E-BANKING: IT'S IMPACT ON CUSTOMERS – AN EMPIRICAL STUDY OF SELECTED BANKS IN GOA

A Thesis submitted to the Goa University for the Award of the degree of

DOCTOR OF PHILOSOPHY IN COMMERCE

By

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DECLARATION

I, Mr. Anson Leopold Albuquerque, hereby declare that the thesis titled **"E-Banking: Its Impact On Customers – An Empirical Study Of Selected Banks In Goa"** submitted to the Department of Commerce, Goa University, Goa – India, for the award of the degree of Doctor of Philosophy is a bonafide record of original and independent research work done by me during the period 2014 – 2018. The study is carried out under the supervision and guidance of Dr. Anthony Rodrigues, Director, Research Centre and Associate Professor, Fr. Agnel College of Arts and Commerce, Pilar - Goa, India. **I also declare that this thesis has not been previously formed or presented, either wholly or partly as the basis for an award for any degree, diploma, associate-ship, fellowship or any other similar title in any other universities. I have duly acknowledged all the sources of scholarly information used by me in the preparation of the thesis.**

Date: 14th / June / 2018

Place: Pilar - Goa, India.

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CERTIFICATE

I, hereby certify that this thesis for award of a Ph.D. degree in commerce titled **"E-Banking: Its Impact On Customers – An Empirical Study Of Selected Banks In Goa"** is a bonafide record of original and independent research work done by Mr. Anson Leopold Albuquerque, a research scholar from the Department of Commerce, Goa University. During the period of the study under my supervision and guidance I also certify that this thesis has not been previously formed or presented, either wholly or partly as the basis for an award for any degree, diploma, associate-ship, fellowship or any other similar title in any other universities.

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LIST OF ABBREVIATIONS

ACRONYM	EXPANSION
AD	Anno Domini
ANOVA	Analysis of Variance
ATM	Automated Teller Machine
BC	Before Christ
BPO	Business Process Outsourcing
BRAC Bank	Bangladesh Rehabilitation Assistance Committee Bank
CBS	Core Banking System
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CTS	Cheque Truncation System
DCB	Development Credit Bank
DTH	Direct to Home
e-banking	electronic banking
ECS	Electronic Clearing Service
EFA	Exploratory Factor Analysis
EMI	Equated Monthly Installment
est.	Established
e-STDR	Electronic Special Term Deposit
e-TDR	Electronic Term Deposit Receipt
EXIM	Export and Import
FD	Fixed Deposit
FPO	Follow-up Public Offering

GCC	Green Channel Counter
GDP	Gross Domestic Product
GFI	Goodness-of-Fit Index
HDFC	The Housing Development Finance Corporation Limited
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure
ICICI	Industrial Credit and Investment Corporation of India Bank
IDBI	Formation of Industrial Development Bank of India
IE	Internet Explorer
IGO	International Governmental Organization
IMPS	Immediate Payment Service Bank
IPO	Initial Public Offering
IVR	Interactive Voice Response
KMO	Kaiser-Meyer-Olkin Test
LISREL	Linear Structural Relations
MIT	Ministry of Information Technology
m-passbook	Mobile passbook
NABARD	National Bank for Agriculture and Rural Development
NEFT	National Electronic Funds Transfer System
NFI	Normality Fit Index
NGO	Non-Governmental Organization
NHB	National Housing Bank
NPS	New Pension Scheme
NRI	Non Residential Indian
OTP	One Time Password

p-value	Calculated probability
p.a.	per annum
PCI	Perceived Characteristics of Innovation
PEOU	Perceived Ease Of Use
PIB	Personal Internet Banking
PIN	Personal Identification Number
POS	Point of Sale
PPF	Public Provident Fund
RBI	Reserve Bank of India
RD	Recurring Deposit
RMSEA	Root Mean Square Error of Approximation
ROI	Returns on Investment
RTGS	Real Time Gross Settlement
SEM	Structural Equation Model
SERVPERF	Service Performance
SIDBI	Small Industries Development Bank of India
SPSS	Statistical Package for the Social Sciences
SQUAL	Service Quality
Std. Resd.	Standard Residual
TAM	Technology Acceptance Model
TDS	Tax Deducted at Source
URL	Uniform Resource Locator
WPA	Wi-Fi Protected Access
x2	Chi-square

ABSTRACT

E-banking technology has given the modern banking era a whole new look but more importantly it has provided these banking organizations a competitive edge over their counterparts. This constant desire to remain abreast all counterparts is the striking cord that makes this study germane in this present time.

Business firms as well as individuals rely upon efficient and swift access; prefer easy to use software which is backed by strong security features. Best customer service quality is the only way forward and it majorly depends upon the adoption and adaption to the latest banking technology the quickest.

This thesis aims at identifying the various socio-economic attributes, customer's internet and technology attributes, customer's banking attributes as well as the bank's promotional attributes that influence the adoption of e-banking technology. The factors that will influence customer not just merely adopt but also which will help in sustainable use have been identified. The customer risk level with respect to usage of each technology with reference to their security measures adopted has also been substantiated, all of which have been corroborated with various descriptive statistical tools, inferential statistical tools, multiple regression and factor analysis.

The study concludes about the gender, residential status, age groups, educational qualification and background, facilities of internet, internet usage habits, number of years internet has been used, type of savings account, type of banks and its impact on the adoption of e-banking technologies. It also highlights that although ATM card users showed the highest acceptance rate, majority of these users were found to be in the high risk level.

Recommendations and suggestions with regard to the type of software and operational rights, continuous upgrade of user interface, dedicated team for updates and maintenance and a need of audit of electronic facilities offered by every bank has been expounded and proposed.

CHAPTER I

INTRODUCTION TO E-BANKING

1.1 INTRODUCTION

The fast and advancing digital epoch is a modern day reality; it includes well-designed, re-calibrated and re-imagined technology backed by reliable and resilient networks and telecommunications, all which have had a resounding impact on trade and commerce at a national and global level. According to The Economic Survey 2017-18, a report published by the Ministry of Finance, Government of India as tabled in the Parliament by Union Minister of Finance, an estimated growth rate of 7 to 7.5 percent was predicted for the financial year 2019 which infers that among the developing nations India has one of the most robust economies. The driving and sustainable engine that is most crucial to the rapid economic growth of any nation is its financial sector. The banking system defines a countries' financial sector and economic power-house. Knowledge of various aspects of business, simulated supply chains, redefined technology, alternative and efficient delivery channels and innovative forms of business has manifested a new type of economy called a 'digital economy.'

The banking sector deemed to be the 'life-blood' of a nation's economic system or is often even considered as a vital organ in an economy has had a direct impact as a result of the emergence of the 'digital economy.' The shift of power from banks' to the customers,' value-added services and customized products and services desired yet at the most affordable price in the quickest time has brought a serious challenge to the banking industry. To meet such ever-increasing demands and expectation as well as balancing the cost and profit margin has resulted in the adoption of innovative means of doing business by banks. Banks have now started switching over from traditional methods of doing business to electronic modes of carrying out banking business.

Indian banking sector is determined by a firm and complex structure right from its governing bodies; banking regulations act to various committees formed for making the system more

transparent and vigorous. Adoption of the latest e-banking technology comes bundled with its own pros and cons, it is upon the concerned banking authority to weigh the same, and determine if the said technology will benefit or bring more harm or losses to an organization. Therefore the impact of technology has been drawn both in the form of the positive and negative contribution it brings to the banking sector and thereby corrective and advanced creative measures can be introduced to reduce its adverse impact.

This study focuses on the critical issues for the success of providing various electronic modes and forms of carrying out banking transactions. E-banking technology is no longer a value-added service but an integral component of the banking system which is the foundation of a digital economy. This chapter gives a brief introduction of the banking system, its evolution, history, the Indian banking structure and recent trends which sets the background for better understanding and provides essential knowledge as a basis for the subsequent chapters. The banks have been fighting fierce battles over customers with the deciding element identified as providing a distinctive experience to retain customers. Various dimensions have been attempted to be studied such that banking organizations, as well as governing bodies, re-examine existing practices and systems offering products and services in a very practical and improvised manner thus improving the flow of work, reducing paperwork, better customer management and setting benchmarks in creating cost efficiencies and profitability.

1.2 EVOLUTION OF BANKING

The word ‘Banco’ of Italian origin means a bench. It originated as a result of contracts to borrow and lend money which were placed over on benches by merchants during the Renaissance period. The traces of banking can be dated back to around 2000 BC in the province of Babylon. Medieval literature provides evidence that highlight priest during the Mesopotamian period in temples would provide loans to the trading community. Temples then were considered as a safe haven for depositing gold as temples were buildings with rock-hard structures and sacred nature.

Entrepreneurs from the Greek and Roman empires during the Fourth Century BC undertook various types of financial transactions. It was during this time that money lenders started

trading by recording entries in books, and the concept of coins was introduced. Coins played a vital role as merchants found it difficult to trade animals due to constraints such as weight, transportation and hence these merchants resorted to lending coins. The Romans were the first to include the confiscation of land due to non-payment of the loan amount.

The Second Century AD witnessed the downfall of the Roman Empire and the collapse of trade that led banks to be found nowhere momentarily. The Twelfth and Thirteenth Centuries brought about a rise in the banking sector especially in the towns of Siena, Lucca, Milan, Florence, and Genoa. In the Fourteenth Century, the cities saw two families namely the Peruzzi and the Bardi gain great feudal power as they developed the concept of trading with bills of exchange. It meant that traders could make and receive payments across long distances by merely presenting the bills in one town rather than traveling, a concept we now know as a cheque. The year 1345 saw the bankruptcy of both the great Florentine houses as a result of a hundred-year-old battle fought by King Edward III who had borrowed gold florins from the Bardi and the Peruzzi which he failed to pay back.

The start of the Sixteenth Century witnessed a German dynasty, the Fuggers from the town of Augsburg. They were bankers who borrowed wealth at not less than Twelve percent per month and could also negotiate lending rates as high as Forty-Five percent per month which made the emperors very much profitable. This century also saw a significant reform in the banking sector. It was during this period that banks were established in Venice and brought into a bill of exchange called a cheque.

The development of nationalized banks and bank notes was during the Seventeenth Century. The Dutch and British improved upon the errors committed by the Italian banking methods. Bank of England was set up in the year 1694 to provide loans to public and the government. Groups of money lenders came together to collect a corpus of funds to fund the government for a fixed rate of interest. Similarly, the beginning of Republic of United States of America saw banks becoming an integral part of their economy. It was New York that first adopted the Free Banking Act as it allowed various business enterprises to engage in banking activities. The Eighteenth Century saw the families of goldsmiths begin to lend some of the deposits which were purely kept for safekeeping as a way of making profits and thus there was an evolution of promissory notes to bank notes.

The civil war brought about changes in the federal banking systems concerning banking rules and legislation. The nationalized banks were allowed to not only issue notes but also charge a tax on bank notes issued by them. The note carried a guarantee by the Reserve Bank that even if the nationalized banks did not pay the Reserve Bank would make right the debt. Well-developed banking techniques, rules, and regulations by the English banks became a universal model for banks around the world.

1.3 BRIEF HISTORY OF BANKING IN INDIA

With the British Rule in India and a significant influence of the western culture, the origin of the banking system in India can be dated back to the Eighteenth Century. Similarly in the past commodities were traded and such required remittances of what we now call money then known as 'Hundis.' Such merchant financers were called 'Seths.' Since then the Indian Banking system has undergone several necessary changes. The banking system in India can be viewed through 3 distinct phases

a) Phase 1 (Prior to 1947) The Evolutionary phase pre-independence
b) Phase 2 (1947-1990) The Foundation and Development phase post-independence
c) Phase 3 (Post 1990) The Liberalization and Merging phase

➢ PHASE 1 (PRIOR TO 1947) THE EVOLUTIONARY PHASE PRE-INDEPENDENCE

The traces of banking in India goes back to the books of Manu which contain references of borrowing and lending habits during the Vedic period, The first bank opened on the verity of a western bank was Bank of Bombay instituted in the year 1720 soon followed by Bank of Hindustan in Calcutta in the year 1770. In the year of 1806 on 2nd of June, India saw its first Presidency Bank established in Calcutta called the Bank of Bengal. Presidency banks were banks which were funded by the Presidency of Government which was given the power to issue notes only in the year 1823. The former Presidency Banks were Bank of Bombay incorporated on the 15th of April, 1840 and Bank of Madras incorporated on 1st July, 1843. Some of the other banks established but not under the presidency banks were Allahabad Bank est. In the year 1865, Punjab National Bank est. In the year 1894, Bank of India est. in

the year 1906, Bank of Baroda est. in the year 1908 and Central Bank of India est. in the year 1911.

In 1921 all the three Presidency Banks, i.e., Bank of Bengal, Bank of Bombay and Bank of Madras merged into a single entity to be known as Imperial Bank of India. This again was subsequently renamed in the year 1955 as the State Bank of India. Hilton Young Commission was a committee set up in 1926 based on whose recommendation the Reserve Bank of India was formed on 1st of April, in 1935 in Calcutta as per provisions of the RBI Act, 1934.

- **PHASE 2 (1947-1990) THE FOUNDATION & DEVELOPMENT PHASE POST-INDEPENDENCE**

The portioning of India and the end of the British rule post-1947 witnessed an adverse effect on the banking activities primarily in the states of West Bengal and Punjab. The then government had to take active measures in order to maintain financial stability in the country. During this era of free India, there were roughly about 600 commercial banks in the nation. Although the presidency banks merged to form the Imperial Bank of India later to be called the State Bank of India in 1955, it was still not fulfilling the needs of the agricultural as well as small-scale units. There was a rise of private bank monopolies which resulted in regional imbalance, the priority sector for, e.g., Agriculture was ignored and therefore there arose the need that the banking sector should play a vital role in economic expansion across all sector and scale of industries.

With a view of a systematic economic and social transformation plan, the Government of India took a very bold step of Nationalization of Banks. 19th July 1969 also known as the Bank Nationalization Day came into reality. It was Indira Gandhi who was the Prime Minister during which the following banks were nationalized:

1. Central Bank of India
2. Bank of India
3. Punjab National Bank
4. Bank of Baroda
5. United Commercial Bank
6. Canara Bank

7. Dena Bank
8. United Bank
9. Syndicate Bank
10. Allahabad Bank
11. Indian Bank
12. Union Bank of India
13. Bank of Maharashtra
14. Indian Overseas Bank

Nationalization brought an immediate change in the banking system. The nationalized banks progressed at an alarming rate. There was an increase in branches especially in rural areas, increase in deposits and increase in lending towards priority sector all by leaps and bounds. As a result in April 1980 Government of India decided to nationalize six more commercial banks. They were:

1. Andhra Bank
2. Corporation Bank
3. New Bank of India
4. Oriental Bank of Commerce
5. Punjab & Sindh Bank
6. Vijaya Bank

(New Bank of India merged with Punjab National Bank in the year 1993)

Late 1980 witnessed organizational problems in the banking sector. Even after a high growth rate in the deposits and lending yet the banks in India began heading towards losses. There was an immediate need to detect the flaws and defects in the banking sector which resulted in the constitution of a committee under the chairmanship of Shri. M. Narasimham to review the various problems and defects and suggest suitable actions to rectify the same. Some of the defects pointed out were insufficient liquidity, unwarranted controls and overstaffing. As a result, based upon the recommendations to promote financial inclusion in the most rural areas, Regional Rural Banks had given birth on 2nd October, 1975 and to govern the same, regulatory bodies such as NABARD (est. 1982), EXIM (est. 1982), NHB (est. 1988) and SIDBI (est. 1990) were established.

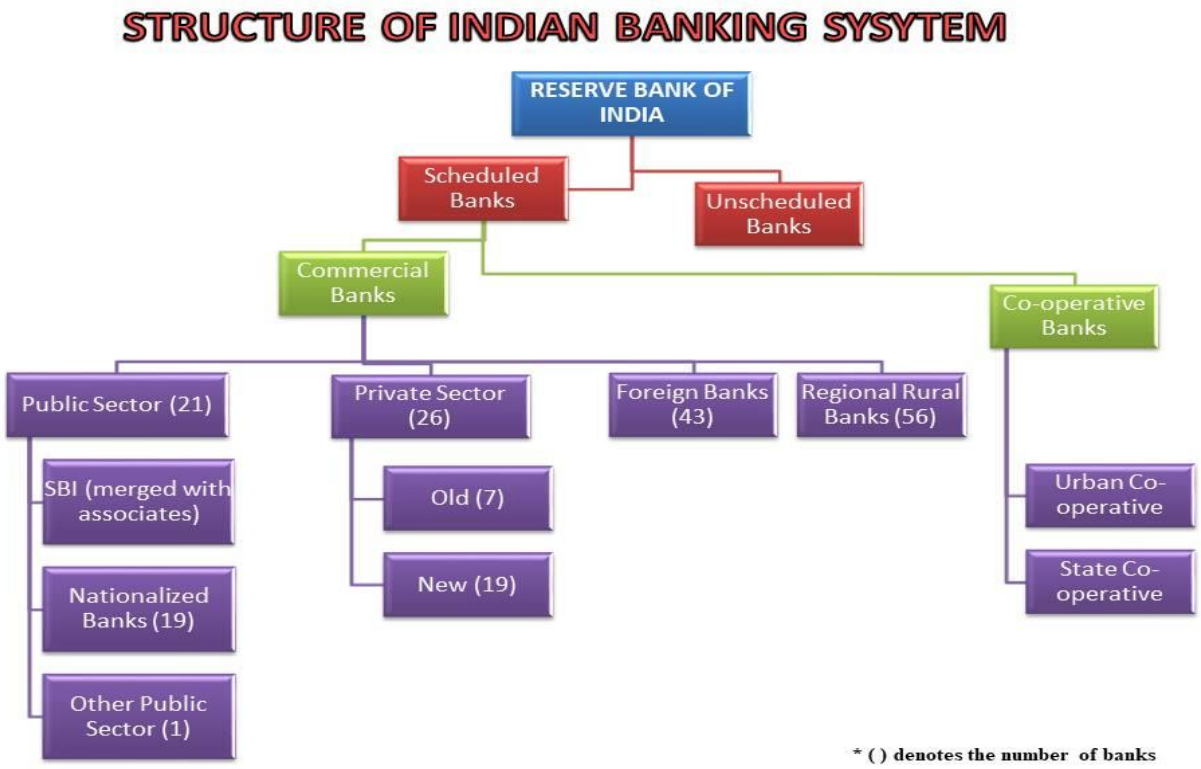
➢ **PHASE 3 (POST-1990) THE LIBERALIZATION AND MERGING PHASE**

The early 1990s watched an invigorated banking sector in India. It was all through that time that the then government adopted the policy of liberalization. This resulted in a remarkable increase in a number of banks. Reserve Bank of India initially licensed ten private banks to be established. These private banks brought into the banking system drastic technological changes and therefore were also known as 'New Generation Tech- Savvy banks.' Some of the banks who were granted licenses were - ICICI, HDFC, Axis Bank, IDBI, Indus, DCB, Kotak Mahindra and Yes Bank. During this time Reserve Bank of India (RBI) also took the initiative to start payment banks and small banks.

1.4 STRUCTURE OF INDIAN BANKING SYSTEM

The banking industry in India is governed by the Reserve Bank of India. It can further be divided into the organized sector and unorganized sector. An organization chart has been developed with reference to the banking structure for better understanding as on 31st August 2017. The outline structure of the Indian Banking System is as follows:-

Figure 1.1 : Structure of Indian Banking System



Source: Reserve Bank of India. www.rbi.org.in

1.4.1 RESERVE BANK OF INDIA

The Reserve bank of India commonly referred to as the Central Bank of India was established on 1st of April, 1935 as per the Reserve Bank of India Act 1934 based upon the recommendations of Hilton Young Commission. Initially, RBI was privately owned but since 1949 is has been retained entirely by Government of India. The headquarters of RBI was initially open in Calcutta but was later moved in the year 1937 to Bombay. The managerial function of RBI is led by a head called the Governor, Deputy Governors and executive directors all who have nominated the government of India and other local bodies. The RBI plays various essential roles as a banker to the banks in India such as the following:

- **FRAMEWORK OF RESERVE BANK OF INDIA:**

RBI is an independent governing body supervising and overseeing the commercial and scheduled banks in India. The Reserve Bank is directed by the following framework:

- ***Core Banking Framework:***

The core banking framework defines the fundamental roles that Reserve Bank of India has executed as a governing body. The following are the core banking framework:

- ***Issuer of currency notes:***

  RBI has the sole authority to issue and mint currency notes in our country. The notes currently accepted in the banking system as on 31st August 2017 are in the denominations of - 20, 50, 100, 200, 500 & 2000.

- ***Conservator of reserves:***

  RBI retains and maintains the minimum amount of reserves in our system in the form of gold, foreign securities, and rupee security.

- ***Banker to the government of India:***

  It acts as an agent to the Central and the State government by performing functions like accepting deposits, taxes, maintenance of government treasury accounts and providing essential data and financial advice.

- ***Banker to banks:***

  The reason is for being called the banker to banks is not just because of the regulatory functions over banks, but RBI is also the lender of the last resort to any scheduled commercial bank.

- ***Regulatory Framework:***

The regulatory banking framework defines the supervising, monitory and directing roles that Reserve Bank of India has to implement as a governing body. The following are the regulatory banking framework:

- ***Setting and implementation of monitory policies:***

  RBI is the governing body for all the banks in India which formulates implements and monitors the banking rules and regulations to be adequately followed.

- ***Exchange controller:***

  In order to maintain a balance in foreign exchange market and encourage the development of trade in India RBI has to keep careful control over the foreign exchange.

- ***The controller of credit:***

  It conserves the reserves maintained by banks by quantitative and qualitative control of credit. Rates such as Bank rates, repo rate, reverse repo rate, cash reserve ratio and statutory liquidity ratio is controlled by RBI.

- ***General Framework:***

The general banking framework describes the universal and overall purpose of establishing the governing body. The following are the regulatory banking framework:

- ***Promotional role:***

  RBI looks to inculcate the habit of savings amongst the citizens of the nation; it also looks to promote and extend banking facilities across the length and breadth of the country in the most remote and rural area and also introduce new specialized investment organizations.

- ***Developmental role:***

  RBI at large organizes its goals and objective in line with national development as a whole.

1.4.2 SCHEDULE BANK

Schedule Banks are those banks which are listed in the second schedule of RBI Act, 1934. Those banks which fulfill the said norms as laid down as per section 42(6)(a) are included in the second schedule as per the said act. The following are the types of scheduled bank

- **COMMERCIAL BANKS**

These banks are incorporated with the objective of accepting deposits and giving loans to the public. These banks have dominated the banking industry being categorized further as Public, Private and Foreign banks.

- ***Public Sector Banks:***

These are banks in which the government holds the majority of the stake (i.e., more than 50% shares) which are also registered on the stock exchange. There are a total of 21 Public Sector Banks in India comprising 19 Nationalized Banks, SBI and its associate Banks which are now merged and the Industrial Development Bank of India (IDBI).

- ***Private Sector Banks:***

These banks have the majority of their shares controlled by private organizations or individuals. As of August 2017, there are 26 such private sector banks registered with RBI.

- ***Foreign Banks:***

When a bank is formed initially and has their registered office in a foreign country but a banking branch in India it is called a Foreign Bank. Presently there are 43 foreign banks operating in India.

- ***Regional Rural Banks:***

This was an initiative by the government of India to facilitate local farmers and artisans from rural areas with credit facilities. Regional Rural Banks were established in each state currently having 56 such banks associated with each state.

- **CO-OPERATIVE BANKS**

These banks were formed for the purpose of providing finance to self-employed, small-scale industries and local communities. Usually, individuals with a common interest to carry out banking activities would come together and form a Co-operative Bank registered under the Banking Laws Co-operative Societies Act 1956 and Banking Regulation Act, 1949.

1.4.3 NON-SCHEDULE BANK

There may be banks which do not follow the criteria laid down as per RBI Act, 1934 which are called Non-Schedule Banks. These banks are defined as per the Banking Regulation Act, 1949 under section 5(c). These banks are also called the Local Area Banks. Some of the examples of non-scheduled banks are Akhand Anand Co-Operative Bank Ltd., Alavi Co-Operative Bank Ltd., Amarnath Co-Operative Bank Ltd., Amod Nagrik Sahakari Bank Ltd., and Amreli Nagrik Sahakari Bank Ltd.

1.5 MODERN BANKING IN INDIA

The Financial system of India is undergoing a significant change, especially on the technological front. Banking in India is no longer limited to the functions of just accepting deposits, disbursing loans, a place for safe custody or limited use of technologies introduced. The types of e-banking technologies have no longer remained the same such as ATM's with previously of the facility to only withdraw cash or Mobile Banking just with a balance check facility. As a matter of fact, it is said that in this modern age if a customer knows to use an ATM card, Mobile Banking and Internet Banking to its fullest capacity there is no need of him or her to even step into a bank branch to carry out any sort of transaction.

The modern-day banks are now focused on a ray of distinct services rendered at the same time delivering quality service. The banks most significant focus now is not just increasing customer base but very importantly customer retention. Banks nowadays are more market-oriented, identifying the needs of the customers at large and providing the best solution in a very customer friendly manner. The advent of Mobile Banking, Internet Banking, Telephone Banking, and Electronic Fund Transfer are some of the areas which have gained momentum in the recent days. Banks have invested massive capital into a various technological upgrade with a long-term goal of reducing transactions cost and labor cost thereby increasing its long-term financial stability and profitability in the long run.

1.6 IMPACT OF INFORMATION TECHNOLOGY ON BANKING

The scenario in the banks of clerks handling substantial ledger books, communication through letters and calculations of interest and balancing of books done manually and later with calculators. This picture has changed drastically as ledger books are now replaced by a core banking technology adopted by banks, hand-delivered letters have been replaced by e-mails and calculations of interest and balancing of books are replaced by computerized generated formulas. With each passing day, a number of the different tasks are being shifted to a digital interface.

Undoubtedly technology plays an indispensable role in the financial sector as it would not be possible to handle the massive customer base with the traditional banking methods. The questions to be addressed are as below:

- Does a bank have sufficient technological upgrade to suffice the need of its customers?
- Is a bank willing to adapt to the continuously evolving technological advancement?
- Is a bank ready to adopt measures to continuously identify the various snags and bugs prevalent in each electronic knowhow adopted in order to make it safe to use?

Since the development of technology has been considered as the most crucial development in the history of mankind, technology shows its prominence in the banking segment as well. The banking customer has witnessed a drastic change in their banking habits. This

progression comes with its own positive as well as a negative impact. It is unto every organization to weigh the positives and negatives and accordingly move towards advancement.

