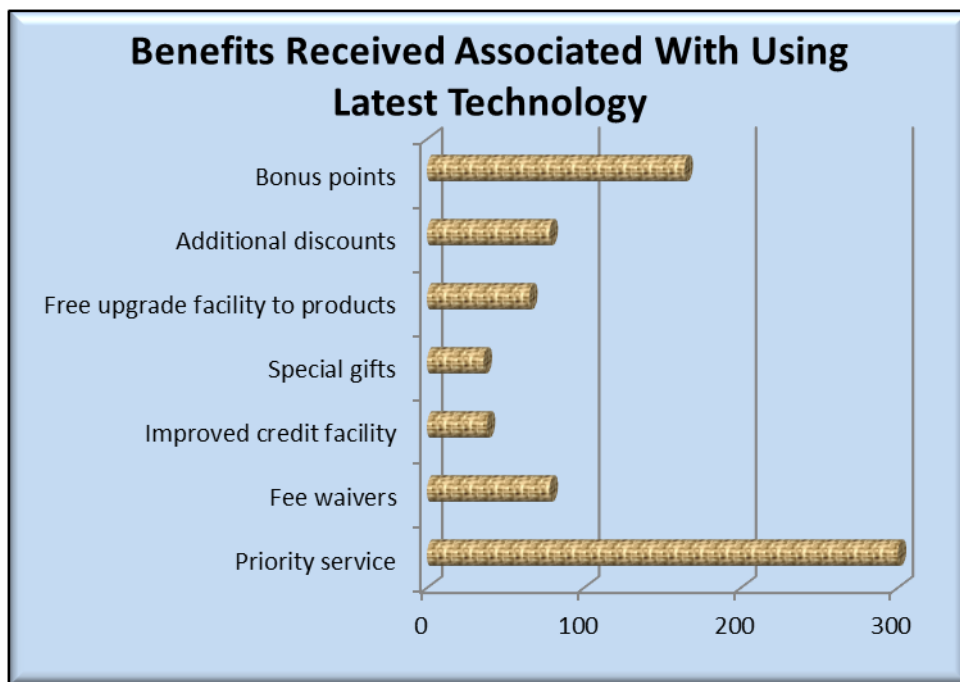


Figure 4.5.2: Benefits Associated with Latest Technology

Interpretation: The most important benefits received by the customer due to use of new technology is Priority of Service followed by Bonus points gained by Customers. Additional Discount and Fee Waiver facility are next points which are mentioned by the customers. It is followed by Free Upgrade Facility to Product, Improved Credit Facility and lastly Special Gifts are benefits enjoyed by the customer in descending order.

3. Additional Product Purchase: It is to check whether customers purchased new product/s with the help of technology.

Have you purchased additional products from your bank since you have started using new technology?	Frequency	Percent
Credit card / petrol card	185	42.3
Insurance policy	86	19.7
Mutual funds / D-mat account opening	91	20.8
Holiday packages or any memberships or gifts	5	1.1
Housing / Car / Personal loan	105	24.0
Other	24	5.5

Table 4.5.3: Additional Product Purchase

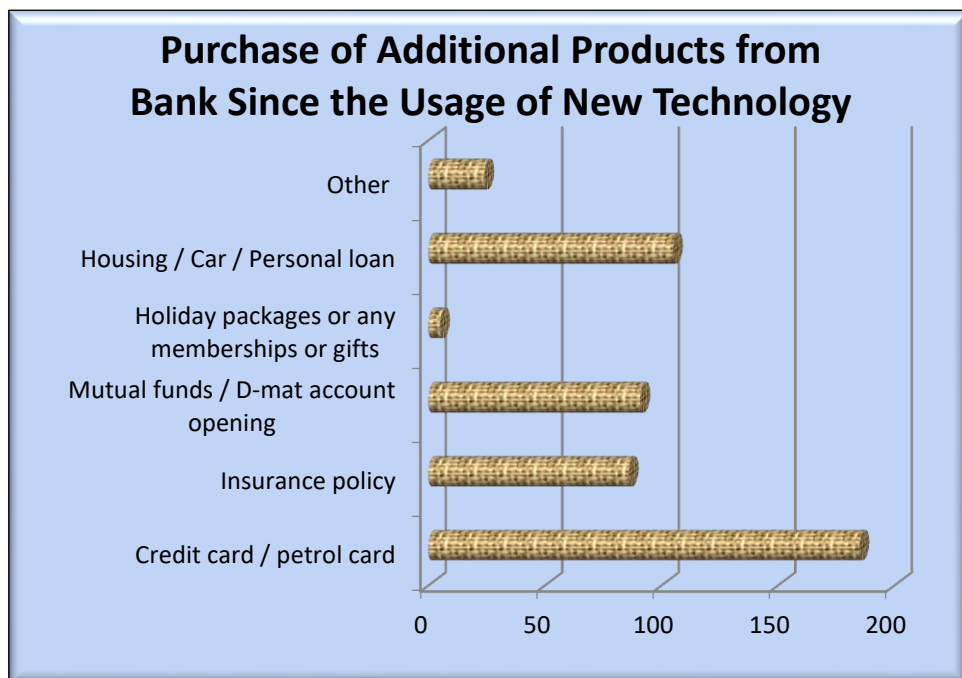


Figure 4.5.3: Additional Product Purchase

Interpretation: The above chart shows that, Credit card/ Petro card purchase is most preferred option followed by Housing /Car/Personal loan. The next alternative is Mutual Funds/ D-mat account while ensuring policy is fourth last preference. The last but-one is other and at least priority place there is Holiday packages or any membership or gift purchase by the use of bank technology.

4.6 Bank Employee

1. Reasons for Closing Bank Account: This data depicts the Bank employees’ view about closing account by the customers.

What are typical reasons mentioned by customers while closing relationship with bank due to following / lack of technology offering?	Frequency	Percent
Out dated technology / Lack of upgrade i.e. no internet banking, no assistance over phone etc.	91	31.5
Frequent technology issues hampering customer services e.g. website not working, net banking issues, call centre delays	76	26.3
Higher cost of technology offerings e.g. fees for using mobile banking	85	29.4
Customer service issues	248	85.8
Hidden charges and complicated paper work	260	90.0

Table 4.6.1: Reasons for Closing Bank Account

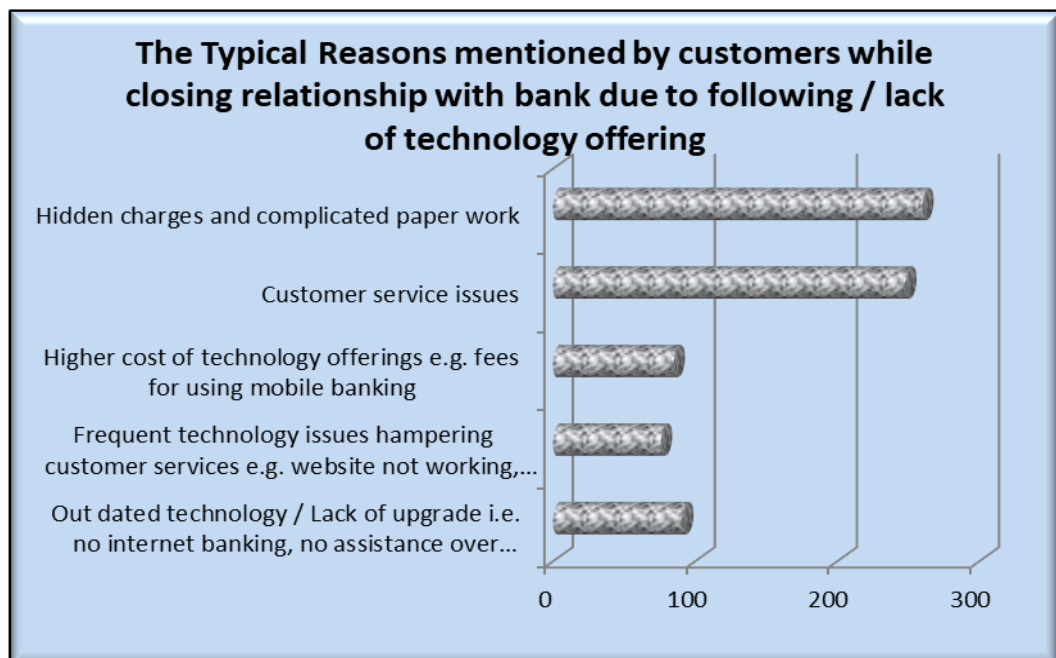


Figure 4.6.1: Reasons for Closing Bank Account

Interpretation: The above bar chart indicates that, Hidden Charges and complicated paper work is main reason mentioned by the customers to the bank employees. The second reason is Customer service issue followed by Out dated technology/ Lack of upgrade i.e. no internet

banking, no assistance etc. The fourth and fifth reason mentioned are Higher cost of technology e.g. Fees for using mobile banking and Frequent technology issues hampering customer services e.g. Website not working etc. respectively.

2. Training Offered: This point indicates when the training is offered to the employees.

Typically, when is the training offered to you?	Frequency	Percent
Before new version of software / product is implemented	184	63.7
After new version of software / product is implemented	141	48.8
In an Ad-hoc manner or needed to basis once of software / product is implemented	40	13.8
It is expected to learn the features on the job	62	21.5
In parallel while development is being carried out	20	6.9

Table 4.6.2: Training Offered

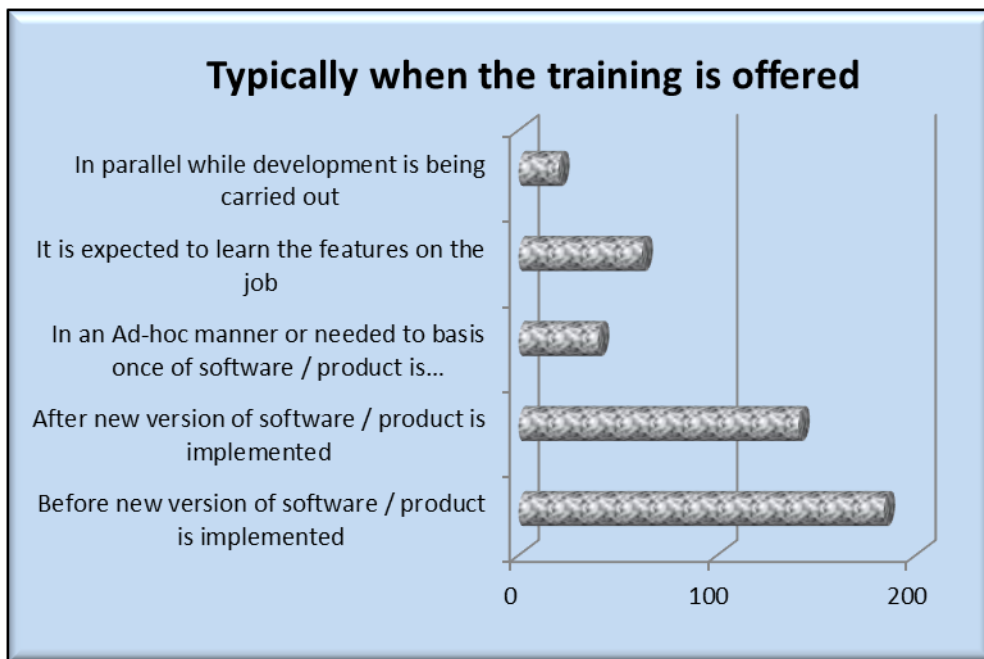


Figure 4.6.2: Training Offered

Interpretation: It is observed from the chart that, typically training is offered before the release of new version of software / product and next to this is After the new version of software / product is implemented. The next position is, it is expected to learn the features on the job followed by in an ad-hoc manner or need basis once the software/ product is implemented. At the last, training is expected in parallel while development is being carried out.

3. Type of Training: This about the type of training received by bank employees with respect to new technology adoption.

Please mention the type of training received.	Frequency	Percent
System upgrade / new feature / product launch	223	77.2
Regulatory & mandatory training	209	72.3
Management / leadership	46	15.9
Customer Management, Customer satisfaction improvement	38	13.1
Internal systems and it's usage with new features	23	8.0

Table 4.6.3: Type of Training

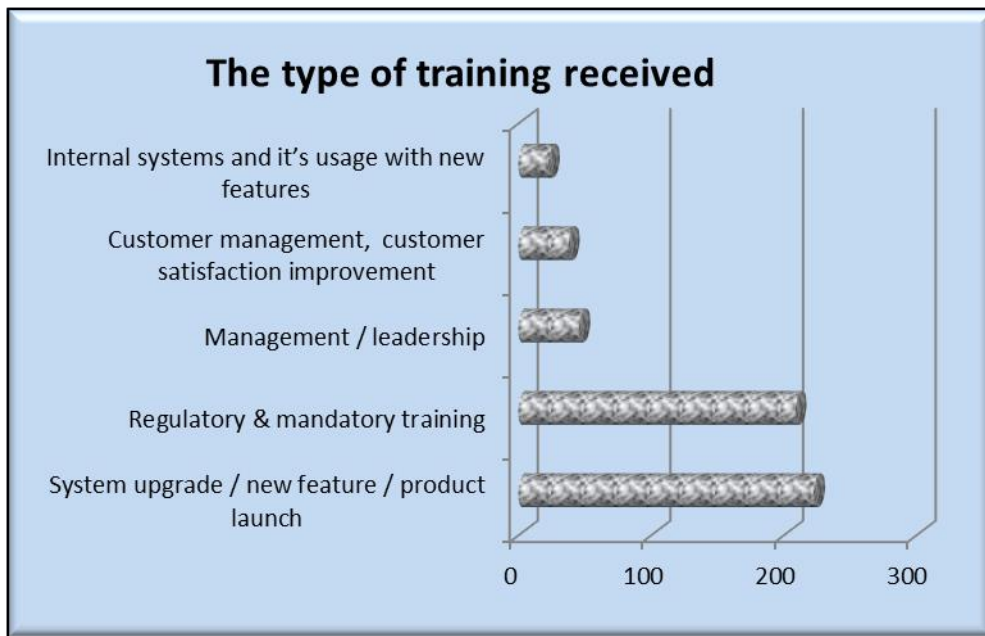


Figure 4.6.3: Type of Training

Interpretation: System Upgrade/New feature/Product launch is the prime training received by the employees. The next in list is the training about Regulatory and Mandatory Training followed by Management/ Leadership Training. Customer management, Customer Satisfaction Improvement and Internal System and its usage with new feature is at 4th and 5th position respectively.

4. Benefits Provided by the use of New Technology: It is about understanding the benefits provided by the employees with usage of New Technology.

Which benefits do you provide associated with using latest technology?	Frequency	Percent

Priority service	197	68.2
Fee waivers	126	43.6
Improved credit facility	173	59.9
Special gifts	75	26.0
Free upgrade facility to products	48	16.6
Additional discounts	90	31.1
Bonus points	97	33.6

Table 4.6.4: Benefits Provided by the use of New Technology

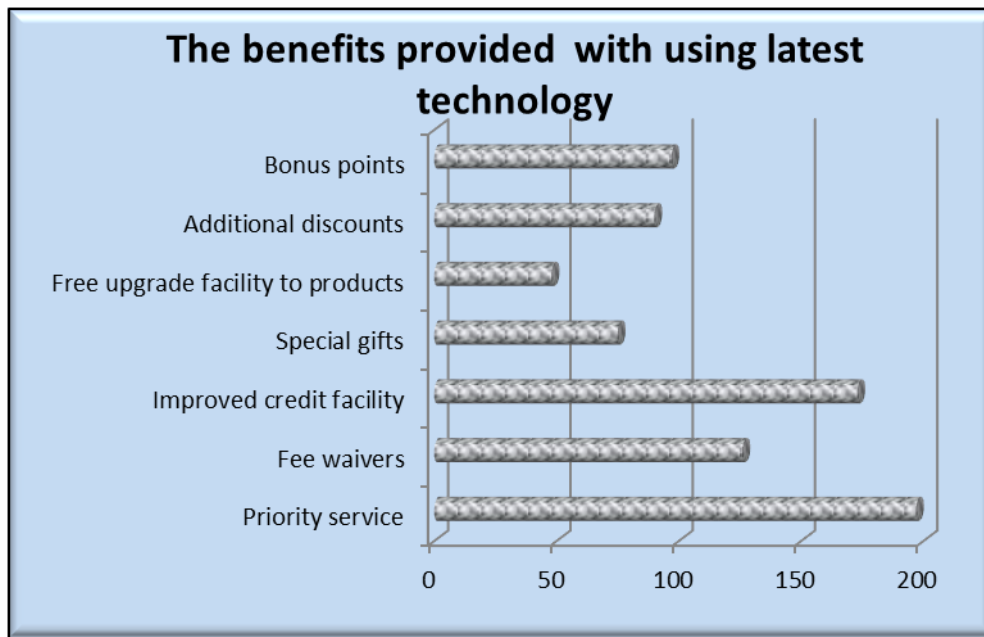


Figure 4.6.4: Benefits Provided by the use of New Technology

Interpretation: Priority Service is the most acclaimed benefits provided to the customers according to Bank employees. The next benefits are Improved Credit Facility and Fee Waiver at second and third position. Bonus point, Additional Discount and Special gifts are at fourth, fifth and sixth position. The least type of benefits as per employees is Free upgrade facility to products.

5. Decision about using New Technology: This provides the basis for the factors which influence to take decision about new technology.

In your view how, the decision to use new technology is determined. Please check one or more boxes as appropriate	Frequency	Percent
Considering customer feedback and issues in the past	202	69.9
Regulatory requirement	208	72.0

Competitor analysis and trend analysis	179	61.9
Senior management's decision - Innovation investment	86	29.8
Structured process of cost benefit analysis and customer feedback	136	47.1
Influenced by Technology partner recommendation	88	30.4

Table 4.6.5: Decision about using New Technology

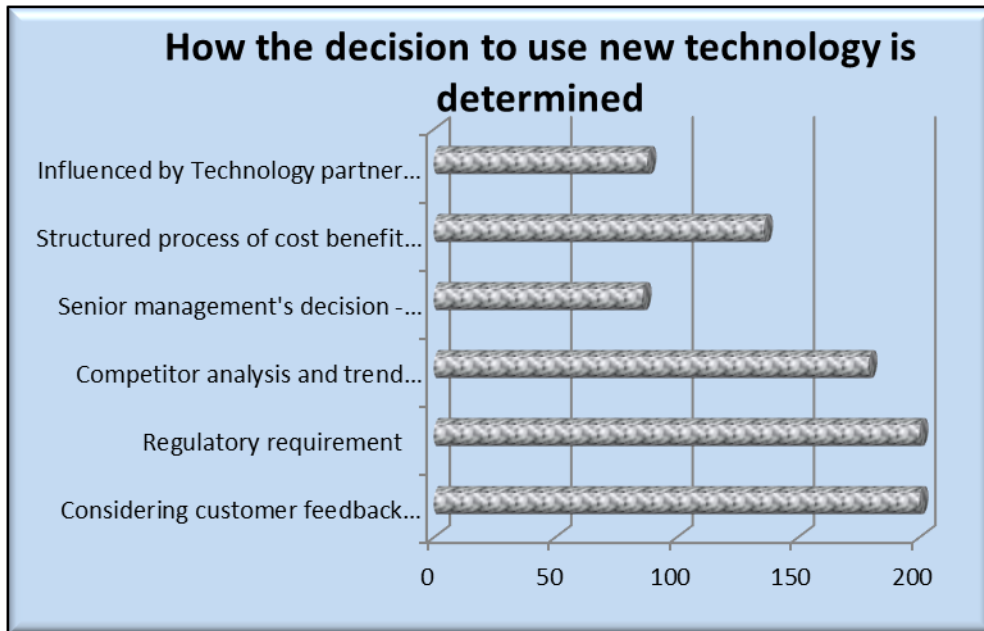


Figure 4.6.5: Decision about using New Technology

Interpretation: Most influential factors are Regulatory Requirement and Consideration of Customers Feedback and issues in the past. The next factors which affect the use new technology decisions are Competitor analysis and trend analysis followed by Structured process of cost benefit analysis and customer feedback. Influenced by Technology partner recommendation and Senior management's decision - Innovation investment are comparatively less influential factors.

6. Reasons for Growth: These are the reasons for the growth of bank as viewed by the employees in last four years.

During last 4 years, in your view, what could be reasons for the growth? Please check one or more boxes as appropriate	Frequency	Percent
Improved service quality	151	52.2
Attractive products launched by the Bank	17	5.9
Better technology enhancing customer experience, service & quality	180	62.3
Better marketing including social media offerings	114	39.4

Favourable market situation i.e. economy growth, better regulations	14	4.8
---	----	-----

Table 4.6.6: Reasons for Growth

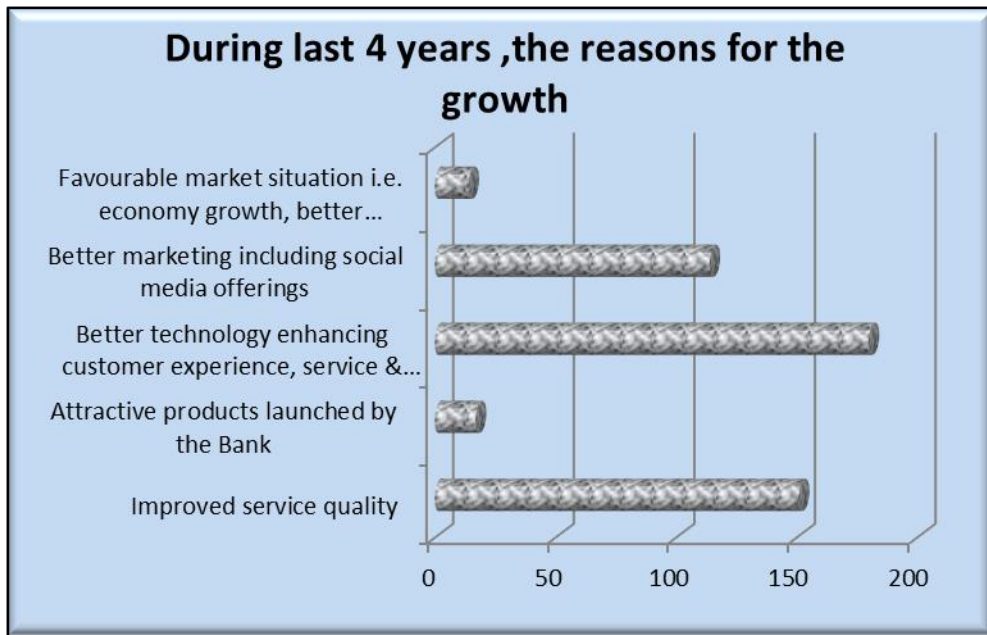


Figure 4.6.6: Reasons for Growth

Interpretation: The main reason highlighted by the Bank employees is Better technology enhancing customer experience, service & quality. The next reasons are Improved Service Quality and Better marketing including social media offerings. Attractive Products launched by the bank and Favourable market situation i.e. economy growth; better regulations are the less contributing factors in the Growth.