1.6.1 BENEFICENCE OF TECHNOLOGY IN BANKING

- ***Mass data storage and efficient management:***

  The traditional banking system would require a number of banks clerks to maintain the balance of customers and which would consume a lot of time the same can be handled by a single computer, an even more complicated task can be performed in seconds. The core banking technologies help store and organize the colossal amount of data entered by each branch on a server in a very logical manner. The advent of computers is highly responsible for mass data storage as well as very efficient data management.

- ***Quick retrieval of information:***

  Traditional banking systems would take hours or sometimes even days especially to locate a transaction which was recorded a couple of years back. But the arrival of computers and information technology can retrieve a transaction recorded several years ago in a matter of few seconds as long as the transaction has been recorded on the computer. Again core banking technology has made it possible that information of a customer can be accessed from any part of the world irrespective of the geographical region in which the account has been opened.

- ***Communication redefined:***

  Communication had a severe hurdle especially with regards to time taken for a message to be delivered. The time taken would depend upon the efficiency of the post office and the geographical location of the place the letter needed to be sent. Any person, seeking a reply to the same message sent would have to wait for ages. Communication has been redefined in today's banking world. Messages are being sent over e-mails which are delivered as fast as a click of a button and a reply can be sought no sooner the receiver reads the text.

- ***Reduced human mistakes:***

Computers are known to have automated many fundamental banking processes such as interest calculation, EMI calculations, posting of transaction and preparing of final accounts. All mundane jobs which were once manually calculated by staff working in the banks and were prone to human mistakes are now done by computers which are not only much faster but more importantly without any human mistakes. Computer calculations are not subject to any mistakes as calculations are100% correct if anything it is only subject-able to an error caused by a human who has designed the programming code or defective hardware.

- ***Privacy to performing banking transactions:***

Keeping in mind all the banking secrecy rules and regulations that is to be followed by each and every person working in any bank, yet when a customer visits a branch there no complete right to privacy due to human intervention in the branch. A customer can privately carry out a transaction if he uses E-Banking technologies rather than traditional banking methods. Privacy from banking staff to a large extent can be achieved if technological advancements are accepted over old-style banking methods.

- ***Round the clock service:***

Outdated banking methods were limited to the timings of the branch irrespective of the type of banking transaction required to be performed. With modern day banking and advancement in technology banks are offering various types of services to its customer 24 hours a day and all 7 days a week.

1.6.2 ADVERSITIES OF TECHNOLOGY ON BANKING

- ***Obsolete technology:***

Technology is being introduced at a prevailing rate. In fact, technology is advancing with every passing second; latest technologies are even kept on hold and not rolled

out in the market since the stock of previous technologies needs to be sold out. No longer have companies achieved their desired sales a new technology is rolled out and the previous product itself becomes obsolete. The same technology is playing a significant role in the banking sector thereby facing the challenge of becoming outdated in the near future.

- ***Cyber-crime:***

Fraudsters are adapting to new ways of hacking, phishing, and malware with the continuous change in technology. Cybercrime also knew as internet crime is on a continuous rise especially with more number of customers switching over from traditional banking activities to the modern banking technologies. The more the number of users there is an increase in the number of such victims and thereby increasing the amount of cash lost as a result of such fraud.

- ***Limited interaction:***

Customer service does not just include offering prompt service at the required time but also very necessarily interacting with the customer face to face to understand the real difficulties faced and thereby providing the best solution possible. Technology has limited the interaction between bank staff and customers which could result in lack of soft skills on behalf of the staff and not understanding the needs of the customers apparently due to which customers could switch between banks to attain the best customer service as per their individual needs.

- ***Connectivity and server issues:***

Developing countries especially India has gained a lot from the technological evolution. Yet there are many areas with respect to technology untapped such as the uninterrupted supply of internet connectivity and increase in bandwidth of wireless internet. Connectivity and server issues are one of the significant barriers faced by the banks which could face penalty and fines in future for such inconvenience caused to customers for entirely no fault of theirs.

- ***Education and rural development:***

Indian literacy rate stands at around 74.04% as per the 2011 census, which means there is yet a significant amount of 26% of the population in India which is still illiterate. There are many bank customers mainly from rural areas which are not developed who use thumb impression as a mode of operation for their accounts. Firstly it is challenging for such customer to switch over to modern banking tools and even if they switch over such are the customers who are at high risk as victims to frauds.

1.7 CURRENT TRENDS IN E-BANKING

Traditional business model of banking has been rejuvenated by the current e-banking model. With the current demand, capital investment in financial services are transmuting at an alarming rate with outlay into new technology, and many banks have now reported a higher return on investment (ROI) as a result of an opportunity to diversify wealth creation. E-channel has reinvigorated banking institutions across the globe to adopt the same as a result of amplified revenues mainly due to the capability to manage an enormous increase in a number of customers and the immense prospects of cross-selling by understanding the customer's prerequisites. The following trends across the globe have been taken into consideration during the study:

a) Indian scenario
b) International scenario

- ***Indian scenario(developing country):***

Banks in India have started funding massive capital into technological advancement and up-gradation. In the year 2000 Kotak Securities reported a figure of 9 Lakh Internet users, while a report drafted by The Boston Consulting Group and Facebook in the year 2017 reported a sum of 45 million online banking users in India. Another report by the Internet and Mobile Association of India reported a figure of 481 million internet users in December 2017. If the two, that is online banking users, and internet users figures are

compared, it highlights that a mere 9.35 percent of the total number of internet users use online banking services which is a minimal number. India is a developing country showing a lot of potential to develop electronic banking technologies. Although strategic approach by banks will surely dissuade the customer from visiting the branch in the future, more importantly, it will help banks manage a broader customer base and help render pleasing services thus giving them an opportunity for cross-selling other products.

- ***International scenario (developed countries):***

  Analysis and projections as per the Center of Economics and Business Administration, United Kingdom have projected a substantial upsurge of internet banking users from 53 percent in the year 2014 to 66 percent in the year 2020. Weekly transactions worth £5.8 billion in 2013 are expected to rise to £9.4 billion in 2020. The mobile banking users in the year 2014 were reported to be 17.8 million users who had a significant increase as compared to the year 2009 with just mere 4 million users, while the same is expected to cover a staggering 32.6 million users in the year 2020. Reports inveterate that banks customers with mobile bank applications are more satisfied than a customer without mobile banking applications. Although e-banking payment modes have reduced the cost of banking transactions, technology has also given rise to other payment methods such as Paypal, Google Wallet, Apple Pay and many others which has paved the way for new entrants as well thus forcing the existing banks to an aggressive competition with regards to the latest technological update.

  Findings as per the Pew Research Center, Washington, United States of America reported a total of 61 percent of the adults using online banking while 35 percent of the adults were informed using their cell phones to conduct banking transactions.

1.8 SUMMARY

The introductory chapter provides a concise and transient overview of the digital economy the globe has consumed and the importance of technology and digitization in the banking sector. Profound insights on the development and rise of e-banking technologies from an outline of the conception of the concept banking, in 2000 B.C. to the evolution of banking in India with respect to 3 distinct phases, i.e., Phase 1 (Prior to 1947) The Evolutionary phase pre-independence, Phase 2 (1947-1990) The Foundation & Development phase post-independence and Phase 3 (Post 1990) The Liberalization and merging phase has been expounded. The detailed structure of the Indian banking has been explained along with the core, regulatory and general frameworks of RBI. A crisp summary of the current trends of e-banking across developed countries and developing countries is underlined thus giving a contextual of basic understanding of the crucial electronic banking technologies that are prevalent in the Indian banking system.

CHAPTER II

AN OVERVIEW OF E-BANKING TECHNOLOGY

2.1 INTRODUCTION

Every banking organization is making every effort to provide various e-banking technologies available at the disposal of a customer in order to make his or her banking experience a comfortable one. Electronic banking most commonly referred to as e-banking or internet banking makes the unimaginable possible in the current world. Since this study concentrates on e-banking, a comprehensive and extensive outline elaborating the various existing types of e-banking technologies, its facilities, and services available on the same and the security measures that a customer requires adopting for safe use is emphasized upon.

Processes such as filling of the pay-in-slip, account opening forms, drawing of cheques and subsequently filling up slips are slowly taking the exit door from both customers and banks perspective. Such traditional banking methods are proving to be much costlier and thus increasing the bank's direct overhead cost.

Developed, as well as developing countries, have begun to witness a transformation in the entire banking system. The e-banking system has seemed to have spread its roots deep beneath the banking system. All most all private and public sector banks have adopted the core banking system (CBS) which results in centralized processing and avoided the hassle of a back office processing in every branch. Complete adoption of e-banking technology is, as a matter of fact, going to decrease the cost of operation even further.

2.2 CONCEPT OF E-BANKING

Electronic banking or e-banking is a facility provided to bank customers or other financial institutions to conduct various types of financial transactions electronically or through the bank’s website.

E-banking has transformed the traditional banking techniques and has now begun gaining worldwide acceptance across developed and developing countries. E-banking is a macro concept used to describe various forms of e-banking technologies.

Some of the various forms of e-banking technologies are mentioned and explained briefly below:

- **ATM:**

Automated Teller Machine (ATM) is an automated computerized machine which on behalf of the said bank carries out transactions like depositing, withdrawing, balance inquiry through a secured method without the intervention of a human teller (staff).

- **MOBILE BANKING:**

Mobile Banking is a facility offered by the said bank to avail its services over the mobile phone handset of the customer. Various banking transactions like money transfer, bill payments, recharges, balance inquiry and others can be carried out through a protected system at the convenience of the customer's time and place.

- **INTERNET BANKING:**

Internet banking is the cutting-edge technological facility offered by a financial institution. In this case, a financial institution sets up a webpage which sends messages to and fro of the bank's servers and thus allowing a customer with the help of internet facility to access his bank accounts. This again is given at the convenience of place and time of the customer through which he can access his account with the help of a desktop, laptop or nowadays even a smartphone as long as he has the internet facility.

- **TELEBANKING:**

Telephone banking is a facility given by the financial institutions wherein a customer can execute an array of banking transactions through a phone call or Interactive Voice Response (IVR) system. A customer, in this case, needs to answer specific security question after completing the authentication process he or she can perform financial transactions without the need to visit their branch physically. Many banks nowadays are even offering a 24-hour service for such facility.

- **SMART CARD (DEBIT /CREDIT CARD):**

These are the small plastic card provided by the bank that we see with most of the customers carrying around. There are various types of these cards. Some cards are differentiated upon the type of facility available, eg. Debit, ATM card or Credit Card, while some are segregated based on the type of processor and storage unit, eg. Magnetic strip card or Chip-based card.

- **E-CHEQUES:**

The Cheque Truncation System or the Image-based Clearing System also known as CTS 2010 has been introduced by RBI to facilitate faster cheque clearing system. In this process the electronic image of the cheque is sent after following strict security checks like the magnetic ink, checking for signatures and cheque truncation. This allows the image to be sent electronically thus clearing the cheque must faster than the traditional physical presentation of the cheque.

- **ELECTRONIC FUND TRANSFER (EFT):**

In this case, a bank customer can transfer funds from his or her account from one financial organization to that of another customer holding an account in an altogether different financial organization in a matter of a few hours. This can be done by giving a simple application in the bank's present format for Real Time Gross Settlement (RTGS), National Electronic Funds Transfer (NEFT) or Immediate Payment Service (IMPS). The customer can even carry out the same from the comfort of ATM, Mobile Banking and Internet Banking.

With the introduction of e-banking, the banks as a financial institution and a customer as an individual have had many advantages as well as a few disadvantages.

2.3 MAXIMIZING ORGANIZATIONAL INTEREST:

- Adoption of the latest technology first has given the financial institution an advantage over its competitor organizations.
- E-banking has reduced the cost regarding workforce as now the clerical jobs once performed by bank staff has been automated, and bank staff can concentrate more on productive work like marketing and increasing customer base.

- It has also helped at delivering the same service and facilities provided before at a cheaper cost and more efficient manner thus gaining customer satisfaction.
- It has also reduced cash handling charges, and the risk of counterfeit notes as more number of customers have switched over to electronic fund transfer where money is transferred from one account to another electronically without any physical cash.
- The banks have even started saving cost on stationery items once purchased in bulk in order to facilitate traditional banking activities. The requirement of such paper has decreased drastically with customer adopting e-banking thus requirement for filing physical forms is not necessary, and data is saved on servers and backup servers electronically rather than maintaining files.
- E-banking has helped financial organizations reach out to a broader base of customers through their aggressive promotional activities carried out through their websites and other electronic media which covers a broader area in the least time.
- FAQ‟s uploaded over the banks‟ website will reduce the workload on employees.
- Customers can avail e-banking facility from any time, anyplace. Therefore there is a need to invest more and more in related infrastructure.

2.4 SEAMLESS EXPERIENCE TO CUSTOMERS:

- E-banking provides 24 hours and 7 days a week service to all its customer.
- The customer can access his or her account literally anywhere and thus does not require visiting the branch.
- Many of the services offered online are free of charge services or cost comparatively less as compared to traditional banking services as a promotion by the bank to encourage online banking.
- Online banking gives the customer a full picture of the various types of banks accounts held by him in a respective financial institution along with the various options of services available all on the comprehensive banking services website or application available to the customer.

- E-banking is of significant advantage to the customer as it is fast and in real time which becomes very convenient especially for organizations as it saves a lot of their precious time which can be utilized in more productive work.
- Nowadays customer wants the privacy of their banking transactions sometimes even from the bank staff itself. Thus for such customers e-banking is the best option as it provides confidentiality and privacy to some extent from a bank teller.
- E-banking provides a comprehensive picture of a customer's banking services, and with banks nowadays offering services of wealth management, customer get a summary every month of all their expenditure thus helping them to manage the income earned more efficiently.
- Account details such as balance, mini-statement, interest certificates, bank-statement, balance certificate, provisional certificates are all available over the e-banking services at the click of a button.
- Usage of ATM card as shopping malls, cinemas or even other e-banking services in the presence of peers gives a sense of superiority and trendiness to one's style quotient.
- Customers can save money on traveling, instead of traveling daily to a bank branch in order to perform a financial transaction instead could perform the same from the comfort of their home or even workplace.
- Online bill payment, mobile recharges, dish tv recharges along with many more bill payment options are offered through various e-banking technologies which give them a customer more freedom and time for family.
- As a promotion and initiative taken up by various governments and banks, customers receive huge discounts, reward points, loyalty bonuses for usage of such facilities which gives a big boost to use more of such services and thus even spend more.

2.5 TYPES OF E-BANKING SERVICES CONSIDERED FOR THE STUDY:

E-banking is a broad term used for various types of technologies under its gambit. With every passing year, a number of technologies are added under the term of e-banking. Most of these new technological concepts or changes in delivery channels are primarily based on the debit or credit card, mobile or on the bank website. Thus due to a few research limitations, the effective e-banking technologies were considered for the purpose of this study. The critical technologies selected were as follows:

- ATM card
- Mobile Banking
- Internet Banking

The services/facilities and security measures of the above-mentioned technologies are discussed below.

2.5.1 ATM CARD

An ATM card is also known as a cash card, payment card or even sometimes as a money access card. These plastic cards enable an account holder to access his account through an Automatic Teller Machine, Point of Sale Machine or even through an online website which allows card payment. The physical description would be a plastic smart card the size of a palm which comfortably fits into a pocket with the name of the customer printed or embossed upon the same usually with a magnetic strip behind and on the newly issued ones with a small chip on the front of the card.

The card usually has a mention of a 14 digit card number with the name of the bank along with the payment intermediaries also mentioned. The valid period too is cited on the front of the card while behind there is a space for the customers signature along with a 3 to 4 digit CVV number enabling a machine or an online service to check the authenticity of the card.

- **THE SERVICES/FACILITIES AVAILABLE ON AN ATM CARD ARE AS FOLLOWS:**

  - Withdrawal of cash available 24 hours a day and 7 days a week.
  - Depositing of cash facility available 24 hours a day and 7 days a week.
  - Balance inquiry of Savings / Loans account.
  - Payment of credit card bills
  - Payment of utility bills such as mobile, electricity, school, etc.
  - Purchase of online mobile vouchers
  - Availability of Mini/Short statement
  - Request for a cheque-book
  - Request for PIN change
  - Funds Transfer – Intra Bank (within the bank)
  - Funds Transfer – Inter Bank (other banks)
  - Operation of multiple accounts with a single card

Classifications of security measures for an ATM card as per their risk-weighted category are mentioned below:

Table 2.1 : Weighted-risk upon security measures of ATM

Security Measures based upon weighted-risk	
Sr. No.	**High-Risk Security Measures (Weighted Risk 3)**
1	Customer needs to activate SMS or e-mail alerts for each, and every banking transaction carried out.
2	Facility of OTP to be compulsorily used while making payments through an ATM card during online shopping.
3	The customer should never write the PIN on the card or store the PIN within the card pouch as in case of theft of card the PIN will be readily available to the thief.
4	One should always press the CANCEL button before leaving the ATM booth.
5	Care should be taken to shield the screen and keyboard from others whenever they

	operate their ATM card.
Sr. No.	**Moderate Risk Security Measures (Weighted Risk 2)**
6	The customer has to write the call center and ATM card number separately and keep it at home (readily available accessible) in case of theft of the ATM card so that he or she can block the card in case of theft or loss.
7	At all times one should avoid taking help from others, mainly unknown pretending to help willingly. In case of any difficulty, one should approach the bank staff or close relatives.
8	Customers should change their ATM PIN's regularly at least after every 6 months.
9	A customer should avoid using the ATM if he or she finds any unusual parts installed as the same could be done by a thief to fetch account details.
10	Customers should make use of Chip ATM card with more security instead of the standard magnetic ATM card.
Sr. No.	**Low-Risk Security Measures (Weighted Risk 1)**
11	The customer should never use a PIN identical to their birthdate, mobile number or year of birth as these are easy to guess in case of theft.
12	One should try using an ATM booth which has a security guard
13	Customers should keep the transaction receipt them until they match the same with their bank statement
14	Once a customer does not feel the need for the transaction receipt he or she should tear the same and dispose it off.
15	Any other security measures advised by the bank or close relatives.

2.5.2 MOBILE BANKING

Mobile Banking refers to a service given by a financial institution to its customer to perform banking transactions using a cellular device also known as a mobile phone or a tablet. The developed countries like United States of America, Canada, the United Kingdom it is believed that majority of their population have accustomed themselves to the revolutionizing mobile banking. As a matter of fact, with every passing day, we have witnessed advancement in technology in the area of cellular phones. The cellular

device which was solely used for calling initially has transformed over time from sending a text message to now performing almost any computerized task. These cellular phones nowadays commonly referred to as smartphones for the amazingly tremendous task they perform play an indispensable role in the mobile banking era. Mobile Banking has given the customer literally all options of banking in their palm which can be carried out from any part of the world.

Mobile banking has been introduced to various types of cellular phones. There are various methods of Mobile Banking as mentioned below:

- **Unstructured Supplementary Service Data (USSD)**: An example of the USSD based is *111#, wherein a customer dials a similar type of unique number assigned to each financial institution to carry out various banking transactions like balance inquiry, fund transfer and mobile recharges.

- **SMS Based:** In this case, a customer sends an SMS to a through his registered mobile number with the bank to a registered mobile banking number giving instructions in the SMS in a predetermined format as to what banking transactions have to be performed. E.g., sending an SMS <RECHARGE*100*9110011000> to 9333220011 to recharge one's mobile phone or <SBBALENQ> to 9333220011 to inquire about the balance available on one's account.

- **Application Based:** an official banking application is installed on the customer's cellular device. Mostly smartphones are preferred as these applications are not supported on a basic cellular device. After installation, the bank allocated each customer a unique user id through which a customer can perform various banking transactions. Various types of applications are designed depending upon the type of operating system, e.g., android, apple, windows, and other operating systems.

- **THE SERVICES/FACILITIES AVAILABLE ON MOBILE BANKING ARE AS FOLLOWS:**

  - Deposit account (e.g., Saving, Fixed, Recurring) and Loan account inquiry
  - Payment of utility bills – such as mobile, credit card, electricity, school fees, gas, insurance premiums.

- Easy and quick mobile Top-up and DTH Recharges
- Payment of direct taxes such as Income tax, Corporation tax, Tax deducted at source, Tax collected at source, Wealth tax, gift tax, excise tax.
- Opening of instant Term Deposits – e-TDR (Term Deposit Receipts) /e-STDR (Special Term Deposit Receipts) and Recurring Deposits
- Availability of Mini / Short statement
- Request for a cheque-book
- Funds Transfer – Intra Bank (within the bank)
- Funds Transfer – Inter Bank (other banks)
- Operation of multiple accounts with a single User-id password
- IMPS - Interbank Mobile Payment Service
- Auto-payment / transfer facility
- Branch and ATM locator
- M-passbook (Mobile passbook)

Classifications of security measures for Mobile Banking as per their risk-weighted category are mentioned below:

Table 2.2 : Weighted-risk upon security measures of Mobile banking users

Mobile Banking Security Measures based on weighted-risk	
Sr. No.	**High-Risk Security Measures (Weighted Risk 3)**
1	Never store the Mobile Banking username and password on your mobile handsets or tablet.
2	Do not leave the handset unattended after having logged into mobile banking.
3	Always log off properly once you are finished with your mobile banking transactions.
4	Better to set up an auto-lock as well as to enable passcode lock to prevent unauthorized access to your handsets.

5	Use of default browsers initially provided by mobile handsets or tablets rather than newly installed browsers downloaded from other sources.
6	Always type in the URL address directly into the browser or download the official application from the legal online store only to avoid going to fraudulent websites.
Sr. No.	**Moderate-Risk Security Measures (Weighted Risk 2)**
7	Always install and update the latest anti-virus and anti-spyware software regularly on one's mobile handsets or tablet, whenever they are available.
8	Avoid sharing one's mobile handsets with others and use your own handset to log into your mobile banking account.
9	Wipe data or format your old phone or tablet before donation, reselling or recycling.
10	If there are any suspicious transactions observed, it is best to contact Customer Service Hotline and report immediately.
11	When using Wi-Fi connection, one should always use a trusted Wi-Fi network as well as a trusted internet service provider and should enable security protection such as Wi-Fi Protected Access (WPA), if possible.
12	Don't use any jail-broken handset or tablet which may have security loopholes to log on to mobile banking
13	Don't install applications on your mobile handsets or tablets from untrusted sources nor use untrusted custom virtual keyboards.
14	Don't install applications on your mobile handsets or tablets from untrusted sources nor use untrusted custom virtual keyboards.
Sr. No.	**Low-Risk Security Measures (Weighted Risk 1)**
15	If a customer's mobile phone or tablet is lost, one should review his or her account transaction history through Personal Internet Banking (PIB).
16	Disable Bluetooth or set the smartphone or tablet to non-discovery mode while using the mobile banking application.

2.5.3 INTERNET BANKING

Internet banking has been prevalent in our country for a couple of years now and is steadily catching the attention of an increasing number of customers each day. Internet banking has transformed the banking habit of an ordinary Indian and is known to have emerged as the most efficient, time-saving and customer satisfying delivery channel. Internet banking is often referred to as online banking, e-banking or web-banking. Other delivery channels introduced were an extension to the traditional banking methods, but the internet banking technology is an altogether new medium of carrying out banking transaction on a whole new level. The customer can use the internet instructing the bank to carry out various transactions or even receive simple instructions and updates about their respective accounts.

Internet banking has not only brought about changes in the banking industry, but the ripple effect can be seen across various sectors. It has transmuted the design of carrying out business transactions and brought about much more ease of doing business. Business customers handle various payments and receipts through their personal computer or laptop from the comfort of their offices or homes. Clients have to no longer wait for days together for a cheque to be cleared or bother about the risk of the same cheque bouncing. Internet banking has changed the face of doing business.

A customer in order to access his or her internet banking account has to login into the bank's official website for internet banking. The official online banking website is encrypted with a minimum of 126 bits to ensure that the communication between the client and the bank servers are safe and secure. Nowadays all banking website's URLs start with "https" – in which the "s" stands for secure, thus meaning that the website is encrypted and secured.

Online banking caters to two different segments as follows:

- **Retail Online Banking:** Retail banking is often referred to as personal banking. Retail banking is that segment where the bank caters to the individual retail customers (general public who have an account with the bank). The volume of clientele, in this case, is comparatively enormous as compared to that of the clientele of corporates.

- **Corporate Online Banking:** Corporate Online banking is also known as commercial banking or business banking. Corporate banking caters to business organizations rather than individual customers. In this case, the clientele base is much smaller as compared to the retails clientele, but this segment is often considered the key profit center for the majority of the banks. The Corporate Online banking segment in some banks is again divided into various categories based upon small, medium and large scale business enterprises.

- **THE SERVICES/FACILITIES AVAILABLE ON INTERNET BANKING ARE AS FOLLOWS:**

  - Deposit account (e.g., Saving, Fixed, Recurring) and Loan account inquiry
  - Payment of utility bills – such as mobile, credit card, electricity, school fees, gas, insurance premiums.
  - Request for the online opening of Accounts – Savings / PPF (Public Provident Fund / Overdraft
  - Request for Demand Draft / Bankers cheque to the registered home address
  - Easy and quick mobile Top-up and DTH Recharges
  - Application for new ATM/blocking of ATM card
  - TDS details / Forms 26 AS / Submission of Form 15 H & G
  - Payment of direct taxes such as Income tax, Corporation tax, Tax deducted at source, Tax collected at source, Wealth tax, gift tax, excise tax.
  - Opening of instant Term Deposits – e-TDR (Term Deposit Receipts) /e-STDR (Special Term Deposit Receipts) and Recurring Deposits
  - Nomination facility – Registration / updating / change
  - Availability of Mini / Short statement
  - Request for Account Statements / Interest Certificates / Provisional Certificates
  - Request for a cheque-book / enquiry of cheque / stopping of cheque
  - Funds Transfer – Intra Bank (within the bank)
  - Funds Transfer – Inter Bank (other banks) RTGS, NEFT and International FOREX transactions

- Operation of multiple accounts with a single User-id password
- Auto-payment / schedule payment facility
- Personal details – updating / change
- Purchase of IPO / FPO / Demat / Mutual Fund / Insurance / PPF / NPS contribution
- Selection of user interface / personalized
- Branch and ATM locator
- E-shopping / railways and airway ticket booking / movie tickets
- Login / Transaction password - change and reset

Classifications of security measures for Online Internet Banking as per their risk-weighted category are mentioned below:

Table 2.3 : Weighted-risk upon security measures of Internet Banking users

Internet Banking Security Measures based upon weighted-risk	
Sr. No.	**High-Risk Security Measures (Weighted Risk 3)**
1	Typing of the URL directly in the address bar of the browser to access internet banking
2	Do not click or login to any links in an e-mail message to access internet banking
3	Never respond to email/SMS or calls which inquire about personal information, password or one time SMS (high security) password as any such e-mail/SMS or phone call is an attempt to fraudulent activity
4	Never disclose the Internet Banking Password to anyone. No bank staff will ever ask you for your Password
5	Do not write your Internet Banking Username together with your password. Do not write your password in a recognizable format and never leave your login details with your Online Security Device
6	Disable the function on your computer or browsers that remember login details
7	Check the site certificate. Use the site with HTTPS:// rather that HTTP:// which ensures that the connection is secure

8	Always log-out after using Online Banking. Select the log-out button and do not directly close the browser and never leave the computer unattended especially when you are logged in into your online banking
Sr. No.	**Moderate-Risk Security Measures (Weighted Risk 2)**
9	Ensure that your personal computer is well protected with the latest anti-virus and firewall protection software at all times. Download updates regularly to ensure you have the latest protection
10	Choose a Password that is memorable to you but not easy to guess by someone else. Passwords could contain 8 to 12 characters, which includes a combination of alpha and numeric characters, and a minimum of one special character (e.g., a7g3@cy91#)
11	Do not choose a Password that is often used for other services. Internet banking password should be unique
12	Keep your Web Browser updated. Use recognized browsers like IE, Mozilla Firefox, Opera, Google Chrome
13	Enable Firewall
14	Always keep your Bank's customer service desk number handy in-case of any doubt in-order to freeze or block the account until you confirm with the bank staff
15	Avoid the use of public computers to carry out online banking transactions, including those at libraries, internet cafes, and schools
16	Delete the browsing history before logging out of the computer: Some internet browsers store information such as passwords and pages visited.
Sr. No.	**Low-Risk Security Measures (Weighted Risk 1)**
17	Change the Internet Banking Password on a regular basis
18	Checking of account details regularly and in case of a doubt, one should immediately contact their bank home branch.
19	Always check the last log-in date and time on the post-login page

2.6 CYBER CRIME / E-BANKING FRAUD

Although technology plays an indispensable role in the banking and business sector yet, there are very evident traces of drawbacks it carries along with it. The footprints of e-banking can be seen all across India and so does e-banking fraud.