C. Hypothesis Testing

4.7 Testing of Hypothesis

4.7.1 Hypothesis 1

Research Question-1:

Is there any difference in the perceptions of customers considering technology used by the banks?

Hypothesis:1

H0: There is no difference in the perceptions of customers considering technology used by the banks.

H1: There is a difference in the perceptions of customers considering technology used by the banks.

Statistical Test: Friedman chi-square test

Level of Significance $\alpha = 0.05$

Test Statistics	
N	289
Chi-Square	179.444
Df	5
Asymp. Sig.	.000

Table 4.7.1: Test Statistics for Hypothesis 1

Observation: $\chi^2 (10) = 395.276, P= 0.000$

Conclusion: Since P value (0.000) is less than level of Significance (0.05), alternate hypothesis is accepted hence it is concluded that There is a difference in the perceptions of customers considering technology used by the banks.

The rank table related to usage of technology may be referred for finding out which technology most used by the customer.

	Mean Rank
Internet Banking	3.51
Personal Visit	2.38
Mobile Banking	3.40
Family Member	3.53
Call Center	4.40
ATM	3.78

Table 4.7.2: Rank Table for Hypothesis 1

From the ranks table it is evident that customers prefer to use call center technology more and then ATM and followed to that Internet Banking, it is also evident that visiting the branch is less preferred.

4.7.2 Hypothesis 2

Research Question-2:

Is there any difference in the perceptions of the bank employees regarding the technology challenges faced by them in banking operations?

Hypothesis: 2

H0: There is no difference in the perceptions of the bank employees regarding the technology challenges faced by them in banking operations.

H1: There is a difference in the perceptions of the bank employees regarding the technology

challenges faced by them in banking operations.

Statistical Test: Friedman chi-square test

Level of Significance $\alpha = 0.05$

Test Statistics	
N	289
Chi-Square	53.695
df	4
Asymp. Sig.	.000

Table 4.7.3: Test Statistics for Hypothesis 2

Observation: $\chi^2 (10) = 395.276, P= 0.000$

Conclusion: Since P value (0.000) is less than level of Significance (0.05), alternate hypothesis is accepted hence it is concluded that there is a difference in the perceptions of the bank employees regarding the technology challenges faced by them in banking operations.

To find out whether difference lies following to Ranks table may be referred -

	Mean Rank
No. of Customer/ Queries	2.49
Delay in Access of IT System	3.35
To Access Multiple System	3.20
Reliable IT System	3.12
Limited IT Knowledge	2.85

Table 4.7.4: Rank Table for Hypothesis 2

From the ranks table it is evident that delay in accessing the IT system is the major challenge faced by them followed to which access to multiple system is a challenge again for them. What they perceive less as a challenge is processing customer queries.

4.7.3 Hypothesis 3

Research Question-3:

Is there any difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations?

Hypothesis: 3

H0: There is no difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations.

H1: There is a difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations.

Statistical Test: Friedman chi-square test

Level of Significance $\alpha = 0.05$

Test Statistics	
N	437
Chi-Square	79.827
Df	5
Asymp. Sig.	.000

Table No. 4.7.5: Test Statistics for Hypothesis 3

Observation: $\chi^2 (10) = 395.276, P= 0.000$

Conclusion: Since P value (0.000) is less than level of Significance (0.05), alternate hypothesis is accepted hence it is concluded that there is a difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations.

To find out the difference lies, the reference of Ranks table is presented below –

	Mean Rank
Internet Banking	3.06
Personal Visit	3.30
Mobile Banking	3.70
Family Member	3.34
Call Center	3.54
ATM	4.06

Table No. 4.7.6: Rank Table for Hypothesis 3

From the ranks table it is evident that bank employee’s perception is; customer use ATM maximum time for lot of banking operations such as money withdrawal/password change/money transfer etc. followed to that their perception is they used mobile banking technology more. The least used technology is internet banking is what the bank employees feel with respect to other technology options.

4.7.4 Hypothesis 4

Research Question-4:

Is there any difference in the perception of customers with respect to issues they have faced

in using banking technology?

Hypothesis: 4

H0: There is no difference in the perception of customers with respect to issues they have faced in using banking technology.

H1: There is a difference in the perception of customers with respect to issues they have faced in using banking technology.

Statistical Test: Friedman chi-square test

Level of Significance $\alpha = 0.05$

Test Statistics ^a	
N	437
Chi-Square	354.997
df	9
Asymp. Sig.	.000

Table No. 4.7.7: Test Statistics for Hypothesis 4

Observation: $\chi^2 (10) = 395.276, P= 0.000$

Conclusion: Since P value (0.000) is less than level of Significance (0.05), alternate hypothesis is accepted hence it is concluded that there is a difference in the perception of customers with respect to issues they have faced in using banking technology.

To find out whether difference lies we refer to Ranks table.

	Mean Rank
Unavailability of Website/ Server	4.20
SMS/ OTP Notification	4.41
ATM Issue	4.71
Waiting Time for Attendant	5.03
System Performance	5.38
Technology Cost	5.82
Complicated Paperwork for Technology usage consent	6.02
Forced Adoption	6.23
Hacking/ Mis-use	6.49
Account Protection Mechanism	6.70

Table No. 4.7.8: Rank Table for Hypothesis 4

From the ranks table it is evident that issues perceived by the customers are different and the highest issue that customers feels is that account protection mechanism should be there and also there should be counter measure for hacking or account misuse. The least issue they had is unavailability of bank server.

4.7.4 Hypothesis 5

Research Question No.-5:

Is there any association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality?

Hypothesis: 5

H0: There is no association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality.

H1: There is an association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality.

Statistical Test: Chi-Square test of contingency

Level of Significance: $\alpha = 0.05$

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	206.813	9	.000
Likelihood Ratio	208.311	9	.000
Linear-by-Linear Association	130.750	1	.000
N of Valid Cases	437		

Table No. 4.7.9: Test Statistics for Hypothesis 5

Observation: $\chi^2(9) = 206.813, P < 0.01$

Conclusion: Since P value is less than level of significance (0.05), alternate hypothesis is accepted hence it is concluded that there is an association between the promises made by bank staff to customers regarding the technology for banking operations and the technology

benefits received by customers in reality.

To see the relationship the below mentioned figure will help us to understand

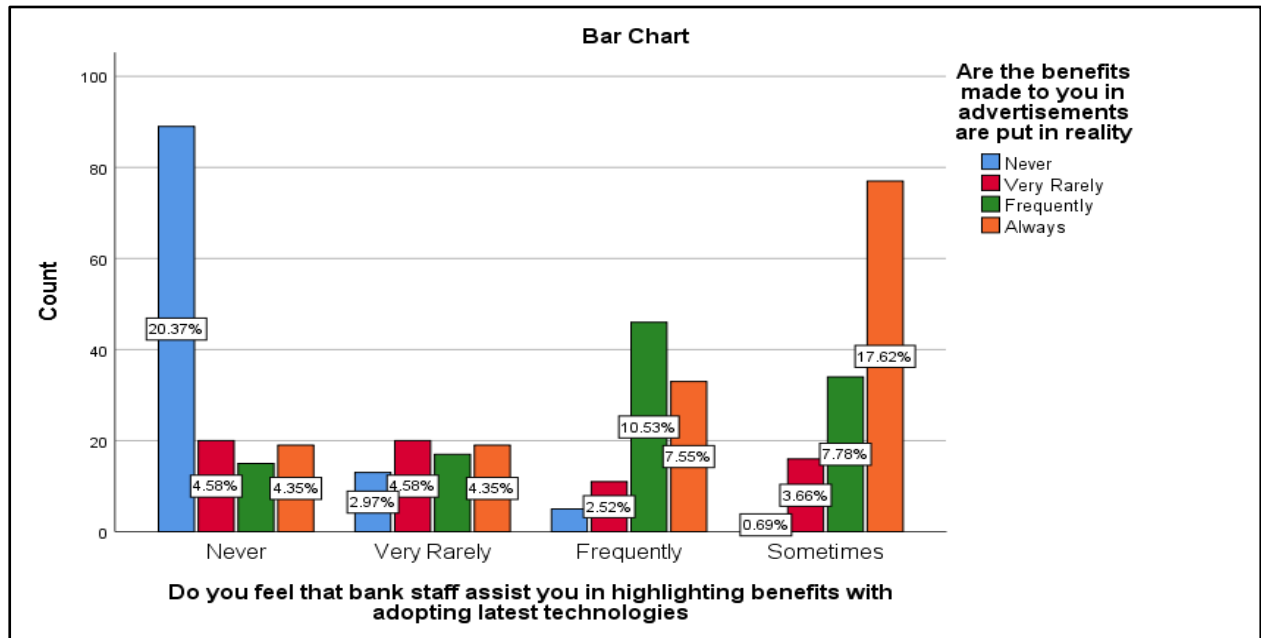


Chart No. 4.7.: Chart for Hypothesis 5

From the above graph its evident that frequently or sometimes the customers got the promised mode of technology at their disposal for executing their desired banking operations.

4.7.6 Hypothesis 6

Research Question -6:

Is there any correlation exist between adoption of technology by the bank and business growth?

Hypothesis: 6

H₀: There is no association between adoption of technology and business growth.

H₁: There is positive association between adoption of technology and business growth.

Testing of Hypothesis

As a first step, significance of the variables understudy was tested by using one sample t-test. The one-sample t-test compares the mean score found in an observed sample to a hypothetically assumed value. In general, the hypothetically assumed value is the population mean or some other theoretically derived value.

The two tailed hypothesis was used to determine whether the variables are significant or not.

H₀: There is no difference between the true mean (μ) and the comparison value (m_0).

H_1 : There is a difference between the true mean (μ) and the comparison value (m_0).

The statistic of interest is the p-value for significance. If the p-value is <0.05 , the null hypothesis is rejected i.e. the variables are significant.

Based on defined Dependent and Independent variables in the previous chapter, one-sample t-test is carried out. The result is as follows.

One-Sample Test						
	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
V1V2C1	37.968	436	.000	.890	.84	.94
V1C2	1.831	436	.068	.069	-.01	.14
V1C3	4.972	436	.000	.162	.10	.23
V1C4	-11.047	436	.000	-.851	-1.00	-.70
V1B1	28.769	284	.000	1.698	1.58	1.81
V1B2	-34.838	281	.000	-1.730	-1.83	-1.63
V1B3	24.107	281	.000	.745	.68	.81
V2B1	-69.350	285	.000	-1.888	-1.94	-1.83
V2B2	20.130	284	.000	1.347	1.22	1.48
V2B3	14.471	284	.000	.558	.48	.63
V2B4	12.800	284	.000	.695	.59	.80
V2B5	2.815	284	.005	.151	.05	.26

Table No. 4.7.10: One-Sample Test for Hypothesis 6

In the above table, most of the variables are emerged as significant variables as P- value is less than 0.05 at 95% confidence level. It means we have to reject the null hypothesis. The only variable which is insignificant is about switching of customer due to technology.

For testing of hypothesis, first correlation was checked to see the strength of the relationship between the two variables. Then, as the Likert Scale data is ordinal data, Non-parametric testing is carried out using SPSS in the case of all the three hypotheses.

The correlation analysis was shown in table below.

		Correlations											
		V1V2C1	V1C2	V1C3	V1C4	V1B1	V1B2	V1B3	V2B1	V2B2	V2B3	V2B4	V2B5
V1V2C1	Pearson Correlation	1	.044	.019	-.026	-.050	.250**	-.030	.004	-.022	-.036	-.046	.073
	Sig. (2-tailed)		.364	.689	.592	.405	.000	.621	.943	.710	.548	.443	.222
	N	437	437	437	437	285	282	282	286	285	285	285	285
V1C2	Pearson Correlation	.044	1	.125*	.003	.008	-.018	-.037	.015	-.056	.002	-.045	-.008
	Sig. (2-tailed)	.364		.009	.954	.889	.763	.540	.794	.346	.967	.447	.888
	N	437	437	437	437	285	282	282	286	285	285	285	285
V1C3	Pearson Correlation	.019	.125*	1	.130*	.019	-.075	.023	-.027	.030	.068	-.100	.010
	Sig. (2-tailed)	.689	.009		.006	.745	.208	.699	.644	.619	.250	.091	.866
	N	437	437	437	437	285	282	282	286	285	285	285	285
V1C4	Pearson Correlation	-.026	.003	.130*	1	.041	-.101	.000	-.042	-.060	-.006	-.083	.051
	Sig. (2-tailed)	.592	.954	.006		.490	.090	.998	.484	.309	.913	.160	.392
	N	437	437	437	437	285	282	282	286	285	285	285	285
V1B1	Pearson Correlation	-.050	.008	.019	.041	1	.032	.552**	-.508**	.665**	.481**	-.310**	.005
	Sig. (2-tailed)	.405	.889	.745	.490		.598	.000	.000	.000	.000	.000	.928
	N	285	285	285	285	285	279	279	284	283	283	283	283
V1B2	Pearson Correlation	.250**	-.018	-.075	-.101	.032	1	.044	.178**	.068	-.092	.042	.222**
	Sig. (2-tailed)	.000	.763	.208	.090	.598		.457	.003	.259	.124	.481	.000
	N	282	282	282	282	279	282	282	281	280	280	280	280
V1B3	Pearson Correlation	-.030	-.037	.023	.000	.552**	.044	1	-.441**	.684**	.557**	-.524**	.118*
	Sig. (2-tailed)	.621	.540	.699	.998	.000	.457		.000	.000	.000	.000	.048
	N	282	282	282	282	279	282	282	281	280	280	280	280
V2B1	Pearson Correlation	.004	.015	-.027	-.042	-.508**	.178**	-.441**	1	-.399**	-.397**	.281**	.061
	Sig. (2-tailed)	.943	.794	.644	.484	.000	.003	.000		.000	.000	.000	.309
	N	286	286	286	286	284	281	281	286	285	285	285	285
V2B2	Pearson Correlation	-.022	-.056	.030	-.060	.665**	.068	.684**	-.399**	1	.660**	-.424**	.193**
	Sig. (2-tailed)	.710	.346	.619	.309	.000	.259	.000	.000		.000	.000	.001
	N	285	285	285	285	283	280	280	285	285	285	285	285
V2B3	Pearson Correlation	-.036	.002	.068	-.006	.481**	-.092	.557**	-.397**	.660**	1	-.540**	.293**
	Sig. (2-tailed)	.548	.967	.250	.913	.000	.124	.000	.000	.000		.000	.000
	N	285	285	285	285	283	280	280	285	285	285	285	285
V2B4	Pearson Correlation	-.046	-.045	-.100	-.083	-.310**	.042	-.524**	.281**	-.424**	-.540**	1	-.428**
	Sig. (2-tailed)	.443	.447	.091	.160	.000	.481	.000	.000	.000	.000		.000
	N	285	285	285	285	283	280	280	285	285	285	285	285
V2B5	Pearson Correlation	.073	-.008	.010	.051	.005	.222**	.118*	.061	.193**	.293**	-.428**	1
	Sig. (2-tailed)	.222	.888	.866	.392	.928	.000	.048	.309	.001	.000	.000	
	N	285	285	285	285	283	280	280	285	285	285	285	285

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Table No. 4.7.11: Correlation Analysis for Hypothesis 6

As shown in table following variables found to be associated significantly from identified variables. V1B1 which is related to Customer preference for technology Vs traditional method found to be positively significantly associated with V2B2 i.e. Demonstration of Growth and Investment for Technology and V2B3 i.e. Objectives Achievement Through Technology. While the same variable is negatively associated with V2B1 i.e. % of Spending on Technology Initiatives.

The other variable V1B2 i.e. Enquiry about Bank Planning to Roll out New Technology found to be positively correlated with V2B1 and V2B5 i.e. Growth due to Technology Adoption.

The next variable V1B3 i.e. Customer Need for Upgradation for Technology Adoption was positively correlated with all the variables related to Business growth aspects of Bankers.

It can be noted that all the significant correlation found between the variables which were identified from banker responses.

Then Non-parametric testing is carried out by using SPSS. The SPSS does by using Friedman test. It is the non-parametric alternative to the one-way ANOVA with repeated measures.

This test is mainly used to test for differences between groups when the dependent variable being measured is ordinal.

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distributions of V1V2C1, V1C2, V1C3, V1C4, V1B1, V1B2, V1B3, V2B1, V2B2, V2B3, V2B4 and V2B5 are the same.	Related-Samples Friedman's Two-Way Analysis of Variance by Ranks	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table No. 4.7.12: Hypothesis Test Summary for Hypothesis 6

Non-parametric testing analysis by SPSS pointed out that as P-value is less than 0.05 the null hypothesis should be rejected there by supporting to accept alternative hypothesis.

Thus, it can be stated there is a correlation between adoption of technology with business growth.

4.8 Findings

- The responses gathered comprises of both the genders in the case of Customers as well as Bank employees. Around 70% male and 30% female customers were part of this survey. In the case of employees this percentage was 83% and 17% respectively.

- 73% of the customers were from age group 25 to 45 years and in the case of employees 63% were from age group 25 to 35 years and 20% from the age group 35 to 45 years.
- 50% Customers and 73% employees were post graduates. So, we can say that the respondents were well educated. Hence supposed to be trustworthy.
- From the Customers, 63% were salaried and 15% Self-employed. Only 8% students were part of this research.
- It was found that the association of 63% of the employees was less than 5 years with the current bank.
- It has been observed that customers prefer bank which uses latest technology to save time and provides better banking experience. This supports the notion of technology adoption of the bank thereby achieving business growth. But according to bank employees Best interest rate or product is the main attraction for the customer. The technology aspects come afterwards.
- Internet transaction followed by use of ATM is most preferred banking technology from customer's perspective while according to employees, mobile banking ranked 1st then ATM banking. The mean ranking of preferred technology indicated that Call center is also preferred option for the use of banking technology. This indicates the acceptance of technology by both the users.
- Though ATM banking is mostly popular among the users, the issues related to it i.e. ATM machine is the main problem highlighted by both type of respondents. This is a loophole in the technology implementation which may hamper business growth. Hence timely maintenance is the most expected thing by the customers.
- The second preferred technology facet is acceptance of Credit/Debit card and its usage. It again supports the technology adoption by the bank as well as customer.
- Limited knowledge of IT system is the hurdle for handling banking day-to-day operations, this was pointed out by the employees. This problem is supposed to be solved by providing appropriate training to the employees.
- As Customer Service emerged as a means to provide competitive advantage, lack of service is main reason to lose customer. Customer service can be enhanced by better use of technology thereby achieving business growth.
- Business growth in terms of revenue is accepted as measure of success as per the opinion of bank employees.

- Priority Services is well acclaimed benefit of technology which is part of both adoption of technology and as quality service is important chunk of management strategy which leads to business growth.
- Decision related to technology adoption are mainly based on Customer feedback as well as it is part regulatory requirement. Hence training needs to be given to employees and Customer for proper usage of technology. As a part of management policy, as per respondent i.e. bank employee, it is given before system upgradation or whenever new features or product expected to launch. The assistance also expected from the customers.
- Outdated technology or lack of upgradation is the 2nd prompted reason for closing relationship with bank. Hence it is required that, bank should upgrade their technology time to time for providing better and quality services too the customer thereby witnessing growth.
- Better technology which enhances customer experience as well as service and quality is the main reason for the growth. Hence it may be noted that technology initiative as a part of management strategy results into business growth.
- The first hypothesis was about perceptions of customers considering technology used by the banks. The clear difference has been observed between perception of customer and bankers backed mean values of the parameters related to this hypothesis in rank table.
- In the case of second hypothesis, it was indicated that, delay in accessing the IT system is the major challenge faced by them followed to which access to multiple system is a challenge. Again, difference of opinion related to IT technology has been highlighted.
- For third hypothesis, a difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations was tested. The acceptance of this hypothesis pointed the difference lies about awareness of technology usage.
- The fourth hypothesis was related to views about issues faced by the use of banking technology. The acceptance of this hypothesis gravitated differences between the perception of customers and banker those who are part of banking technology adoption.

- The association of between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality is established by the acceptance of the said hypothesis.
 - The sixth hypothesis is about correlation of business growth and technology adoption by the bank. This correlation is appropriately reflected in the variable association portrayed in the analysis. But the point to be noted that, mainly employees view appeared to be significant in this case. The existence of definite constructive correlation between Adoption of technology and Business Growth for the Banking organization is affirmed by the acceptance of sixth hypothesis.
 - The objectives which are delineated in the previous chapters are also connected with the hypothesis as well as with the other data categorized under ranked data and multiple-choice data. The first objective is about technology acceptance by the customers is in line with banker's expectation is linked with first hypothesis which is accepted during analysis. The second objective talks about ascertain that the customers prefer using new technology is in line with third hypothesis which is accepted. This is well supported by the ranked and multiple-choice data. This data pointed out that internet technology and ATM usage along with acceptance of Credit/Debit card and its usage is most accepted technology aspects by the customers. The third objective is to understand the gap between promised services and benefits received by the customer by the use of technology for banking operations. This objective may be linked with fifth hypothesis. This hypothesis is about checking association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality. As this hypothesis is accepted during the analysis phase, it can be noted that, the third research objective also fulfilled.
- The next objective is to determine if adoption of new technology results into business growth in the case of banks considered for the study. This objective is in line with sixth hypothesis, which is well accepted with help of non-parametric testing. Thus, it can be stated that all the stated research objectives were achieved to the fullest extended along with acceptance of all the hypotheses and supported by ranked and multiple-choice data analysis.

4.9 Summary

This chapter step by step analysed data collected by the researcher for the support of this study. As a first step demographic data were discussed. Afterward ranked data and multiple-choice data analysed for the support of hypotheses and research hypothesis. In the case of first four hypothesis Friedman chi-square test was used while in the case of fifth hypothesis chi-square test for contingency was used for testing. In the case of sixth i.e. last hypothesis firstly significance of data was checked. Secondly Correlation among the dependent and independent variables were determined and finally hypotheses testing was carried out by incorporating non-parametric testing approach. At the last all findings were gathered together to establish fulfilment of research work.

Next chapter will talk about conclusion based on the findings and managerial implications of the said research.