The Reserve Bank of India has defined fraud as "A deliberate act of omission or commission by any person, carried out in the course of a banking transaction or in the books of accounts maintained manually or under computer system in banks, resulting into wrongful gain to any person for a temporary period or otherwise, with or without any monetary loss to the bank."
The various types of fraud in relation to e-banking are explained below:

- Phishing
- Spyware and Adware
- Card Skimming
- Phishing over the phone
- Identity theft
- Viruses and Trojans

➢ **Phishing:**

In case of this kind of frauds, a scamster looks to steal information such as the User ID and passwords of customer operation various e-banking technologies. "Phishing" is a form of internet banking fraud wherein a fake identical website which looks like a duplicate of the genuine is created and sent to various customers operating internet banking. Later when the customer tries to login into his or her account by entering the User ID and password thinking it is the bank's official website he inadvertently feeds the same information into the database of the fraudster.

➢ **Spyware and Adware:**

Spyware and Adware are such kinds of programs that appear as pop-ups or advertisements online while surfing the internet. These types of programs usually come bundled with free or cracked versions of other software that are downloaded online. These spyware and adware are automatically downloaded with cracked version software's and are installed automatically on the customer's computer which

later gathers all sort of personal information of the user and reported to various advertising agencies and fraudsters.

- **Card skimming:**

Card skimming is when a fraudster copies and retrieves the data and PIN from a magnetic strip debit or credit card of a bank customer. This kind of illegal activity is usually carried out at secluded or tampered ATM's or POS (Point of Sales) Machines wherein a customer's card is used to make payment. Such data is transferred to a counterfeit card later used by the fraudster to carry out online shopping and withdrawals.

- **Phishing over the phone:**

Fraudsters have now found alternative ways as old fraudulent methods are made aware of, and due precautionary measures have been taken. Imposters have now resorted to false and decoying phone calls as customers are tricked into disclosing the personal details such as PIN or OTP (One Time Password) into the hands of such imposters. Such scamsters lure a customer by claiming they have won various prize and gifts and as verification process needs to send an OTP which is later used to dupe innocent customers of their money.

- **Identity theft:**

In this case a scamster uses a complete different identity of another customer by using fake documents like passport, election card, driving license or aadhar card of another customer thereby opening fake accounts and fraudulently using credit card facilities, overdraft, obtaining loans from several banks and even carrying out other illegal and anti-national funding's through these accounts

- **Viruses and Trojans:**

Harmful programs or add-ons in the form of viruses and Trojans can affect a customer's computer device thereby obtaining personal and confidential information. The same viruses and Trojans can even be harmful to the electronic device as it negatively affects the performance of the computing device as well as damages the

system software. These viruses and Trojans if not detected or deleted in time can multiply and embed themselves to monitor banking activities.

2.7 SUMMARY

Banking has come a long way in India since its inception. The evolution of the system, infrastructure and approach had scaled new heights. Technologies such as ATM, mobile banking, and internet banking, the prominent e-banking technologies have been of prime focus in the study. The benefits of technology towards a customer as well as a banking organization have been enumerated. Facilities/services available on each respective e-banking technology have been explicated. The security measures required to be adopted by a customer while using each of the e-banking technology has been listed along with the allocated risk weights. Different types of e-banking frauds have been conferred about relating to ATM, mobile banking, and internet banking based upon all of which an exhaustive literature survey was a requisite.

CHAPTER III

LITERATURE REVIEW

3.1 INTRODUCTION

A literature review is a thorough reporting of information in the literature related to the selected areas area of study after very detailed evaluation and analysis. It forms a foundation and a basis upon which new researchers determine their area, nature, the scope of research work. The primary objective behind giving a detailed literature review is to convey to the readers the knowledge and ideas which have already been established and proved on various topics of study and the weakness and limitations maybe their research contains. For the purpose of this study, various online, offline journals, and thesis published in India as well as across the globe have been referred, in order to draw a bigger view of various facets to be considered for the purpose of the study.

3.2 REVIEW OF JOURNALS

- **(Olusanya and Fadiya 2003)** The researcher through this paper seeks to measure customer satisfaction with regards to ATM services. In order to study the measure of satisfaction with this regard, a questionnaire was designed with questions about the services which were again rated on a scale of 5 points of the Likert scale. The populations under study were bank customers that constituted mainly from the United of Africa within the area of Lagos. The sample considered for the study was 200 respondents. The Pearson correlation and regression analysis were some of the methods used to establish a relationship and analyze the data. The author was of the opinion that ATM service should able to provide enhanced interactivity and deliver a relaxed and easy experience to the customer and secondly that banks should not only concentrate on providing short-term satisfaction to ATM users but also look to retain their customers.

- **(Ahuja 2003)** The researcher in her study highlights the consumer awareness about various green banking initiatives by various banks. The study also attempts to analyze the various problems in the implementation of green

banking. She has also compared the green banking practices of the public sector and private sector banks. A case study of SBI bank has also been conducted in order to study the various avenues and urgency of green banking. The author is of the opinion that banks as well are corporate citizens and have to concentrate on green banking as a critical issue to national development. She has recommended that adequate training to staff and customer along with various educational programmes will make green banking a colossal success.

- **(Kaur 2007)** The researcher through his article looks to identify the advantages of the use of green banking. The source of information has been secondary sources such as journals, magazines, and research articles. Various green banking products were first identified such as green loans, green mortgages, green credit cards, green saving accounts, mobile banking and internet banking. The advantages a bank gets through the adoption of the same were identified as follows: it saves time, leads to rationalization of paper usage, makes people constantly aware of global warming and creates social awareness of the responsibility among people. The author further suggested that websites could be used to make people more aware of green banking initiatives.

- **(Srivastava 2007)** The researcher has focused on the perception of the customer with regards to internet banking. He also looks to find the various factors that influence the non-usage of internet banking. A total of 500 respondents were interviewed with a well-structured questionnaire. The bank customers interviewed were selected from Mumbai who knew how to use the internet. The Likert five-point scale was used to measure the opinions of various customers. The percentage method and chi-square analysis were used to analyze the data. The analysis revealed that factors such as education, culture, religion, gender price and security had a minor impact on the customer influencing the same to use e-banking. The researcher further suggested that with an upgrade of necessary skills in computer and internet the customers would be encouraged to use more of e-banking.

- **(Garg, Jha and Chamoli 2008)** The authors aim to identify the factors that the customers perceive to be existing while using an online bank service. The

respondents were selected from the region of Meerut by using stratified random sampling with a sample size of 350 internet users. 14 factors were identified and listed on a questionnaire using a 5 point Likert scale. Data were analyzed with statistical tools such as Chi-square with the help of SPSS. The results showed that a customer looks for good simulation, clear navigation options, availability of features and privacy of E-banking website which are elements considered in the website quality.

- **(Singh and Komal 2009)** In their paper, they made an attempt to analyze the impact of ATM on customer satisfaction for which they conducted a comparative study of three major banks, i.e., State Bank of India, ICICI Bank, and HDFC Bank. The researchers collected primary data through an ATM structured questionnaire with a sample size of 360 respondents with all of the respondents equally representing each bank selected. The F test was used in order to study the variances in satisfaction levels of customers from various branches. The author concluded that the satisfaction level of customer of SBI was the highest to which ICICI was second and third was HDFC proving that size of bank and year of its establishment created a considerable significance.

- **(Luca, Langheinrich and Hussmann 2010)** The researchers in through this paper look to understand the ATM security through which in turn the implications of the design of ATMs and the evaluation mechanisms in place for authentication of ATMs has also been studied. This study was carried out through a field observation method in 6 different locations of central European cities, i.e., Munich (Germany) and Delft (Netherlands). The sample size considered for the study was 360 users of ATM cards observed during 44 sessions of sitting. The results of the study showed that contextual factors of security and performance such as distractions, physical hindrance, trust relationships and memorability of ATM pin have a significant influence on the use of ATM card.

- **(Baghdadi, S Rizvi and H Rizvi 2011)** The researcher tries and identifies the reasons and the need of adopting electronic banking in today's modern era. The main reason for identifying the factor is because of the tremendous amount of

money invested in a reliable infrastructure for e-banking. For this purpose, the researchers have carried out an intensive literature review and conducted a descriptive study. They are of the opinion that e-banking gives the customers a sense of unrestricted use, while its willingness to use depends upon the security measures, network, speed, accuracy, and user-friendliness. They were also of the opinion that the brick and mortar coordination would achieve a high adoption rate of e-banking.

- **(Premlatha and Sharma 2012)** The authors have studied the different factors that are affecting customers' satisfaction for ATM services. The study is restricted to the area of Vellore district in Tamil Nadu. The sample size considered for the study was 200 bank customers. 5 different hypotheses were framed with respect to age, education, occupation and its association with ATM usage; operational problems faced and awareness of security measures. The authors adopted simple percentage and chi-square analysis for the testing of formulated hypothesis. Some of the significant findings were that with respect to the denominations, majority customer had agreed to the dispensing of those denominations as specified by them. Secondly, customer strongly agreed to the need and requirement of ATM with the new age technology. Lastly, customers felt safe and secured using the ATM card.

- **(Bamrara, Singh and Bhatt 2012)** The researchers attempted to study the responsiveness of banks and customers satisfaction level by its cyber-crime victims. The author collected secondary data, reports published by RBI, Deloitte, KPMG, and many others have been analyzed. Besides secondary data, primary data with a sample size of 100 respondents was selected. Chi-square and Karl Pearson coefficient of correlation have been used to study the relationship between various variables. The results pointed out that confidentiality on behalf of the bank, financial security and reliability of the banking system was negatively correlated with types of bank account while bank reputation had a positive correlation with the type of bank account.

- **(Boateng, Amponsah and Adomako 2012)** Were of the opinion that since banks in Kumasi, Ghana wanted to increase customer base and simultaneously

maintain their existing customer base it was necessary to provide quality product and services. As a result of which they were keen on understanding the main reason for implementing the use of ATM cards from the customer's as well as bank staff point of view. A total sample of 200 various respondents was taken into consideration. They further recommend that in order to achieve higher profits banks should primarily concentrate on service quality dimensions.

- **(Singh 2012)** He explored the risk factors that were accountable for faking electronic money in E-banking and measures taken by respective banks to overcome such risk. A total sample size of 311 respondents from Haryana, Punjab, Chandigarh, and Delhi from the public, private and foreign banks were considered for the study. Statistical tools such as ANOVA were used to test the data with the help of PASW 18.0 version. The results indicated that the most crucial reason for criminals to falsify the electronic money was for funding of improper payment. It concluded that in order overcome such risk the best measure was to develop and follow the audit trails online.

- **(Chattopadhyay and Saralelimath 2012)** The authors have attempted to study the relationship between demographic variable, awareness of ATM services offered, problems faced and preference to use an ATM card. In order to analyze and test the hypothesis, data was collected from a sample size of 300 respondents who were bank customers from three different cooperative banks from the city of Pune. The authors used frequency tables, Percentages and chi-square tests for data analysis and interpretation. The authors were of the opinion that banks should concentrate on educating and training the female customers as well as the older age group customers to use the ATM card. They also suggested that a number of ATM's could be increased and special incentive schemes could be introduced to increase ATM usage.

- **(Sawalqa 2012)** The author attempted to study two primary objectives, that is to assess the effect of low-cost facilities, security and confidentiality and ease of use of ATM card play had a significant influence on the financial needs of ATM users. Secondly, the authors study whether there is a difference in the

customer's financial need satisfaction dependent upon their age, gender or qualification. In order to achieve these 2 main objectives the author analyses data based on a survey conducted on 132 ATM users from the city of Jordan. The study concluded that only privacy and security contributed significantly to the customer's financial needs satisfaction and also revealed that the demographic profile of customers did not play any role in the financial needs satisfaction of ATMs

- **(Hassanuddin et al. 2012)** The authors aim to examine the aspects influencing the acceptance of online banking services provided by Bank Rakyat (Malaysian co-operative banks). For the purpose of the study, various independent variables were identified such as security and privacy, ease of use, quality of internet connection with which were compared to the acceptance of internet banking services. The stratified random sampling technique was used with a sample size of 171 respondents from the Pasir Mas branch which consisted of employees and customers. Although the evidence showed that security and privacy, internet connection quality and ease of use contributed towards acceptance the logistic regression analysis was used to note any further relationship. Some of the significant findings were that uninterrupted internet connection could increase the use of internet banking by 6 times as compared to those with a poor internet connection.

- **(Njuguna et al. 2012)** The researchers aim to study the factors that have influence the bank customers to adopt internet banking. For the perseverance of the study, a survey was conducted wherein a total of 300 respondents were interviewed from the town of Nairobi situated in Kenya. The study was conducted during the year 2010 and 2011. The prime objective of the research was to analyze and specify the reasons that had an influence on the acceptance of internet banking amongst those individuals who had their bank accounts with commercial banks in Nairobi County, Kenya. The authors have used an extended model of TAM (Technology Acceptance Model) with extended variables such as risk and self-efficacy considered as well as the reduced model of PCI (Perceived Characteristics of Innovation) without variables voluntariness and image. The study revealed that revised PCI and TAM model

displayed a 20% variance from the intended variance. The research further directed that the perception of users' of internet banking was much more positive than that of non-users' of internet banking. Some of the suggestions were that banks could launch a demonstration drive indicating the usefulness and benefits one would receive in case of adoption of internet banking, while for the existing customer's banks should make continuous efforts with respect to the development of designs and satisfying customers ever increasing needs.

- **(Hasan et al. 2013)** The researcher aimed at studying the effects of technology-based service quality of ATM's and its effects on customer retention. To carry out this study data was from different from different banks of Pakistan from Mianwali and Sargodha. A sample of 240 respondents with a diverse demographic profile was selected for the study. The sampling technique of Non-Probability random sampling in the form of convenience sampling was used to collect the data. The ATM SQUAL (Service Quality) questionnaire method was adopted from Joseph and Stone, (2003) for the research. Research analytical methods such as correlation and regression were used to analyze the data. The authors suggested that since service quality of ATM leads to customer retention in the bank, it's better than a manager concentrates on ATM service for long-term retention of customers.

- **(Shanna 2013)** Had conducted an explanatory research to study the strengths and weaknesses of the E-banking industry in Jordan. Two sets of questionnaires were designed, one to interview customers for which 22 respondents were selected while the other was addressing the local banking executives. 4 hypothesis studying 3 main dimensions such as infrastructure readiness, regulatory coverage, and behavioral influences were framed in order to achieve the objective of the study. The finding showed indicated that the infrastructure and the legal and regulatory coverage were below standards as compared to the western standards. The researcher recommended that mobile-functionalities should be given more focus as compared to internet services along with organizing awareness campaigns to understand various types of services and security measures.

- **(Jha and Bhome 2013)** The authors in their study look to identify the various ways to go green through green banking. The researchers also seek to analyze the awareness level of green banking among bank employees, associates, and the general public. A sample size of 12 bank managers, 50 bank employees, and 50 bank customers were considered for the study. The authors highlighted various methods such as checking of account details online, cheaper loans for green homes, use of power saving equipment's by individual bank branch, green credit cards and others as green banking methods.

- **(Dhar and Rahman 2013)** This paper looks to study the bank ATM queuing model in order to understand the wait time in the ATM queue so that the customer avails the desired services. The authors studied the waiting lines from BRAC BANK ATM, at Chittagong city, Bangladesh. The methodology used for the study was Little's theorem and ATM Model (M/M/I queuing model). The researchers observed that the arrival of customers is 1 per minute, while the service rate was 1.50 customer per minute. The buffer flow recorded, i.e., if there are 3 or more customers in line was 10 out of 100 customers.

- **(Perkins and Annan 2013)** The researchers have used a crossed-section mixed approach to study the factors affecting the adoption of online banking in Ghana. This methodology was based on the TAM (Technology Acceptance Model). Data were analyzed using statistical tools such as ANOVA and Multiple Regression Analysis. The original construct of the TAM, i.e., Perceived Ease Of Use (PEOU) and Perceived Usefulness (PU) showed a considerate amount of significance along with government support, security and trust. The authors suggested that the bank managers could make paybacks that are gained from benefits of online banking such as higher deposit rates and lower transaction cost.

- **(Momeni, Kheiry and Dashtipour 2013)** The authors seek to study the effects of online banking upon the customer loyalty and satisfaction. Due to the increasing pressure of customer demand and with an aim to lower sustainable cost internet banking has gained importance. For this purpose, the researchers have administered a questionnaire among 358 respondents who are

using e-banking services. The respondents were from 6 various branches of Melli Bank in Tehran, Iran. The structural equation model has been developed with the help of LISREL software. The SEM approach demonstrates that ease of service, the speed of connectivity and transactions, website design, security, support services has a significant effect on customer satisfaction while satisfaction of customer had a significant impact upon the loyal of a customer.

- **(Padachi, Rojid, and Seetanah 2014)** Analysed the factors that encourage the acceptance of internet banking in the developing African economy of Mauritius. A total of 188 respondents represented the population. Data indicated that services such as inter-account transfers, payment of credit cards, mobile recharges were some of the most commonly used services over internet banking. Factor analysis was used to list out the factors influencing the use of internet banking which was further identified as ease of use, trustworthy relationship with the bank, cost of computers, internet accessibility, the convenience of use and security. The analysis also pointed out to a significant relationship between the length of a banking relationship, access to internet facility, awareness, and education level and income group with that of usage.

- **(Jahangir and Begum 2014)** The main aim to conduct the research was to investigate whether perceived usefulness, security, customer attitude, privacy and ease of use have a positive impact on the adoption of E-banking technologies. Structural equation modeling technique was used to study the data collected from 227 respondents who were customers of private banks in Bangladesh. The confirmatory factor analysis and structural equation modeling Amos 5.0 had been used. The study revealed that the identified factors like perceived usefulness, ease of use, security, and privacy had a positive impact on the adaptation of E-banking.

- **(Al-abedallat 2014)** The goal of the study was to study the obstacles that prevent the increased usage of ATMs in banks. The study was carried out on the customer in Jordan. A questionnaire was designed adopting the Likert scale which was used to measure the relationship between the obstacles and that of not using ATM cards. A sample size of 120 was considered for the same. The

researcher used the Scheffe Post Hoc Test, multiple regression analysis and other statistical stools with the help of SPSS to analyze the data. The author concluded by recommending the commercial banks to develop a marketing plan that aimed at increasing the awareness of ATM among bank customers.

- **(Tasmin, Aliyu and Takala 2014)** The authors have summarized various views reviewed in the form of qualitative research by reviewing a number of papers on customer satisfaction derived as a result of the influence of various electronic banking services. Through their study, they have identified 3 vital behavioral factors that underwrite the success of an effective service which was security, convenience, and charges. It was recommended that no sooner the hierarchy and the managers in banks have a clear understanding of the underlying factors it would only then help them channelize and re-direct resources in a more effective and efficient manner.

- **(Sowunmi et al. 2014)** The objective of their study was to find out whether there was a variation between cash withdrawal by an ATM user and a non-ATM user as well as to identify the likely factors influencing ATM usage in Lagos, Nigeria. 180 respondents were interviewed from local areas in Lagos. Simple percentage method was used to study the variation in the withdrawal of cash while the Probit model was used to study the probable factors influencing ATM usage. It was revealed that the demand for money by an ATM user per month was significantly higher than a non-ATM user while the Probit model used, proved that as with an increase in the customer's age the probability of using an ATM also increases.

- **(Mumin, Ustarz, and Yakubu 2014)** The authors have made an effort to study the operational features and usage of ATMs as well as the factors that ask for the willingness to use ATM. The authors have used the queuing modeling to study the operational features while the Probit model was used to study the factors affecting customer usage. A sample size of 160 bank customers from the Wa Municipality of Ghana was used for analyzing purpose. The authors were of the opinion that since there was the intensive use of ATM in the Wa-Municipality the most influencing factors that had an effect on the usage were

number of ATM per bank, convenience, security, efficiency and low transaction charges and attainment of higher education. They recommended that the number of ATMs and quality of service should upsurge in order to increase access and usage of ATMs.

- **(Jegede 2014)** The researcher through his study investigates the effects of ATM on the performance of Nigerian banks. For the purpose of the study, the author has collected data from a sample size of 125 employees from selected banks from the Lagos state. The chi-square technique has been used to analyze the data collected. The results showed that the benefits of deployment of ATM terminals had averagely improved the performance of Nigerian banks as due to a high number of ATM frauds which were reducing the performance. The author also found that the ATM service quality was not correlated with security and privacy. The researcher recommended that government should intervene with laws that will improve ATM security.

- **(Adeniran and Junaidu 2014)** The researchers attempted to measure the satisfaction level of ATM users in Nigeria as they seek answers to decongest the banking halls. A sample size of 100 respondents from United Bank for Africa in Sokoto metropolis was considered through across sectional survey of 5 Likert scale questions. Multiple regression analysis was used for the purpose of analysis. The authors concluded that customers were satisfied with perceiving ease of use of ATM, service security and transaction cost but were not satisfied by the dispensing of cash by the ATM. The authors also suggested that officers-in-charge of cash should always try and ensure availability of cash.

- **(Geetha 2014)** In her study, the researcher studies the problems that are faced by the bank customer with respect to ATMs. This study also covers various types of frauds and techniques in ATMs. An observational method and exploratory study of the various security measures was conducted. The author concluded with valuable precautionary measures for customer's in-order to practice safe ATM usage practices. Some of a few suggestions were that every customer should always watch for any suspicious person or activities

happening around an ATM and in case of such suspicion do not use the same ATM. Visit an ATM during the day as much as possible especially for female customers. Never to throw the ATM transaction slip in the dustbin provided in the ATM carry it along and dispose it at home by tearing the slip.

- **(Ibukun 2014)** The researcher through his study aims at studying the customer satisfaction derived from the use of ATM banking system. A total of 40 ATM users various Commercial banks in Nigeria branch were selected. The sample size was selected by random sampling methods. The research also aimed at understanding the various services used by customers on these ATM's. SPSS was used to investigate the data using Pearson chi-square statistic to test the hypothesis. The results depicted that the customers were delighted especially with the cost of using an ATM, timings of the ATM's and the average waiting time was maximum 5 minutes. Sanitization of the other services offered by ATM's was highly recommended.

- **(Danlami and Mayowa 2014)** The authors through their study scrutinize the usage of ATM as well as its usefulness in the city Ilorin in Nigeria. For the purpose of this study, three commercial banks were selected namely First Bank of Nigeria, Guaranty Trust Bank and First City Monument Bank. A total of 180 customers were randomly interviewed from all three selected banks. Statistical tools such as percentages, charts, and chi-square have been used to test the hypothesis. The writers were of the view that the banks could increase their investment in Information and communication technology while the regulatory bodies of the financial sector should reinforce and introduce a stringent framework that will ensure customer protection.

- **(Nigudge and Pathan 2014)** The researchers through their study stress on the various types of services being offered as a result of E-banking. Some of the essential types of services mentioned were Automated Teller Machines, Telephone Banking, Electronic Clearing Cards, Smart Cards, Electronic Funds Transfer (EFT) System, Electronic Clearing Services, Mobile Banking, Internet Banking and Telebanking. They have also highlighted the importance of E-banking in today's business world. As a result of the study, various challenges

such as infrastructural, knowledge, legal and security, economic and socio-cultural were identified.

- **(Nuwagaba and Brighton 2014)** The researcher aims to analyze e-banking technology so as to improve the services offered by banks in Zambia, Southern Africa. For this purpose, a qualitative and quantitative study with the help of secondary data from various reports from the Bank of Zambia was considered. The period for the same was from December 2012 to December 2013. Data analysis was done using the correlation coefficient tool which was represented by +1 for a healthy relationship and -1 for a weak relationship. The researcher through his study indicated that there was a positive correlation between RTGS, cheque image clearing, EFT while mobile money showed a negative correlation while test on POS and ATM showed all positive correlation coefficients. The researchers concluded with the opinion that telecommunication, IT sector contributed hugely to the improved services of banks and had to develop even further to make e-banking safer and trusted gaining more acceptance in the future.

- **(ElAziz, ElBadrawy and Hussien 2014)** The researchers in their article aim to study the relationship between self-service technologies such as ATM, Internet Banking, Mobile Banking and perceived ease of use, usefulness, risk, need of interaction, cost, and demographics of the users. The researchers conducted an empirical study on bank customer wherein 1500 structured questionnaires which included questions on a 5 level Likert Scale were distributed among ATM, Internet Banking, and Mobile Banking customers. The analysis was conducted on the data collected using chi-square test, frequencies, and cross-tabulations. The results indicated that the observed usefulness, ease while using, cost of operations and the requirement for communication had a substantial effect on the usage and adoption of various e-banking technologies. While on the other hand perceived risk had a consequence on both the users and non-users of mobile banking and ATM card only.

- **(Nath, Nayak and Goel 2014)** The researchers through this paper have reviewed various literature like magazines, annual reports, environment reports bringing to light the different initiatives carried out by numerous banks. Top performing banks based on net profit were selected from the private and public sector for the study. Some of the unique initiatives were State bank of India adopted the GCC (Green Channel Counter) in 2010 to change over from traditional paper-based banking to electronic-based banking. Punjab National bank conducts an electricity audit for measuring the amount of electricity consumed by offices after adopting green initiatives. Bank of Baroda, on the other hand, gives preference to environmentally friendly projects such as a windmill, biomass, and solar power projects. ICICI bank has adopted the go green initiatives such as green products/contributions, green engagement, and green communication.

- **(Ogunlowore and Oladele 2014)** The authors aim to study the complaints with respect to e-banking in Nigeria, as well as they also seek to identify the challenges affecting smooth implementation of electronic banking. The respondents from Lagos, banking with GTB bank in Nigeria were considered for the purpose of the study. The sample size considered for the study is 120. The simple percentage method along with the chi-square method was used to test various hypotheses. The chief conclusion was that there was a significant relationship between customer's satisfaction and electronic banking, while factors such as efficiency and accessibility, the speed of transaction, flexibility, and convenience contributed to the popularity of e-banking. The researchers suggested that necessary infrastructure like telecommunication, security; power requires significant development and foreign direct investment in the same would be an additional advantage.

- **(Massoud, Saunders and Scholnick 2015)** The authors look to examine the impact of ATM surcharges levied on the customer from larger banks and smaller banks and whether these charges had an influencing factor over a switch between small banks to a large bank in order to avoid surcharges. The authors covered an overview of ATM growth and presented a model that showed how the bank ATM surcharges had an impact on the bank's

profitability. Hausman test was used to indicate the random and fixed effects. They concluded that the market share of deposits in large banks increase and that of smaller banks decreased with the increase in ATM surcharges.

- **(Sadiq and Balachandran 2015)** Scrutinized the revolutionary trends that were set as a result of the adoption of E-banking in Malaysia. The objective was to study the factors which influenced the customer to use the same as well as studied the customer's preference for adopting the E-banking service. A sample of 300 respondents from different age groups and educational backgrounds were considered for analysis. Results indicated that awareness, computer access costs, banks trust, security, ease of use, convenience and attitude towards change were the significant factors influencing internet banking services in Malaysia. Furthermore, it was understood that the banks initiative to promote the benefits of E-banking to its customers would play a significant success in E-banking services patronage.

- **(Phan and Nham 2015)** In this study, the authors explored the factors that had a significant impact on service quality performance on customer satisfaction. The study was carried out in Vietnam for which the researchers examined the level of service quality of 260 customers through a well-designed questionnaire including 20 items in order to measure 5 dimensions of service quality. The authors used SERVPERF framework to analyze the data collected. The results showed that assurance and physical factors had a very significant impact on customer satisfaction.

- **(Sharma, Sarika and Gopal 2016)** Their study aimed to identify the awareness level of the bank employees along with the customers with respect to green banking initiatives. Socioeconomic factors were studied relative to the green banking initiatives taken by public and private sector banks using various statistical tools in SPSS. A total of 100 respondents with 59 from private sectors banks and 41 from public sector banks were interviewed. The authors were of the opinion that all banks should work closely with government, NGO's, IGO's, Central Bank, business communities and consumers to achieve the goal of green banking. The authors recommended that banks could give

concessions on use of energy-saving products, banks could make use of solar-powered ATM's and initiatives by banks with respect to green technology should be communicated through the press.

3.3 REVIEW OF THESIS

- **(SivaRama 2009)** In his thesis, he has concentrated prospects of using ATM card, the purpose of using the same and problems faced. The researcher has used multi-stage random sampling method and has selected 300 respondents from Sri Kalahasti, Tirupati and Chittoor town of Andhra Pradesh. Simple statistical tools like average and percentages were used for the purpose of analysis. The research concluded that customers would mainly visit the branch for withdrawing cash, balance inquiry and depositing cash. He also found that majority of the respondents would transact up to a maximum of 3 transactions per month. The author suggested that due care with respect to the selection of the location of ATM should be taken, frequent cost-benefit of the ATM should be reviewed and proper placements of boards with the attractive color should be placed on main roads indicating an ATM.

- **(Modi 2009)** The researcher in his study analyses the impact of the emergence and integration of ATM in Indian Banking Industry and also studies the impact of globalization on the financial services. The researcher has used a causal and descriptive approach to study. A total of 363 respondents with the help of stratified sampling technique were identified and surveyed from the Western, Harbor and Central Zone of Mumbai. Techniques such as frequency table and chi-square were used to analyze the data and test the hypothesis framed. The key results of the research were that in a city like Mumbai the average users of ATM were much more than non-users especially in the income group of Rs. 2 Lakh and above. It was found that people in Mumbai were usually working class and students who would prefer using ATM's due to their busy schedule. It was also found that private bank ATM users were more than government bank ATM card users.

- **(Hamid 2012)** The foremost objective of his study was to examine the effect of electronic banking on its customer's loyalty and customer value. A total of 13 commercial banks in Jordan were chosen from which 206 replies by various respondents were selected as sample size. Various dimensions of customer value and customer loyalty were studied with the help of both 7 and 5 points Likert scale. Various statistical tests such as Cronbach's Alpha, simple linear regression, ANOVA, and t-test were used. The finding showed that Ease of use, usefulness, and cost saved had a positive outcome on Customer value. Other dimensions such as emotional value and functional value had a positive impact on customer loyalty. He further recommended that the Jordanian commercial banks needed to innovate and develop techniques which will encourage customers to use e-banking services and that these banks need to provide detailed information about their services in order to withstand competition.

- **(Altun 2012)** The author aims to study the factors affecting an individual to adopt internet banking in relation to trust and internet security variables. 9 different hypotheses were framed for the same purpose and were tested using SPSS 18 using the regression model. The survey included 232 students and 68 instructors from the Eastern Mediterranean University students from Northern Cyprus. The following conclusions were determined that perceptions of accessibility, security, awareness, and ease of use have a positive and statistical impact on customer satisfaction and on their word of mouth. The analysis further showed that customers were looking for Internet Banking systems that give them confidence about the security, timely and realized services.

- **(Sudeep 2013)** This study Identifies factors influencing the adoption and usage of Internet Banking in India by using the 2 theories, i.e., Theory of Planned Behavior (TPB) or Technology Acceptance Model (TAM) as to which can be appropriately applied and hence to develop a model to explain behavioral intention to use Internet Banking.

- **(Geetha 2014)** In her research thesis, she concentrated upon the usage pattern and service quality of SBI ATM's from 18 areas across Salem Town in Tamil

Nadu. A total of 519 respondents with a minimum of 5 years of experience of using an ATM card were evaluated for the purpose of the study. The primary objectives of the study were to compare the growth of ATM machines along with the increase in ATM cardholders in Salem Town. The author was also seeking to study the service quality, usage pattern, utility pattern and awareness of ATM cardholders. For this purpose, the various hypotheses were framed and tested. Various tests such as Chi-square, K-mean cluster analysis, Karl Pearson's Co-efficient of Correlation and the Paired t-test was used for analyzing the data. The academic scholars established that the increase in the percentage of ATM machines was more than the increase in the percentage of ATM cardholders. With respect to the service quality of SBI ATM in Salem, Town Convenience was ranked on top followed by Privacy, Efficiency of operations, Reliability, and Responsiveness. The researcher suggested that awareness was the key to increased ATM cardholders while adequate maintenance and 24 hours service was the prime factor increasing trust.

- **(Ajimon 2014)** The researcher validated his study with the Technology Acceptance Model (TAM). The findings of his study were that customers are enlightened on various Internet Banking Services, Security features adopted by banks and that customers take great precautions for safe banking over the Internet. He also expressed the urgent need for creating awareness on the risk preventive security features adopted by banks. The study is confined to the state of Kerala.

- **(Kumar 2015)** The researcher in his study aims to analyze and compare the satisfaction level as well as opinions of mobile banking users of HDFC Bank and ICICI Bank. The researcher also looks to identify the problems faced by Mobile Banking users. A total of 500 respondents were interviewed from the various classes of the society such as salaried, agriculturist, professional and businessmen from Gujarat. The finding from the study was that mobile banking transactions were on a continuous rise and an increased satisfaction level was a result of better mobile banking services and facilities. The author suggested that banks introduce modern and well-developed services while rendering personalized services. He also suggested that banks could organize public

exhibitions and talk shows in order to make its mobile banking services more accessible.

- **(Mirsath 2015)** The primary objective of the researcher is to determine the relationship between the frequency of using mobile banking users, and they're respective socio-economic and demographic characteristics. Some of the other objectives were to study the problems with respect to mobile banking. A total number of 427 respondents were interviewed out of which 200 were from the private sector while 227 were from the public sector; a 3 stage sampling technique was used to determine the same. Various statistical tools such as Chi-square test, Factor analysis, Rating scale, Regression analysis, Kolmogorov-Smirnov test, ANOVA and Garrett's score were used to analyze the data. Some of the major findings were, the majority of the respondents would use mobile banking at least once or twice a week. Most of the respondents using mobile banking were males from the age group of 21-30 years. The author proved that the frequency of usage of mobile banking depends upon independent factors like religion, community, income and is independent of gender, age, marital status, and educational level. The researcher suggested that mobile banking could become more popular with a combined effort of the bank as well as the telecom industry. Cheap, reliable, comfortable, regional language were some of the suggestions given in order to improve mobile banking services.

- **(Raju 2015)** The researcher aims to understand the various purposes for which self-service banking technology are used, the factor influencing its adoption and to identify its pull factors which limit its use. A total of 480 respondents from Kerala were interviewed for the same purpose. Statistical tools such as Multiple Regression, Correlation, Tukey Multiple comparison test, ANOVA, t-test, Z test and chi-square were used. Some of the major findings was that the Public sector banks were the most preferred with respect to self-service banking technologies, age-wise classification revealed that most of the respondents within 26 to 35 years would resort to self-service banking technology; it was also found that as compared to ATM users' internet banking users were more cautious with respect to security.

- **(Khan 2016)** The objectives of the researcher are to analyze the trends, growth, and issues emerging with respect to mobile banking as well as to develop strategies to enhance mobile banking. A total of 150 respondents were selected out of which 100 were customers, and 50 were bank employees from various public and private sector banks. The respondents selected were from the Southern Rajasthan from Udaipur with the help of convenience sampling technique. Various statistical tools like standard deviation and z test were used to test various hypotheses framed. Some of the significant findings were that bank employees felt that mobile banking improved service efficiency; it was also found that a significant reason behind deciding to use mobile banking was time-saving. The researcher suggested that banks make a mandatory disclosure of risk and security while using Mobile Banking as well as banks should provide multiple channels for registration wherein a customer does not require visiting the branch for registration.

3.4 SUMMARY

ATM card, mobile banking, and internet banking have been the predominant banking technologies that banks have been inspiring their customers' to get accustomed to. The review of the literature had studied various aspects and viewpoints such as adoption, green banking; sustainability of e-banking technology along with its risk with respect to ATM, mobile banking as well as internet banking which gives an overview of previous research work. Since literature review has always been the determining factors in a well-investigated research gap, Indian as well as global viewpoint was taken into consideration for analyzing the research gap. An intensive theoretical base from various journals, news articles, books, the thesis has benefited from drawing an adequate sample size, objectives, hypothesis, and statistical models along with the outcome of the research were noted upon which the research gap has been established. A critical appraisal of the literature has followed the same under study.

CHAPTER – IV

RESEARCH METHODOLOGY

4.1 INTRODUCTION

A literature review has been a critical factor in identifying a suitable research gap. Extensive literature survey also gives a basic understanding about various studies carried out in the same area of study, provides useful information about the do's and don'ts of research, and most importantly the systematic methodology that needs to be followed during the course of study. The methodology in this study has identified a research gap which is followed by a systematic description of various methods used to elucidate the research problem.

4.2 BACKGROUND OF STUDY

The banks play a very vigorous and dynamic role in the economy and financial system of any country, while technology plays an equivalent vibrant role in the system of the banks. Among today's generation, the survival and fate of a bank organization are dependent upon its efficiency of the delivery of the services through the adoption of latest technology. Information technology is not just a mode, but it stands as a key difference with reference to the type of product and services available in the market. It is the modern day customers that are the driving force behind innovation and revolutionizing technology we are witnessing nowadays.

With reference to the above although we understand the importance of technology in the banking sector yet, there are many shortcomings faced by such organization. Although we find common men continuously hooked to their mobile phones using the same for internet surfing, social networking, online shopping the figure that is being reported by RBI with reference to e-banking technologies is shockingly low. The best of technologies have not yet interested the mindset of the customers to adopt the same. Therefore it becomes increasingly important to identify those factors that have influenced those using e-banking technologies

while it is equally important to understand the various factors that could be leading to the non-adoption of e-banking technologies.

The amount of capital raised and invested in order to invest in the latest technology is a staggeringly high amount. The benefit from such investment can be derived only when customers put such technology to use, not just for a little period but over a period of time. As a consequence of a modern era shift of traditional banking to electronic banking and the intensified motto driven by the government and worldwide international bodies to achieve the go green objective. Therefore the studying the factors that will help in the sustainable use of the e-banking technologies and measure customers risk with respect to the use of such technology becomes very necessary.

4.3 STATEMENT OF RESEARCH PROBLEM

In recent years researchers have focused a lot on e-banking. Prior studies conducted have mostly studied the impact of the socio-economic attributes of respondents on their usage of e-banking technologies. Secondly, the authors stress mostly on the factors influencing the adoption of such technology. The various problems noted are as follows:

- E-banking technology is dependent upon various other factors other than socioeconomic factors. The other influencing factors are the internet, other technological device usage attributes and customers banking attributes which are usually correspondingly significant are not taken into consideration in previous research. Again with regards to adoption banking technologies not many reasons are identified if a customer is not availing the benefit of such technology as these essential persuasive causes would provide a better understanding for increasing usage thus forming strategic decisions to increase usage.

- Mere adoption of e-banking technologies, may it be voluntarily or compulsorily which practices many banks have now resorted to in order to achieve e-banking targets is not enough. Factors influencing a customer to adopt may just inspire him or her to use e-banking technologies for a small period of time which is not the long-term objective of introducing such expensive and advanced technology. In fact, the cost at the initial stage of creating a new user id and registering a customer for an e-

banking technology is high, but the same cost is recovered only when such technology is put to optimum use by the customer thereby decreasing the cost per transaction of the bank in the long run. Thus making it very essential to study the factors influencing the sustainable use of each respective e-banking technology in the long run.

- Literature review reveals that previous studies due attention had not been given to the security measures adopted by banks as well as the customer. The liability of a bank is also determined by the amount the bank has to pay in damages for the amount lost by the bank's customers as a result of frauds. Inadequate security measures adopted by the bank and more importantly insufficient knowledge by a customer about the procedure and caution of use of a given e-banking technology was overlooked due to which banks, as well as the customers, have borne massive amount of losses, therefore, making the study of adopting security measures a significant aspect.

- Adequate importance has not been given to the environment in an era where pollution has had the better of mankind. The amount of pollution and degradation to the environment caused by banks is enormous. Environmental studies divulge that traditional banking methods are a major cause of the environmental deterioration which makes it very important to study the awareness level of customers with respect to green banking technologies as well as initiatives taken by the banks. The green banking initiatives on lines with customers' initiation and their awareness level need prime focus.

The above problem statement states that there are a lot of areas with regards to e-banking technologies that require research, analysis, and development. The above-stated research problem is the key to this study.

4.4 NEED AND SIGNIFICANCE OF THE STUDY

Despite many studies and research being conducted various literature reviews are evidence that many areas, as well as different perspectives, have not yet been covered. The successful adoption of e-banking technologies is of prodigious importance to the banking sector for the considerable amount of sunk cost invested already into various types of technologies. Many

of the western countries have successfully replaced the traditional banking methods with the latest thereby promoting particular trade and commerce. Traditional banking methods are deeply embedded in the blood of a large population in our country. Thus in, most of the developing countries in the world, the traditional banking methods still exist side-by-side with the modern system. In fact, traditional banking practices far outnumber modern the modern practices which makes it the need of the hour to adopt the modern banking practices for more significant growth of our nation. Some of the reasons to study various areas of e-banking include:

- Individuals and businesses today rely on efficient and swift access to banking information such as bank balances, cash flow reviews and daily financial transaction for various reasons such as taking critical routine decisions, strategic and financial planning as well as auditing. Hence studying the number of users using various types of E-Banking Technologies as compared to the traditional banking methods is required.

- Banks claim that E-Banking offers ease of access, secure transactions and 24-hour banking options to its customers, therefore, studying the customer's perception about the ease of use, security measures adopted and the comfort of 24 hour banking facility which will bring a change in the mindset of customers that their money and transactions are safe is essential to gain the customers trust and confidence.

- Better customer service will help banks in customer retention and with today's increase in a number of customers quality service is possible only with the espousal of e-banking technologies. Therefore studying the customers view on whether the adoption of e-banking technologies has improved the satisfaction level of banks customer service or not.

- Many banks have started the process of imposing upon the customers to compulsory use e-banking technologies like ATM, Mobile Banking, and Internet Banking even if the customer is not willing to use the same. Mere adoption of such technologies either by free will or even by force will not make a difference as the long-term cost benefit will not have an impact unless the customers use the same technology consistently in the future but surely the short term, as well as the long-term cost, would increase as a cost of maintaining the same would increase. Therefore studies

should concentrate on the sustainable use of such technology rather than the mere adoption of the same.

- With the banks looking to cover a broad base of the customer currently not having bank accounts it is important to study how E-Banking Technologies will help in attracting customers and thereby increasing the customer base.

- A new concept of Green Banking has been introduced which is primarily related to e-Banking technologies hence it is important to study if the customers are aware of the concept of Green Banking and its benefits with respect to environmental conservation.

- Extensive use of technology in the banking sector has redefined the role of a modern banker and banks but are the customers availing of these modern facilities and factors determining its usage. Therefore, it is essential to study the same area to encourage extensive use of E-Banking Technologies.

- RBI and Ministry of Information Technology along with state government have taken various initiatives to promote the use of E-Banking Technologies hence it is essential to study its effectiveness as the government will be able to draft more effective plans.

4.5 OBJECTIVES OF THE STUDY

- To identify factors leading to the adoption of e-banking technologies.
- To explore the factors that lead to the sustainable use of e-banking technologies.
- To determine the customers' cognizance and level of risk involved in using of e-banking technologies.
- To ascertain the customer's awareness level of Green Banking initiatives and to study their perception of the effectiveness of such initiatives.

4.6 HYPOTHESIS TESTED

A hypothesis is a scientific guess which is falsifiable and tested. In this study, many factors have been identified for the purpose of verification and testing. Rational assumptions were drawn and transformed in the hypothesis in working form upon which relevant research was developed. The following were the attributes upon which the hypotheses were framed:

- To identify factors leading to the adoption of e-banking technologies.
  - Socio-economic attributes
  - Internet and technology attributes
  - Customers' banking attributes
  - Promotional attributes
- To determine the factors that influences the customers' risk level while using e-banking technologies.
  - Socio-economic attributes
  - Internet and technology attributes
  - Banking and technology attributes

The attributes bases upon which the hypothesis have been framed have been mentioned above; the hypothesis has been mentioned in the data analysis and hypothesis testing chapter.

4.7 SCOPE OF STUDY

This study seeks to highlight the factors that influence a customer to either use or not use a particular e-banking technology, even more importantly for the customers who use a given e-banking technology it studies the factors which will help the bank understand certain aspects that will encourage continuous and sustainable use of the same technology for a more extended period in the future. Various security measures adopted by customers using a particular e-banking technology from different socio-economic backgrounds have been analyzed to study the risk involved and knowledge to use the same. The present study is confined to customers of various public and private commercial banks of both North and South District in the state of Goa.

4.8 METHODOLOGY

Research methodology is a systematic procedure in which a researcher carries out his work. The study methods are described in a methodical manner below:

4.8.1 UNIVERSE AND SAMPLE SIZE

A well-organized study requires a well-defined universe in order to arrive at the correct sample size. The following procedures have been undertaken to derive the universe and sample size:

- **UNIVERSE OF STUDY:**

This study has been confined to the state of Goa. Goa is a state consisting of two Districts, namely North Goa District and South Goa District. The following criteria for deriving the size of the universe and correspondingly the sample size has been used for the purpose of this study.

- The data for this purpose of calculation of population has been taken from the Census survey conducted in the year 2011.
- Since the study is for a later period the projected data for the corresponding year has been considered again which has been provided by the Census Survey 2011.
- Since minors below the age of 18 years are not given particular banking transactions rights, please note that all those below 18 years have not been considered as a part of the universe.

The following table 4.1 determines the population size for the purpose of the study:

Table 4.1: Calculation of Population for study

Particulars	Number / Percentage	Source of Data	Additional Information
Goa Population 2011 Census	14.59 Lakh	http://www.census2011.co.in/census/state/goa.html	
Projected Goa Population 2015	14.88 Lakh	http://www.census2011.co.in/census/state/goa.html	
Population in Age group under 18 years in Goa	2.89 Lakh	http://mhrd.gov.in/sites/upload_files/mhrd/files/statistics/PopulationProjection2016%20updated.pdf	18 age and not 21 is selected since nowadays college student to are using mobile phones and banks give full operation rights to only those 18 and above
Therefore projected population above 18 years in Goa	11.99 Lakh	Therefore **11.99 Lakh** is the population considered for the Sample Size	

Source: Data compiled

The Population / Universe of study is **11.99 Lakh**

➢ SAMPLE SIZE OF STUDY

Adequate sample size is always essential as it determines the power of the statistical test. The following sampling techniques have been used as the population of the study determined is larger than ten thousand.

- ***Krejcie and Morgan Sample Size Model***

Since the population is finite, the following formula (Krejcie & Morgan, 1970) has been used to determine the sample size.

$$n = \frac{X^2 NP(1-P)}{d^2(N-1) + X^2 P(1-P)}$$

Where:

n = Required Sample size

X = Z value (e.g. 1.96 for 95% confidence level)

N = Population Size

P = Population proportion (expressed as decimal) (assumed to be 0.5 (50%)

d = Degree of accuracy (5%), expressed as a proportion (.05); It is the margin of error

Subsequently, since the size of the population is more than 10 Lakh the calculated sample size as per the table of Krejcie & Morgan is 384.

<u>Yamane Sample Size Model</u>

Yamane formula for determining the sample size is given by:

n = N / (1 + Ne^2)

Where: n= corrected sample size, N = population size, and e = Margin of error (MoE), e = 0.05 based on the research condition.

$$n = \frac{1199000}{1 + 1199000 \ * .05^2} = 399.933$$

Calculated Sample Size = **400 Respondents**

The sample size recommended by Krekcie and Morgan Model and Yamane Model are 384 and 400 respondents respectively, while for the purpose of this study a sample size of 2000 has been considered as larger sample size give's a more reliable result at a reduced margin of error. The following table 4.2 gives the calculation for sample size:

Table 4.2: Calculation of Sample Size

Particulars		**Sample**
Recommended by Krejcie & Morgan Model		384
Recommended by Yamane Model		400
	Sample size considered for the study	2000
	Number of responses received	1432
Less:	Number of responses invalid / incomplete	136
Total sample considered for the study		**1296**

Source: Compiled data

A sample size of 1296 respondent's responses was complete and qualified for analysis, which was considered for the purpose of this study.

4.8.2 SAMPLING TECHNIQUE

The multistage sampling technique is also known as multi-stage cluster sampling was adopted. Multistage sampling is an advanced form of cluster sampling. The cluster sampling is a random sampling technique which divides the population into subgroups called a cluster, while the multistage further divides these clusters into sub-cluster.

As stated earlier for the purpose of this study, primarily the state of Goa which has two districts North-Goa, and South-Goa. A total of 500 males and 500 females were approached from North Goa, similarly in South Goa, bringing the total count of questionnaires administered to 2000 respondents.

4.8.3 PERIOD OF THE STUDY

- The period of the study is from April 2014 to March 2017 – 3 years
- A period of 3 years has been covered to receive fair responses to the recent trends in e-banking technologies over the current period which will help in drawing more eloquent analysis and recommendations.

4.8.4 DATA COLLECTION

➢ **PRIMARY DATA**

A well-designed questionnaire was administered after conducting a pilot study, for which the test for reliability was executed, and required modifications were made. The questionnaire was structured, framed and developed on Google forms and therefore could be routed online through e-mails, text messages, and various others social networking sites through the following link:

https://docs.google.com/forms/d/e/1FAIpQLSdoowZT5KlXPMiE4BXR9XpUYHj9ZkIB9Youz_M3YsJzrjb9RA/viewform?usp=sf_link

Messages, e-mails, links and a few hard copies of the questionnaire were sent to numerous people in Goa, and many were told to forward the same to their friends after repeated and constant reminders data was collected and sorted out as per requirement.

The primary data was collected from various respondents from different works of life all above the age of 18 years. Respondents of minimum 18 years were a requirement as banks in India did not give full e-banking transaction rights to those below 18 as they were considered to be minors and hence laws applicable to a minor were applicable to the same.

- **SECONDARY DATA**

Secondary data has been collected from various different online sites as well as libraries in the form of journals, thesis, books, newspaper articles, articles in magazines and brochures, banks mobile banking applications, banks internet banking sites, RBI sites, other official and government websites and other sources on the internet.

4.9 TOOLS AND TECHNIQUES USED FOR DATA ANALYSIS

The data collected through primary and secondary sources have been analyzed based on research hypothesis framed and considered objective-wise. The following statistical tools have been used:

4.9.1 DESCRIPTIVE STATISTICS:

- **PERCENTAGE:**

A statistical tool used by researchers to calculate the proportion per hundred. The percentage method is the most common tool especially used when a comparison is required to be made on the common ground. It is a ratio or number expressed in terms of fractions of 100's and commonly denoted using the sign "%." The percentage method has been used to study the following:

- To analyze the demographic profile of respondents.
- To compare the demographic profile with the factors influencing the adoption or non-adoption of e-banking services.
- To determine the percentage of variance between the measured variables derived from the Exploratory Factor Analysis.
- To determine the customer's risk levels into low, medium and high based upon security measures adopted while using several e-banking technologies in relation to various the factors influencing risk levels.
- To ascertain the customer's cognizance of the various services/facilities available on their respective e-banking technology in use.
- To analyze the awareness level of the respondents concerning the various green banking initiatives.

➢ **MEAN:**

It is an average of the sum of a set of numbers. In this case, a researcher adds up all the given numbers in the set and then divides it by the number of numbers. It is ultimately the middle value in a given list of numbers. The mean has been used in this study mainly to study the respondent's perception concerning the level of significance of the green banking initiatives introduced by various banks.