Chapter - 4

ANALYSIS AND FINDINGS

1.1 Introduction

The first chapter gave introduction about the topic selected for the doctoral study. The second chapter explored the background about the topic and highlighted evidences about need and support related to selected topic. The previous chapter shared the information about the way the objective of the study and tools used to collect the primary data which was useful for further analysis and drawing conclusion on that basis.

This part mainly focused on achievement of objectives and hypothesis testing.

The Objectives framed for the studies were as follows: -

1. To identify preference of customer as well as bank staff in technology usage.
2. To understand the challenges faced by customers and bank staff while using technology in operations.
3. To understand gap between promised services and benefits received by the customer by the use of technology for banking operations.
4. To identify whether technology strategy helps in managing business growth

Research Hypothesis tested were mentioned below

1. There is a difference in the perceptions of customers considering technology used by the banks.
2. There is a difference in the perceptions of the bank employees regarding the technology challenges faced by them in banking operations.
3. There is a difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations.
4. There is a difference in the perception of customers with respect to issues they have faced in using banking technology.
5. There is an association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality.
6. There is a correlation between adoption of technology with business growth

This analysis is divided into two parts: Both Customers and Employees data analysed and

- I. Demographic Data Presentation
- II. Analysis
 - A. Analysis of Ranked Data
 - B. Analysis of Multiple-choice Data
 - C. Hypothesis Testing

The Description of variables is already presented in previous chapter. The same is used for hypothesis testing. Mainly Likert Scale data used for hypothesis testing supported by ranked and multiple -choice data.

I. Demographic Data Presentation

4.1 Customer

1. **Customer - Gender:** In all 437 responses were gathered. The representations were both male and female. The statistics of participation in the customer survey was as follows:

Gender	No. of Responses	Percent (%)
Female	134	30.7
Male	303	69.3
Total	437	100.0

Table 4.1.1: Customer Survey Response Participation

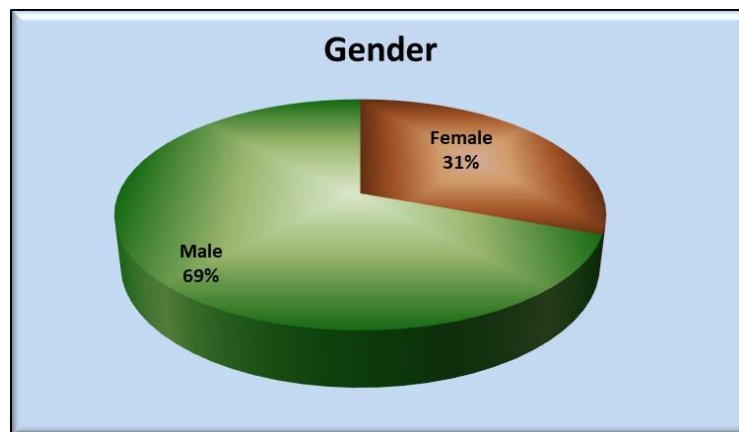


Figure 4.1.1: Customer Survey Response Participation

Interpretation: In all 134 Female and 303 Male were part of the Customer Survey.

2. **Customer - Age:** Following table shows Age wise distribution of the customers who participated in survey for this study.

Age Group	No. of Responses	Percent (%)
-----------	------------------	-------------

Less than 25	56	12.8
25 to 35	160	36.6
35 to 45	160	36.6
45 to 60	51	11.7
Above 60	10	2.3
Total	437	100.0

Table: 4.1.2: Age wise distribution of Customer Participants

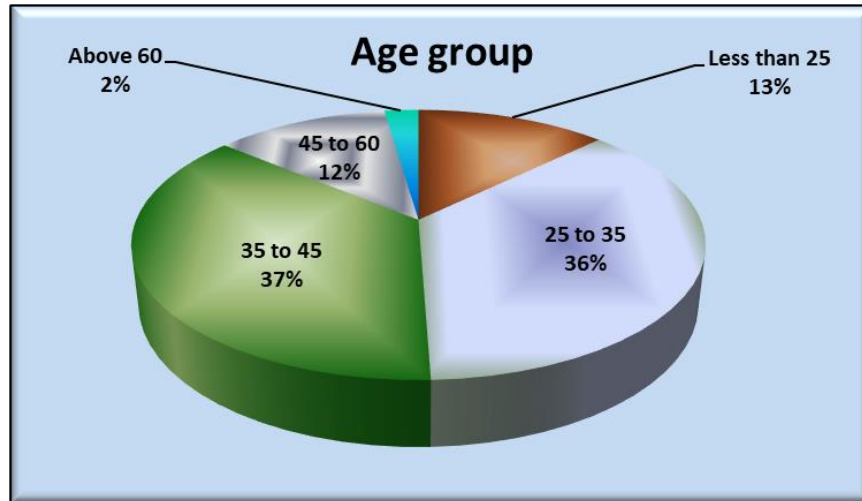


Figure 4.1.2: Age wise distribution of Customer Participants

Interpretation: The pie chart indicates that most of customers were of the age between 25 to 35 years and 35 to 45 years. In all 73% of customers were from age 25 – 45 years considering both age group together.

3. Customer Education: The Customer from all the categories participated in survey. The categories were Uneducated, Under Graduate, Graduate and Post Graduate.

Education	No. of Responses	Percent (%)
Uneducated	3	.7
Under Graduate	47	10.8
Graduate	166	38.0
Post Graduate	221	50.6
Total	437	100.0

Table 4.1.3: Customer Education

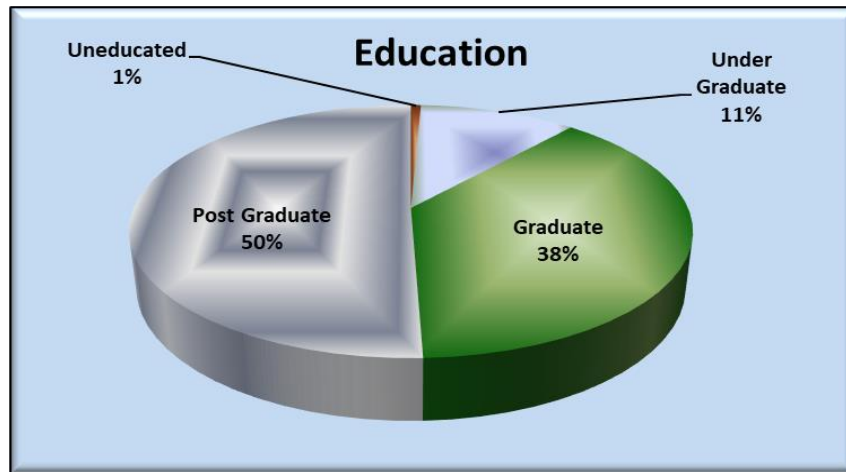


Figure 4.1.3: Customer Education

Interpretation: Above chart shows that, 50% of the respondents were post graduate followed by 38% graduate respondents. Only 1% respondents were not educated.

4. Customer Occupation: The customers who contributed in this survey were grouped under following occupations – Retired, Salaried, Self Employed, Students, Unemployed.

Occupation	No. of Responses	Percent (%)
Retired	9	2.1
Salaried	300	68.6
Self employed	65	14.9
Student	35	8.0
Unemployed	28	6.4
Total	437	100.0

Table 4.1.4: Customer Occupation

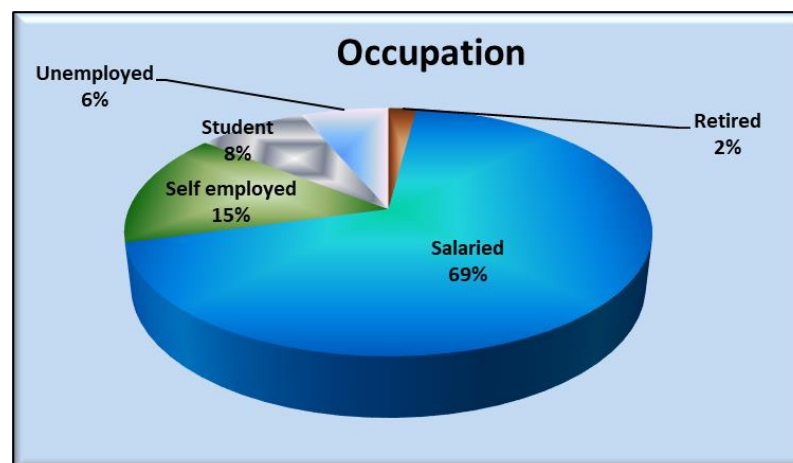


Figure 4.1.4: Customer Occupation

Interpretation: 69% of the respondents were salaried whereas only 15% of the respondents were self-employed and 8% students, who were part of this study.

5. Customer Association with Bank: This is about since how many years, customer is having bank account with existing bank. The alternatives framed for grouping the data were Less than 5 years, 5 to 10 years, 10 to 15 years, 15 to 20 years and more than 20 years.

Account with Existing Bank	No. of Responses	Percent
Less than 5 years	151	34.6
5 to 10 years	144	33.0
10 to 15 years	93	21.3
15 to 20 years	39	8.9
More than 20 Years	10	2.3
Total	437	100.0

Table 4.1.5: Customer Association

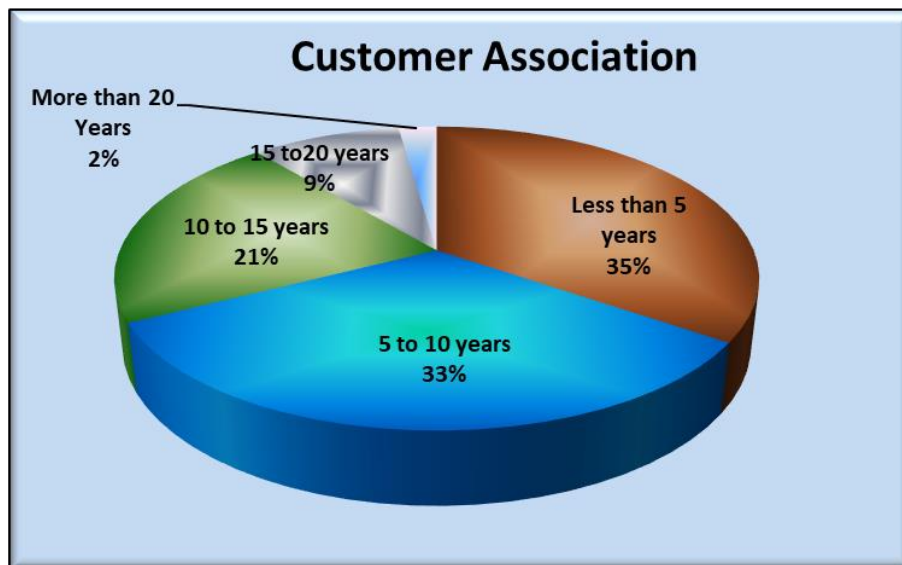


Figure 4.1.5: Customer Association

Interpretation: Above figure shows that, the customer association with their existing bank is varied. 35% of the respondents were having less than 5 years association with their current bank while 33% of the respondents belongs to the category 5 to 10 years. Only 2% of the customer respondents having more than 20 years of association with their current bank. The other responses were from 10 to 15 years and 15 to 20 years are 21% and 9% respectively.

4.2 Bank Employee

1. **Bank Employee – Gender:** In the case of Bank Employee altogether 289 valid responses were considered for the study. The gender wise bifurcation is given below.

Gender	No. of Responses	Percent (%)
Female	48	16.6
Male	241	83.4
Total	289	100.0

Table 4.2.1: Customer Survey Response Participation

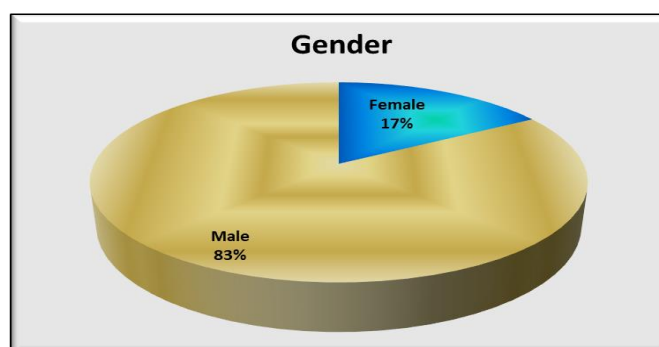


Figure 4.2.1: Customer Survey Response Participation

Interpretation: The pie chart shows that, from the bank employees respondents 16.6% were female and 83.4% were male.

2. **Bank Employee – Age:** The age categories were same as customer respondents.

Age Group	No. of Responses	Percent (%)
Less than 25	29	10.0
25 to 35 years	183	63.3
35 to 45 years	58	20.1
45 to 60 years	19	6.6
Total	289	100.0

Table 4.2.2: Age wise distribution of Bank Employee Participants

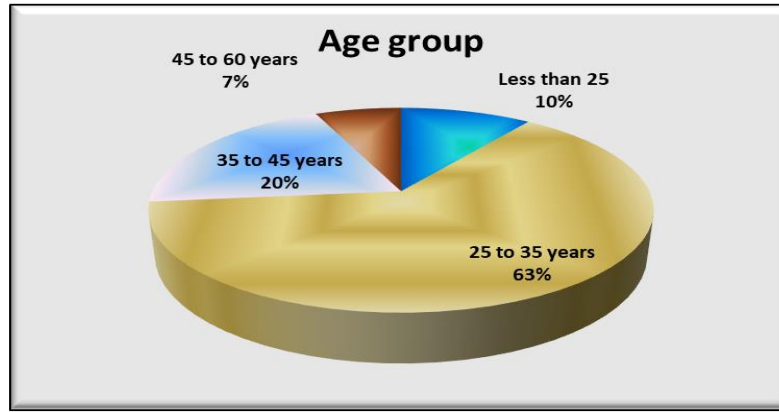


Figure 4.2.2: Age wise distribution of Bank Employee Participants

Interpretation: In the case of bank employee almost 63% of the employees were from the age group 25 to 35 years, while 20% of the employees were of the age between 35 to 45. The participants from the age group less than 25 years were 10% and 7% were from the age group 45 to 60 years.

3. Bank Employee Education: The education aspects of bank employee are divided into two types namely Graduate and Post Graduate.

Education	No. of Responses	Percent (%)
Graduate	77	26.6
Post Graduate	212	73.4
Total	289	100.0

Table 4.2.3: Bank Employee Education

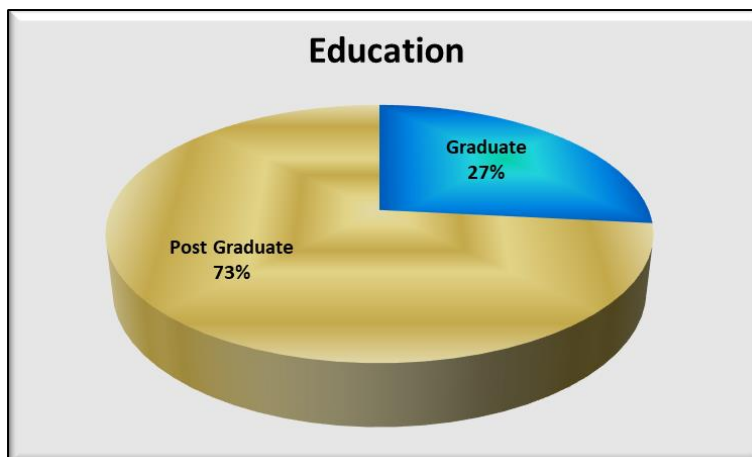


Figure 4.2.3: Bank Employee Education

Interpretation: From the Bank employee respondents 73% were Post Graduate and 27% were Graduates. It can be stated that Bank Employees who participated in the study were well educated.

4. Tenure of Employee with Current Bank: This shows the no. of years association of the bank employee with the current bank.

Tenure of service with the bank	No. of Responses	Percent (%)
Less than 5 Years	183	63.3
5 to 10 Years	29	10.0
10 to 15 Years	48	16.6
15 to 20 Years	29	10.0
Total	289	100.0

Table 4.2.4: Bank Employee Tenure

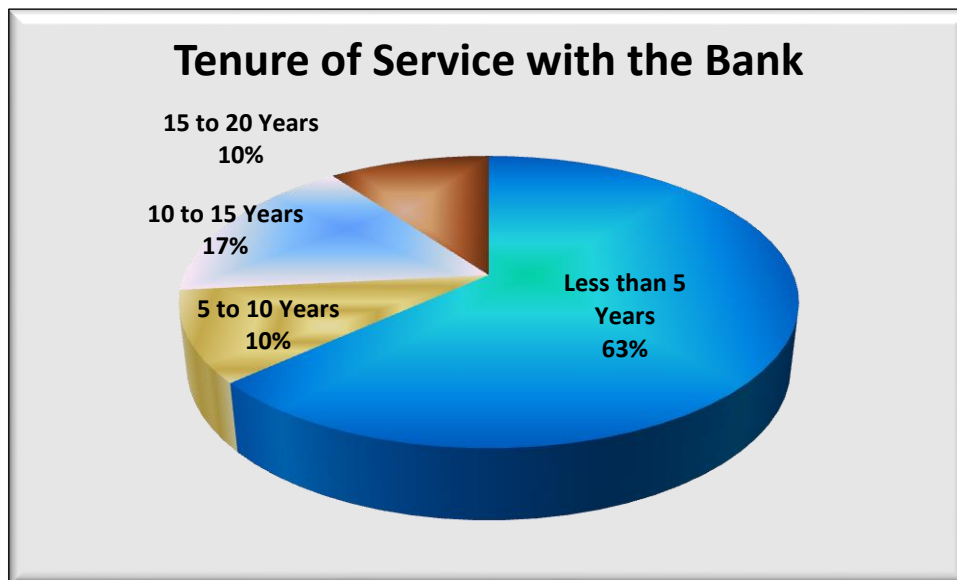


Figure 4.2.4: Bank Employee Tenure

Interpretation: The pie chart shows that about 63% of the employees were from the category who are associated with current bank, less than 5 years followed by 17% of the employees were associate between 10 to 15 years. There are 10% of the employees were from both the categories i.e. from 5 to 10 years and 15 to 20 years.

II. Analysis

A. Analysis and Interpretation of Ranked Data

4.3 Customer

- 1. Customer Preference from Bank:** It is about understanding, what should bank have from the customer perspective.

As a customer my preference from bank is to have....	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Latest technology to save time and better experience	167	126	95	47	48
%	38.2	28.8	21.7	10.8	11.0
Best customer service	150	164	91	52	34
%	34.3	37.5	20.8	11.9	7.8
Best interest rates / products / Benefits	61	92	140	93	59
%	14.0	21.1	32.0	21.3	13.5
Branch location close to my home	47	31	58	128	119
%	10.8	7.1	13.3	29.3	27.2
Friendly staff who can assist me with all my queries	12	24	53	117	177
%	2.7	5.5	12.1	26.8	40.5

Table 4.3.1: Customer Preference

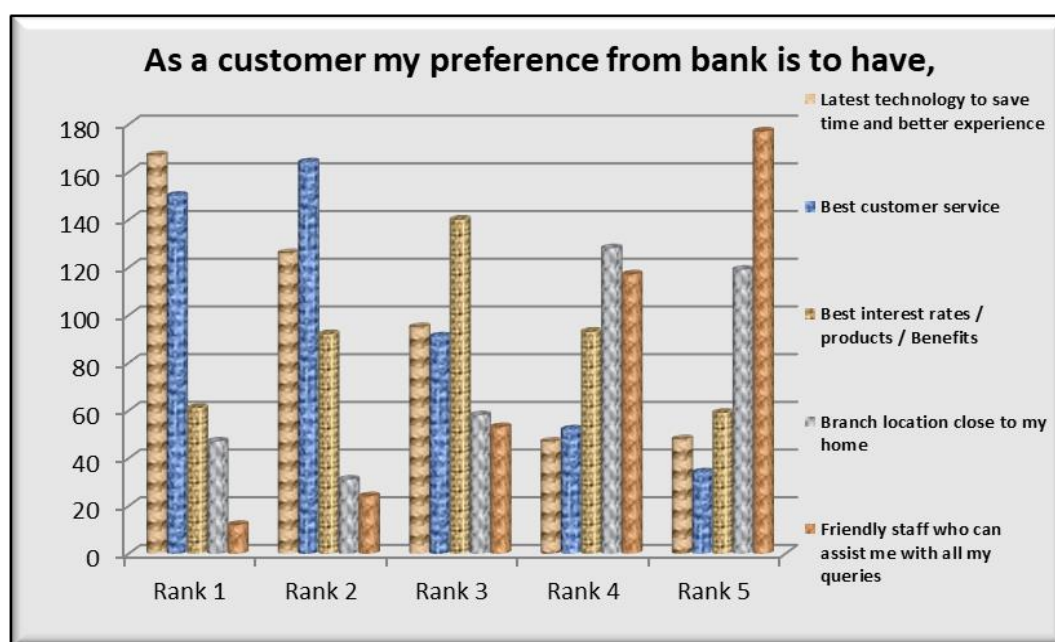


Figure 4.3.1: Customer Preference

Interpretation: Above bar chart clearly indicated that, Bank must have Latest Technology to save time and better experience as this expectation ranked one. The next expected aspect is Best Customer Service which is ranked two followed by Best Interest Rate/Products/Benefits, Branch Location close to home and then Friendly Staff assistance ranked third, fourth and fifth respectively.