➢ **MODE:**

In a given set of data values, the value that most often appears is known as the Mean. It is that value in a data set which is most likely to appear or occur. A researcher usually uses the mode to calculate the frequency of variables appearing in the data set. The mode has been used to study the following:

- To determine the frequency of factors influencing the adoption or non-adoption of respective e-banking technologies.
- To determine the frequency of factors influencing the risk levels of a customer into low, medium and high based upon security measures adopted while using respective e-banking technologies.

- To derive the frequency of various services/facilities the customer is aware of while using a particular e-banking technology.
- To analyze the frequency of the awareness of various green banking initiatives of a bank customer.

➢ **STANDARD DEVIATION:**

An analytical instrument used to measure the variance and dispersion between members of a group and from the mean of a set of values of the same group is called standard deviation. Standard deviation is often symbolized by the Greek symbol sigma σ or s as a Latin letter. The sample standard deviation formula is a follows:

$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$$

Where S = standard deviation of a sample

$\sum$ means "sum of"

x = each value in the dataset

$\bar{x}$ = mean of all values in the data set

n = number of all values in the dataset

The Standard Deviation has been used in this study to measure the variance of the perception level of respondents with regards to green banking initiatives.

➢ **RATIOS:**

A Ratio is a tool used by a researcher to compare two different variables of two quantities to show the proportion of the same quantities by multiplying both by common numbers. This study has used ratios to give a comparison between various independent and dependent variables in the study.

➢ **GRAPHS & CHARTS:**

A Graph or chart is a method of presenting strong numerical data which could sometimes be too intricate or complicated to describe by representing the same in the

form of a picture to describe the same in a very brief and organized manner. Different types of graphs and charts have been used in this study to give a more accurate representation of the numerical data collected.

- **MULTIPLE RESPONSE TECHNIQUES:**

This type of situation arises when a respondent is allowed to tick more than one option for a question asked in the questionnaire, as a result of several variables as possible answers. An example is listed below for better understanding:

Example:

Which of the following assets or facilities do you own? (Multiple responses)

- *Smartphone (Mobile Phone)*
- *Computer/Laptop*
- *Internet facility on your Mobile or Computer or Laptop*

In the above example, a respondent is allowed to tick anyone option, any two option or even all three options as a customer could possess a smartphone along with a laptop as well as could be using internet facility on this device.

Multiple response questions are of two types:

- "Tick all responses that apply" known as multiple dichotomies.
- "List up to four reasons you opened a bank account" known as multiple responses.

This study has used multiple dichotomies set of multiple response questions in its questionnaire.

4.9.2 INFERENTIAL STATISTICAL TOOLS:

As an alternative to descriptive statistics provides information about only the immediate data collected, inferential statistics are tools used by a researcher to reach conclusions beyond the immediate primary data collected. It is also used to make judgments about the relationship between independent and dependent variables. The various types of inferential statistical tools used are as follows:

- **PEARSON CHI-SQUARE:**

This statistical tool developed by Karl Pearson indicated (χ^2) is used in-case of sets of categorical data which is used to evaluate if there exist any practical difference between the sets. This tool is suitable for large unpaired data samples. This test used to test goodness of fit or used to examine the test of independence.

The (χ^2) test formula for goodness fit is:

$$X^2 = \sum \frac{(o-e)^2}{e}$$

Where,
o = observed frequency
e = expected frequency

- **FISHER EXACT TEST:**

Fishers test which was developed by Sir Ronald A. Fisher is another non-parametric test which is used in-case of sets of categorical data which is used to evaluate if there exist any pragmatic difference between the sets. This tool is suitable where the chi-square test is not suitable especially for smaller sample size. The Fisher exact test formula is a follows:

$$Fisher's\ Exact\ Test = \frac{R_1!R_2!C_1!C_2!}{n!a!b!c!d!}$$

- **RAO & SCOTT TEST:**

Rao & Scott test is designed to include the differences between expected and observed frequencies. This test considers the adjusted version of Pearson chi-square. The Fisher's Exact Test formula is a follows:

The Rao-Scott chi-square Q_{RS} is computed as

$$Q_{RS} = Q_P / D$$

Where *D* is the design correction

This test had been developed by two famous mathematicians and statisticians John NK Rao and Alistair J Scott.

4.9.3 STANDARD RESIDUAL:

Standard residual is similar to standardization in Z-score testing. It is a ratio between the difference raised between observed count and expected count and the standard deviation of the normal count through chi-square testing. The standard residual value helps to determine the variables that are contributing the most to the value of a string of variables. Standardized residual more than ± 2 are considered as outliers. The formula for standard residual is:

Standardized residual = (observed count – expected count) / √expected count

4.9.4 RELIABILITY TEST:

Reliability test is used to check the consistency of the results as a result of statistical tools used to analyze the data. The type of reliability test used to check the internal consistency of data collected on a Likert scale was Cronbach's alpha.

Cronbach's alpha:

Cronbach's alpha a measure commonly used to determine the internal consistency ("reliability"). This tool is best suitable for multiple Likert questions in a survey/questionnaire that is used to determine whether the scale is reliable or not. This test was conducted using SPSS Software version 20. The validity and reliability are two fundamental elements in the evaluation of a measurement instrument. Validity is concerned with the degree to which an instrument processes what it is envisioned to calculate. Reliability is concerned with the capability of a tool to measure consistently.

The formula for Cronbach's alpha is:

$$\alpha = \frac{N * \bar{c}}{\bar{v} + (N-1) * \bar{c}}$$

Where:

N = The number of items,

$\bar{c}$ = Average covariance between item-pairs, and

$\bar{v}$ = Average variance.

The thumb rule for interpreting alpha for Likert scale questions is:

Table 4.3: Interpretation of Cronbach's Alpha

Cronbach's alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

In general, a score of more than 0.7 is considered acceptable

For the purpose of this study 5 various tools had been designed on a Likert scale to analyze the data. The same tools were verified initially before administering the final questionnaire with the help of a pilot study on 50 respondents and later once again after all the data had been collected the same was tested using the Cronbach's Alpha reliability test.

4.9.5 MULTIPLE REGRESSIONS:

This type of statistical tool is used to predicting an unknown variable value from the value of two or more variables which are already known.

For example, the rate of adoption of ATM card depends upon the type of bank, type of account operated, and annual charges on an ATM card, additional facilities available on the ATM card. Thus to study the joint effect of all the listed factors upon the adoption of ATM card the statistical tool of multiple regressions is most appropriate.

The formula for Multiple Regression analysis is:

$$Y = a + b_1X_1 + b_2X_2 + B_3X_3 + \ldots + B_tX_t + u$$

Where:
Y= the variable that we are trying to predict(DV)
X= the variable that we are using to predict Y(IV)
a= the intercept
b= the slope (Coefficient of X1)
u= the regression residual (error term)

The above technique has been used in the multiple response types of questions in order to determine the most influencing factors that lead to the adoption or non-adoption of e-banking technologies. The same technique has also been used as a part of the confirmatory factor analysis.

4.9.6 FACTOR ANALYSIS

Factor analysis is a statistical tool used to condense a vast option of variables into a smaller amount of factors. This tool calculates the score of each factor and groups the variables with a standard score into one factor, thus creating groups of variables with a common variance. The main factors formed as a result of this analysis is used for further analysis. This statistical tool is a part of GLM (General Linear Model). The following factoring methods were in the study:

- **KMO and Bartlett's Test:**

  These are two different test run in order to test data for structure detection. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy also known as KMO test points out to the part of the variance in the variables considered that might be caused as a result of the underlying factors. A value near 1.0 is a sign that the results derived from factor analysis will be used with the data available.

  Bartlett's test is a test for sphericity is a test of the hypothesis that the correlation matrix is not identical and thus indicating that the variables are related therefore the data is suitable for structure detection. A value less than 0.05 on a 5% significance level indicates that the data is suitable for factor analysis.

- **Exploratory Factor Analysis:** This is a statistical method to uncover the fundamental structure of the relationship behind a comparatively massive set of variables and the respondent. This is based on the assumption that any variable could be associated with another factor.

- **Confirmatory Factor Analysis:**

  This statistical procedure is a multivariate tool used to measure how well the measured variables represent the constructs. Although Confirmatory Factor analysis is similar to the Exploratory Factor Analysis, in CFA a researcher can

measure the value of the relationship that the variables are related to the latent variables. This method fundamentally rejects or confirms the already measured theory.

Since experts have advised not to use EFA and CFA on the same data set, hence the collected data had been divided into two parts 50% each for running EFA and CFA respectively.

- **Structural Equation Modeling (SEM):**

  The SEM model is an alternative approach to the factor analysis. It is a multivariate statistical tool used to measure the relationship between variables and hidden variables. It is a set of algorithms, mathematical models, and statistical operations which measures and analyzes the structural relationship and fits the constructs of data. The Chi-square and other incremental fit indexes like :

  - Comparative Fit Index (CFI)
  - Goodness-of-Fit Index (GFI)
  - Normality Fit Index (NFI)
  - Root Mean Square Error of Approximation (RMSEA)

Table 4.4: Fit indices along with model status

Fit Index	**Values**	**Model status**	**Fit Index**	**Values**	**Model status**
CFI	< 0.80	Unacceptable	NFI	< 0.80	Unacceptable
	0.80 - 0.90	Acceptable		0.80 - 0.90	Acceptable
	> 0.90	Good		> 0.90	Good
GFI	< 0.80	Unacceptable	RMSEA	<.05	Good
	0.80 - 0.90	Acceptable		<.08	Acceptable
	> 0.90	Good		<0.10	Mediocre
				>= .10	Poor

Source: Data compiled

4.10 LIMITATIONS OF THE STUDY

Although the data received has been analyzed there were some unavoidable limitations while carrying out the study:

- Due to time constraint and other scarce resources, the research could be carried out only in the state of Goa.
- A paired qualitative study concerning the costing systems embraced by banks may have provided a different viewpoint from another angle and would enable to determine additional factors that are persuasive in adopting and influencing the sustainable use of various e-banking technologies.
- Though there are varieties of e-banking technologies offered by commercial banks, the prominent technologies such as ATM Card, Mobile Banking, and Internet Banking technologies have only been considered for the purpose of the study.
- Since the research is a descriptive one based on qualitative information, data has been collected from respondents through questionnaire by using various scaling techniques. Hence the limitations of such scaling techniques also affected the research.

However sincere efforts to reduce the effect of these limitations have been taken.

4.11 STRUCTURE OF THESIS

4.11.1 Chapter I – Introduction to e-banking

A very concise introductory and brief overview of the importance of banking sector in the Indian economy has been drawn. An outline right from the conception of the concept of banking during the 2000 B.C. during the Mesopotamian period to the banking system in India with respect to 3 distinct phases, i.e., The Evolutionary phase pre-independence, The Foundation & Development phase post-independence and The Liberalization and merging phase has been expounded. Details of the structure of the Indian banking system have been explained along with the core, regulatory and general functions of RBI. A brief mention about the current scenario of banking in developed and developing countries have been made.

4.11.2 Chapter II – An overview of e-banking technologies

In-Depth knowledge about the prominent selected e-banking technologies considered under the study is emphasized upon. Technologies such as ATM card, mobile banking, and internet banking which are commonly encouraged by banks inspiring customers to use have been considered for the purpose of the study. The various advantages of the same technology towards the banking organization as well as its benefits to its customers have been described. The services/facilities available, on each of the e-banking technology along with its corresponding security measures, have been elucidated. E-banking Frauds endangering a bank customer during the usage of ATM card, mobile banking, and internet banking is stated.

4.11.3 Chapter III – Literature Review

A review of the various researches carried out in the field of banking technologies is carried out. Commencement with a summary of the topic and followed by a theoretical, methodological and analytical review which is later summed up by the significant finding conclusion and suggestions. Since literature review has always been the determining factor to a well-investigated research gap, numerous books, research abstract, thesis, and journals from the Indian as well as global viewpoint were referred to for analyzing the research gap. A critical appraisal of the literature has followed the same under study.

4.11.4 Chapter IV – Research Methodology

Background about the procedure during the study followed by a well analyzed and specific research gap has been described. The need and significance of the study have been elaborated based upon the various problem statement identified in the study. The objectives have been methodologically derived with respect to the research gap. The scope of the study which includes the various areas under analysis has been specified along with the detailed methodology used to derive the sample size as well as a mention of all the statistical tools used to analyze the data collected has been made. The limitations of the study have been listed although utmost care has been taken to reduce its effect, and finally followed by the structure of the thesis.

4.11.5 Chapter V – Data Analysis and Hypothesis Testing

Based upon the objectives, several hypotheses have been framed. Various statistical tools have been run in SPSS to test for reliability, parametric data, and the correlation between dependent and independent variables. The various hypotheses have been tested to whether accept or reject the same. The interpretations and inferences follow the tested hypothesis and analysis.

4.11.6 Chapter VI – Findings, Conclusions, and Suggestions

Significant findings of the study, ephemeral conclusions along, and suitable suggestions by the researcher have been summarized based upon the interpretation and analysis of the data. The chapter concludes with the scope of future research in other related areas.

4.12 SUMMARY

The background of study has been followed by a specific and detailed research gap as a result of an exhaustive literature review survey was undertaken. The need and significance of the study have been expounded based upon the various gap statements acknowledged in the study. The objectives listed are a derivate with respect to the research gap. The scope of the study covers the various areas of analysis and a detailed methodology used to derive the sample size has been drawn. Mentions of all the statistical tools used to analyze the data and test the hypothesis have been addressed and have been concluded with the limitations of the study and the structure of the thesis.

CHAPTER – V

DATA ANALYSIS AND HYPOTHESIS TESTING

5.1 INTRODUCTION

Previously a brief explanation about the banking system in India, an introduction to the current scenario of electronic banking, a comprehensive literature review based upon which the methodology and hypotheses to be tested have been developed. The data, models, and the hypothesis have been analyzed, summarized and presented in a methodical manner. Starting first is the summary of data collected as per its demographic characteristics along with the results of the tested questionnaire than followed by critical analysis and testing of hypothesis objective wise.

5.2 RESPONDENTS PROFILE AND QUESTIONNAIRE TESTING

5.2.1 DEMOGRAPHIC PROFILE OF RESPONDENTS

Table 5.1: Demographic Profile of Respondents

Variables	Particulars	Frequency	Percent
1. Gender	Female	708	54.6
	Male	588	45.4
2. Residential Status	Goan (Indian)	1216	93.8
	Goan (NRI status)	80	6.2
3. Age	18 - 27 Years	793	61.2
	28 - 45 Years	266	20.5
	46 - 60 Years	158	12.2
	61 Years & Above	79	6.1
4. Education	Less than High School	49	3.8
	High School & Higher Secondary School	194	15.0
	Bachelors	607	46.8
	Post-graduate	416	32.1

	Professional	30	2.3
5. Education background	Arts	141	10.9
	Science	151	11.7
	Commerce	830	64.0
	Specialized / Professional	80	6.2
	Computers	40	3.1
	Elementary School	54	4.2
6. Occupation	Student	446	34.4
	Government / Public Sector	246	19.0
	Bank Employee	20	1.5
	Private Sector	262	20.2
	Business Person	76	5.9
	Professional	55	4.2
	Housewife	81	6.3
	Retiree	30	2.3
	Working Abroad	80	6.2
	Total	1296	100.0
7. Income in Rupees Per Month	Less than 10,000	519	42.7
	10,001 - 30,000	342	28.1
	30,001 - 60,000	210	17.3
	60,001 - 1,00,000	94	7.7
	More than 1,00,001	51	4.2
	Total	1216	100.0
8. Income in Dollars Per Month	Below $ 5000	50	62.5
	$ 5001 - 10000	30	37.5
	Total	80	100.0
Total		1296	100.0

Source: Primary data

The above table 5.1 gives a summary of a demographic profile of the respondents who were interviewed with through the online and paper-based questionnaire. The demographics presented are gender, age, residential status, education, education background, occupation and income of the respondent. A reasonably good representation was made from the gender

perspective with 45.4 % representing males and 54.6% of the total respondents representing females. The residential status, especially in the state of Goa, was considered as a considerate population of Goans has been working abroad. In this case, 93.8% of the population is Goans having residential Indian status and working in India itself while 6.2% of the sample collected is born and brought up in Goa but working abroad with a non-residential Indian status. The education along with the education background of the respondents has been considered for the purpose of this study, the majority of the population, i.e., 46.8% had a bachelor's degree while only 3.8% of the population was less than high school qualified. The majority of the respondent's occupations were students, government/public sector and private sector with 34.4%, 19%, and 20.2% respectively.

5.2.2 SUMMARY OF E-BANKING TECHNOLOGY USERS

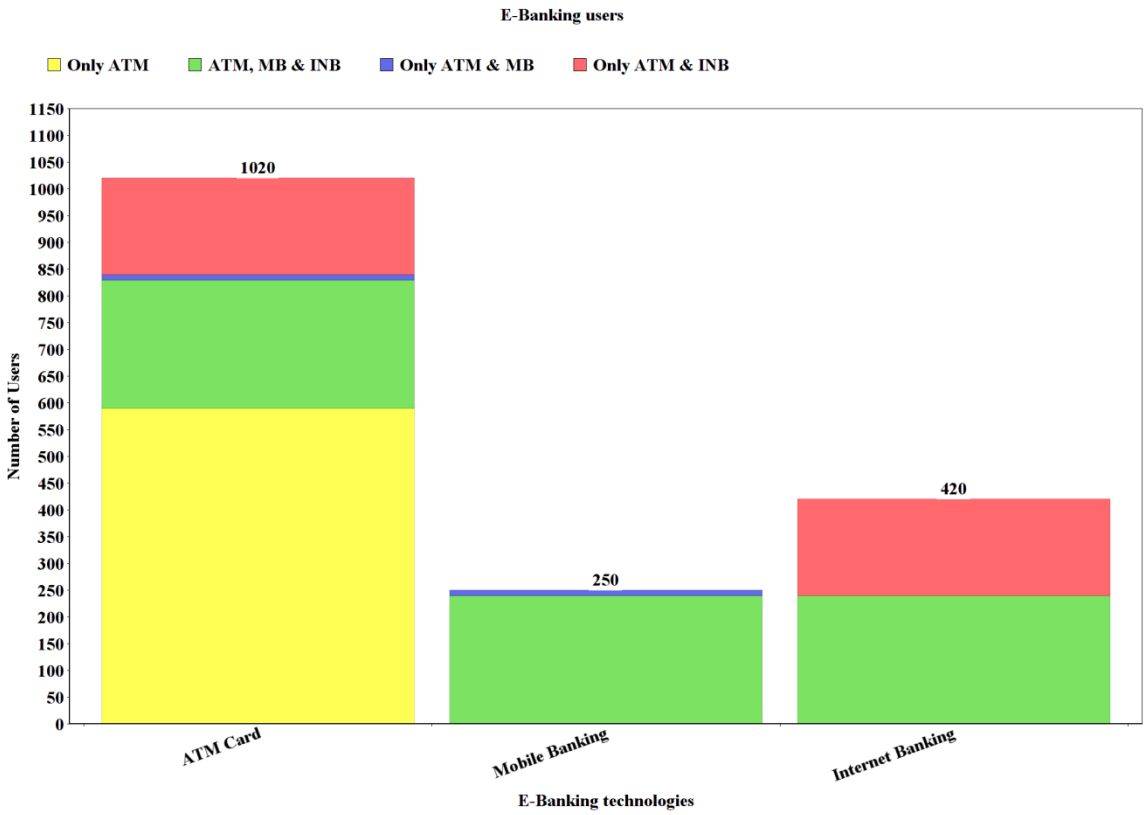
Table 5.2: Summary of e-banking users

E-banking technology	Only ATM	Only ATM & MB	Only ATM & IB	ATM, MB & IBN	Total no. of users	Percentage
ATM Card	590	10	180	240	**1020**	**78.70%**
Mobile Banking	0	10	0	240	**250**	**19.29%**
Internet Banking	0	0	180	240	**420**	**32.41%**
Total Respondents	**1296**					

Source: Primary data

The table 5.2, as shown above, gives a summary of the total number of respondents using each type of e-banking technology. The percentage of the total number of users has been calculated against the total number of respondents 1296. From the total number of 1296, about 21.3% of the total respondents did not use any of the e-banking technologies. The highest number of respondents was recorded using the ATM card at 78.70% of the total respondents. The figure 5.1 gives a graphical representation of the number of users solely using a respective technology as well as using a combination of more than one e-banking technology.

Figure 5.1: Summary of E-banking users



Source: Primary data

The above figure 5.1 is a graphical representation of the total number of e-banking users. As seen above a considerable number of 590 respondents are using only ATM card, while only a handful of 240 total number of respondents are using all three, i.e., ATM card, mobile banking, and internet banking which results to a mere 18.51%. The total number of mobile banking users is a meager 19.29%, whereas internet banking stands marginally higher at 32.40%. This shows that both mobile banking and internet banking requires immediate attention by the banking authorities' in order to increase their rate of adoption figures with consideration towards ATM card as well in a state like Goa with high literacy rate.

5.2.3 TESTING OF QUESTIONNAIRE BEFORE AND AFTER COLLECTION OF DATA.

The study uses 5 various tools designed for the purpose of analysis which was designed upon a Likert scale to determine the factors influencing e-banking usage, the same tools were verified initially by conducting the Cronbach's Alpha reliability test based upon a pilot study conducted for 50 respondents. The following results were determined in the analysis:

Table 5.3: Reliability test before administering the final questionnaire

Reliability Statistics

Model description	**Cronbach's Alpha**	**Cronbach's Alpha Based on Standardized Items**	**No. of Items**
Factors influencing ATM usage	0.744	0.762	12
Factors influencing Mobile Banking usage	0.794	0.822	12
Factors influencing Internet Banking usage	0.815	0.823	11
Usefulness of e-banking as a whole	0.714	0.728	14
Usefulness of green banking initiatives	0.808	0.826	8

Source: Pilot study

In the above table 5.3 the results for all the models are showing $\alpha > 0.7$. Therefore it is interpreted that the scale designed for the questionnaire is valid and a reliable instrument which in order is suitable to be administered to the public for data collection.

After the questionnaire was administered and the final data were collected, the same Cronbach's Alpha reliability test was rerun. The following results were determined:

Table 5.4: Reliability test after administering the final questionnaire

Reliability Statistics

Model description	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
Factors influencing ATM usage	0.924	0.924	12
Factors influencing Mobile Banking usage	0.931	0.941	12
Factors influencing Internet Banking usage	0.959	0.961	11
Usefulness of e-banking as a whole	0.938	0.937	14
Usefulness of green banking initiatives	0.943	0.944	8

Source: Primary data

The results in the above table 5.4 are all showing $\alpha > 0.9$. Therefore, we construe that the scale designed for the questionnaire had an excellent internal consistency and the analysis for the same scale would give useful output.

5.3 ANALYSIS - FIRST OBJECTIVE

To identify factors leading to the adoption of e-banking technologies.

5.3.1 CONCEPTUAL OUTLINE AND RESEARCH HYPOTHESES

The backbone of an economy is the financial sector and if this sector has to survive its spinal cord is the continuous development of its electronic and information technology systems. E-banking technologies have been able to cut through the per customer operational cost ever since the transition from traditional banking methods. Although it is effortless in the modern era for a banking customer to avail services about their balances in their account easily, inter and intrabank account transfer payment of various utility bills and many more facilities yet there is a queue of customers standing in line at bank counters to carry out their daily banking transactions. Therefore it is essential to understand the factors which lead to the adoption of various e-banking technologies as well as the factors which lead to the non-adoption of e-banking technologies.

To help understand the factors that lead to the adoption or non-adoption of e-banking technologies various attributes of a customer have been considered which has been independently compared with the usage of its particular e-banking technology.

➢ **SOCIO-ECONOMIC ATTRIBUTES OF A CUSTOMER**

Socio-economic Attributes

- Gender
- Residential Status
- Age
- Education qualification
- Education background
- Occupation
- Income earned
- Electronic devices / facilities used
- Standard of living

- ***Null hypothesis on Socio-economic attributes:***

$H0_{(1)}$: There is no substantial association between gender and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(2)}$: There is no significant relationship between residential status and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(3)}$: There is no significant difference between age and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(4)}$: There is no substantial difference between education qualification and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(5)}$: There is no significant association between educational background and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(6)}$: There is no significant difference between occupation and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(7)}$: There is no significant association between income earned in rupees and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(8)}$: There is no significant relationship between income earned in foreign currency and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(9)}$: There is no significant association between electronic devices/facilities used and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(10)}$: There is no significant relationship between the standard of living and ATM card; Mobile Banking; Internet Banking usage.

➢ INTERNET & TECHNOLOGY ATTRIBUTES OF A CUSTOMER

Internet & Technology Attributes

- Internet usage
- Device used for internet
- Place of use of internet
- Number of years internet has been used
- Types of services used on internet

- ***<u>Null hypothesis on Internet & Technology attributes:</u>***

$H0_{(11)}$: There is no significant difference between internet usage and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(12)}$: There is no significant association between the device used for internet and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(13)}$: There is no significant association between place of use of internet and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(14)}$: There is no substantial relationship between a number of years the internet has been used and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(15)}$: There is no significant difference between types of services used on internet and ATM card; Mobile Banking; Internet Banking usage.

➢ CUSTOMERS BANKING ATTRIBUTES

Banking Attributes

- Type of Bank
- Type of bank A/c operated
- Number of transactions carried out per month

- ***Null hypothesis on Banking attributes:***

$H0_{(16)}$: There is no significant association between type of bank and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(17)}$: There is no significant difference between the type of bank account operated and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(18)}$: There is no significant association between the number of transaction carried out per month and ATM card; Mobile Banking; Internet Banking usage.

➢ PROMOTIONAL ATTRIBUTES

Promotional Attributes

- Forms of advertisements
- Source of advice

- ***Null hypothesis on Promotional attributes:***

$H0_{(19)}$: There is no significant association between forms of advertisements and ATM card; Mobile Banking; Internet Banking usage.

$H0_{(20)}$: There is no significant difference between the source of advice and ATM card; Mobile Banking; Internet Banking usage.

5.3.2 HYPOTHESIS TESTING AND ANALYSIS:

➢ **NULL HYPOTHESIS ON SOCIO-ECONOMIC ATTRIBUTES:**

- ***$H0_{(1)}$: There is no substantial association between gender and ATM card; Mobile Banking; Internet Banking usage.***

Table 5.5: Association between gender and ATM; MB & INB

			ATM Card		Total	Mobile Banking		Total	Internet Banking		Total
			YES	NO		YES	NO		YES	NO	
Gender	**MALE**	Count	534	54	588	154	434	588	255	333	588
		Std. Residual	3.3	-6.4		3.8	-1.9		4.7	-3.2	
	FEMALE	Count	486	222	708	96	612	708	165	543	708
		Std. Residual	-3	5.8		-3.5	1.7		-4.3	2.9	
Total		**Count**	**1020**	**276**	**1296**	**250**	**1046**	**1296**	**420**	**876**	**1296**

Source: Primary data

Table 5.6: Test results - Gender and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Pearson Chi-Square	94.216[a]	1	.000
2	Mobile Banking usage	Pearson Chi-Square	32.918[a]	1	.000
3	Internet Banking usage	Pearson Chi-Square	59.023[a]	1	.000

Since the computed value of chi-square as per the above tables 5.5 and 5.6 for ATM, Mobile Banking & Internet Banking usage in a relationship with gender is 94.216, 32.918 & 59.023 respectively and the calculated p-value is $\leq .05$ hence the null hypothesis is rejected. Therefore it is concluded that there is a significant connotation between the gender of a customer and their usage of ATM Card, Mobile Banking & Internet Banking. Inspecting the individual cells, we see that the adoption of e-banking technologies is higher among males as

compared to females while the non-adoption is vice-versa. The standardized residual shows that despite the overall association between gender and usage of particular e-banking technologies, non-usage of mobile banking did not have a significant association with either male or female with a standard residual of -1.9 and 1.7 respectively which was less than ± 2. We conclude that gender had significance with the rest with an extensive negative relationship between male not adopting ATM card at -6.4 and a definite link between female and non-adoption of ATM card at 5.8.

From the above data, we can infer that a male respondent had a tendency to use an E-Banking technology more than that of a female respondent while the tendency of a Female not using any E-Banking technology was higher than that of a male whether it was ATM, Mobile Banking or Internet Banking.

Some of the common reasons for a female not using the E-Banking technologies:

- Although they would look after expenses at home, maintaining the bank accounts was usually done by the male head of the house.
- Women usually did not prefer carrying out bank work as most of the time their husbands or fathers (parent) would carry out the banking transactions.
- Women found themselves less techno-savvy as compared to men whether it is an ATM card or a mobile phone.

$H0_{(2)}$: There is no significant relationship between residential status and ATM card; Mobile Banking; Internet Banking usage.

Table 5.7: Relation between residential status and ATM; MB & INB

			ATM Card		Total	Mobile Banking		Total	Internet Banking		Total
			YES	NO		YES	NO		YES	NO	
Residential Status	**GOAN (Indian)**	Count	940	276	1216	190	1026	1216	360	856	1216
		Std. Residual	-.6	1.1		-2.9	1.4		-1.7	1.2	

	GOAN ABROAD (NRI)	Count	80	0	80	60	20	80	60	20	80
		Std. Residual	2.1	-4.1		11.3	-5.5		6.7	-4.6	
Total		**Count**	**1020**	**276**	**1296**	**250**	**1046**	**1296**	**420**	**876**	**1296**

Source: Primary data

Table 5.8: Test results - residential status and ATM, MB & INB

Sr. No.	**Particulars**	**Test**	**Value**	**df**	**Asymp. Sig. (2-sided)**
1	ATM Card usage	Pearson Chi-Square	23.071[a]	1	.000
2	Mobile Banking usage	Pearson Chi-Square	169.967[a]	1	.000
3	Internet Banking usage	Pearson Chi-Square	70.613[a]	1	.000

The computed value of Pearson chi-square as shown in the above tables 5.7 and 5.8 for ATM, Mobile Banking & Internet Banking usage in a relationship with residential status is 23.071, 169.967 & 70.613 respectively and the calculated p-value is $\leq .05$ hence the alternative hypothesis is accepted, and the null hypothesis is rejected. Therefore we conclude that there is a significant association between the residential status of a client and their practice of e-banking technologies. An independent examination of each cell with the help of standard residual depicts that we cannot definitely conclude for sure that there is a definite association between a customer who is a Goan (Indian) and adoption or non-adoption of ATM Card, Internet Banking, and mobile banking with its residual values all below ± 2. Those above ± 2 are outliers who are having the most relationships between the residential status and adoption of e-banking technologies. Goan having NRI status has a positive relationship with 11.3 and 6.7 above the expected value over the adoption of Mobile Banking and Internet banking respectively.

Data collected shows that a respondent who is a Goan working abroad (NRI) had a tendency to use an E-Banking technology more than that respondent who is a Goan (Ordinary resident) staying in Goa. Some of the common reasons for Goans working abroad (NRI's) to use more of E-Banking Technologies:

- Most of the Goans working abroad (NRI's) adopted E-Banking technologies for their bank accounts in India as they were already familiar with its usage as even abroad

they were compelled to use E-Banking technologies especially in countries like USA, Canada, Australia, and the UK.

- Goans working abroad (NRI's) felt they were compelled to use many of the E-Banking technologies as they could carry out their banking transaction from any part of the world due to constraints of long distances and different time zones. example
- Many Goans working abroad (NRI) had family members in Goa itself, for instance a husband working abroad on the ship or on land and usually the spouse, parents or children had to have access to the bank accounts hence they felt E-Banking technologies was a good option rather than old banking methods.

H0$_{(3)}$: There is no significant difference between age and ATM card; Mobile Banking; Internet Banking usage.

Table 5.9: Difference between age and ATM; MB & INB

Particulars			ATM Card		Total	Mobile Banking		Total	Internet Banking		Total
			YES	NO		YES	NO		YES	NO	
Age	18 - 27 YEARS	Count	658	135	793	188	605	793	310	483	793
		Std. Residual	1.4	-2.6		2.8	-1.4		3.3	-2.3	
	28 - 45 YEARS	Count	212	54	266	42	224	266	90	176	266
		Std. Residual	.2	-.4		-1.3	.6		.4	-.3	
	46 - 60 YEARS	Count	110	48	158	10	148	158	10	148	158
		Std. Residual	-1.3	2.5		-3.7	1.8		-5.8	4.0	
	61 YEARS & ABOVE	Count	40	39	79	10	69	79	10	69	79
		Std. Residual	-2.8	5.4		-1.3	.7		-3.1	2.1	
Total		**Count**	**1020**	**276**	**1296**	**250**	**1046**	**1296**	**420**	**876**	**1296**

Source: Primary data

Table 5.10: Test results - Age and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Pearson Chi-Square	53.711[a]	3	.000
2	Mobile Banking usage	Pearson Chi-Square	31.312[a]	3	.000
3	Internet Banking usage	Pearson Chi-Square	79.544[a]	3	.000

After running the Pearson chi-square analysis as shown in the above tables 5.9 and 5.10, the construed value for ATM, Mobile Banking & Internet Banking usage in a relationship with age was 53.711, 31.312 & 79.544 respectively, while the computed p-value is found to be ≤ .05 hence the null hypothesis is rejected, therefore we conclude that there is a significant association between age of a customer and their usage of ATM Card, Mobile Banking & Internet Banking. Further the standardized residual indicates that although there is a substantial overall impact yet the association between the age group of 28 – 45 years and the adoption and non-adoption of e-banking technologies was not very strong. The age group of 61 years and above had a negative impact on ATM and internet banking adoption with -2.8 and -3.1 values congruently. The age group 18 – 27 years showed a positive connection between +2.8 and +3.3 above the normal count with that of mobile banking and internet banking adoption.

With regards to ATM Card, Mobile banking and Internet Banking usage there is a trend which is initially high for the lower age groups and decreases as we go to the higher age groups. Some of the common reasons for younger age groups using E-Banking technologies:

- While with respect to e-banking technologies most of those who are working have adopted such technology but it can be observed that most of them are from a younger age group as they are more techno-savvy and they feel that in today's developed world and especially with the online option of shopping, ATM card, Mobile Banking, and Internet banking is becoming the need of the hour.

- The age group 18 – 27 years is the generation which has adapted to the latest technology of smartphones and internet the fastest and hence this too is an influencing factor for usage of E-Banking technologies.

$H0_{(4)}$: There is no substantial difference between education qualification and ATM card; Mobile Banking; Internet Banking usage.

Table 5.11: Difference between education-qualification and ATM; MB & INB

Particulars			ATM Card		Total	Mobile Banking		Total	Internet Banking		Total
			YES	NO		YES	NO		YES	NO	
Education	Less than High School	Count	10	39	49	0	49	49	0	49	49
		Std. Residual	-4.6	8.8		-3.1	1.5		-4.0	2.8	
	High School & Higher Secondary School	Count	125	69	194	25	169	194	30	164	194
		Std. Residual	-2.2	4.3		-2.0	1.0		-4.1	2.9	
	Bachelors	Count	475	132	607	155	452	607	210	397	607
		Std. Residual	-.1	.2		3.5	-1.7		.9	-.7	
	Post-graduate	Count	380	36	416	70	346	416	180	236	416
		Std. Residual	2.9	-5.6		-1.1	.6		3.9	-2.7	
	Professional	Count	30	0	30	0	30	30	0	30	30
		Std. Residual	1.3	-2.5		-2.4	1.2		-3.1	2.2	
Total		**Count**	**1020**	**276**	**1296**	**250**	**1046**	**1296**	**420**	**876**	**1296**

Source: Primary data

Table 5.12: Test results - Educational qualification and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Pearson Chi-Square	170.782[a]	4	.000
2	Mobile Banking usage	Pearson Chi-Square	40.819[a]	4	.000
3	Internet Banking usage	Pearson Chi-Square	87.035[a]	4	.000

Since the interpreted value of chi-square in the above tables 5.11 and 5.12 for ATM, mobile banking & internet banking usage in a relationship with educational qualification are 170.783, 40.819, 87.035 respectively and the calculated p-value is ≤ .05 hence the null hypothesis is rejected. Therefore it can be concluded that there is an overall significant association between the educational qualification of a customer and their usage of ATM Card, Mobile Banking & Internet Banking. Inspecting the individual cells with the help of standardized residual values we see that the customers with a bachelor's degree did not have a significant impact upon the usage of e-banking technologies on ATM and internet banking adoption with residual values below ± 2, while it showed a positive link with the adoption of mobile banking at 3.5. The educational qualification of respondents having the qualification of higher secondary school and below showed a clear negative significance with all values more than -2 as compared to the adoption of e-banking technologies. Post-graduates showed a definite link with the adoption of ATM card and internet banking with a value of 2.9 and 3.9 correspondingly above the predicted values. Professional like doctors, lawyers, and chartered accountants showed a negative affiliation upon the adoption of mobile banking and internet banking with a value of -2.4 and -3.1 below the expected values.

With regards to ATM Card usage for those customers who are educated less than high school has adopted the usage of an ATM card which on the whole is comparatively very less as compared to those who are more educated, but which is much more to the adoption of Mobile Banking and Internet Banking usage which is NIL. While that of Mobile Banking and Internet Banking the percentage of usage seems to increase along with the increase in educational qualification. But the striking fact is that professionals such as lawyers, doctors, and chartered accountants have not felt the need to use any of Mobile Banking or Internet Banking which is a point to be taken seriously by the banks. Some of the reasons why education plays a role in the usage and adoption of E-Banking technologies:

- Firstly with regards to usage of ATM cards, although some of the customers are having a qualification which is less than high school, many have resorted to the use of ATM cards. But with respect to Mobile banking and Internet Banking, none of them have accepted them. This is a possibility because of the ease of use of ATM card, while that of Mobile Banking and Internet Banking was a little more complicated and catered to the interest of those who were educated.
- Education does play a significant role, notably higher education. As education up to high school did not use much of computers. While that of higher education has more of computers first as a compulsory subject and secondly almost all projects, assignment done are done through, or with the help of computers hence they had an advantage of computers in higher education.
- While the noteworthy point is that none of the professionals used Mobile Banking and Internet Banking as most of the professionals interviewed were in the age group to 50 and above who had already established themselves in the market but were yet following traditional ways of office work as they have been following the same for years.

$H0_{(5)}$: There is no significant association between educational background and ATM card; Mobile Banking; Internet Banking usage.

Table 5.13: Association between educational background and ATM; MB & INB

Particulars			**ATM Card**		**Total**	**Mobile Banking**			**Internet Banking**		**Total**
			YES	**NO**		**YES**	**NO**	**Total**	**YES**	**NO**	
Education Background	Arts	Count	105	36	141	5	136	141	25	116	141
		Std. Residual	-.6	1.1		-4.3	2.1		-3.1	2.1	
	Science	Count	127	24	151	32	119	151	60	91	151
		Std. Residual	.7	-1.4		.5	-.3		1.6	-1.1	
	Commerce	Count	653	177	830	183	647	830	285	545	830
		Std. Residual	.0	.0		1.8	-.9		1.0	-.7	

	Specialized / Professional	Count	80	0	80	20	60	80	20	60	80
		Std. Residual	2.1	-4.1		1.2	-.6		-1.2	.8	
	Computers	Count	40	0	40	10	30	40	30	10	40
		Std. Residual	1.5	-2.9		.8	-.4		4.7	-3.3	
	Elementary School	Count	15	39	54	0	54	54	0	54	54
		Std. Residual	-4.2	8.1		-3.2	1.6		-4.2	2.9	
Total		**Count**	**1020**	**276**	**1296**	**250**	**1046**	**1296**	**420**	**876**	**1296**

Source: Primary data

Table 5.14: Test results - Education background and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Pearson Chi-Square	120.164[a]	5	.000
2	Mobile Banking usage	Pearson Chi-Square	42.274[a]	5	.000
3	Internet Banking usage	Pearson Chi-Square	80.000[a]	5	.000

The computed value of chi-square as shown in the above tables 5.13 and 5.14 for ATM, mobile banking & internet banking usage in a relationship with the educational background are 120.164, 42.274 & 80.000 respectively and the calculated p-value is $\leq .05$ hence the alternative hypothesis is accepted, and the null hypothesis is rejected. Therefore we conclude that there is a significant association between the educational background of a customer and their usage of e-banking technologies. The standardized residual of each particular cell illustrates that respondents with science background did not have a significant affiliation with the adoption and non-adoption of any of the e-banking technologies with its residual values all falling within ± 2. Respondents from the arts stream showed a negative correlation with the adoption of mobile banking and internet banking with values of -4.3 and -3.1 correspondingly. The ones with elementary schooling as their background showed a negative bond with the adoption of all of the e-banking technologies which were -4.2 for ATM, -3.2 for mobile banking and -4.2 for internet banking. Those with computers as their educational

background showed a negative relation with non-adoption of ATM and internet banking at -2.9 and -3.3 which showed that their rate of adoption was higher than the predicted count.

Detailed inference shows that customers with arts, science, commerce and with specialization had a very high tendency to use the ATM Card services while those who had elementary school the tendency of them not using ATM card services was comparatively less. While with respect to using Mobile Banking and Internet Banking usage the number of users not using were much more than those using such services while only those customers having elementary school educational background were found not to be using either Mobile Banking or Internet Banking at all.

Some of the noteworthy points while analyzing the influence of the type of education background such as Arts, Science, Commerce, Specializations, Computer and elementary school, its influence on the usage of E-Banking services.

- With the help of the analysis performed on the following data, it has been seen that the rate of adopting the ATM card is almost the same irrespective of the education background except for those with elementary schooling.
- While with respect to Mobile Banking and Internet Banking based upon the analysis performed it can be noted that as compared to Arts, Science and Commerce those having specialized in computer education have a higher rate of acceptance and usage of Mobile Banking as well as Internet Banking. While on the other hand those having specialized as Lawyers, CA's or even doctors had an acceptance rate very low as compared to the general Arts, Science and even Commerce stream as most of this specialized educationist were also in the age group of above 50 yrs.

$H0_{(6)}$: There is no significant difference between occupation and ATM card; Mobile Banking; Internet Banking usage.

Table 5.15: Difference between occupation and ATM; MB & INB

Particulars			ATM Card		Total	Mobile Banking		Total	Internet Banking		Total
			YES	NO		YES	NO		YES	NO	
Occupation	Student	Count	313	133	446	96	350	446	124	322	446
		Std.	-2.0	3.9		1.1	-.5		-1.7	1.2	

		Residual									
	Government / Public Sector	Count	210	36	246	20	226	246	70	176	246
		Std. Residual	1.2	-2.3		-4.0	1.9		-1.1	.8	
	Bank Employee	Count	20	0	20	10	10	20	20	0	20
		Std. Residual	1.1	-2.1		3.1	-1.5		5.3	-3.7	
	Private Sector	Count	215	47	262	37	225	262	91	171	262
		Std. Residual	.6	-1.2		-1.9	.9		.7	-.5	
	Business Person	Count	67	9	76	12	64	76	25	51	76
		Std. Residual	.9	-1.8		-.7	.3		.1	-.1	
	Professional	Count	55	0	55	15	40	55	30	25	55
		Std. Residual	1.8	-3.4		1.3	-.7		2.9	-2.0	
	Housewife	Count	30	51	81	0	81	81	0	81	81
		Std. Residual	-4.2	8.1		-4.0	1.9		-5.1	3.5	
	Retiree	Count	30	0	30	0	30	30	0	30	30
		Std. Residual	1.3	-2.5		-2.4	1.2		-3.1	2.2	
	Working Abroad	Count	80	0	80	60	20	80	60	20	80
		Std. Residual	2.1	-4.1		11.3	-5.5		6.7	-4.6	
Total		**Count**	**1020**	**276**	**1296**	**250**	**1046**	**1296**	**420**	**876**	**1296**

Source: Primary data

Table 5.16: Test results - Occupation and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Pearson Chi-Square	165.624[a]	8	.000
2	Mobile Banking usage	Pearson Chi-Square	226.573[a]	8	.000
3	Internet Banking usage	Pearson Chi-Square	180.220[a]	8	.000

The computed value of Pearson chi-square in tables 5.15 and 5.16 for ATM, mobile banking & Internet Banking usage in a relationship with occupation are 165.624, 226.573 & 180.220 correspondingly and the calculated p-value is $\leq .05$ hence the null hypothesis is rejected. Therefore it is concluded that there is an overall significant association between the occupation of a customer and their usage of ATM Card, Mobile Banking & Internet Banking. Inspecting each selected cells with standardized residuals revealed that although there is an overall impact between occupation of an individual and their adoption of e-banking technologies we cannot conclude with confidence that those from the public sector, private sector, business person and student has a substantial influence on the adoption of e-banking technologies as their standard residual were within ± 2. Those who were housewife's and retirees showed a negative association with the adoption of mobile banking and internet banking while housewife alone showed a negative association with the adoption of ATM as well with all their residual values more than -2. Bank employees displayed a positive rapport with the adoption of mobile banking and internet banking at residual values 3.1 and 5.3 correspondingly.

Further extrapolation showed that most of the occupation showed a percentage of more than 70% of usage of ATM cards while with regards to Mobile Banking and Internet Banking there was a considerable dip in the percentage.

Some of the points while analyzing the occupation of a customer on the usage of E-Banking services.

- Firstly with respect to ATM card usage irrespective whether the customer was a student above 18 years of age, from the private or public sector or even a retiree the acceptance and usage of ATM card has been above 70% as the overall usage of ATM

card is almost 80% as compared to 19% and 32% of Mobile banking and Internet banking respectively.

- The striking occupations which had a comparatively higher rate of acceptance with respect to Mobile banking and Internet banking were those who were bank employees, business persons and those who were working abroad had the highest rate of more than 80% rate of acceptance of all E-Banking technologies. Firstly banks make it compulsory for its employees to start using its various technology even before it is introduced to the public for various reasons, secondly business persons prefer ease of use of banking from the place of business which shows how e-banking is of an advantage to them while lastly, those working abroad are already using most and even more e-banking technologies abroad hence they also prefer switching over to e-banking from the traditional banking methods.

$H0_{(7)}$: There is no significant association between income earned in rupees and ATM card; Mobile Banking; Internet Banking usage.

Table 5.17: Association between income in rupees and ATM; MB & INB

Particulars			ATM Card		Total	Mobile Banking		Total	Internet Banking		Total
			YES	NO		YES	NO		YES	NO	
Income - (Per Month in Rupees)	Less than 10,000	Count	360	159	519	95	424	519	130	389	519
		Std. Residual	-2.1	3.8		1.5	-.7		-1.9	1.2	
	10,001 - 30,000	Count	285	57	342	10	332	342	70	272	342
		Std. Residual	1.3	-2.3		-5.9	2.6		-3.1	2.0	
	30,001 - 60,000	Count	150	60	210	20	190	210	70	140	210
		Std. Residual	-1.0	1.8		-2.2	1.0		1.0	-.6	
	60,001 - 1,00,000	Count	94	0	94	39	55	94	48	46	94
		Std. Residual	2.5	-4.6		6.3	-2.7		3.8	-2.5	

	More than 1,00,001	Count	51	0	51	26	25	51	42	9	51
		Std. Residual	1.8	-3.4		6.4	-2.7		6.9	-4.5	
Total		**Count**	**940**	**276**	**1216**	**190**	**1026**	**1216**	**360**	**856**	**1216**

Source: Primary data

Table 5.18: Test results - Income in rupees and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Pearson Chi-Square	72.434[a]	4	.000
2	Mobile Banking usage	Pearson Chi-Square	146.657[a]	4	.000
3	Internet Banking usage	Pearson Chi-Square	109.130[a]	4	.000

As per the above tables 5.17 and 5.18 after the Pearson chi-square analysis, the computed value for ATM, Mobile Banking & Internet Banking usage in a relationship with income in rupees is 72.434, 146.657 & 109.130 correspondingly, while the computed p-value is found to be ≤ .05 hence the null hypothesis is rejected. Therefore it is concluded that there is a significant association between the income of a customer in rupees and their usage of ATM Card, Mobile Banking & Internet Banking. Further, with the help of the derived standard residual, we can conclude that although the overall income in rupees had a significant impact on the usage and non-usage of e-banking technologies, yet the income group below Rs. 10,000/- and that of Rs. 60,000/- to 1,00,000/- did not have a noteworthy influence on the adoption or non-adoption of e-banking technologies in general except for usage and non-usage of ATM card for those in the income bracket of less than 10,000/- and that of usage of mobile banking for the income bracket 30,001 to 60,000/- while the rest showed residual values between ± 2. The income brackets of 60,001/- and above showed a negative dependence upon the non-adoption of ATM, mobile banking and internet banking with all their residual values more than -2. Those in the income group of 10,001/- to 30,001/- revealed a negative rapport with the adoption of mobile banking and internet banking at -5.9 and -3.1 below the predicted values.

With respect to ATM cards usage the higher, the income the higher is the usage of ATM cards, in fact, those falling in the income bracket of more than Rs. 60001/- per month almost

all the customers had been using ATM cards. While it was not the same with respect to usage of Mobile banking and Internet Banking

Noteworthy points while analyzing the income of a customer on the usage of E-Banking services.

- The usage of ATM card was directly associated with the increase in the income bracket. In fact the higher the income bracket, the higher was the usage of ATM card.
- With respect to Mobile Banking and Internet Banking, the same applies to the income group of Rs. 60,000/- per month. Interestingly in the income brackets above Rs. 60,001/- the number of customers using Mobile Banking and Internet Banking has decreased drastically although the income has increased as most customers from this income bracket were nearing their retirement age as they have received these increase in scale in salaries after more than 20 years of service, and these are the same employees with who prefer the traditional banking methods except for the ATM card for the purpose of withdrawing of cash.

$H0_{(8)}$: There is no significant relationship between income earned in foreign currency and ATM card; Mobile Banking; Internet Banking usage.

Table 5.19: Relation between income earned in dollars and ATM; MB & INB

Particulars			**ATM Card**		**Total**	**Mobile Banking**			**Internet Banking**		
			YES	**NO**		**YES**	**NO**	**Total**	**YES**	**NO**	**Total**
Income (per month in Dollars)	Below $ 5000	Count	50	0	50	40	10	50	40	10	50
		Std. Residual	0.0			.4	-.7		.4	-.7	
	$ 5001 - 10000	Count	30	0	30	20	10	30	20	10	30
		Std. Residual	0.0			-.5	.9		-.5	.9	
Total		**Count**	**80**	**0**	**80**	**60**	**20**	**80**	**60**	**20**	**80**

Source: Primary data

Table 5.20: Test results - Income in dollars and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	N.A.	N.A.	N.A.	N.A.
2	Mobile Banking usage	Pearson Chi-Square	1.778[a]	1	.182
3	Internet Banking usage	Pearson Chi-Square	1.778[a]	1	.182

As per the above tables 5.19 and 5.20, the construed value of chi-square for Mobile Banking & Internet Banking usage in relationship with income earned in dollars (NRI's) is 1.778 & 1.778 correspondingly, and the calculated p-value is ≥ .05 hence the null hypothesis is accepted that there is no relationship between the adoption or non-adoption of Mobile banking, Internet Banking and that with the income of a person working abroad. The standardized residual too showed values between ± 2 which also signifies that there is no noticeable correlation between those earning abroad and their use of e-banking technology. But the primary inference we can draw is that a large percentage of these respondents have already adopted the various e-banking technologies while the non-adoption rate was very insignificant.

$H0_{(9)}$: There is no significant association between electronic devices/facilities used and ATM card; Mobile Banking; Internet Banking usage.

Table 5.21: Association between electronic devices/facilities and ATM; MB & INB

Particulars		use of ATM Card		use Mobile Banking		use Internet Banking	
		YES	NO	YES	NO	YES	NO
		Count	Count	Count	Count	Count	Count
Electronic devices and facilities used	Smartphone	960	201	240	921	410	751
	Computer	784	168	205	747	370	582
	Internet facility	970	189	250	909	420	739
	None of the above	40	75	0	115	0	115

Source: Primary data

Table 5.22: Test results - Electronic devices / facilities and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Rao & Scott Chi-Square	1275.351	4	.000*
2	Mobile Banking usage	Rao & Scott Chi-Square	265.512	4	.000*
3	Internet Banking usage	Rao & Scott Chi-Square	707.4761	4	.000*

Table 5.23: Test results- Electronic devices / facilities and ATM, MB & INB

Model		use of ATM Card		use Mobile Banking		use Internet Banking	
		t	**Sig.**	**t**	**Sig.**	**t**	**Sig.**
1	**(Constant)**	4.252	.000	6.589	.000	3.670	.000
	Smartphone	-2.043	.041	-3.311	.001	-1.186	.236
	Computer	-2.651	.008	-.216	.829	4.186	.000
	Internet facility	5.176	.000	2.482	.013	2.377	.018
	None of the above	-2.285	.022	-2.306	.021	-.826	.409
	Adjusted R Square	.131		.033		.068	
	ANOVA	F(4,1291)=49.859, p=.000		F(4,1291)=12.205, p=.000		F(4,1291)=24.535, p=.000	

The above tables 5.21, 5.22 and 5.23 shows the computation of a multi-responses question calculated using the Rao and Scott chi-square for ATM, Mobile Banking & Internet Banking usage in relationship with electronic devices and facilities used, which value is 442.092, 92.038 & 245.242 respectively and the calculated p-value is $\leq .05$ hence the alternative hypothesis is accepted and null hypothesis is rejected. Therefore we conclude that there is a significant association between the type of electronic device and facilities used and their usage of e-banking technologies. Individually the regression coefficients gave a detailed analysis, with respect to the mobile banking adoption; use of computer did not have a sizeable link with a reported p-value of .829, while with respect to the adoption of internet banking the use of smartphone and the non-use of any devices option did not have a sizable

connection with a reported p-value of 0.236 and 0.409 correspondingly. The rest of the independent variables had a very dominating connection with the adoption of e-banking technologies with a stated p-value of below .5.