2. Preferred Technology: This question gives insight about preferred technology for banking operations.

As a customer, which is the most used technology method?	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6
Internet banking	196	121	62	74	40	25
%	44.9	27.7	14.2	16.9	9.2	5.7
Personal visit	34	69	90	115	110	67
%	7.8	15.8	20.6	26.3	25.2	15.3
Mobile banking	76	118	99	70	56	40
%	17.4	27.0	22.7	16.0	12.8	9.2
Through family members	4	20	41	52	133	134
%	0.9	4.6	9.4	11.9	30.4	30.7
Through call centre	0	8	50	94	82	158
%	0.0	1.8	11.4	21.5	18.8	36.2
ATM	127	101	95	32	16	13
%	29.1	23.1	21.7	7.3	3.7	3.0

Table 4.3.2: Preferred Technology

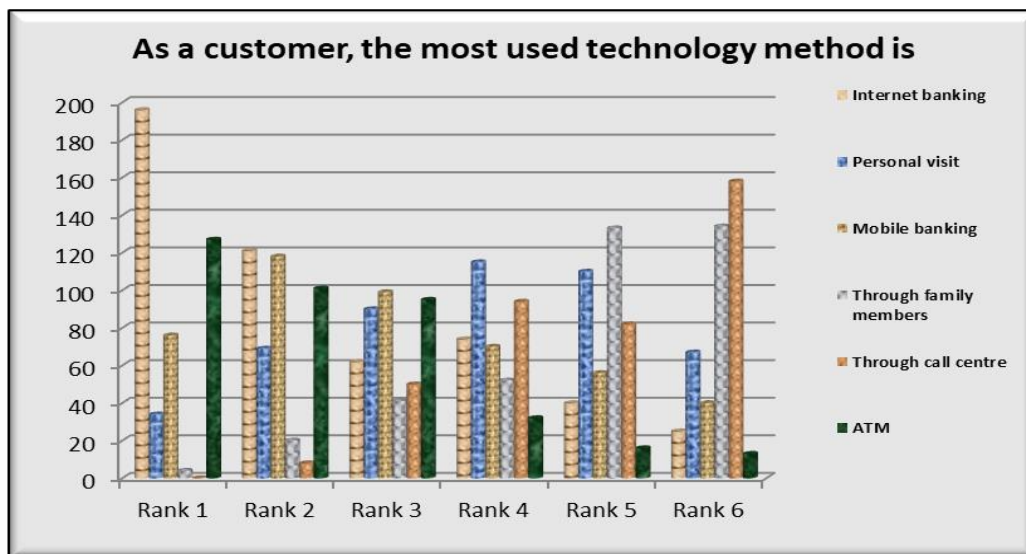


Figure 4.3.2: Preferred Technology

Interpretation: It can be stated that, Internet banking is most preferred mode of banking transactions as it is ranked one and two. In the rank one position, second preferred way is ATM. In the second rank position other preferred option is mobile banking. Personal visit ranked four followed by through family members and through call centre which are ranked 5th and 6th respectively.

3. Observation about Technology Changes: This parameter describes the technology changes observed by the Customers with respect to banking operations.

What are the top 5 technology changes you have observed in the last 4 years the bank (2011- 2015)	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Banking through phone banking / call centre	12	20	51	45	270
%	2.7	4.6	11.7	10.3	61.8
Debit & Credit card acceptance and usage	54	161	113	89	45
%	12.4	36.8	25.9	20.4	10.3
Increased ATMs & ability to use other ATMs	170	58	67	95	74
%	38.9	13.3	15.3	21.7	16.9
Internet Banking for all banking needs	77	120	70	129	10
%	17.6	27.5	16.0	29.5	2.3
Mobile apps for banking transactions	124	78	136	79	38
%	28.4	17.8	31.1	18.1	8.7

Table 4.3.3: Observation about Technology Changes

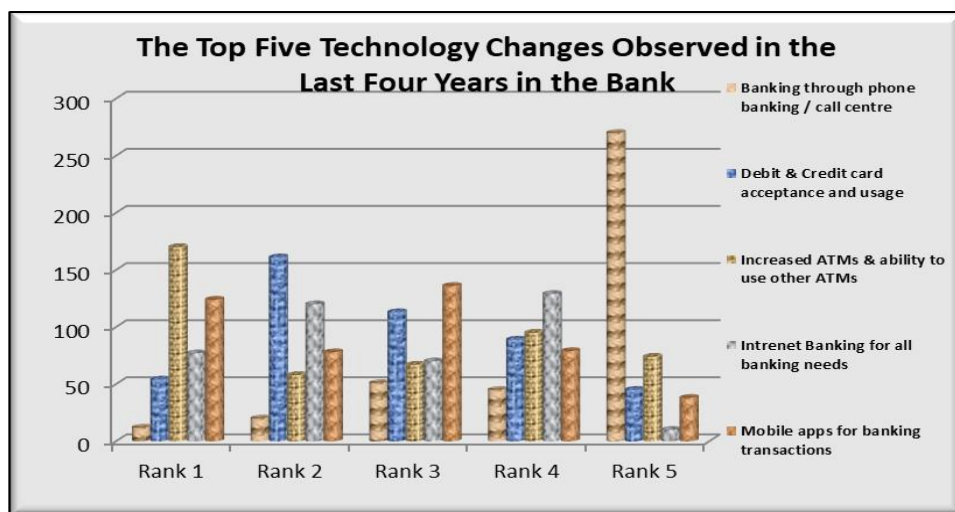


Figure 4.3.3: Observation about Technology Changes

Interpretation: At rank 1 position, Increased ATM and ability to use other ATM is the most observed technological change while at rank 2, Debit and Credit card acceptance and usage is observed technological change. In the case of rank 3 and 4, the observed technological changes in last fours are Mobile apps for banking transactions and Internet Banking for all banking needs respectively. Banking through phone banking/call centre is last ranked technological change observed by the customers.

4. Technology Issues Faced: This data is about the technological issues faced by the customers during last four years.

What are the top 10 technology issues you have faced in the last 4 years with the bank (2011- 2015)	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6	Rank 7	Rank 8	Rank 9	Rank 10
ATM machine issue	111	76	74	51	50	46	38	40	35	29
%	25.4	17.4	16.9	11.7	11.4	10.5	8.7	9.2	8.0	6.6
Complicated paperwork	44	28	38	38	44	48	86	41	23	13
%	10.1	6.4	8.7	8.7	10.1	11.0	19.7	9.4	5.3	3.0
Cost of using new technology	23	33	42	31	54	90	42	21	21	24
%	5.3	7.6	9.6	7.1	12.4	20.6	9.6	4.8	4.8	5.5
Force to learn new technology, no choice given	14	15	27	29	33	39	61	104	39	43
%	3.2	3.4	6.2	6.6	7.6	8.9	14.0	23.8	8.9	9.8
Fraud, hacking, mis- use of account	13	16	15	24	27	37	45	56	115	49
%	3.0	3.7	3.4	5.5	6.2	8.5	10.3	12.8	26.3	11.2
Lack of laws and pain in cases of tech. mis-use	13	15	13	21	16	29	26	42	70	140
%	3.0	3.4	3.0	4.8	3.7	6.6	5.9	9.6	16.0	32.0
Long waiting time to talk with customer executive	65	68	49	84	55	20	31	20	7	14
%	14.9	15.6	11.2	19.2	12.6	4.6	7.1	4.6	1.6	3.2

SMS/OTP not working	40	84	59	61	33	46	47	53	57	33
%	9.2	19.2	13.5	14.0	7.6	10.5	10.8	12.1	13.0	7.6
Staff indicating system performance issue	29	52	60	54	82	49	22	14	12	16
%	6.6	11.9	13.7	12.4	18.8	11.2	5.0	3.2	2.7	3.7
Website not working	85	50	60	44	43	33	39	46	58	76
%	19.5	11.4	13.7	10.1	9.8	7.6	8.9	10.5	13.3	17.4

Table 4.3.4: Technology Issues Faced

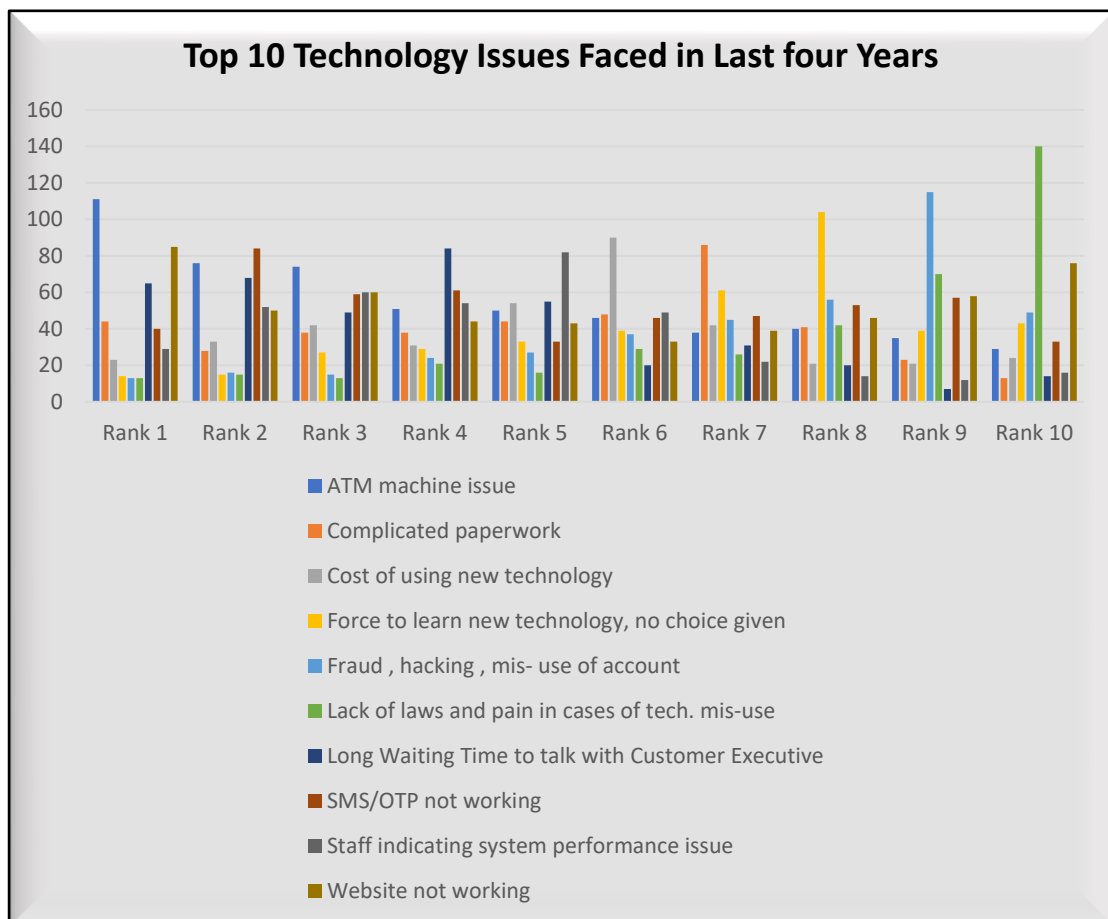


Figure 4.3.4: Technology Issues Faced

Interpretation: The technology issues faced during last four years by the customers from rank 1 to rank 10 are ATM machine issue, STP/OTP not working, again ATM machine issue, Long waiting time to talk with customer executive, Staff indicating system performance issue, Cost of using new technology, Complicated paperwork, Force to learn new technology,

no choice given, Fraud, hacking, mis-use of account and last ranked option is Lack of laws and pain in cases of technology mis-use.

5. Technology Expectations: This indicates the top 5 expectations from the bank by the customers.

My top 5 expectations from Bank are	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Frequent training & ease of procedures	15	23	46	132	177
%	3.4	5.3	10.5	30.2	40.5
Quick service using technology - passbook update, transfers, deposits etc.	110	120	113	71	29
%	25.2	27.5	25.9	16.2	6.6
Services at minimum cost	82	65	53	74	118
%	18.8	14.9	12.1	16.9	27.0
Timely maintenance of ATM & other facilities	159	100	82	71	66
%	36.4	22.9	18.8	16.2	15.1
Timely upgrade of technology	71	129	143	89	47
%	16.2	29.5	32.7	20.4	10.8

Table 4.3.5: Technology Expectations

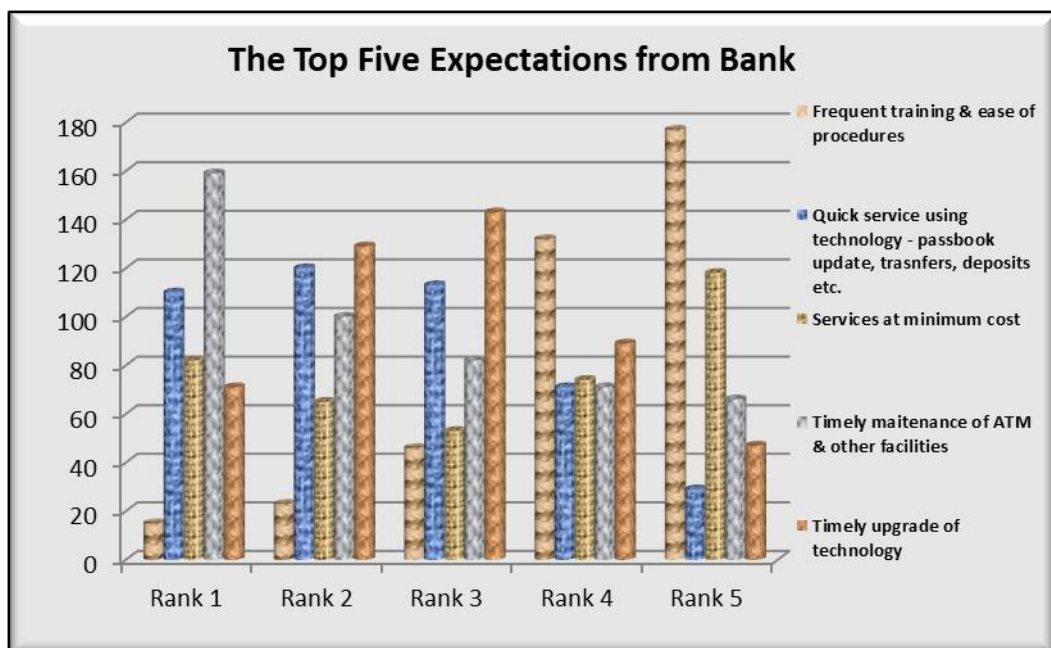


Figure 4.3.5: Technology Expectations

Interpretation: The customers are expecting timely maintenance of ATM and other facilities at first place followed by Timely upgrade of technology at second place and third place. Frequent training and ease of procedures is at fourth and fifth place. Quick Service using technology – passbook, update, transfer, deposits etc. and Service at minimum cost is also expected by the customers.

4.4 Bank Employee

1. Technology Trend Observed: The responses reflect the bank employees’ opinion about technology preference from customers point of view.

As a Bank staff, what trend have you observed from customers as their preference?	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Latest technology to save time and quality of service	58	31	66	76	52
%	20.1	10.7	22.8	26.3	18.0
Best customer service	48	34	88	46	67
%	16.6	11.8	30.4	15.9	23.2
Best interest rates / products	131	49	38	35	30
%	45.3	17.0	13.1	12.1	10.4
Branch location close to their home	47	96	34	53	53
%	16.3	33.2	11.8	18.3	18.3
Friendly staff who can assist with all queries	44	91	39	53	56
%	15.2	31.5	13.5	18.3	19.4

Table 4.4.1: Observation about technology trend

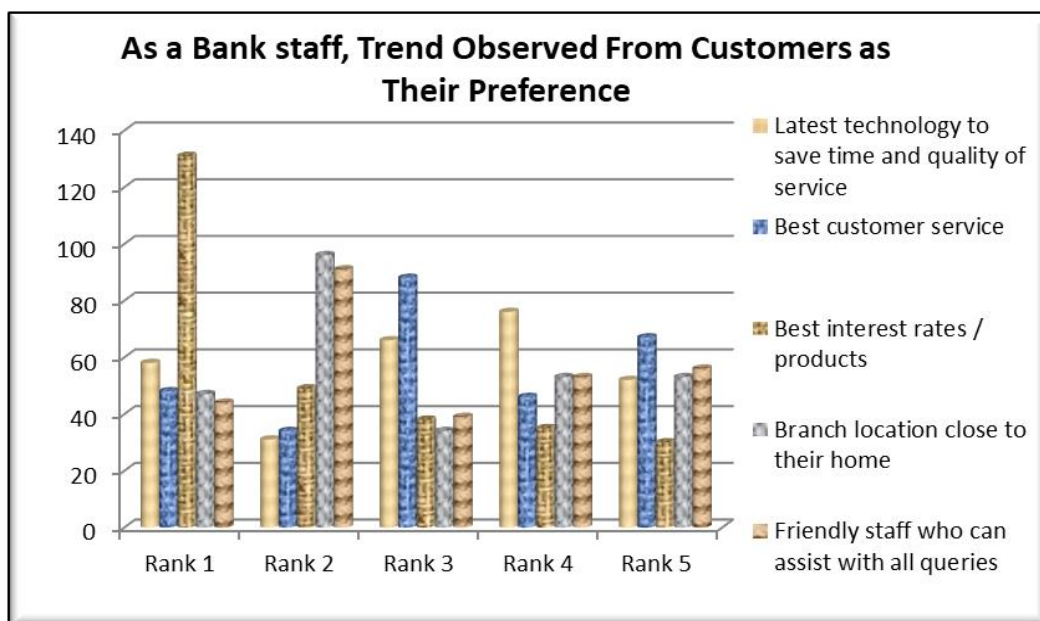


Figure 4.4.1: Observation about technology trend

Interpretation: The chart shows that, Best interest rate/product attract customer for the banking operation as it ranked one. The second ranked preference is Branch location followed by Best customer service at third and fifth rank. Latest technology for saving time and quality service is ranked fourth.

2. Preferred Technology Method: This question displays top six technology methods adopted by the customers for banking operations.

What are the top 6 technology methods used by the customer?	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6
Internet banking	19	57	88	36	81	2
%	6.6	19.7	30.4	12.5	28.0	0.7
Personal visit	14	211	41	2	14	1
%	4.8	73.0	14.2	0.7	4.8	0.3
Mobile banking	89	8	35	84	17	50
%	30.8	2.8	12.1	29.1	5.9	17.3
Through family members	59	7	62	83	70	2
%	20.4	2.4	21.5	28.7	24.2	0.7
Through call centre	48	8	27	33	59	108
%	16.6	2.8	9.3	11.4	20.4	37.4
ATM	88	10	34	32	22	97
%	30.4	3.5	11.8	11.1	7.6	33.6

Table 4.4.2: Preferred Technology Method

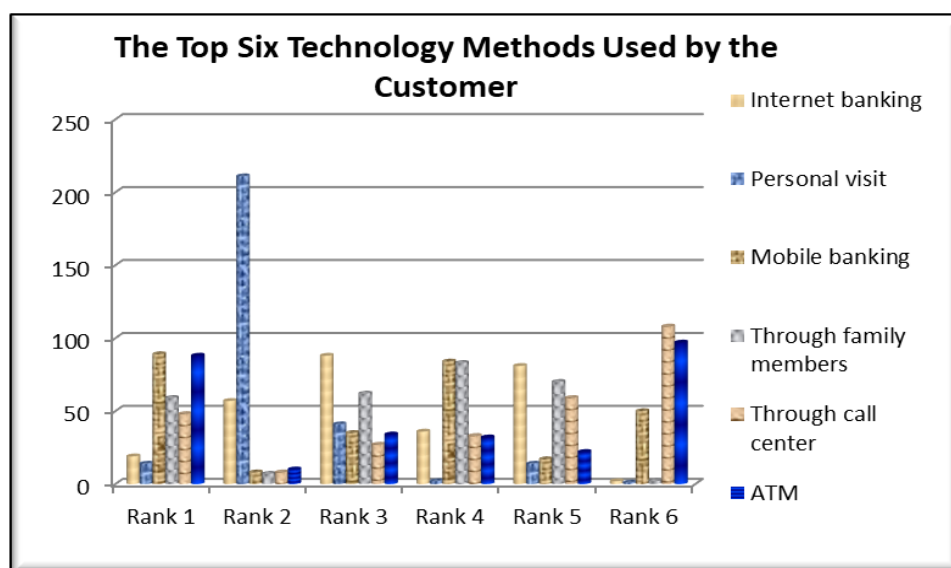


Figure 4.4.2: Preferred Technology Method

Interpretation: Above data clearly represent that, mobile banking as well as ATM technology is ranked one by the respondents. But rank 2 position personal visit is major trend while internet banking is at rank 3. Again, mobile banking together with banking operation through family members are at rank 4. Internet banking is again at rank 5th followed by use of call center is at 6th position.

3. Competitive Advantage: These are the responses of bank employees about the competitive advantages highlighted by the customers.

What is the competitive advantage highlighted by the customers to you?	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6
Latest technology & ease of using	16	198	5	1	63	1
%	5.5	68.5	1.7	0.3	21.8	0.3
Competitive products / rates	14	73	179	0	17	1
%	4.8	25.3	61.9	0.0	5.9	0.3
Customer service	208	10	23	23	0	20
%	72.0	3.5	8.0	8.0	0.0	6.9
Location advantage	34	8	38	204	0	0
%	11.8	2.8	13.1	70.6	0.0	0.0
Offers / Gifts / additional benefits	21	7	23	23	177	33
%	7.3	2.4	8.0	8.0	61.2	11.4
Any other	28	8	19	19	2	208
%	9.7	2.8	6.6	6.6	0.7	72.0

Table 4.4.3: Highlighted Competitive Advantage

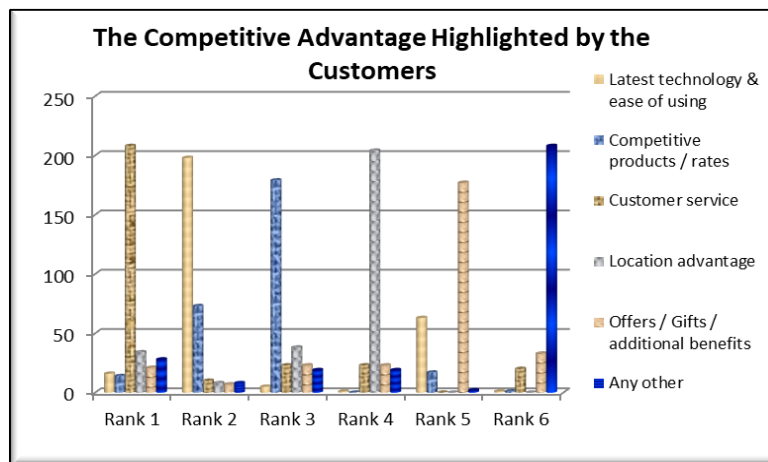


Figure 4.4.3: Highlighted Competitive Advantage

Interpretation: The above bar chart depicts that; customer service is the one which provides competitive advantage to the bank as it ranked first. Latest technology and ease of using ranked second. Competitive products and location of the bank are ranked 3rd and 4th ranked respectively while offers by bank, gifts or additional benefits ranked fifth for gaining competitive advantage.

4. Reasons for Losing Customer: This information tries to find out possible cause of losing the customer from bank employees' point of view.