The further insinuation of the above analysis shows that there is a significant impact on the type of device or facilities used by a customer and the adoption of particular e-banking technology.

- With regards to ATM card adoption, it showed that it had a significant impact on all the factors such as a smartphone, computer/laptop, and internet facility. With regards to Mobile banking, it showed that there was no significant impact with a laptop, but there was a significant impact with a smartphone which goes on to say that nonetheless mobile banking facilities/amenities are accessible on non-smartphone devices yet customers would prefer mobile banking only if they had a smartphone.
- While with respect to internet banking there was no significant difference with a smartphone and internet banking which again goes on to say that customers found it safer to use internet banking (with more facilities than mobile banking) on a computer or laptop, or at least customers were not aware that internet banking can be now carried out on smartphones as well.

H0$_{(10)}$: There is no significant relationship between the standard of living and ATM card; Mobile Banking; Internet Banking usage.

Table 5.24: The relation between the standard of living and ATM; MB & INB

Particulars			ATM Card			Mobile Banking			Internet Banking		
			YES	NO	Total	YES	NO	Total	YES	NO	Total
Standard of living of the surroundi-ngs	Low Standard	Count	30	9	39	10	29	39	20	19	39
		Std. Residual	-.1	.2		.9	-.4		2.1	-1.4	
	Average Standard	Count	610	183	793	120	673	793	230	563	793
		Std. Residual	-.6	1.1		-2.7	1.3		-1.7	1.2	

	High Standard	Count	380	84	464	120	344	464	170	294	464
		Std. Residual	.8	-1.5		3.2	-1.6		1.6	-1.1	
Total		**Count**	**1020**	**276**	**1296**	**250**	**1046**	**1296**	**420**	**876**	**1296**

Source: Primary data

Table 5.25: Test results - Standard of living and ATM, MB & INB

Sr. No.	**Particulars**	**Test**	**Value**	**df**	**Asymp. Sig. (2-sided)**
1	ATM Card usage	Pearson Chi-Square	4.396[a]	2	.111
2	Mobile Banking usage	Pearson Chi-Square	22.687[a]	2	.000
3	Internet Banking usage	Pearson Chi-Square	14.328[a]	2	.001

From the above tables 5.24 and 5.25 the following are the results after running the Pearson chi-square analysis the computed value for ATM, Mobile Banking & Internet Banking usage in relationship with standard of living of the surroundings is 4.396, 22.687 & 14.328 correspondingly, while the computed p-value is found to be ≥ .05 with respect to ATM card usage while the p-value for Mobile Banking and Internet Banking usage was ≤ .05 hence the null hypothesis with respect to ATM card usage is accepted and with respect to Mobile Banking and Internet Banking is rejected. Therefore it is concluded that there is a significant association between the standard of living of the surroundings and that with the usage of Mobile & Internet Banking. Further with the help of the derived standardized residuals we can conclude that although there is an overall significance between the standard of living of the surrounding and that of the usage of Mobile and Internet banking we cannot say with confidence that the adoption of mobile banking and the standard of living of respondents from a low standard had a significant association. Those from an average standard of living had a negative affiliation with the adoption of mobile banking with a residual value of more than -2.7, while those from a high standard of living had a positive consociation with the adoption of mobile banking with a stated residual value of 3.2 above the predicted value.

Additional inference from the above analysis shows that there is a significant difference in the standard of living of a customer and the adoption and non-adoption of Mobile banking and Internet banking.

- With regards to ATM card, there is no difference between the standard of living of the customers and usage of ATM card as irrespective of the standard of living customer preferred using an ATM card. While with respect to Mobile banking and Internet banking there was a significant difference. As a matter of fact the higher the standard of living the more was the upsurge in usage of both the e-banking technologies.
- This could be due to the higher the standard of living they had access to higher education, better access to established private schools, access to technologies and facilities like the internet. While to operate an ATM card a customer need not required private internet connection or devices such as a laptop/computers of a smartphone.

➢ **NULL HYPOTHESIS ON INTERNET & TECHNOLOGY ATTRIBUTES:**

- ***$H0_{(11)}$: There is no significant difference between internet usage and ATM card; Mobile Banking; Internet Banking usage.***

Table 5.26: Difference between internet usage and ATM; MB & INB

Particulars			**ATM Card**		**Total**	**Mobile Banking**		**Total**	**Internet Banking**		**Total**
			YES	**NO**		**YES**	**NO**		**YES**	**NO**	
Internet usage	**Yes**	Count	970	189	1159	250	909	1159	420	739	1159
		Std. Residual	1.9	-3.7		1.8	-.9		2.3	-1.6	
	No	Count	50	87	137	0	137	137	0	137	137
		Std. Residual	-5.6	10.7		-5.1	2.5		-6.7	4.6	
Total		**Count**	**1020**	**276**	**1296**	**250**	**1046**	**1296**	**420**	**876**	**1296**

Source: Primary data

Table 5.27: Test results - Internet usage and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Pearson Chi-Square	162.824[a]	1	.000
2	Mobile Banking usage	Pearson Chi-Square	36.614[a]	1	.000
3	Internet Banking usage	Pearson Chi-Square	73.449[a]	1	.000

The above tables 5.26 and 5.27 show that the calculated value of chi-square for ATM, Mobile Banking & Internet Banking usage in a relationship with internet usage is 162.824, 36.614 & 73.449 respectively and the calculated p-value is ≤ .05 hence the null hypothesis is rejected. Therefore it is concluded that there is a significant association between the usage of internet by a customer and that with the usage of ATM Card, Mobile Banking & Internet Banking. Observing the individual cells with the help of standard residual values shows usage of internet has a positive association with adoption and usage of internet banking at a residual value of 2.3, while those not using internet had a negative dependence with the adoption of ATM, mobile banking and internet banking with a residual of -5.6, -5.1 and -6.7 more than the expected value.

Although a considerable proportion of the respondents, i.e., 89% have used the internet facility in one way or the other yet the percentage of use of Mobile banking and Internet banking remain at 19% and 32% respectively. Although internet usage plays a role in the adoption and non-adoption of e-banking technologies the rate of usage is meager. This could be due to the following:

- Customers are not aware of the advantages of using Mobile banking or Internet banking and hence have used internet only when they find it an advantage or are compelled to do so.
- Customers who are using internet seemed to have adopted the Mobile banking technology which shows that non-internet based Mobile banking is not preferred by most of the customers.

$H0_{(12)}$: There is no significant association between the device used for internet and ATM card; Mobile Banking; Internet Banking usage.

Table 5.28: Association between the device used for internet and ATM; MB & INB

Particulars		use of ATM Card		use Mobile Banking		use Internet Banking	
		YES	NO	YES	NO	YES	NO
		Count	Count	Count	Count	Count	Count
Device used for internet	Computer / Laptop	675	96	185	586	340	431
	Smartphone	960	189	250	899	420	729
	Others	8	0	0	8	0	8

Source: Primary data

Table 5.29: Test results - Device used for internet and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Rao & Scott Chi-Square	56.77869	3	.000*
2	Mobile Banking usage	Rao & Scott Chi-Square	25.77189	3	.000*
3	Internet Banking usage	Rao & Scott Chi-Square	102.769	3	.000*

Table 5.30: Test results- Device used for internet and ATM, MB & INB

Model		use of ATM Card		use Mobile Banking		use Internet Banking	
		t	Sig.	t	Sig.	t	Sig.
1	(Constant)	1.468	.142	7.237	.000	6.328	.000
	Computer / Laptop	5.566	.000	3.173	.002	8.758	.000
	Smartphone	9.624	.000	4.750	.000	5.457	.000
	Other	.893	.372	-1.778	.076	-2.866	.004
	Adjusted R Square	.129		.038		.115	
	ANOVA	F(3,1292)=65.149, p=.000		F(3,1292)=17.920, p=.000		F(3,1292)=57.350, p=.000	

The tables 5.28, 5.29 and 5.30 of a multiple response, indicates that the computed value of Rao and Scott chi-square for ATM, Mobile Banking & Internet Banking usage in a relationship with the type of device on which internet is used is 28.623, 12.992 & 71.896 respectively and the calculated p-value is ≤ .05 hence the alternative hypothesis is accepted, and null hypothesis is rejected. Therefore we conclude that there is a significant association between type of device on which internet is used and the adoption of e-banking technologies. Individually the regression coefficient shows that devices other than a computer and smartphone (e.g., tabs, televisions, smart watches) on which internet was used did not have a significant impact on the usage of ATM card nor Mobile Banking with reported p-values of .372 and .076 which were more than equal to .05.

Even though there is a significant relationship between the type of device on which internet is used and their usage of e-banking technologies, yet added devices did not show an impact.

- As the other devices on which a few customers used the internet was smart-watches, television, household appliances and a tablet on which internet could be used only for the specific purpose and not for banking purposes except for internet banking on a tablet.

$H0_{(13)}$: There is no significant association between place of use of internet and ATM card; Mobile Banking; Internet Banking usage.

Table 5.31: Association between the place of use of internet and ATM; MB & INB

Particulars		**use of ATM Card**		**use Mobile Banking**		**use Internet Banking**	
		YES	**NO**	**YES**	**NO**	**YES**	**NO**
		Count	**Count**	**Count**	**Count**	**Count**	**Count**
Place of use of Internet	Home	940	189	250	879	420	709
	Work place	535	36	155	416	280	291
	School / College	240	72	70	242	120	192
	Library	110	0	30	80	70	40

	Internet café	60	12	10	62	20	52
	Other	7	0	0	7	0	7

Source: Primary data

Table 5.32: Test results - Place of use of internet and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	**Rao & Scott Chi-Square**	**178.3989**	**6**	**.000***
2	Mobile Banking usage	**Rao & Scott Chi-Square**	**50.61304**	**6**	**.000***
3	Internet Banking usage	**Rao & Scott Chi-Square**	**200.9486**	**6**	**.000***

Table 5.33: Test results- Place of use of internet and ATM, MB & INB

Model		use of ATM Card		use Mobile Banking		use Internet Banking	
		t	**Sig.**	**t**	**Sig.**	**t**	**Sig.**
1	**(Constant)**	.263	.793	6.233	.000	5.179	.000
	Home	9.135	.000	5.471	.000	7.568	.000
	Work	9.007	.000	4.844	.000	8.872	.000
	School / College	-3.025	.003	.888	.374	.624	.533
	Library	3.799	.000	.920	.358	5.597	.000
	Internet café	-.468	.640	-1.963	.050	-2.802	.005
	Other	1.206	.228	-1.519	.129	-3.186	.001
	Adjusted R Square	.168		.056		.167	
	ANOVA	F(6,1289)=44.498, p=.000		F(6,1289)=13.873, p=.000		F(6,1289)=44.359, p=.000	

The above tables 5.31, 5.32 and 5.33 specify that the computed value of chi-square for ATM, Mobile Banking & Internet Banking usage in a relationship with the place of use of the internet is 127.903, 36.287 & 144.070 respectively and the calculated p-value is ≤ .05 hence the null hypothesis is rejected. Therefore we can conclude that there is a significant

association between the place of use of internet and their usage of ATM Card, Mobile Banking & Internet Banking.

Regression coefficients give us an even more detailed perspective about the usage of each e-banking technology that usage of internet in an internet café did not have a strong association with the use of ATM card. Similarly, the use of internet in school and library did not have a strong association with the use of mobile banking and internet banking.

Additional extrapolation states that though there is a significant relationship between place of use of internet and usage of e-banking tools, there are further significant implications such as:

- There are a few respondents who use internet in schools / colleges, library and internet café and also use various e-banking technologies, firstly for those who use the internet in public places for surfing and not banking transactions they are on the safe side but for those who use internet in public places for general surfing and also for internet banking transactions are at a very high risk.

$H0_{(14)}$: There is no significant relationship between a number of years the internet has been used and ATM card; Mobile Banking; Internet Banking usage.

Table 5.34: Relation between number of years the internet has been used and ATM; MB & INB

Particulars			ATM Card		Total	Mobile Banking		Total	Internet Banking		Total
			YES	NO		YES	NO		YES	NO	
No. of years internet has been used for	**1 - 3 years**	Count	250	117	367	50	317	367	60	307	367
		Std. Res.	-3.3	7.4		-3.3	1.7		-6.3	4.8	
	4 - 8 years	Count	425	48	473	95	378	473	180	293	473
		Std. Res.	1.5	-3.3		-.7	.4		.7	-.5	
	more	Count	295	24	319	105	214	319	180	139	319

	than 8 years	Std. Res.	1.7	-3.9		4.4	-2.3		6.0	-4.5	
Total		Count	**970**	**189**	**1159**	**250**	**909**	**1159**	**420**	**739**	**1159**

Source: Primary data

Table 5.35: Test results - No. of years internet used and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Pearson Chi-Square	96.395[a]	2	.000
2	Mobile Banking usage	Pearson Chi-Square	38.585[a]	2	.000
3	Internet Banking usage	Pearson Chi-Square	119.775[a]	2	.000

The tables 5.34 and 5.35 indicate that the construed value of Pearson chi-square for ATM, Mobile Banking and Internet Banking usage in a relationship with a number of years internet is being used is 96.395, 38.585 & 119.775 respectively and the calculated p-value is $\leq .05$ hence the null hypothesis is rejected. Therefore it is concluded that there is a significant association between the number of years internet is being used and their usage of ATM Card, Mobile Banking & Internet Banking. Further individual analysis of each cell with the help of standard residual depicts that we would not be able to say that there was a strong significance between those customers who were using internet banking for the past 4 to 8 years and the adoption of any of the e-banking technology, those who used internet for 1 – 3 years had a negative correlation with the adoption of ATM card, mobile banking and internet banking with a residual value of -3.3, -3.3 and -6.3 correspondingly inferior than the predicted values, while on the other hand those respondents who use internet for more than 8 years had a negative association with the non-adoption of ATM card, mobile banking and internet banking at residual values -3.9, -2.3 and -4.5.

The study specifies that more the number of years a customer has used the internet the more they are likely to adopt and use e-banking technologies

- Customer prefers using ATM card, Internet banking, and Mobile banking after a comfort level which is achieved after continuous use of the internet for a while.

When a customer first starts using internet other services are first tested out such as social networking and surfing.

- Continuous use of internet makes it easy to use various services only after which customer move towards more cautious services such as banking only and only if they have not come across any difficulty or fraud during the preliminary stage.

H0$_{(15)}$: There is no significant difference between types of services used on internet and ATM card; Mobile Banking; Internet Banking usage.

Table 5.36: Difference between types of services used on internet and ATM; MB & INB

Particulars		use of ATM Card		use Mobile Banking		use Internet Banking	
		YES	NO	YES	NO	YES	NO
		Count	Count	Count	Count	Count	Count
Services used on Internet	Whatsapp	930	177	240	867	400	707
	Facebook	740	144	210	674	350	534
	E-mail	880	159	220	819	390	649
	Online shopping	780	120	220	680	380	520
	Internet surfing	800	177	220	757	370	607
	Others	10	0	10	0	10	0

Source: Primary data

Table 5.37: Test results - Services used on internet and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Rao & Scott Chi-Square	142.0568	6	.000*
2	Mobile Banking usage	Rao & Scott Chi-Square	193.837	6	.000*
3	Internet Banking usage	Rao & Scott Chi-Square	307.1289	6	.000*

Table 5.38: Test results- Services used on internet and ATM, MB & INB

Model		use of ATM Card		use Mobile Banking		use Internet Banking	
		t	Sig.	t	Sig.	t	Sig.
1	(Constant)	-.937	.349	-1.644	.100	-.887	.375
	Whatsapp	8.025	.000	4.970	.000	2.856	.004
	Facebook	-2.691	.007	1.439	.150	1.676	.094
	Email	4.258	.000	-4.435	.000	-.658	.511
	Online Shopping	7.154	.000	4.477	.000	7.210	.000
	Internet surfing	-6.843	.000	1.498	.134	-.315	.753
	Others	3.821	.000	7.559	.000	4.795	.000
	Adjusted R Square	.168		.092		.120	
	ANOVA	F(6,1289)=44.451, p=.000		F(6,1289)=22.885, p=.000		F(6,1289)=30.340, p=.000	

The above tables 5.36, 5.37, and 5.38 display the following results; after running the chi-square analysis, the computed value for ATM, Mobile Banking & Internet Banking usage in a relationship with the types of services used on the internet is 52.230, 71.268 & 112.922 correspondingly, while the computed p-value is found to be $\leq .05$ hence the null hypothesis is rejected. Therefore it is concluded that there is a significant association between the type of services used on the internet and that with the usage and adoption of ATM card, Mobile & Internet Banking. Further with the help of regression test coefficients we can conclude that although overall there is an impact of the types of services used on internet and the usage of e-banking technologies yet we would not be able to say with confidence that there is a

significant impact on services such as e-mail, Facebook and internet surfing and the usage of Mobile banking and Internet banking.

- **NULL HYPOTHESIS ON BANKING ATTRIBUTES:**

$H0_{(16)}$: There is no significant association between type of bank and ATM card; Mobile Banking; InternetBanking usage.

Table 5.39: Association between the type of bank and ATM; MB & INB usage

Particulars			ATM Card		Total	Mobile Banking		Total	Internet Banking		Total
			YES	NO		YES	NO		YES	NO	
Most prefer-ed type of bank	Nationalized Bank	Count	810	207	1017	180	837	1017	310	707	1017
		Std. Resid.	.3	-.7		-1.2	.6		-1.1	.7	
	Private Bank	Count	140	12	152	50	102	152	90	62	152
		Std. Resid.	1.9	-3.6		3.8	-1.9		5.8	-4.0	
	Co-Operative Bank	Count	50	57	107	0	107	107	0	107	107
		Std. Resid.	-3.7	7.2		-4.5	2.2		-5.9	4.1	
	Foreign Bank	Count	20	0	20	20	0	20	20	0	20
		Std. Resid.	1.1	-2.1		8.2	-4.0		5.3	-3.7	
Total		**Count**	**1020**	**276**	**1296**	**250**	**1046**	**1296**	**420**	**876**	**1296**

Source: Primary data

Table 5.40: Chi-Square test results - Type of bank and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Pearson Chi-Square	87.506[a]	3	.000
2	Mobile Banking usage	Pearson Chi-Square	128.977[a]	3	.000
3	Internet Banking usage	Pearson Chi-Square	144.588[a]	3	.000

The tables 5.39 and 5.40 suggest that the interpreted value of chi-square for ATM, Mobile Banking & Internet Banking usage in a relationship with the most preferred type of bank is 87.506, 128.977 & 144.588 respectively and the calculated p-value is $\leq .05$ hence the null hypothesis is rejected. Therefore it is concluded that there is a significant association between types of the bank a customer banks with and their usage of ATM Card, Mobile Banking & Internet Banking. After analyzing each option individually with the help of the standardized residuals, we were not able to establish a very significant impact on a few variables although the overall showed a significant impact. Private bank had a strong positive association between with the adoption Mobile Banking and Internet Banking reporting residual values of 3.8 and 5.8 respectively; while again co-operative banks had a negative inter-relation with adoption of ATM card, mobile banking and internet banking with figures such as -3.7, -4.5 and -5.9 residual values below the expected value. Foreign banks showed an surprising adverse link with the non-adoption of all of ATM card, mobile banking and internet banking with values such as -2.1, -4.0 and -3.7 below the predicted value and a far noticeable positive association with the adoption of mobile banking and internet banking at 8.2 and 5.3 above the expected value.

The most astonishing facts are with respect to private banks and foreign banks:

- Private banks, as well as foreign banks, have a very high minimum deposit that ranges between Rs. 5,000/- to Rs. 25,000/- which caters to the need of high net-worth customers. These customers are all well-educated and have been handling the management role, therefore, prefer services at the comfort of their offices or homes thus promoting e-banking technologies.

- Secondly, these banks appoint very less staff. The staff appointed is only for the sake of customer relationship management and not to carry out traditional banking activities due to which the bank relies more on the use of e-banking technology thus giving the customer too a superior and trendy feeling.

$H0_{(17)}$: There is no significant difference between the type of bank account operated and ATM card; Mobile Banking; Internet Banking usage.

Table 5.41: Difference between the type of bank account and ATM; MB & INB usage

Particulars		use of ATM Card		use Mobile Banking		use Internet Banking	
		YES	NO	YES	NO	YES	NO
		Count	Count	Count	Count	Count	Count
Type of bank account	Savings Account	950	270	210	1010	380	840
	Current Account	145	6	55	96	60	91
	NRE / NRO Account	40	0	20	20	30	10

Source: Primary data

Table 5.42: Test results - Type of bank account and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Rao & Scott Chi-Square	79.13971	3	.000[*,b]
2	Mobile Banking usage	Rao & Scott Chi-Square	180.3109	3	.000[*,b]
3	Internet Banking usage	Rao & Scott Chi-Square	83.89259	3	.000[*,b]

Table 5.43: Test results- Type of bank account and ATM, MB & INB

Model		use of ATM Card		use Mobile Banking		use Internet Banking	
		t	Sig.	t	Sig.	t	Sig.
1	(Constant)	.642	.521	6.854	.000	2.655	.008
	Savings Account	1.637	.102	-3.673	.000	-.130	.897
	Current Account	5.440	.000	2.729	.006	1.329	.184
	NRE / NRO Account	3.388	.001	1.840	.066	4.719	.000
	Adjusted R Square	.030		.049		.026	
	ANOVA	F(3,1292)=14.36, p=.000		F(3,1292)=23.165, p=.000		F(3,1292)=12.591, p=.000	

The above tables 5.41, 5.42 and 5.43 indicate that the construed value of chi-square for ATM, Mobile Banking & Internet Banking usage in a relationship with the type of bank account operated is 50.419, 114.874 & 53.447 respectively and the calculated p-value is ≤ .05 hence the null hypothesis is rejected. Therefore it is concluded that there is a significant association between the type of bank account operated by a customer and their usage of ATM Card, Mobile Banking & Internet Banking. The regression coefficients show that although there is an overall association it is difficult to say that there is an association between a regular savings account customer and usage of ATM card, similarly for NRE/NRO account customers there is no strong association with mobile banking adoption, while for internet banking there was no significant impact on saving account and current account holders, all showing p-values of more than .05.

The above analysis gives us the following insights about types of account:

- That there is no relationship between a savings account and ATM card usage while the total users are more hence the amount of ATM card users has also increased. But the critical facts are that a few of the current account holder did not use ATM card

and preferred to bank the traditional way especially the business class in the upper age groups as they were continuing with the methods they started with.

- There was no significant difference between mobile banking and NRE/NRO account holders as the mobile banking applications were designed for Indian based telephone numbers and it was difficult to register their foreign numbers unless they would take the application on a family member's handset. While catering to the needs of NRI's was internet banking which could register any international number hence a significant difference in the same.

$H0_{(18)}$: There is no significant association between a number of transaction carried out per month and ATM card; Mobile Banking; Internet Banking usage.

Table 5.44: Association between the number of transactions and ATM; MB & INB usage

Particulars			ATM Card		Total	Mobile Banking		Total	Internet Banking		Total
			YES	NO		YES	NO		YES	NO	
No. of transactions carried out in a month	Rare (less than 5 transaction)	Count	110	60	170	40	130	170	50	120	170
		Std. Resid.	-2.1	4.0		1.3	-.6		-.7	.5	
	Average (5 - 15 transaction)	Count	475	111	586	115	471	586	200	386	586
		Std. Resid.	.6	-1.2		.2	-.1		.7	-.5	
	Regular (15 and above)	Count	435	105	540	95	445	540	170	370	540
		Std. Resid.	.5	-.9		-.9	.4		-.4	.3	
Total		**Count**	**1020**	**276**	**1296**	**250**	**1046**	**1296**	**420**	**876**	**1296**

Source: Primary data

Table 5.45: Chi-Square test results - Number of transactions and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Pearson Chi-Square	22.916[a]	2	.000
2	Mobile Banking usage	Pearson Chi-Square	3.004[a]	2	.223
3	Internet Banking usage	Pearson Chi-Square	1.701[a]	2	.427

After running the Pearson chi-square analysis the above tables 5.44 and 5.45 show the computed value for ATM, Mobile Banking & Internet Banking usage in relationship with the frequency of transactions carried out in a month is 22.916, 3.004 & 1.701 correspondingly, while the computed p-value is found to be $\leq .05$ for ATM card usage for which the null hypothesis is rejected, as we can see that for Mobile Banking and Internet Banking the p-value is $\geq .05$ hence we would have to accept the null hypothesis that there is no significant difference between the frequency of transactions carried out in a month and usage of Mobile banking and Internet Banking. The standardized residual reveals that there is a negative association with the number of banking transaction of less than 5 a month with the usage of ATM card and a positive relation with the non-usage of ATM card at -2.1 and 4.0 correspondingly. While the rest shows there was no sizeable link between a number of banking transactions carried out in a month and adoption of ATM card, mobile banking and internet banking with residual values all ranging within ± 2.

- **NULL HYPOTHESIS ON PROMOTIONAL ATTRIBUTES:**

$H0_{(19)}$: There is no significant association between forms of advertisements and ATM card; Mobile Banking; Internet Banking usage.