What are the typical top 5 reasons of losing the customer?	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Competitors with better technology offerings	34	99	87	24	34
%	11.8	34.3	30.1	8.3	11.8
Minimum Balance requirement	35	52	48	73	70
%	12.1	18.0	16.6	25.3	24.2
Change of job / location	60	35	64	61	58
%	20.8	12.1	22.1	21.1	20.1
Fear / issues flagged in the media about the bank	71	50	41	60	56
%	24.6	17.3	14.2	20.8	19.4
Lack of service	90	51	40	51	46
%	31.1	17.6	13.8	17.6	15.9

Table 4.4.4: Reason for Losing the Customer

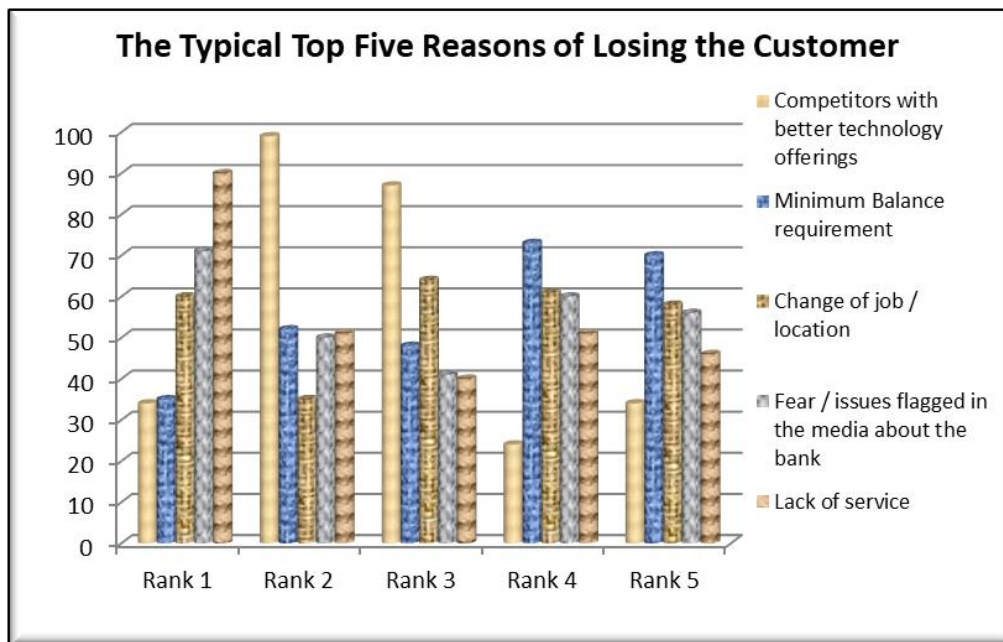


Figure 4.4.4: Reason for Losing the Customer

Interpretation: The most important reason for losing the customer is Lack of Services which is ranked one followed by competitor with better technology offerings as it ranked second and third also. At rank 4th and 5th position the main reason is minimum balance requirement of specific bank.

5. Technology Challenges: The day-to-day technology challenges faced by bank employees are highlighted here.

What are the typical top 5 day to day technology challenges you face?	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Volume of customers and queries	63	100	70	20	26
%	21.8	34.6	24.2	6.9	9.0
Delays in accessing the IT system to resolve queries	38	48	57	62	74
%	13.1	16.6	19.7	21.5	25.6
Accessing multiple systems / menu to resolve the queries	52	45	53	65	64
%	18.0	15.6	18.3	22.5	22.1
Availability & Reliability of IT systems	53	51	57	61	57
%	18.3	17.6	19.7	21.1	19.7
Limited knowledge of various IT systems while handling queries	82	45	48	59	45
%	28.4	15.6	16.6	20.4	15.6

Figure 4.4.5: Technology Challenges

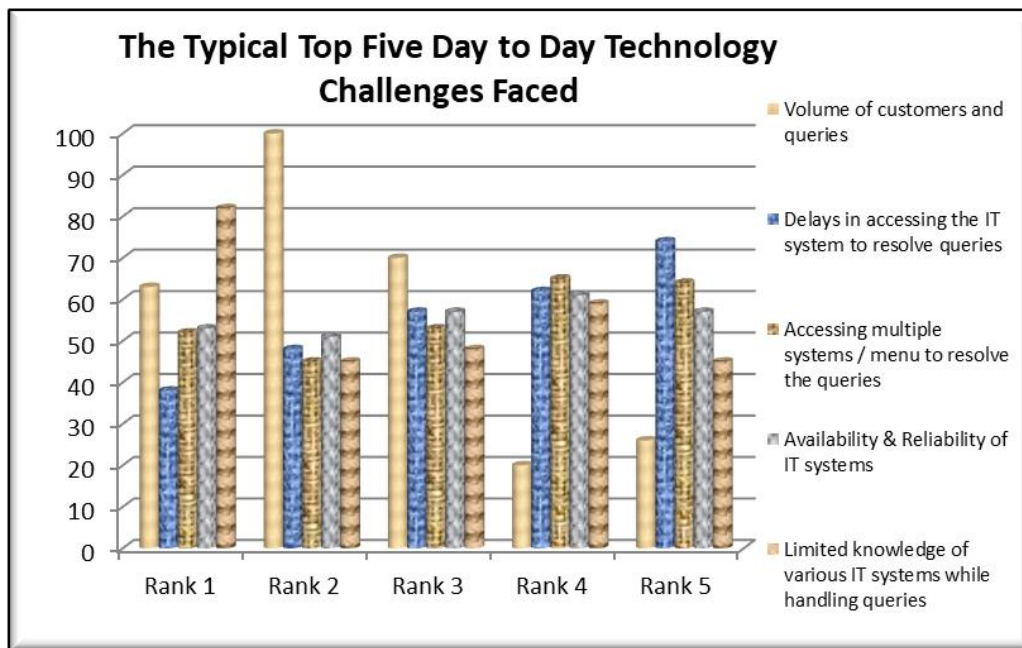


Figure 4.4.5: Technology Challenges

Interpretation: The above graph shows that; limited knowledge of various IT systems is the main hurdle for the use of technology in day-to-days banking. In the second rank and third rank position, the challenge is to handle volume of customers and queries. At the fourth ranking except volume of customers and queries all other alternatives are major, which includes limited knowledge of various IT systems followed by delays in accessing IT system to resolve queries and availability and reliability of IT system. In the 5th rank position delays in accessing IT system to resolve queries is one of technology challenge faced by bank employees.

6. Observation about Technology Changes: Bank employee’s observation about technology changes noted here.

What are the top 5 technology changes you have observed in the last 4 years the bank (2011- 2015)	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Increased ATMs and ability to use ATM of other banks	74	65	74	64	2
%	25.6	22.5	25.6	22.1	0.7
Debit and Credit card acceptance and usage	124	45	54	15	41
%	42.9	15.6	18.7	5.2	14.2
Mobile apps for Banking transactions	50	55	45	62	67
%	17.3	19.0	15.6	21.5	23.2
Internet banking facility to perform all day to day transactions easily	48	55	45	58	73
%	16.6	19.0	15.6	20.1	25.3
Banking through call centers	31	64	50	55	79
%	10.7	22.1	17.3	19.0	27.3

Table 4.4.6: Technology Challenges

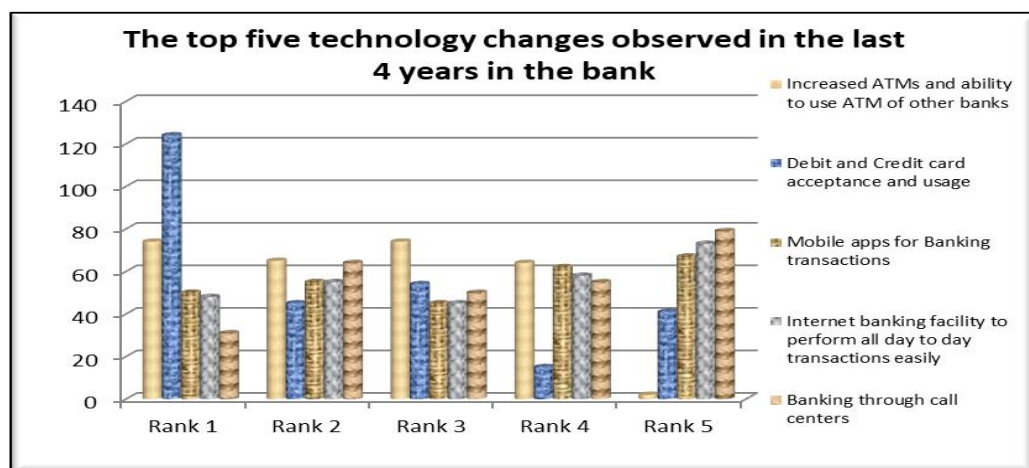


Figure 4.4.6: Technology Challenges

Interpretation: Above graph shows that; Debit and Credit Card acceptance and usage is most sought technology change observed during 2011-2015. In the second, third and fourth rank, increased ATM and ability to use ATM of other banks is the observed technology change followed by Banking through call centers ranked 5th position.

7. Observation about Technology Issues: The technology issues observed during 2011-2015 are illustrated in the following data.

What are the top 5 technology issues you have observed in the last 4 years with the bank (2011- 2015)	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5
Website / server not available for internet banking	21	38	97	25	101
%	7.3	13.1	33.6	8.7	34.9
SMS / OTP notifications not working on time	69	44	25	93	51
%	23.9	15.2	8.7	32.2	17.6
ATM machine issues, impacting various transactions	120	51	33	41	37
%	41.5	17.6	11.4	14.2	12.8
Long wait time to speak to customer service executive	53	44	95	50	40
%	18.3	15.2	32.9	17.3	13.8
Systems not working at branch / staff indicating system performance issues	43	114	33	51	41
%	14.9	39.4	11.4	17.6	14.2

Table 4.4.7: Technology Issues

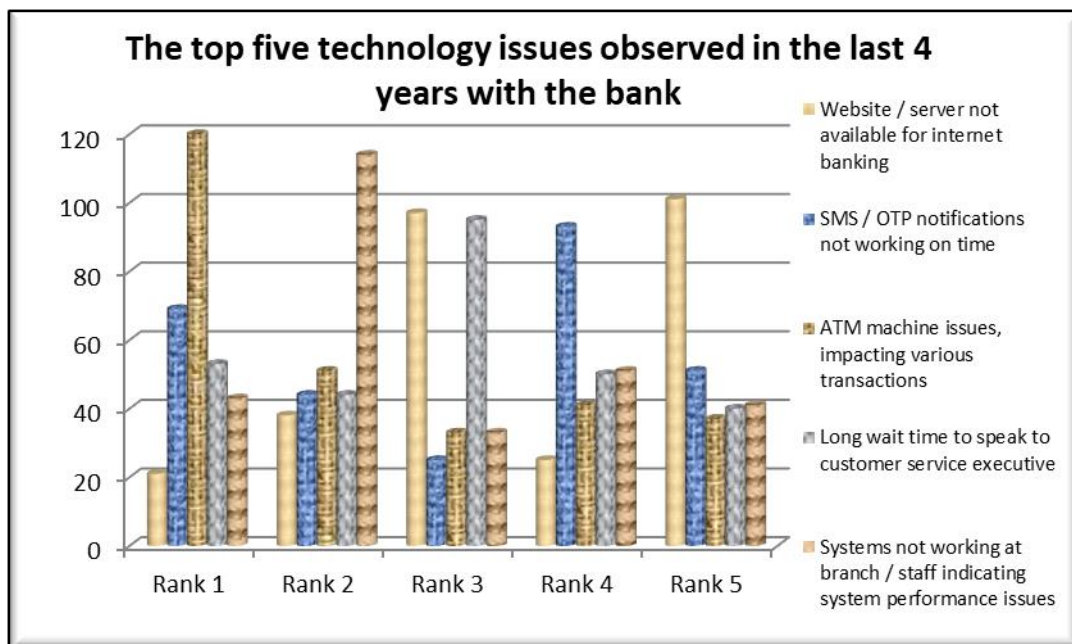


Figure 4.4.7: Technology Issues

Interpretation: ATM machine issues impacting banking transaction is the highest ranked issue followed by System not working at branch/staff indicating system performance issue. At the 3rd rank place Website / Server not available for internet banking is the major issue. In the 4th and 5th ranking place the issues are SMS/OTP notification not working on time and again Website / Server not available for internet banking respectively.

8. Measurement of Success: This demonstrate how bank success can be measured according to bank employees.

How is your success measured?	Ran k 1	Ran k 2	Ran k 3	Ran k 4	Ran k 5	Ran k 6
Growth of revenue	149	66	16	11	32	3
%	51.6	22.8	5.5	3.8	11.1	1.0
Growth of number of customers	13	55	2	2	75	130
%	4.5	19.0	0.7	0.7	26.0	45.0
Increase in customer satisfaction	43	138	33	30	3	30
%	14.9	47.8	11.4	10.4	1.0	10.4
Identification of new / innovative products	48	17	176	31	4	1
%	16.6	5.9	60.9	10.7	1.4	0.3
Being 100% compliant with the process and policies	41	8	22	25	135	46
%	14.2	2.8	7.6	8.7	46.7	15.9
Growth in Technology adoption of customers	36	16	21	154	3	47
%	12.5	5.5	7.3	53.3	1.0	16.3

Table 4.4.8: Technology Issues

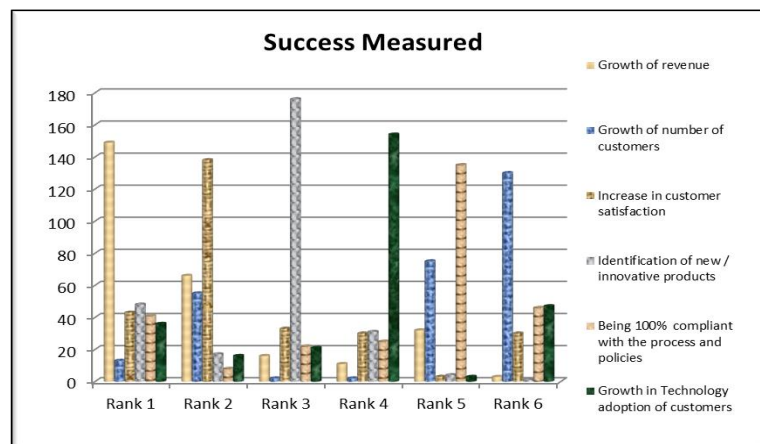


Table 4.4.8: Technology Issues

Interpretation: Growth of Revenue is the highest rank indication of Success followed by Increase in Customers. At 3rd and 4th rank, Identification of new/innovative products and Growth in technology adoption of customers are placed respectively. Being 100% compliant with the process and policies is placed at 5th position while at the lowest rank i.e. rank 6th, Growth of number of customers is placed.

B. Analysis and Interpretation of Multiple-Choice Data

4.5 Customer

1. Reasons for Closing Bank Account: This parameter describes the reasons for closing bank account considering technology aspects.

Have you closed relationship with any bank due to following / lack of technology offering?	Frequency	Percent
Out dated technology / Lack of upgrade i.e. no internet banking, no assistance over phone etc.	105	24.0
Frequent technology issues hampering customer services e.g. website not working, net banking issues, call centre delays	73	16.7
Higher cost of technology offerings e.g. fees for using mobile banking	82	18.8
Other	242	55.4

Table 4.5.1: Reasons for Closing Bank Account

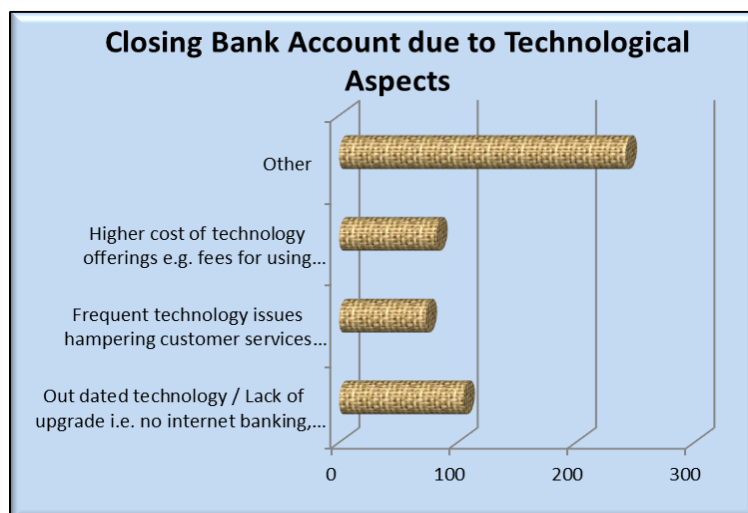


Figure 4.5.1: Reasons for Closing Bank Account

Interpretation: Above Bar Chart clearly indicate that other than technology is the main reason to close the relationship with bank. Second most mentioned reason is Outdated technology followed by Higher cost of technology offerings and then Frequent technology issues is the last aspect to close the bank account.

2. Benefits Associates with Latest Technology: This variable gives insight about the benefits received by the customer due to adoption of latest technology by the bank.

Which benefits do you receive associated with using latest technology?	Frequency	Percent
Priority service	300	68.6
Fee waivers	78	17.8
Improved credit facility	38	8.7
Special gifts	36	8.2
Free upgrade facility to products	65	14.9
Additional discounts	78	17.8
Bonus points	164	37.5

Table 4.5.2: Benefits Associated with Latest Technology

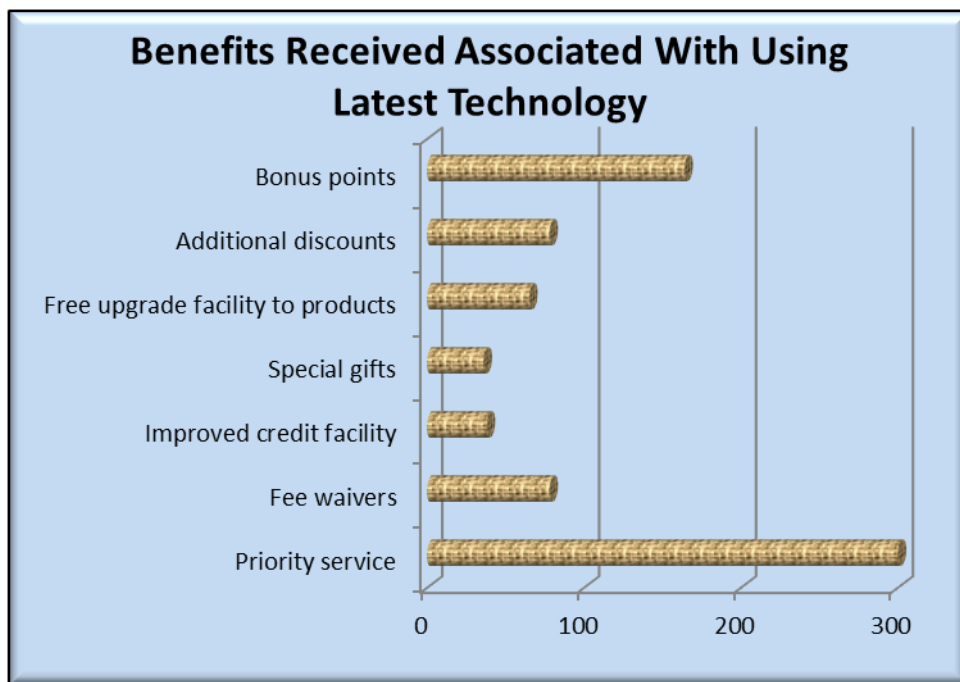


Figure 4.5.2: Benefits Associated with Latest Technology

Interpretation: The most important benefits received by the customer due to use of new technology is Priority of Service followed by Bonus points gained by Customers. Additional Discount and Fee Waiver facility are next points which are mentioned by the customers. It is followed by Free Upgrade Facility to Product, Improved Credit Facility and lastly Special Gifts are benefits enjoyed by the customer in descending order.

3. Additional Product Purchase: It is to check whether customers purchased new product/s with the help of technology.

Have you purchased additional products from your bank since you have started using new technology?	Frequency	Percent
Credit card / petrol card	185	42.3
Insurance policy	86	19.7
Mutual funds / D-mat account opening	91	20.8
Holiday packages or any memberships or gifts	5	1.1
Housing / Car / Personal loan	105	24.0
Other	24	5.5

Table 4.5.3: Additional Product Purchase

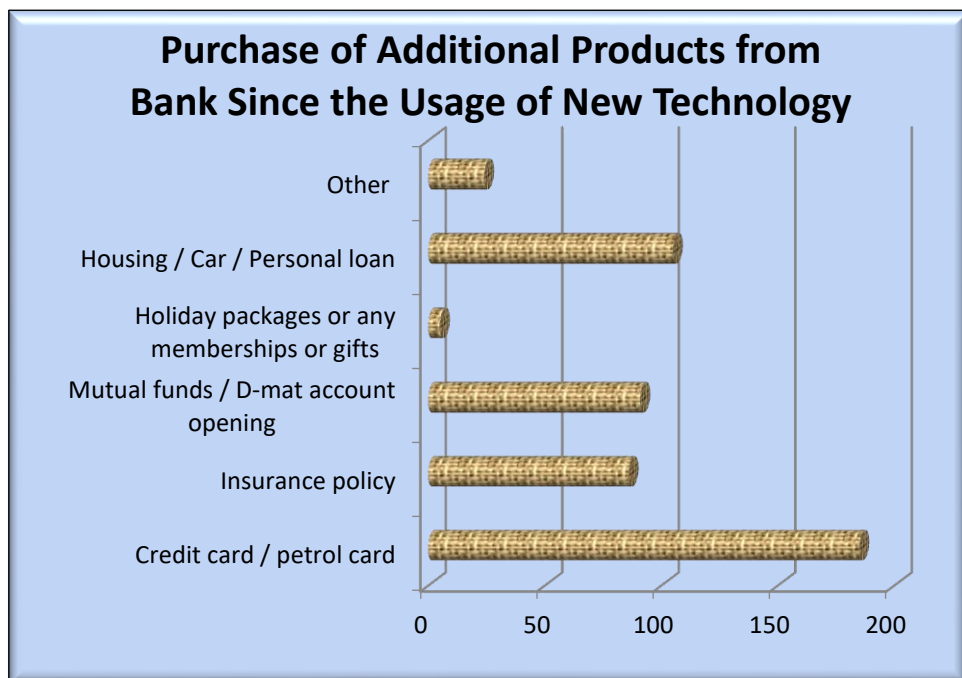


Figure 4.5.3: Additional Product Purchase

Interpretation: The above chart shows that, Credit card/ Petro card purchase is most preferred option followed by Housing /Car/Personal loan. The next alternative is Mutual Funds/ D-mat account while ensuring policy is fourth last preference. The last but-one is other and at least priority place there is Holiday packages or any membership or gift purchase by the use of bank technology.

4.6 Bank Employee

1. Reasons for Closing Bank Account: This data depicts the Bank employees’ view about closing account by the customers.

What are typical reasons mentioned by customers while closing relationship with bank due to following / lack of technology offering?	Frequency	Percent
Out dated technology / Lack of upgrade i.e. no internet banking, no assistance over phone etc.	91	31.5
Frequent technology issues hampering customer services e.g. website not working, net banking issues, call centre delays	76	26.3
Higher cost of technology offerings e.g. fees for using mobile banking	85	29.4
Customer service issues	248	85.8
Hidden charges and complicated paper work	260	90.0

Table 4.6.1: Reasons for Closing Bank Account

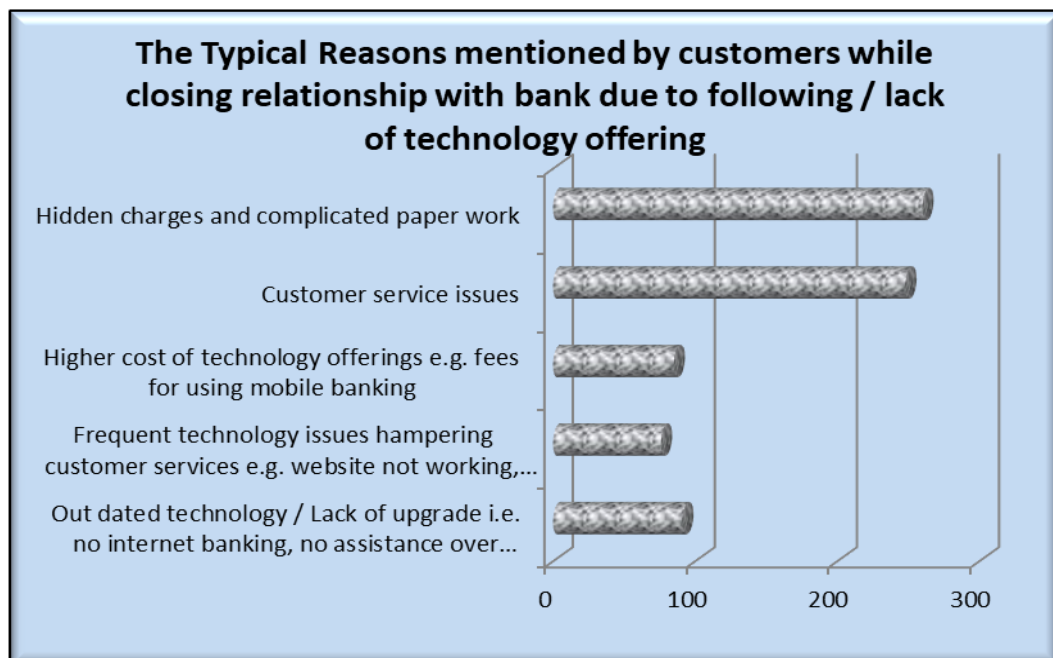


Figure 4.6.1: Reasons for Closing Bank Account

Interpretation: The above bar chart indicates that, Hidden Charges and complicated paper work is main reason mentioned by the customers to the bank employees. The second reason is Customer service issue followed by Out dated technology/ Lack of upgrade i.e. no internet

banking, no assistance etc. The fourth and fifth reason mentioned are Higher cost of technology e.g. Fees for using mobile banking and Frequent technology issues hampering customer services e.g. Website not working etc. respectively.

2. Training Offered: This point indicates when the training is offered to the employees.

Typically, when is the training offered to you?	Frequency	Percent
Before new version of software / product is implemented	184	63.7
After new version of software / product is implemented	141	48.8
In an Ad-hoc manner or needed to basis once of software / product is implemented	40	13.8
It is expected to learn the features on the job	62	21.5
In parallel while development is being carried out	20	6.9

Table 4.6.2: Training Offered

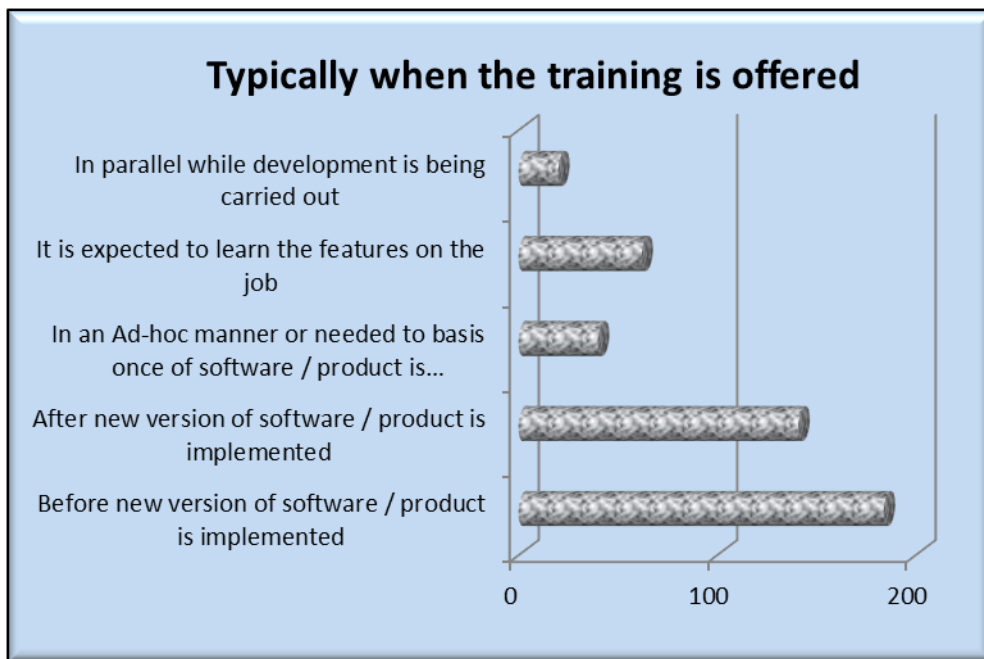


Figure 4.6.2: Training Offered

Interpretation: It is observed from the chart that, typically training is offered before the release of new version of software / product and next to this is After the new version of software / product is implemented. The next position is, it is expected to learn the features on the job followed by in an ad-hoc manner or need basis once the software/ product is implemented. At the last, training is expected in parallel while development is being carried out.

3. Type of Training: This about the type of training received by bank employees with respect to new technology adoption.

Please mention the type of training received.	Frequency	Percent
System upgrade / new feature / product launch	223	77.2
Regulatory & mandatory training	209	72.3
Management / leadership	46	15.9
Customer Management, Customer satisfaction improvement	38	13.1
Internal systems and it's usage with new features	23	8.0

Table 4.6.3: Type of Training

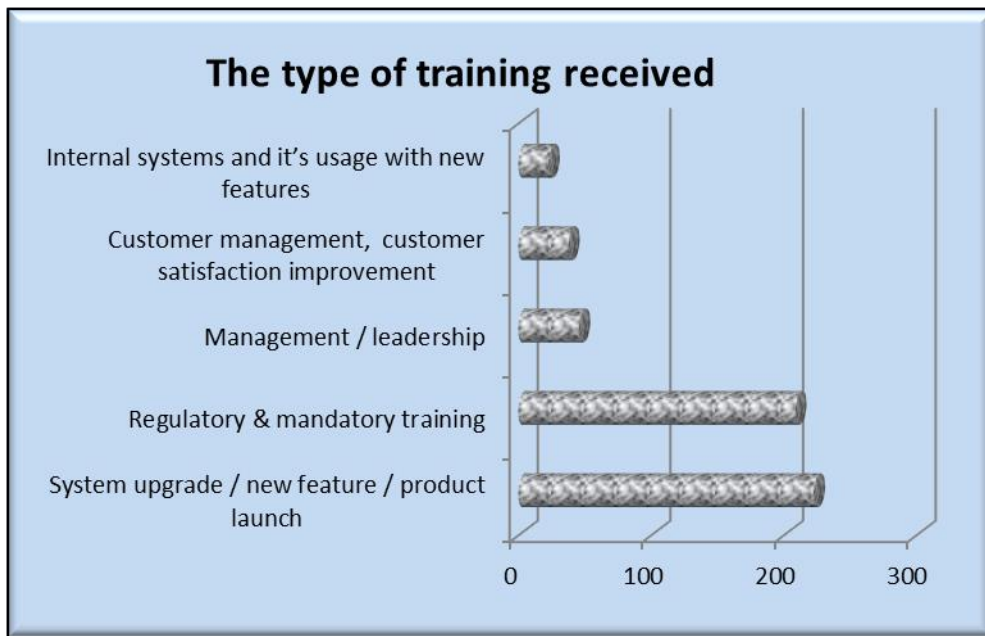


Figure 4.6.3: Type of Training

Interpretation: System Upgrade/New feature/Product launch is the prime training received by the employees. The next in list is the training about Regulatory and Mandatory Training followed by Management/ Leadership Training. Customer management, Customer Satisfaction Improvement and Internal System and its usage with new feature is at 4th and 5th position respectively.

4. Benefits Provided by the use of New Technology: It is about understanding the benefits provided by the employees with usage of New Technology.

Which benefits do you provide associated with using latest technology?	Frequency	Percent

Priority service	197	68.2
Fee waivers	126	43.6
Improved credit facility	173	59.9
Special gifts	75	26.0
Free upgrade facility to products	48	16.6
Additional discounts	90	31.1
Bonus points	97	33.6

Table 4.6.4: Benefits Provided by the use of New Technology

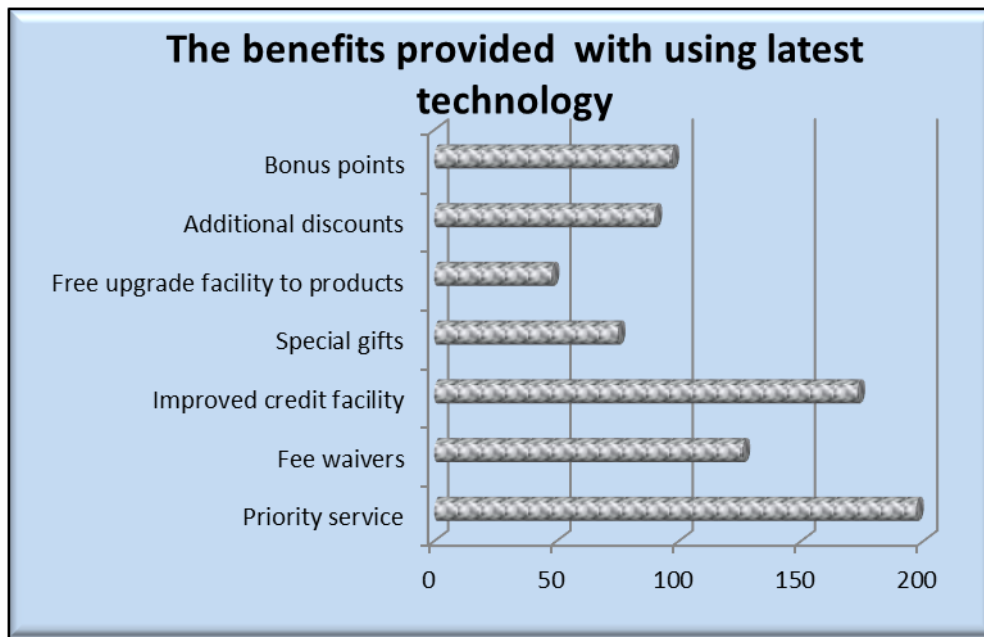


Figure 4.6.4: Benefits Provided by the use of New Technology

Interpretation: Priority Service is the most acclaimed benefits provided to the customers according to Bank employees. The next benefits are Improved Credit Facility and Fee Waiver at second and third position. Bonus point, Additional Discount and Special gifts are at fourth, fifth and sixth position. The least type of benefits as per employees is Free upgrade facility to products.

5. Decision about using New Technology: This provides the basis for the factors which influence to take decision about new technology.

In your view how, the decision to use new technology is determined. Please check one or more boxes as appropriate	Frequency	Percent
Considering customer feedback and issues in the past	202	69.9
Regulatory requirement	208	72.0

Competitor analysis and trend analysis	179	61.9
Senior management's decision - Innovation investment	86	29.8
Structured process of cost benefit analysis and customer feedback	136	47.1
Influenced by Technology partner recommendation	88	30.4

Table 4.6.5: Decision about using New Technology

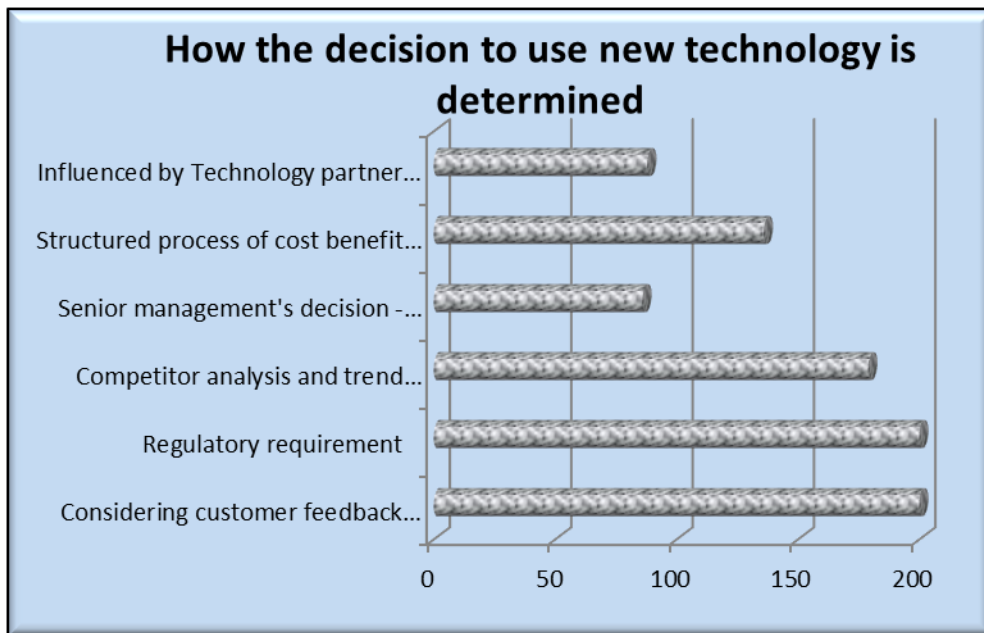


Figure 4.6.5: Decision about using New Technology

Interpretation: Most influential factors are Regulatory Requirement and Consideration of Customers Feedback and issues in the past. The next factors which affect the use new technology decisions are Competitor analysis and trend analysis followed by Structured process of cost benefit analysis and customer feedback. Influenced by Technology partner recommendation and Senior management's decision - Innovation investment are comparatively less influential factors.

6. Reasons for Growth: These are the reasons for the growth of bank as viewed by the employees in last four years.

During last 4 years, in your view, what could be reasons for the growth? Please check one or more boxes as appropriate	Frequency	Percent
Improved service quality	151	52.2
Attractive products launched by the Bank	17	5.9
Better technology enhancing customer experience, service & quality	180	62.3
Better marketing including social media offerings	114	39.4

Favourable market situation i.e. economy growth, better regulations	14	4.8
---	----	-----

Table 4.6.6: Reasons for Growth

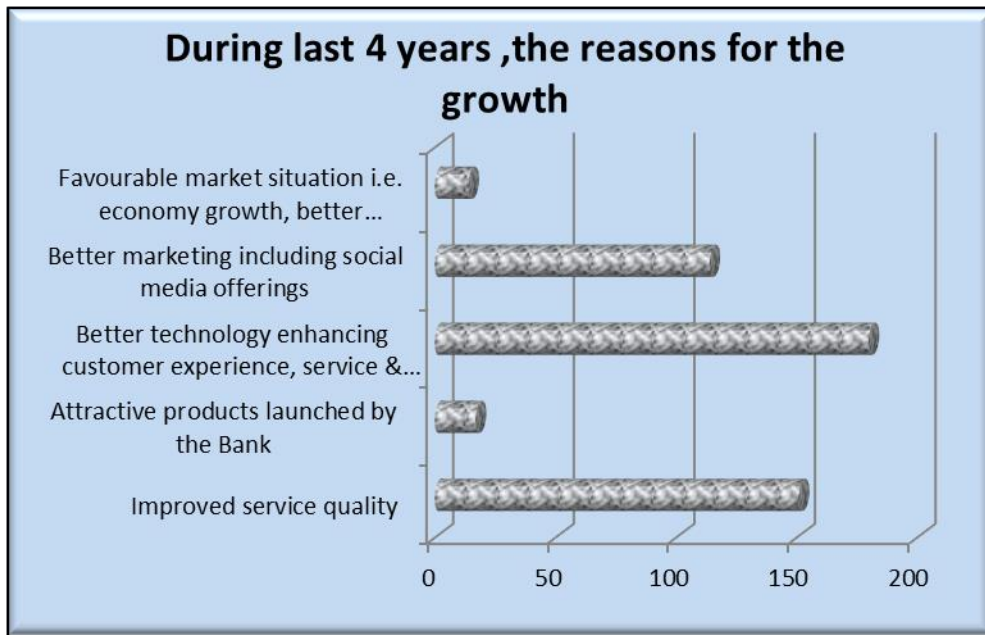


Figure 4.6.6: Reasons for Growth

Interpretation: The main reason highlighted by the Bank employees is Better technology enhancing customer experience, service & quality. The next reasons are Improved Service Quality and Better marketing including social media offerings. Attractive Products launched by the bank and Favourable market situation i.e. economy growth; better regulations are the less contributing factors in the Growth.

C. Hypothesis Testing

4.7 Testing of Hypothesis

4.7.1 Hypothesis 1

Research Question-1:

Is there any difference in the perceptions of customers considering technology used by the banks?

Hypothesis:1

H0: There is no difference in the perceptions of customers considering technology used by the banks.

H1: There is a difference in the perceptions of customers considering technology used by the banks.

Statistical Test: Friedman chi-square test

Level of Significance $\alpha = 0.05$

Test Statistics	
N	289
Chi-Square	179.444
Df	5
Asymp. Sig.	.000

Table 4.7.1: Test Statistics for Hypothesis 1

Observation: $\chi^2 (10) = 395.276, P= 0.000$

Conclusion: Since P value (0.000) is less than level of Significance (0.05), alternate hypothesis is accepted hence it is concluded that There is a difference in the perceptions of customers considering technology used by the banks.

The rank table related to usage of technology may be referred for finding out which technology most used by the customer.

	Mean Rank
Internet Banking	3.51
Personal Visit	2.38
Mobile Banking	3.40
Family Member	3.53
Call Center	4.40
ATM	3.78

Table 4.7.2: Rank Table for Hypothesis 1

From the ranks table it is evident that customers prefer to use call center technology more and then ATM and followed to that Internet Banking, it is also evident that visiting the branch is less preferred.

4.7.2 Hypothesis 2

Research Question-2:

Is there any difference in the perceptions of the bank employees regarding the technology challenges faced by them in banking operations?

Hypothesis: 2

H0: There is no difference in the perceptions of the bank employees regarding the technology challenges faced by them in banking operations.

H1: There is a difference in the perceptions of the bank employees regarding the technology

challenges faced by them in banking operations.

Statistical Test: Friedman chi-square test

Level of Significance $\alpha = 0.05$

Test Statistics	
N	289
Chi-Square	53.695
df	4
Asymp. Sig.	.000

Table 4.7.3: Test Statistics for Hypothesis 2

Observation: $\chi^2 (10) = 395.276, P= 0.000$

Conclusion: Since P value (0.000) is less than level of Significance (0.05), alternate hypothesis is accepted hence it is concluded that there is a difference in the perceptions of the bank employees regarding the technology challenges faced by them in banking operations.

To find out whether difference lies following to Ranks table may be referred -

	Mean Rank
No. of Customer/ Queries	2.49
Delay in Access of IT System	3.35
To Access Multiple System	3.20
Reliable IT System	3.12
Limited IT Knowledge	2.85

Table 4.7.4: Rank Table for Hypothesis 2

From the ranks table it is evident that delay in accessing the IT system is the major challenge faced by them followed to which access to multiple system is a challenge again for them. What they perceive less as a challenge is processing customer queries.

4.7.3 Hypothesis 3

Research Question-3:

Is there any difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations?

Hypothesis: 3

H0: There is no difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations.

H1: There is a difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations.

Statistical Test: Friedman chi-square test

Level of Significance $\alpha = 0.05$

Test Statistics	
N	437
Chi-Square	79.827
Df	5
Asymp. Sig.	.000

Table No. 4.7.5: Test Statistics for Hypothesis 3

Observation: $\chi^2 (10) = 395.276, P= 0.000$

Conclusion: Since P value (0.000) is less than level of Significance (0.05), alternate hypothesis is accepted hence it is concluded that there is a difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations.

To find out the difference lies, the reference of Ranks table is presented below –

	Mean Rank
Internet Banking	3.06
Personal Visit	3.30
Mobile Banking	3.70
Family Member	3.34
Call Center	3.54
ATM	4.06

Table No. 4.7.6: Rank Table for Hypothesis 3

From the ranks table it is evident that bank employee’s perception is; customer use ATM maximum time for lot of banking operations such as money withdrawal/password change/money transfer etc. followed to that their perception is they used mobile banking technology more. The least used technology is internet banking is what the bank employees feel with respect to other technology options.

4.7.4 Hypothesis 4

Research Question-4:

Is there any difference in the perception of customers with respect to issues they have faced

in using banking technology?

Hypothesis: 4

H0: There is no difference in the perception of customers with respect to issues they have faced in using banking technology.

H1: There is a difference in the perception of customers with respect to issues they have faced in using banking technology.

Statistical Test: Friedman chi-square test

Level of Significance $\alpha = 0.05$

Test Statistics ^a	
N	437
Chi-Square	354.997
df	9
Asymp. Sig.	.000

Table No. 4.7.7: Test Statistics for Hypothesis 4

Observation: $\chi^2 (10) = 395.276, P= 0.000$

Conclusion: Since P value (0.000) is less than level of Significance (0.05), alternate hypothesis is accepted hence it is concluded that there is a difference in the perception of customers with respect to issues they have faced in using banking technology.

To find out whether difference lies we refer to Ranks table.

	Mean Rank
Unavailability of Website/ Server	4.20
SMS/ OTP Notification	4.41
ATM Issue	4.71
Waiting Time for Attendant	5.03
System Performance	5.38
Technology Cost	5.82
Complicated Paperwork for Technology usage consent	6.02
Forced Adoption	6.23
Hacking/ Mis-use	6.49
Account Protection Mechanism	6.70

Table No. 4.7.8: Rank Table for Hypothesis 4

From the ranks table it is evident that issues perceived by the customers are different and the highest issue that customers feels is that account protection mechanism should be there and also there should be counter measure for hacking or account misuse. The least issue they had is unavailability of bank server.

4.7.4 Hypothesis 5

Research Question No.-5:

Is there any association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality?

Hypothesis: 5

H0: There is no association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality.

H1: There is an association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality.

Statistical Test: Chi-Square test of contingency

Level of Significance: $\alpha = 0.05$

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	206.813	9	.000
Likelihood Ratio	208.311	9	.000
Linear-by-Linear Association	130.750	1	.000
N of Valid Cases	437		

Table No. 4.7.9: Test Statistics for Hypothesis 5

Observation: $\chi^2 (9) = 206.813, P < 0.01$

Conclusion: Since P value is less than level of significance (0.05), alternate hypothesis is accepted hence it is concluded that there is an association between the promises made by bank staff to customers regarding the technology for banking operations and the technology

benefits received by customers in reality.

To see the relationship the below mentioned figure will help us to understand

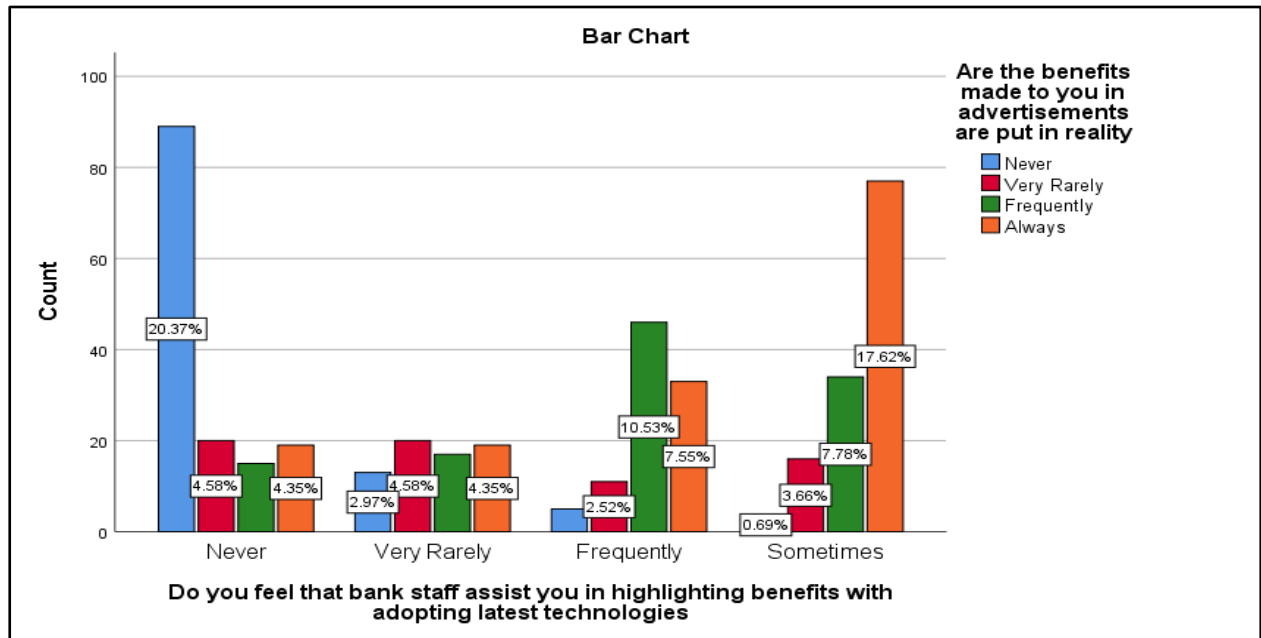


Chart No. 4.7.: Chart for Hypothesis 5

From the above graph its evident that frequently or sometimes the customers got the promised mode of technology at their disposal for executing their desired banking operations.

4.7.6 Hypothesis 6

Research Question -6:

Is there any correlation exist between adoption of technology by the bank and business growth?

Hypothesis: 6

H₀: There is no association between adoption of technology and business growth.

H₁: There is positive association between adoption of technology and business growth.

Testing of Hypothesis

As a first step, significance of the variables understudy was tested by using one sample t-test. The one-sample t-test compares the mean score found in an observed sample to a hypothetically assumed value. In general, the hypothetically assumed value is the population mean or some other theoretically derived value.

The two tailed hypothesis was used to determine whether the variables are significant or not.

H₀: There is no difference between the true mean (μ) and the comparison value (m_0).

H_1 : There is a difference between the true mean (μ) and the comparison value (m_0).

The statistic of interest is the p-value for significance. If the p-value is <0.05 , the null hypothesis is rejected i.e. the variables are significant.

Based on defined Dependent and Independent variables in the previous chapter, one-sample t-test is carried out. The result is as follows.

One-Sample Test						
	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
V1V2C1	37.968	436	.000	.890	.84	.94
V1C2	1.831	436	.068	.069	-.01	.14
V1C3	4.972	436	.000	.162	.10	.23
V1C4	-11.047	436	.000	-.851	-1.00	-.70
V1B1	28.769	284	.000	1.698	1.58	1.81
V1B2	-34.838	281	.000	-1.730	-1.83	-1.63
V1B3	24.107	281	.000	.745	.68	.81
V2B1	-69.350	285	.000	-1.888	-1.94	-1.83
V2B2	20.130	284	.000	1.347	1.22	1.48
V2B3	14.471	284	.000	.558	.48	.63
V2B4	12.800	284	.000	.695	.59	.80
V2B5	2.815	284	.005	.151	.05	.26

Table No. 4.7.10: One-Sample Test for Hypothesis 6

In the above table, most of the variables are emerged as significant variables as P- value is less than 0.05 at 95% confidence level. It means we have to reject the null hypothesis. The only variable which is insignificant is about switching of customer due to technology.

For testing of hypothesis, first correlation was checked to see the strength of the relationship between the two variables. Then, as the Likert Scale data is ordinal data, Non-parametric testing is carried out using SPSS in the case of all the three hypotheses.

The correlation analysis was shown in table below.

Correlations													
		V1V2C1	V1C2	V1C3	V1C4	V1B1	V1B2	V1B3	V2B1	V2B2	V2B3	V2B4	V2B5
V1V2C1	Pearson Correlation	1	.044	.019	-.026	-.050	.250**	-.030	.004	-.022	-.036	-.046	.073
	Sig. (2-tailed)		.364	.689	.592	.405	.000	.621	.943	.710	.548	.443	.222
	N	437	437	437	437	285	282	282	286	285	285	285	285
V1C2	Pearson Correlation	.044	1	.125**	.003	.008	-.018	-.037	.015	-.056	.002	-.045	-.008
	Sig. (2-tailed)	.364		.009	.954	.889	.763	.540	.794	.346	.967	.447	.888
	N	437	437	437	437	285	282	282	286	285	285	285	285
V1C3	Pearson Correlation	.019	.125**	1	.130**	.019	-.075	.023	-.027	.030	.068	-.100	.010
	Sig. (2-tailed)	.689	.009		.006	.745	.208	.699	.644	.619	.250	.091	.866
	N	437	437	437	437	285	282	282	286	285	285	285	285
V1C4	Pearson Correlation	-.026	.003	.130**	1	.041	-.101	.000	-.042	-.060	-.006	-.083	.051
	Sig. (2-tailed)	.592	.954	.006		.490	.090	.998	.484	.309	.913	.160	.392
	N	437	437	437	437	285	282	282	286	285	285	285	285
V1B1	Pearson Correlation	-.050	.008	.019	.041	1	.032	.552**	-.508**	.665**	.481**	-.310**	.005
	Sig. (2-tailed)	.405	.889	.745	.490		.598	.000	.000	.000	.000	.000	.928
	N	285	285	285	285	285	279	279	284	283	283	283	283
V1B2	Pearson Correlation	.250**	-.018	-.075	-.101	.032	1	.044	.178**	.068	-.092	.042	.222**
	Sig. (2-tailed)	.000	.763	.208	.090	.598		.457	.003	.259	.124	.481	.000
	N	282	282	282	282	279	282	282	281	280	280	280	280
V1B3	Pearson Correlation	-.030	-.037	.023	.000	.552**	.044	1	-.441**	.684**	.557**	-.524**	.118*
	Sig. (2-tailed)	.621	.540	.699	.998	.000	.457		.000	.000	.000	.000	.048
	N	282	282	282	282	279	282	282	281	280	280	280	280
V2B1	Pearson Correlation	.004	.015	-.027	-.042	-.508**	.178**	-.441**	1	-.399**	-.397**	.281**	.061
	Sig. (2-tailed)	.943	.794	.644	.484	.000	.003	.000		.000	.000	.000	.309
	N	286	286	286	286	284	281	281	286	285	285	285	285
V2B2	Pearson Correlation	-.022	-.056	.030	-.060	.665**	.068	.684**	-.399**	1	.660**	-.424**	.193**
	Sig. (2-tailed)	.710	.346	.619	.309	.000	.259	.000	.000		.000	.000	.001
	N	285	285	285	285	283	280	280	285	285	285	285	285
V2B3	Pearson Correlation	-.036	.002	.068	-.006	.481**	-.092	.557**	-.397**	.660**	1	-.540**	.293**
	Sig. (2-tailed)	.548	.967	.250	.913	.000	.124	.000	.000	.000		.000	.000
	N	285	285	285	285	283	280	280	285	285	285	285	285
V2B4	Pearson Correlation	-.046	-.045	-.100	-.083	-.310**	.042	-.524**	.281**	-.424**	-.540**	1	-.428**
	Sig. (2-tailed)	.443	.447	.091	.160	.000	.481	.000	.000	.000	.000		.000
	N	285	285	285	285	283	280	280	285	285	285	285	285
V2B5	Pearson Correlation	.073	-.008	.010	.051	.005	.222**	.118*	.061	.193**	.293**	-.428**	1
	Sig. (2-tailed)	.222	.888	.866	.392	.928	.000	.048	.309	.001	.000	.000	
	N	285	285	285	285	283	280	280	285	285	285	285	285

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table No. 4.7.11: Correlation Analysis for Hypothesis 6

As shown in table following variables found to be associated significantly from identified variables. V1B1 which is related to Customer preference for technology Vs traditional method found to be positively significantly associated with V2B2 i.e. Demonstration of Growth and Investment for Technology and V2B3 i.e. Objectives Achievement Through Technology. While the same variable is negatively associated with V2B1 i.e. % of Spending on Technology Initiatives.

The other variable V1B2 i.e. Enquiry about Bank Planning to Roll out New Technology found to be positively correlated with V2B1 and V2B5 i.e. Growth due to Technology Adoption.

The next variable V1B3 i.e. Customer Need for Upgradation for Technology Adoption was positively correlated with all the variables related to Business growth aspects of Bankers.

It can be noted that all the significant correlation found between the variables which were identified from banker responses.

Then Non-parametric testing is carried out by using SPSS. The SPSS does by using Friedman test. It is the non-parametric alternative to the one-way ANOVA with repeated measures.

This test is mainly used to test for differences between groups when the dependent variable being measured is ordinal.

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
1	The distributions of V1V2C1, V1C2, V1C3, V1C4, V1B1, V1B2, V1B3, V2B1, V2B2, V2B3, V2B4 and V2B5 are the same.	Related-Samples Friedman's Two-Way Analysis of Variance by Ranks	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

Table No. 4.7.12: Hypothesis Test Summary for Hypothesis 6

Non-parametric testing analysis by SPSS pointed out that as P-value is less than 0.05 the null hypothesis should be rejected there by supporting to accept alternative hypothesis.

Thus, it can be stated there is a correlation between adoption of technology with business growth.

4.8 Findings

- The responses gathered comprises of both the genders in the case of Customers as well as Bank employees. Around 70% male and 30% female customers were part of this survey. In the case of employees this percentage was 83% and 17% respectively.

- 73% of the customers were from age group 25 to 45 years and in the case of employees 63% were from age group 25 to 35 years and 20% from the age group 35 to 45 years.
- 50% Customers and 73% employees were post graduates. So, we can say that the respondents were well educated. Hence supposed to be trustworthy.
- From the Customers, 63% were salaried and 15% Self-employed. Only 8% students were part of this research.
- It was found that the association of 63% of the employees was less than 5 years with the current bank.
- It has been observed that customers prefer bank which uses latest technology to save time and provides better banking experience. This supports the notion of technology adoption of the bank thereby achieving business growth. But according to bank employees Best interest rate or product is the main attraction for the customer. The technology aspects come afterwards.
- Internet transaction followed by use of ATM is most preferred banking technology from customer's perspective while according to employees, mobile banking ranked 1st then ATM banking. The mean ranking of preferred technology indicated that Call center is also preferred option for the use of banking technology. This indicates the acceptance of technology by both the users.
- Though ATM banking is mostly popular among the users, the issues related to it i.e. ATM machine is the main problem highlighted by both type of respondents. This is a loophole in the technology implementation which may hamper business growth. Hence timely maintenance is the most expected thing by the customers.
- The second preferred technology facet is acceptance of Credit/Debit card and its usage. It again supports the technology adoption by the bank as well as customer.
- Limited knowledge of IT system is the hurdle for handling banking day-to-day operations, this was pointed out by the employees. This problem is supposed to be solved by providing appropriate training to the employees.
- As Customer Service emerged as a means to provide competitive advantage, lack of service is main reason to lose customer. Customer service can be enhanced by better use of technology thereby achieving business growth.
- Business growth in terms of revenue is accepted as measure of success as per the opinion of bank employees.

- Priority Services is well acclaimed benefit of technology which is part of both adoption of technology and as quality service is important chunk of management strategy which leads to business growth.
- Decision related to technology adoption are mainly based on Customer feedback as well as it is part regulatory requirement. Hence training needs to be given to employees and Customer for proper usage of technology. As a part of management policy, as per respondent i.e. bank employee, it is given before system upgradation or whenever new features or product expected to launch. The assistance also expected from the customers.
- Outdated technology or lack of upgradation is the 2nd prompted reason for closing relationship with bank. Hence it is required that, bank should upgrade their technology time to time for providing better and quality services too the customer thereby witnessing growth.
- Better technology which enhances customer experience as well as service and quality is the main reason for the growth. Hence it may be noted that technology initiative as a part of management strategy results into business growth.
- The first hypothesis was about perceptions of customers considering technology used by the banks. The clear difference has been observed between perception of customer and bankers backed mean values of the parameters related to this hypothesis in rank table.
- In the case of second hypothesis, it was indicated that, delay in accessing the IT system is the major challenge faced by them followed to which access to multiple system is a challenge. Again, difference of opinion related to IT technology has been highlighted.
- For third hypothesis, a difference in the perceptions of bank employees regarding the customers preference for using technology in their banking operations was tested. The acceptance of this hypothesis pointed the difference lies about awareness of technology usage.
- The fourth hypothesis was related to views about issues faced by the use of banking technology. The acceptance of this hypothesis gravitated differences between the perception of customers and banker those who are part of banking technology adoption.

- The association of between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality is established by the acceptance of the said hypothesis.
 - The sixth hypothesis is about correlation of business growth and technology adoption by the bank. This correlation is appropriately reflected in the variable association portrayed in the analysis. But the point to be noted that, mainly employees view appeared to be significant in this case. The existence of definite constructive correlation between Adoption of technology and Business Growth for the Banking organization is affirmed by the acceptance of sixth hypothesis.
 - The objectives which are delineated in the previous chapters are also connected with the hypothesis as well as with the other data categorized under ranked data and multiple-choice data. The first objective is about technology acceptance by the customers is in line with banker's expectation is linked with first hypothesis which is accepted during analysis. The second objective talks about ascertain that the customers prefer using new technology is in line with third hypothesis which is accepted. This is well supported by the ranked and multiple-choice data. This data pointed out that internet technology and ATM usage along with acceptance of Credit/Debit card and its usage is most accepted technology aspects by the customers. The third objective is to understand the gap between promised services and benefits received by the customer by the use of technology for banking operations. This objective may be linked with fifth hypothesis. This hypothesis is about checking association between the promises made by bank staff to customers regarding the technology for banking operations and the technology benefits received by customers in reality. As this hypothesis is accepted during the analysis phase, it can be noted that, the third research objective also fulfilled.
- The next objective is to determine if adoption of new technology results into business growth in the case of banks considered for the study. This objective is in line with sixth hypothesis, which is well accepted with help of non-parametric testing. Thus, it can be stated that all the stated research objectives were achieved to the fullest extended along with acceptance of all the hypotheses and supported by ranked and multiple-choice data analysis.

4.9 Summary

This chapter step by step analysed data collected by the researcher for the support of this study. As a first step demographic data were discussed. Afterward ranked data and multiple-choice data analysed for the support of hypotheses and research hypothesis. In the case of first four hypothesis Friedman chi-square test was used while in the case of fifth hypothesis chi-square test for contingency was used for testing. In the case of sixth i.e. last hypothesis firstly significance of data was checked. Secondly Correlation among the dependent and independent variables were determined and finally hypotheses testing was carried out by incorporating non-parametric testing approach. At the last all findings were gathered together to establish fulfilment of research work.

Next chapter will talk about conclusion based on the findings and managerial implications of the said research.

Chapter - 6

BIBLIOGRAPHY

Article References

1. Aboelmaged, M. G. and Gebba, T. R. (2013). Mobile Banking Adoption: An Examination of Technology Acceptance Model and Theory of Planned Behavior, *International Journal of Business Research and Development*, 2(1), 35-50.
2. Agrawal, S. and Jain, A. (2012). Technological Advancement in Banking Sector in India: Challenges Ahead, *Abhinav Journal of research in Commerce and Management*, 2(1), 89-96.
3. Baghdadi, Z. A., Dr. Rizvi, S.A.M., Dr. Rizvi, H. S. (2011). Do We Really Need to Adopt Electronic Banking?, *IPCSIT*, 3, 234-238.
4. Bamoriya, P. S., and Dr. Singh, P. (2012). Mobile Banking in India: Barriers in Adoption and Service Preferences, *Integral Review- A Journal of Management*, 5(1), 1-7.
5. Basheer, A. A. and Saeed, A. T. (2011). Gaining Competitive Advantage and Organizational Performance Through Customer Orientation, Innovation Differentiation and Market Differentiation, *International Journal of Economics and Management Sciences*, 1(5).
6. Bhardwaj, S. S. and Dev, K. (2014). Environmental Scanning by Banks in India: A Comparative Study, *Global Journal of Finance and Management*, 6(7), 637-648.
7. Dangolani, S. K. (2011). The Impact of Information Technology in Banking System, *Procedia - Social and Behavioral Sciences*, 30, 13-16.
8. Dr. Anjum, B., and Deepika (2012). Technological Implementations-Path of Growth: A Comparative Study of Public and Private Sector Banks, *Asia Pacific Journal of Marketing and Management Review*, 1(1), 34-44.

9. Dr. Baral, S.K. (2012). Redefining E-Banking from Bankers' Perspectives, *Arth Prabandh: A Journal of Economics and Management*, 1(6).
10. Dr. Lal, R., and Dr. Saluja, R. (2012). E-Banking: The Indian Scenario, *Asia Pacific Journal of Marketing & Management Review*, 1(4) 16-25.
11. Goyal, V., Dr. Pandey, U.S., and Batra, S. (2012). Mobile Banking in India: Practices, Challenges and Security Issues, *International Journal of Advanced Trends in Computer Science and Engineering*, 1(2), 56-66.
12. Khandelwal, S. (2012). E Banking Innovations: Trends in India, *International Journal of Management*, 3(3), 200-215.
13. Mohan, R. and Ray, P. (2017). Indian Financial Sector: Structure, Trends and Turns, *IMF Working Paper*, WP/17/7.
14. Mishra, S. K. and Sahoo, D.P. (2013). Mobile Banking Adoption and Benefits Towards Customers Service, *International Journal on Advanced Computer Theory and Engineering*, 2(1), 78-83.
15. Mnjala, D. M. (2014). The Challenges of Creating Sustainable Competitive Advantage in the Banking Industry in Kenya, *IOSR Journal of Business and Management*, 16(4).
16. Nath, R., Bhal, K. T., and Kapoor, G.T. (2013), Factors influencing IT Adoption by Bank Employees: An Extended TAM Approach, *Vikalpa*, 38(4), 83-96.
17. Nayak, A. KJR (2010). ICICI Bank: Reaching Global Markets through Technology, *Journal of Case Research*, 1(2). 100-143.
18. Nayak, N., Nath, V. and Goel, N. (2014), A Study of Adoption Behaviour of Mobile Banking Services by Indian Consumers *IMPACT: International Journal of Research in Engineering & Technology*, 2(3). 209-222.

19. Pan, S. (2015). An Overview of Indian Banking Industry, *International Journal of Management and Social Sciences Research*, 4(5).
20. Prof. Sharma, M. C. and Sharma A., (n.d.). Role of Information Technology in Indian Banking Sector, *Shiv Shakti, International Journal in Multidisciplinary and Academic Research*, 2(1).
21. Safeena, R., Date, H. and Kammani, A. (2011). Internet Banking Adoption in an Emerging Economy: Indian Consumer's Perspective, *International Arab Journal of e-Technology*, 2(1), 56-64.
22. Safeena, R., Date, H., Kammani, A. and Hundewale, N. (2012). Technology Adoption and Indian Consumers: Study on Mobile Banking, *International Journal of Computer Theory and Engineering*, 4(6), 1020-1024.
23. Singh, S. and Arora, R. (2011). A Comparative Study of Banking Services and Customer Satisfaction in Public, Private and Foreign Banks, *J Economics*, 2(1), 45-56.
24. Sharma, A. (2011), Mobile Banking as Technology Adoption and Challenges, *Zenith International Journal of Multidisciplinary Research*, 1(6), 147-157.
25. Sharma, A. and Dr. Kansal, V. (2012). Mobile Banking as Technology Adoption and Challenges: A Case of M-Banking in India, *International Journal of Scientific and Research Publications*, 2(2), 1-5.
26. Sharma, R. and Sharma, S. (2014). Banking Sector in India: An overview, *Global Journal of Commerce and Management Perspective*, 3(3), 37-39.
27. Tater, B., Tanwar, M. and Murari, K. (2011). Customer Adoption of Banking Technology in Private Banks of India, *The International Journal of Banking and Finance*, 8(3), 73-88.

28. Thyaga, R. N. (2016). Impact of Information Technology (IT) on The Banking Sector, *International Journal of Current Advanced Research*, 5(7), 1106-1111.

Web References

29. AXIS progress on....(2015). Retrieved from https://www.axisbank.com/docs/default-source/investor-presentations/investor-presentation-on-digital-banking.pdf?sfvrsn=6f0acb55_8 \
30. Banking on Technology Perspectives on the Indian Banking Industry (2014). [http://www.ey.com/Publication/vwLUAssets/EY-Banking-on-Technology/\\$File/EY-Banking-on-Technology.pdf](http://www.ey.com/Publication/vwLUAssets/EY-Banking-on-Technology/$File/EY-Banking-on-Technology.pdf)
31. Bohmayr, W., Neu, P., Grebe, M., Muller, K., Subramanian, A., Geier C., Muller, J., Benzinger, C., Hansen, F., and Krah, C. (2011). Capitalize on Regulatory Change: Moving Beyond Compliance, Retrieved from https://www.bcgperspectives.com/content/articles/financial_institutions_it_performance_moving_beyond_compliance/?chapter=5
32. CA Adukia, R. S. (n.d.). An Overview of Banking Sector in India, www.caaa.in/.../An%20Overview%20of%20Banking%20Sector%20in%20India.pdf
33. Case Study: ICICI Bank – Internal Audit Department Pentana Audit Work System Implementation (2011). Retrieved from https://www.sepiasolutions.net/Events/2011_11_24/Case_Study_ICICI.pdf
34. Chhapia, H. (2014). Banks leverage technology to maximize reach and streamline internal processes: CII-PwC study, Retrieved from <https://timesofindia.indiatimes.com>

35. Figueira, C. and Nellis, J. (2007). Banking Efficiency In Non-Core Eu Countries - A Comparative Analysis of Portugal And Spain, *Research Paper Series - Cranfield School of Management*, Retrieved from, www.som.cranfield.ac.uk/som/research/researchpapers
36. Competitive Advantage with Information Systems (n. d.). Retrieved from <http://www4.comp.polyu.edu.hk/~csajaykr/CA.pdf>
37. Core Banking Modernization (2010). Retrieved from http://www-05.ibm.com/cz/businessstalks/pdf/Core_Banking_Modernization_Point_of_View.PDF
38. Dr Srinivas K. (n.d.). Indian Public Sector Banks In The Hi-Ch Environment – A Case Study of State Bank Group, Retrieved from <http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan047089.pdf>
39. Enterprise Digital Transformation: Evaluating Indian Enterprises' Digital Readiness (2017). Retrieved from <http://www.nasscom.in/knowledge-center/publications/nasscom-frost-enterprise-digital-transformation>
40. Golani, P. (2017). Role of Information Technology in Indian Banking Industry, Retrieved from <https://www.capitaworld.com/information-technology-banking-industry-india/>
41. Gupta, S. (2012). Role of Information Technology in Banking sector, Retrieved from <https://issuu.com/sanjaykumarguptaa/docs/role-of-information-technology-in-banking-sector1>
42. India in 2014 Creating Value with Speed and Quality: The New Imperative (2014). Retrieved from https://www.accenture.com/acnmedia/Accenture/Conversion-Assets/DotCom/Documents/Global/PDF/Dualpub_23/Accenture-India-In-2014-Creating-Value-Speed-Quality.pdf

43. Indian Banking Sector in Transition (2017). *The Management Accountant*, <http://icmai.in/upload/Institute/Journal/Jan-2017.pdf> , 52(1).
44. Jamaluddin N. (2013). E-Banking: Challenges and Opportunities in India, *Proceedings of 23rd International Business Research Conference*, Melbourne, Australia Retrieved from https://wbiworldconpro.com/uploads/melbourne-conference-2013-november/banking/1384600741_607-Jamal.pdf
45. Kamesam V. (n.d.). Recent Technological Developments In Indian Banking, Retrieved from <https://www.rbi.org.in/upload/Speeches/zips/DGK-Colombo-DIT.ppt>
46. Modernize or Fail: The Modernization Challenges Facing Banks, and the Technology Implications (2012). Retrieved from <http://www.oracle.com/us/industries/financial-services/oracle-modernization-banks-wp-1439641.pdf>
47. Nandhi, M. A. (2012). Effects of Mobile Banking on the Savings Practices of Low Income Users - The Indian Experience, Retrieved from https://www.imtfi.uci.edu/files/blog_working_papers/2012-7_nandhi.pdf
48. Pearson, M. (2016). Industry Reports Efma-Infosys 'Innovation in Retail Banking 2016', Retrieved from <https://www.edgeverve.com/wp-content/uploads/.../efma-innovation-report-2016.pdf>
49. Rajesh, R. and Palpandi, A. (2015). A Study on Impact of Information Technology In Banking Sector with Reference To Southern Tamilnadu, International Conference on Inter Disciplinary Research in Engineering and Technology, Retrieved from http://www.retawprojects.com/uploads/IT_in_banking.pdf
50. Reserve Bank of India, Report on Trend and Progress of Banking in India2010-11, RBI Mumbai, Retrieved from <https://www.rbi.org.in>
51. Reserve Bank of India, Report on Trend and Progress of Banking in India2015-16, RBI Mumbai, Retrieved from <https://www.rbi.org.in>

52. Retail Banking 2020 Evolution or Revolution? (2014). Retrieved from <https://www.pwc.com/gx/en/banking-capital-markets/banking-2020/assets/pwc-retail-banking-2020-evolution-or-revolution.pdf>
53. Role of Information Technology (IT) in the Banking Sector (2010). Retrieved from <https://www.mbaknol.com/business-finance/role-of-information-technology-it-in-the-banking-sector/>
54. Sattar S. (2014). Role of IT in banking sector, Retrieved from <https://nation.com.pk/09-Jun-2014/role-of-it-in-banking-sector>
55. Sengupta, J., Lam, K., Desmet, D., Avasarala, K., Bailey T. B., Brandley J., Chen, J., and Chon, E. (2014). Asia Financial Institutions Digital Banking in Asia Winning approaches in a new generation of financial services. Retrieved from <https://www.mckinsey.com/global-themes/asia-pacific/digital-banking-in-asia-winning-approaches-in-a-new-generation-of-financial-services>
56. Shah, A. Garg, A, Poddar, B., Aggarwal, N., Mehrotra, P., Goyal, R., and Tripathi, S. (2010). Indian Banking 2020 Making the Decade's Promise Come True Retrieved from http://image-src.bcg.com/Indian-Banking-2020-Sep-2010_tcm21-28897.pdf
- [Singh, H. K. and Tigga, A. E. \(2012\). Impact of Information Technology on Indian Banking Services, International Conference on Recent Advances in Information Technology \(RAIT\), Dhanbad, India, Accession Number: 12713757](#)
- [DOI: 10.1109/RAIT.2012.6194608](#)
- [Retrieved from http://ieeexplore.ieee.org/document/6194608/](http://ieeexplore.ieee.org/document/6194608/)
57. Singh, H. K. and Tigga, A. E. (2012). Impact of information technology on Indian banking services. Retrieved from https://www.researchgate.net/publication/261345518_Impact_of_information_technology_on_Indian_banking_services

Book Reference

58. Kerlinger, F.N. (1992). *Foundation of Behavioral Research*. Harcourt Brace College Publishers, Third Edition.
59. Kothari, C. R. (2009). *Research Methodology*, New Age International Pvt Ltd Publishers, Second Edition.
60. Kumbhar V. (n.d.). *Alternative Banking Channels in India*, VDM Verlag.
61. Drescher, D. (2017). *Blockchain Basics: A Non-Technical Introduction in 25 Steps*, Apress, First Edition.
62. Dr. Chawla, D., and Dr. Sundhi, N. (2001). *Research Methodology Concepts and Cases*. Vikas Publishing House Pvt. Ltd., First Edition.
63. Dr. Shroff, F. T. (2007). *Modern Banking Technology*, Northern Book Centre.
64. Nanda, B. R. (2010). *Indian Banking Industry and Information Technology*, Surendra Publications.
65. McMillan, J. (2014). *The End of Banking: Money, Credit, and the Digital Revolution*, Zero/One Economics, First Edition.
66. Panneerselvam, R. (2014). *Research Methodology*, PHI, Second Edition.
67. Sharma, K. C. (2007). *Modern Banking in India*, Deep and Deep Publications Pvt. Ltd.
68. Skinner, C. (2014). *Digital Bank: Strategies to Launch or Become a Digital Bank*, Marshall Cavendish International (Asia) Pte Ltd.
69. Uppal, R.K. et. al. (2007). *E-banking in India: Challenges and Opportunities*, New Century Publication, First Edition.
70. Uppal, R.K. (2008). *Banking with Technology*, New Century Publication, First Edition.

71. Uppal, R.K. and Mishra B. (2009). *Modern Banking in India - Dimensions and Risks*, New Century Publication, First Edition.
72. Xu, J. and Quaddu, M. (2013). *Managing Information Systems*, Atlantis Press
DOI: 10.2991/978-94-91216-89-3

Thesis Reference

73. Al-Hajri, S. (2005). *Internet Technology Adoption in the Banking Industry* (Doctoral thesis), Victoria University of Technology, Retrieved from
http://vuir.vu.edu.au/15431/1/Al-Hajri_2005_compressed.pdf
74. Amutha, M. (2015). *Customers Attitude on The New Technological Services of Banking Sector in Dindigul District A Study with Special Reference to Net Banking* (Doctoral thesis), Madurai Kamraj University, Available from
<http://shodhganga.inflibnet.ac.in>
75. Bansal, M. (2012). *Effect of Information Technology on Performance of Indian Banking Industry* (Doctoral Thesis), Punjabi University, Patiala, Available form
<http://shodhganga.inflibnet.ac.in>
76. Joshua, A. J. (2009). *Adoption of Technology-Enabled Banking Self-Services: Antecedents and Consequences* (Doctoral thesis), Cochin University of Science and Technology, Kerala, Retrieved from <http://hdl.handle.net/10603/6229>
77. Mamta (2012). *Adoption and Diffusion Of Modern Banking Technology _ A Study Of Public And Private Sector Banks*, Himachal Pradesh University, Available from
<http://shodhganga.inflibnet.ac.in>

78. Rahman, A. A. (2013). *Role of Information Technology in Banking Industry_ A Case Study of State Bank of India in Aligarh City* (Doctoral thesis), Aligarh Muslim University, Available from <http://shodhganga.inflibnet.ac.in>
79. Reixach, A. A. (2001). *The Effects of Information and Communication Technologies on the Banking Sector and the Payments System* (Doctoral Thesis), Universitat de Girona, Retrieved from <https://dugidoc.udg.edu/bitstream/handle/10256/4434/taar.pdf?sequence=5>
80. Yogendra, V. S., and (2013). *Strategies for Cloud Computing Adoption for the Indian Banking Industry* (MBA Internship Project), University of Hyderabad, Retrieved from http://www.idrbt.ac.in/assets/alumni/PT-2013/V%20SAI%20RAGHU%20YOGENDRA_Strategies%20for%20cloud%20computing-%20adoption%20for%20Indian%20banking%20industry_2013.pdf

Questions for the Bank's representative

Section A - Profile

Name								
Gender	<input type="checkbox"/> Male	<input type="checkbox"/> Female						
Age (in Years)	<input type="checkbox"/> Less than 25	<input type="checkbox"/> 25 to 35	<input type="checkbox"/> 35 to 45	<input type="checkbox"/> 45 to 60	<input type="checkbox"/> Above 60			
Education	<input type="checkbox"/> Graduate	<input type="checkbox"/> Post Grad	<input type="checkbox"/> Under Grad					
Tenure of service with the bank	<input type="checkbox"/> Less than 5	<input type="checkbox"/> 5 to 10	<input type="checkbox"/> 10 to 15	<input type="checkbox"/> 15 to 20	<input type="checkbox"/> Above 20			
Tenure of service with other the bank	<input type="checkbox"/> Less than 5	<input type="checkbox"/> 5 to 10	<input type="checkbox"/> 10 to 15	<input type="checkbox"/> 15 to 20	<input type="checkbox"/> Above 20			
Bank Name								
Branch Name								
Designation / Current Role								

Section B - Customer preference / usage of technology

• As a Bank staff, what trend have you observed from customers as their preference, **please rank 1 to 5, 1 is most preferred option**

- | | |
|--|--------------------------|
| 1. Latest technology to save time and quality of service | <input type="checkbox"/> |
| 2. Best customer service | <input type="checkbox"/> |
| 3. Best interest rates / products | <input type="checkbox"/> |
| 4. Branch location close to their home | <input type="checkbox"/> |
| 5. Friendly staff who can assist with all queries | <input type="checkbox"/> |

• What are the top 6 technology methods used by the customer, **Rank 1 to 6, 1 is the most frequently used method**

- | | |
|------------------------|--------------------------|
| Internet banking | <input type="checkbox"/> |
| Personal visit | <input type="checkbox"/> |
| Mobile banking | <input type="checkbox"/> |
| Through family members | <input type="checkbox"/> |
| Through call center | <input type="checkbox"/> |
| ATM | <input type="checkbox"/> |

• Do you feel customer prefer technology Vs traditional method of banking ? **Please Check one option**

- | | |
|-------------|--------------------------|
| Always | <input type="checkbox"/> |
| Sometimes | <input type="checkbox"/> |
| Frequently | <input type="checkbox"/> |
| Very rarely | <input type="checkbox"/> |
| Never | <input type="checkbox"/> |

• What is the competitive advantage highlighted by the customers to you, **Rank 1 to 6, 1 is the most frequently used method**

- | | |
|---|--------------------------|
| 1. Latest technology & ease of using | <input type="checkbox"/> |
| 2. Competitive products / rates | <input type="checkbox"/> |
| 3. Customer service | <input type="checkbox"/> |
| 4. Location advantage | <input type="checkbox"/> |
| 5. Offers / Gifts / additional benefits | <input type="checkbox"/> |
| 6. Any other | <input type="checkbox"/> |

• What are typical reasons mentioned by customers while closing relationship with bank due to following / lack of technology offering?
Please check one or more boxes as appropriate

- | | |
|---|--------------------------|
| 1 Out dated technology / Lack of upgrade i.e. no internet banking, no assistance over phone etc. | <input type="checkbox"/> |
| 2 Frequent technology issues hampering customer services e.g. website not working, net banking issues, call center delays | <input type="checkbox"/> |
| 3 Higher cost of technology offerings e.g. fees for using mobile banking | <input type="checkbox"/> |
| 4 Customer service issues | <input type="checkbox"/> |
| 5 Hidden charges and complicated paper work | <input type="checkbox"/> |

Questions for the Bank's representative

• What are the typical top 5 reasons of losing the customer? **Please rank 1 to 5 , 1 is most frequent reason**

- | | |
|---|--------------------------|
| 1 Competitors with better technology offerings | <input type="checkbox"/> |
| 2 Minimum Balance requirement | <input type="checkbox"/> |
| 3 Change of job / location | <input type="checkbox"/> |
| 4 Fear / issues flagged in the media about the bank | <input type="checkbox"/> |
| 5 Lack of service | <input type="checkbox"/> |

• What are the typical top 5 day to day technology challenges you face? **Please rank 1 to 5 , 1 is most frequent reason**

- | | |
|--|--------------------------|
| 1 Volume of customers and queries | <input type="checkbox"/> |
| 2 Delays in accessing the IT system to resolve queries | <input type="checkbox"/> |
| 3 Accessing multiple systems / menu to resolve the queries | <input type="checkbox"/> |
| 4 Availability & Reliability of IT systems | <input type="checkbox"/> |
| 5 Limited knowledge of various IT systems while handling queries | <input type="checkbox"/> |

• Does Customer ask you about the new technology that the bank is planning to roll out? **Please Check one option**

- | | |
|-------------|--------------------------|
| Always | <input type="checkbox"/> |
| Sometimes | <input type="checkbox"/> |
| Frequently | <input type="checkbox"/> |
| Very rarely | <input type="checkbox"/> |
| Never | <input type="checkbox"/> |

• Do you feel, customer need to upgrade phone / computer to take advantage of new technology suggested by Bank. Please Check one option. **Please check one or more boxes as appropriate**

- | | |
|------------|--------------------------|
| Yes | <input type="checkbox"/> |
| No | <input type="checkbox"/> |
| Cannot say | <input type="checkbox"/> |

Section C - Training & Feedback

• In your role, do you always get trained on the latest technology deployed by the Bank? **Please check one option**

- | | |
|-------------|--------------------------|
| Always | <input type="checkbox"/> |
| Sometimes | <input type="checkbox"/> |
| Frequently | <input type="checkbox"/> |
| Very rarely | <input type="checkbox"/> |
| Never | <input type="checkbox"/> |

• Typically when is the training offered to you? **Please check one or more boxes as appropriate**

- | | |
|---|--------------------------|
| 1. Before new version of software / product is implemented | <input type="checkbox"/> |
| 2. After new version of software / product is implemented | <input type="checkbox"/> |
| 3. In an Ad-hoc manner or needed to basis once of software / product is implemented | <input type="checkbox"/> |
| 4. It is expected to learn the features on the job | <input type="checkbox"/> |
| 5. In parallel while development is being carried out | <input type="checkbox"/> |

• Please mention the type of training received. **Please check one or more boxes as appropriate**

- | | |
|---|--------------------------|
| 1. System upgrade / new feature / product launch | <input type="checkbox"/> |
| 2. Regulatory & mandatory training | <input type="checkbox"/> |
| 3. Management / leadership | <input type="checkbox"/> |
| 4. Customer management, customer satisfaction improvement | <input type="checkbox"/> |
| 5. Internal systems and it's usage with new features | <input type="checkbox"/> |

• Typically how many number of days of technology training is provided to you in a year? **Please check one box**

- | | |
|--------------|--------------------------|
| 1 to 10 | <input type="checkbox"/> |
| 11 to 20 | <input type="checkbox"/> |
| More than 20 | <input type="checkbox"/> |

Questions for the Bank's representative

• How many days of training have you received in last 4 years

• Which benefits do you provide associated with using latest technology ? *Please check one or more boxes as appropriate*

Priority service	
Fee waivers	
Improved credit facility	
Special gifts	
Free upgrade facility to products	
Additional discounts	
Bonus points	

• Do you feel that the bank has strong advertisement mechanism to showcase technology benefits? *Please check one box*

Always	
Sometimes	
Frequently	
Very rarely	
Never	

• Do you have any system to capture / share customer technology specific problems & complaints. *Please check one box*

Yes	
No	
Can not say	

• While hiring the new associates, does your bank follow any internal talent search? *Please check one box*

Yes	
No	
Can not say	

Section D - Technology observations (2011 - 2015)

• What are the top 5 technology changes you have observed in the last 4 years the bank (2011- 2015), *Rank 1 to 5*

1 Increased ATMs and ability to use ATM of other banks	
2 Debit and Credit card acceptance and usage	
3 Mobile apps for Banking transactions	
4 Internet banking facility to perform all day to day transactions easily	
5 Banking through call centers	

Questions for the Bank's representative

• What are the top 5 technology issues you have observed in the last 4 years with the bank (2011- 2015) , Rank 1 to 5

- | | |
|--|--------------------------|
| 1 Website / server not available for internet banking | <input type="checkbox"/> |
| 2 SMS / OTP notifications not working on time | <input type="checkbox"/> |
| 3 ATM machine issues, impacting various transactions | <input type="checkbox"/> |
| 4 Long wait time to speak to customer service executive | <input type="checkbox"/> |
| 5 Systems not working at branch / staff indicating system performance issues | <input type="checkbox"/> |

• How is your success measured? Please rank 1 to 6 for the following parameters, Rank 1 to 6, where 1 is highest priority

- | | |
|---|--------------------------|
| 1. Growth of revenue | <input type="checkbox"/> |
| 2. Growth of number of customers | <input type="checkbox"/> |
| 3. Increase in customer satisfaction | <input type="checkbox"/> |
| 4. Identification of new / innovative products | <input type="checkbox"/> |
| 5. Being 100% compliant with the process and policies | <input type="checkbox"/> |
| 6. Growth in Technology adoption of customers | <input type="checkbox"/> |

• How much is % spend on the technology initiatives out of the annual profits as per your understanding. Please check one box

- | | |
|-----------------|--------------------------|
| 1. Less than 5% | <input type="checkbox"/> |
| 2. 5 – 10% | <input type="checkbox"/> |
| 3. 10 – 15% | <input type="checkbox"/> |
| 4. 15 – 20% | <input type="checkbox"/> |
| 5. 20% - More | <input type="checkbox"/> |

• In your view how the decision to use new technology is determined. Please check one or more boxes as appropriate

- | | |
|--|--------------------------|
| 1. Considering customer feedback and issues in the past | <input type="checkbox"/> |
| 2. Regulatory requirement | <input type="checkbox"/> |
| 3. Competitor analysis and trend analysis | <input type="checkbox"/> |
| 4. Senior management's decision - Innovation investment | <input type="checkbox"/> |
| 5. Structured process of cost benefit analysis and customer feedback | <input type="checkbox"/> |
| 6. Influenced by Technology partner recommendation | <input type="checkbox"/> |

Section E - Growth observations (2011 - 2015)

• Does your senior management able to demonstrate the business growth and associated technology investments? Please check one box

- | | |
|-------------|--------------------------|
| Always | <input type="checkbox"/> |
| Sometimes | <input type="checkbox"/> |
| Frequently | <input type="checkbox"/> |
| Very rarely | <input type="checkbox"/> |
| Never | <input type="checkbox"/> |

• In your interactions with the customers, who are your top 5 competitor banks?

- 1.
- 2.
- 3.
- 4.
- 5.

• Do you feel that your objectives are better achieved due to technology offered by the bank in last 4 years ?Please check one box

- | | |
|-------------|--------------------------|
| Always | <input type="checkbox"/> |
| Sometimes | <input type="checkbox"/> |
| Frequently | <input type="checkbox"/> |
| Very rarely | <input type="checkbox"/> |
| Never | <input type="checkbox"/> |

Questions for the Bank's representative

• Do you feel that bank is able to cross sell products due to technology offered by the bank in last 4 years ?Please check one box

- Always
- Sometimes
- Frequently
- Very rarely
- Never

• Do you feel that better growth in revenue is due to technology adopted by the bank in last 4 years ?Please check one box

- Yes
- No
- Can not say

• During last 4 years , in your view , what could be reasons for the growth ? Please check one or more boxes as appropriate

- 1. Improved service quality
- 2. Attractive products launched by the Bank
- 3. Better technology enhancing customer experience, service & quality
- 4. Better marketing including social media offerings
- 5. Favourable market situation i.e. economy growth, better regulations

Date	
Place	
Time	
Contact number	
Signature	