Table 5.46: Association between forms of advertisements and ATM; MB & INB usage

Particulars		use of ATM Card		use Mobile Banking		use Internet Banking	
		YES	NO	YES	NO	YES	NO
		Count	Count	Count	Count	Count	Count
Forms of	TV commercial	231	55	53	233	98	188

Promotions / Advertisements	**Internet commercials**	223	22	95	150	154	91
	Outdoor advertising	67	11	37	41	57	21
	Magazine	47	0	8	39	27	20
	Periodical Newspaper	115	11	37	89	66	60
	Brochures in the bank	258	78	80	256	125	211
	Promotional Mobile Messages	194	0	71	123	111	83
	N.A. as not heard of any promotion	519	154	89	584	154	519

Source: Primary data

Table 5.47: Test results - Forms of advertisement and ATM, MB & INB

Sr. No.	Particulars	Test	Value	df	Asymp. Sig. (2-sided)
1	ATM Card usage	Rao & Scott Chi-Square	161.241	8	8.79589E-31
2	Mobile Banking usage	Rao & Scott Chi-Square	373.648	8	0.00
3	Internet Banking usage	Rao & Scott Chi-Square	873.23	8	3.3408E-183

Table 5.48: Test results- Forms of advertisements and ATM, MB & INB

Model		use of ATM Card		use Mobile Banking		use Internet Banking	
		t	**Sig.**	**t**	**Sig.**	**t**	**Sig.**
1	**(Constant)**	2.623	.009	7.923	.000	4.928	.000
	TV commercial	-2.104	.036	-5.799	.000	-7.259	.000
	Internet commercials	2.693	.007	5.414	.000	8.059	.000
	Outdoor advertising	-1.595	.111	3.366	.001	3.904	.000
	Magazine	.909	.364	-1.842	.066	2.019	.044

	Newspaper	2.040	.042	.272	.786	-.707	.480
	Brochures in the bank	-3.023	.003	-3.545	.000	-4.517	.000
	Promotional Mobile Messages	7.009	.000	2.715	.007	2.575	.010
	N.A. as not heard of any promotion	-.008	.993	-4.385	.000	-5.500	.000
	Adjusted R Square	**.069**		**.109**		**.172**	
	ANOVA	**F(8,1287)=13.010, p=.000**		**F(8,1287)=20.729, p=.000**		**F(8,1287)=34.533, p=.000**	

The tables 5.46, 5.47 and 5.48 indicate that the computed value of Rao and Scott chi-square for ATM, Mobile Banking & Internet Banking usage in a relationship with forms of advertisement / promotion is 122.018, 208.236 & 357.352 respectively and the calculated p-value is ≤ .05 hence the alternate hypothesis is accepted and the null hypothesis is rejected. Therefore it is concluded that there is a significant association between the form of promotion / advertisement influencing customers and their usage of ATM Card, Mobile Banking & Internet Banking. A further regression coefficient analysis shows that even though there was an overall impact of advertisements and promotions upon the adoption of e-banking technologies yet the relationship between a few factors could not be established with confidence. Outdoor advertising and magazines did not show a significant impact on the adoption of ATM card, magazines and newspapers did not show an impact on the adoption of Mobile banking while newspaper advertisements did not show a significant relationship with the adoption of Internet banking with p-values more than .05 .

Further extrapolation shows that forms of advertisements or promotions create an impact upon the adoption and non-adoption although outdoor advertising, newspaper, and magazines did not show a healthy connection; the following comprehensions could be derived:

- The type of advertisements which are not showing a relationship between adoption is those types of advertisements which are aiming at the public at large without any specifications. Those advertisements are merely advertising for the type of facility available while advertisements over televisions, internet, and brochures advertise the facility as well as explain to the customer the reasons and advantages a customer should adopt the facility as soon as possible. This creates more impact on the

customer, and therefore banks should stop investing in advertisements that do not create a significant impact.

$H0_{(20)}$: There is no significant difference between source of advice and ATM card; Mobile Banking; Internet Banking usage.

Table 5.49: Difference between the source of advice and ATM; MB & INB usage

Particulars		use of ATM Card	use Mobile Banking	use Internet Banking
		Count	Count	Count
Advice to use respective E-banking technology	Bank Staff	485	150	250
	Family members	615	90	210
	Colleagues	160	95	120
	Friends	305	75	150
	Classmates	20	10	30
	Others	60	30	40

Source: Primary data

Table 5.50: Test results- Source of advice and ATM, MB & INB

Model		use of ATM Card		use Mobile Banking		use Internet Banking	
		t	Sig.	t	Sig.	t	Sig.
1	(Constant)	-10.381	.000	-11.290	.000	-20.557	.000
	Bank Staff	26.741	.000	30.488	.000	46.780	.000
	Family members	30.431	.000	11.417	.000	26.821	.000
	Colleagues	.660	.510	8.229	.000	.761	.447
	Friends	17.699	.000	23.376	.000	21.644	.000
	Classmates	-4.840	.000	-12.118	.000	-16.266	.000

	Others	19.186	.000	22.822	.000	32.211	.000
	Adjusted R Square	**.601**		**.792**		**.848**	
	ANOVA	**F(6,1289)=325.729, p=.000**		**F(6,1289)=823.304, p=.000**		**F(6,1289)=1201.540, p=.000**	

The tables 5.49 and 5.50 indicate that it was not possible to run a chi-square analysis as only those respondents who used the respective e-banking technology were considered therefore the regression analysis has been conducted and the results showed that overall there was a significant relationship between the source of advice to use a respective e-banking technology and adoption of ATM card, Mobile banking, and Internet banking. Yet it could not be said with confidence that there is a definite relationship between advice received from colleagues and usage of particular ATM card and Internet banking. The most interesting facts with respect to advice received to use several e-banking technologies were:

- Firstly for the use of ATM card, the most impact was advice from family members for which banks could get in touch with the customers not directly but through family members through a different marketing strategy.
- Secondly for the use of Mobile banking and Internet banking advice from family didn't matter as much as advice from staff which means for these e-banking technologies, staff has to be well versed and trained with the services/facilities available on these respective technologies and how to deal with the difficulties and resolve the complaints in the most efficient manner.

5.4 ANALYSIS - SECOND OBJECTIVE

To explore the factors that lead to the sustainable use of e-banking technologies.

5.4.1 CONCEPTUAL OUTLINE

Technology plays a central role in driving banks towards their sustainability goals, equipped with the elasticity and diagnostic competence of their technology landscape; banks can enhance their power towards sustainable banking practice over an extended period.

Today's banks play a more vital role than just as financial mediators; they are the curators of the society at large. Sustainable banking is the only way forward in today competitive environment where the competition is not just local but also across international borders. Being the driving force of growth, banks need to gear up for their long-term sustainability goals. It is vital that every bank wake up to the reality and understands the urgency of sustainable banking.

This objective looks to study the various factors which will help banks to develop and concentrate on those factors which will help in prolong and sustainable use of E-Banking technologies. The objective is subdivided into two

- **FACTORS INFLUENCING SUSTAINABLE USE OF EACH E-BANKING TECHNOLOGY INDIVIDUALLY.**
    a) ATM Card
    b) Mobile Banking
    c) Internet Banking
- **FACTORS IN GENERAL INFLUENCING SUSTAINABLE USE OF E-BANKING TECHNOLOGY AS A WHOLE.**

5.4.2 DATA ANALYSIS

- **FACTORS INFLUENCING SUSTAINABLE USE OF EACH E-BANKING TECHNOLOGY INDIVIDUALLY**

To determine the most critical factors that influence the usage of the respective e-banking technology and will help in achieving the sustainable development goal, various factors were a list out, and the below analysis was conducted:

- ***Testing of data for suitability for Factor analysis:***

To run a factor analysis test, firstly, the dataset was tested with Kaiser-Meyer Olkin and Bartlett's test (KMO and Bartlett's test) which suggested that data collected was suitable enough for factor analysis. The results determined were as follows:

Table 5.51: Results of KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.887
Bartlett's Test of Sphericity	Approx. Chi-Square	9880.834
	df	66
	Sig.	0.000

Source: Primary data

The above table 5.51 shows the Principal Component Factor (PAF) with a Varimax (orthogonal) rotation of the 12 variables such as (Site launch, Customer care) was conducted. The Kaiser-Meyer Olkin measure of sampling adequacy for the variables under study was found to be .887. The best portion of this test is KMO > .50. The strength of the association amongst variables is studied with the help of Bartlett's test, Bartlett's test of sphericity is significant. That is, its associated probability is less than 0.05, it indicates that the inter-correlation matrix is factorable and it comes from a sample in which variables are non-collinear. The following test suggested that data is suitable for factor analysis.

Data analysis – Exploratory Factor Analysis (EFA):

The Exploratory Factor Analysis (EFA) has been used to uncover the underlying structure of a relatively large set of variables. EFA is a technique within factor analysis whose predominant goal is to identify the underlying relationships between measured variables.

Table 5.52: EFA - Explained variation in data

Total Variance Explained									
Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	6.724	56.031	56.031	6.724	56.031	56.031	4.523	37.692	37.692
2	1.439	11.991	68.023	1.439	11.991	68.023	3.640	30.331	68.023
3	.768	6.399	74.422						
4	.678	5.649	80.071						
5	.523	4.359	84.430						
6	.435	3.628	88.058						
7	.376	3.135	91.193						
8	.293	2.440	93.633						
9	.263	2.191	95.824						
10	.184	1.537	97.361						
11	.173	1.439	98.800						
12	.144	1.200	100.000						

Source: Primary data

The above table 5.52 shows extractable factors from the analysis along with their Eigen-values along with the percentage of variation explained by each factor individually. We observe that 56% total variation is explained by a 1st factor, followed by the second factor which has explained 12% of total variations. Altogether two factors have explained 68% of total variation in the given data. Varimax rotated component matrix has brought more clarity in identifying factors.

Table 5.53: EFA - Latent variables

Particulars	Component	
	1	2
Well informed/trained staff	.865	**Service**
Encouragement in E-Banking usage	.860	
Effective staff Guidance at the initial stage	.855	
Reputed E-Banking services	.735	
Customer support	.732	
Prompt Response from respective tech.	.767	**Performance**
Availability	.761	
Site launches quickly	.720	
Accurate transactions	.702	
Attractive interface	.657	
Accessible machines	.600	
Resolves problems quickly	.586	

Source: Computed data

Factor analysis has suggested there is the existence of two clear underlying factors namely Service and Performance as shown in table 5.53 above. Further, we analyzed ATM, MB, IB with the help of model mentioned above using confirmatory factor analysis (CFA) which is a particular form of factor analysis that is used to test whether measures of a construct are consistent.

<u>Data analysis – Interpretation of CFA</u>

i. Interpretation of CFA for ATM

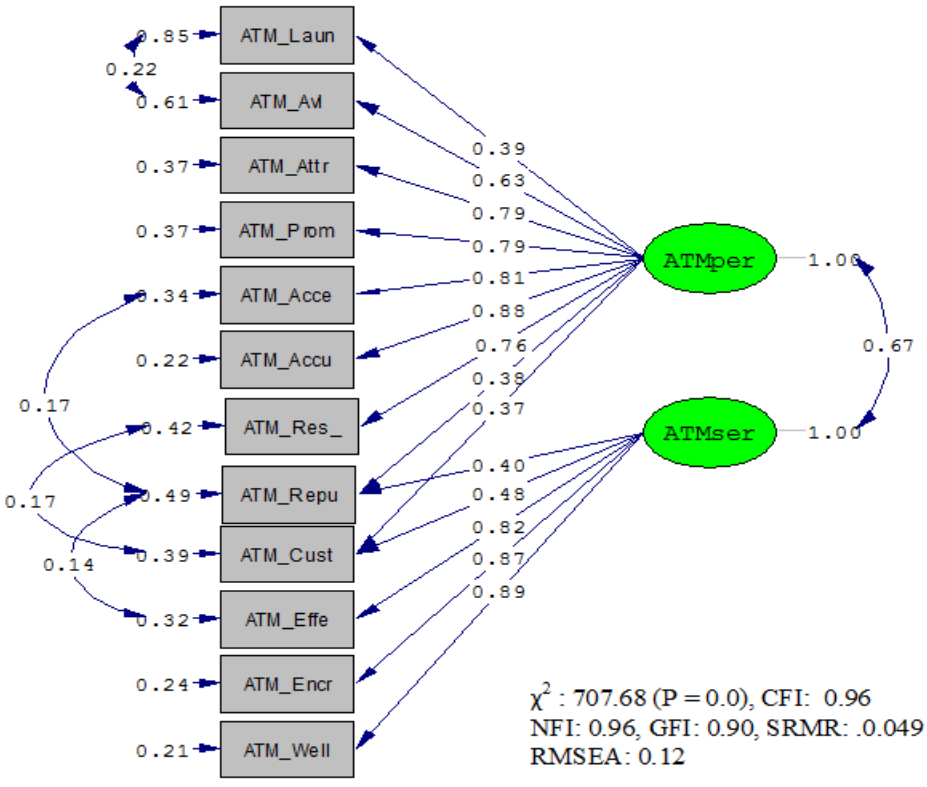
Table 5.54: CFA-Model summary for ATM

Variables	Latent	Beta	SE	T	R-sqr
ATM_ launches quickly	ATMper	0.45	0.036	12.5	0.15
ATM_ Availability	ATMper	0.66	0.031	21.2903	0.39
ATM_ Attractive interface	ATMper	0.94	0.032	29.375	0.63
ATM_ Prompt Response	ATMper	0.81	0.027	30	0.63

ATM_ Accessible machines	ATMper	0.94	0.03	31.3333	0.66
ATM_ Accurate transactions	ATMser	1.05	0.03	35	0.78
ATM_ Reputed services	ATMper/	0.43	0.036	11.9444	0.51
ATM_ Reputed services	ATMser	0.46	0.036	12.7778	
ATM_ Resolves problems	ATMper	0.9	0.032	28.125	0.58
ATM_ Customer support	ATMper	0.48	0.04	12	0.61
ATM_ Customer support	ATMser	0.63	0.036	17.5	
ATM_ Effective staff Guidance	ATMser	1.02	0.033	30.9091	0.68
ATM_ Encouragement in usage	ATMser	1.11	0.032	34.6875	0.76
ATM_ Well trained staff	ATMser	1.12	0.032	35	0.79
Error covariances					
ATM_Avl and ATM_Laun		0.27	0.03	8.92	
ATM_Repu and ATM_Acce		0.22	0.019	11.32	
TM_Cust and ATM_Res_		0.27	0.024	11.17	
ATM_Effe and ATM_Repu		0.2	0.02	9.97	

Source: Primary data

Figure 5.2 : SEM for ATM users



The above model in figure 5.2 shows that the two hidden variables are confirmed from above data related to sustainability of ATM, X^2 :707.68(P = 0.0000), CFI: 0.96, NFI: 0.96, GF I: 0.90, SRMR 0.0433 and RMSEA 0.12 lead to a stable fit of the model. Two latent variables

are observed in the data (ATM_Per and ATM_Ser: namely Performance and Service). We also noted that variables like ATM_ Reputed services and ATM_ Customer support are found to be loading on both the latent variables. The above analysis showed that variables like ATM_ Attractive interface, ATM_ Prompt Response, ATM_ Accurate transactions, ATM_ Accessible machines Access are highly correlated with ATM_Performance similarly ATM_ Effective staff Guidance, ATM_ Encouragement in usage and ATM_ Well trained staff has shown a high degree of correlation with ATM_Service.

The above factor analysis highlights the way for the sustainable use of ATM card in the future; it considers the various variables available in order to achieve continuity of use of an ATM card and stresses on which variables matter the most. The following are the implications:

- Firstly for sustainable use of ATM card the banks have to concentrate on the service component factor as it explains 56% of total variance. While the performance component factor explains on 12%, which is a clear indication that in today's world the types of facilities available on an ATM card is similar with almost all banks, which means customers prefer more of service rendered by the bank. Now in service the key variables a customer would be interested in
    - ATM_ Well trained staff - this is required as there are various types of ATM card, managed by different merchants catering to the specific needs of different types of customer, customer difficulties in using a particular facility or even an ATM complaint which with regards to a technical glitch which need an expert with excellent communication as well as technical skill to resolve the same in the most efficient manner.
    - ATM_ Encouragement in usage – Encouragement to use plays another significant role. Many banks have encouraged the customers to use more of the ATM card with the concept of loyalty bonus, reward points, cash back offers, discounts and even through smart face to face communication skills not only for cash withdrawals but various other facilities available on them in order to achieve maximum utilization of ATM card.
    - ATM_ Effective staff Guidance at initial stage – It's often said that the first impression in the lasting impression. The initial guidance is the most important

as in when a customer faces any difficulty during this stage the sustainability of use of ATM card is hampered. The customer may just take a card because it is being offered by the bank but the primary objective of using it is not achieved. Therefore initial guidance on how to use, types of facilities, emergency contact number, relevant instructions, and safety measures should be well explained at the very first stage.

- Secondly for the sustainable use of ATM card the banks have to concentrate on the second most important component factor that is Performance. A few of the variables considered significant are explained below:
  - ATM_ Accurate transactions – Under the performance index, the most preferred variable is the accuracy of the transactions. Technical problems like debiting the account twice, debiting the account with dispensing of cash, depositing cash but a shortfall in a credit balance, non-functioning or improper functioning of other facilities such as balance inquiry, mobile recharge, cheque book request and fund transfers to wrong account should be avoided to a bare minimum. And even if occurs the rectification should be initiated by the bank without the customer complaining about the same.
  - ATM_ Accessible machines – The location of the ATM is another crucial variable considered under the performance. Usually banks in order to save a little on the rented place the ATM in a little more isolated area. This has a considerable impact on the performance factor as quick accessibility or a strategic located ATM will draw more customers irrespective of the bank. Hence it could decrease rent but increase the cost as banks have to pay the other banks for per transactions used by a customer of the former bank.
  - ATM_ Prompt Response – A prompt response is the next critical factor a customer would prefer for continuity in the usage of ATM card. A text message, an email confirming the success or failure of a transaction from the bank no sooner the transaction is carried out with correct details. Prompt response helps the bank in eliminating errors and frauds.
  - ATM_ Attractive interface – In ATM banking the term interface is understood as a shared boundary across which two components, i.e., the

Automated Teller Machine exchanges information with its bank client. The striking interface includes colors & design, clear font along with the right size visible to the young and old and most importantly user-friendly and self-explanatory catering to all classes of society.

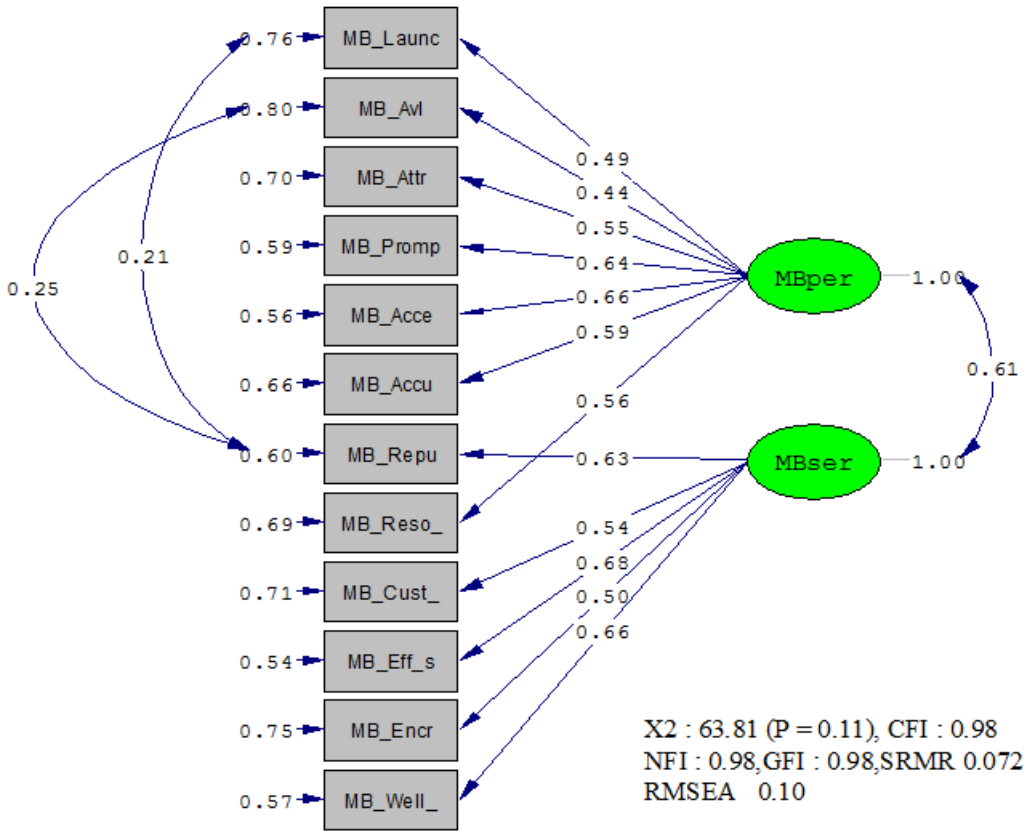
ii. Interpretation of CFA for Mobile Banking

Table 5.55: CFA - Model summary for Mobile Banking

Variable	Latent	Beta	SE	T	R-sqr
MB_App launches quickly	MBper	0.55	0.11	5.00	0.24
MB_ Availability	MBper	0.31	0.07	4.43	0.2
MB_App Attractive interface	MBper	0.51	0.092	5.54	0.3
MB_ Prompt Response	MBper	0.68	0.1	6.80	0.41
MB_ App Accessibility	MBper	0.73	0.1	7.30	0.44
MB_ Accurate transactions	MBper	0.83	0.14	5.93	0.34
MB_ Resolves problems	MBper	0.68	0.12	5.67	0.31
MB_ Reputed services	MBser	0.60	0.089	6.74	0.4
MB_ Customer support	MBser	0.91	0.17	5.35	0.29
MB_ Effective staff Guidance	MBser	1.17	0.17	6.88	0.46
MB_ Encouragement in usage	MBser	0.46	0.094	4.89	0.25
MB_ Well trained staff	MBser	0.72	0.11	6.55	0.43
Error Covariance					
MB_Repu and MB_Launc		0.23	0.076	3.03	
B_Repu and MB_Avl		0.17	0.05	3.40	

Source: Primary data

Figure 5.3 : SEM of Mobile Banking users



The above model in figure 5.3 shows that two hidden variables are confirmed from above data related to sustainability of Mobile Banking, X2: 63.81 (P = 0.11), CFI: .98, NFI: 0.98, GFI: 0.98, SRMR 0.072 and RMSEA 0.10 lead to the stable fit of the model. Two latent variables are observed in the data (MB_Per and MB_Ser: namely Performance and Service). The standardized loadings represent the correlation between each observed variable and the corresponding factor. Considering first the indicators of MB_Service, the standardized loadings are .63 for MB_ Reputed services, MB_ Effective staff Guidance .68 and MB_ Well trained staff .66. Considering the indicators of MB_Performance, they are MB_ App Accessibility .66, MB_ Prompt Response .64 and MB_ Accurate transactions .58.

The SEM (structural equation model) is a good fit model for the sustainable use of Mobile Banking. Mobile banking is a phone based application design by a bank in order to give its customer access to banking transaction with their phones. The SEM model highlights different variables considered significant for the sustainable use:

- Similarly, like the ATM card Mobile Banking customers also prefer the Service component as compared to the Performance component as the service component factor explains 56% of total variance. While the performance component factor explains 12%, which is a clear sign that banks have to concentrate on the below-mentioned variables to make their mobile banking application competitive in nature. The crucial variables in the service components are:
  - MB_ Effective staff Guidance – By useful staff guidance the customer would like guidance in the early stage on how to register for mobile banking, the phone type requirements, the cost (monthly or yearly) the customer is going to incur to adopt the same, the dispatch of user id and passwords, installation of the application on the phone if required, demonstration to use the application, emergency contact number, basis instructions and security and safety measures to be adopted at all times. This guidance will not just help the customer in the short run but in the long run, as well as it will increase usage of the respective technology.
  - MB_ Well trained staff – The customers come across more and more difficulties with increased usage like adding a beneficiary, forgot the password, change in mobile number, stolen phone, up-gradation of transaction rights and technical errors. The staffs have to be well informed and trained to handle such complications at the earliest without wastage of time.
  - MB_ Reputed services – A lot of products and services are rated across marketing, social networking, application downloading (play store, app store) sites. The reputation of the service can be determined by the number of stars allotted by the user of the application or detailed comments and reviews written by users of the application. These complaints or praises in the form of comments and reviews have to be given prioritized attention in resolving the same as it can influence the existing as well as future prospective customers.
- Considering the indicators of the Performance component the following variables were considered most important for the sustainable use:
  - MB_ App Accessibility – Banking customers prefer mobile application accessibility at all times, which means the application should not be under maintenance during crucial hours, adequate connectivity with servers at all time

and regular updating of application to remove bugs. Accessibility of application improves the trust and increase the reputation of the banks.

- MB_ Prompt Response – Text message, email, flash messages confirming the success or failure of a transaction from the bank no sooner the transaction is carried out along with accurate details. A prompt response helps the bank in reducing mistakes and frauds.
- MB_ Accurate transactions – mistakes such as twice debit, wrong account debit, crediting the wrong account, debit of account but payment not gone through, showing of wrong balance can create doubts and distrust which can take a long while to rebuild the trust. Therefore the mobile banking application software should not be compromised during development and maintenance.

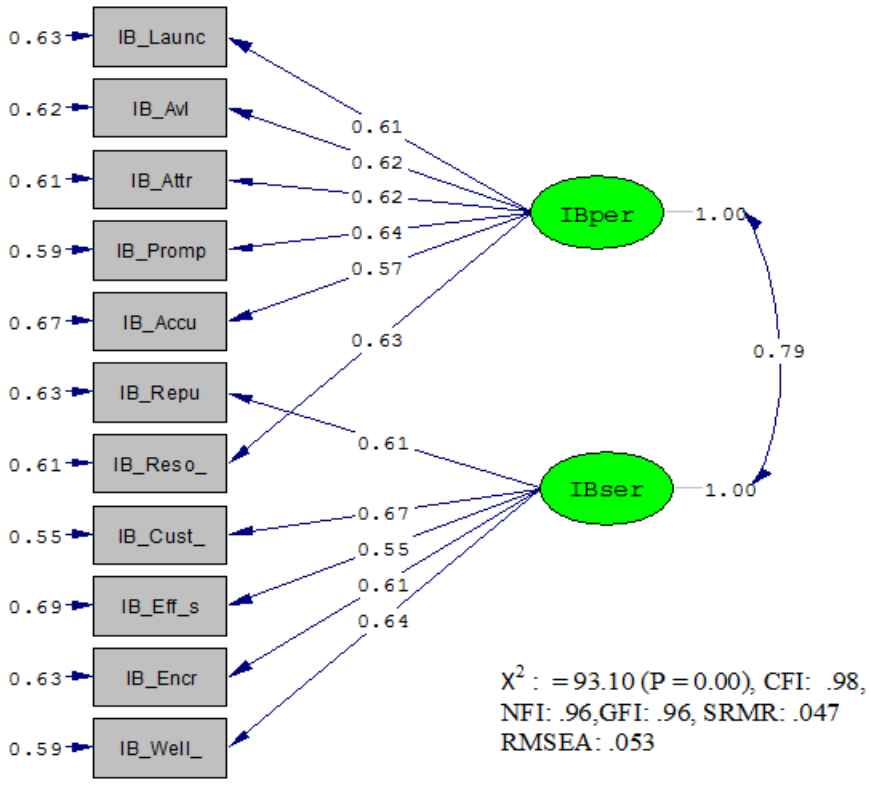
iii. Interpretation of CFA for Internet Banking

Table 5.56: CFA-Model summary for Internet Banking

Variable	Latent	Estimate	SE	T -stat	R-sqr
IB_Site Lauches quickly	IBper	0.93	0.074	12.57	0.37
IB_Availability	IBper	0.85	0.066	12.88	0.38
IB_Attractive interface	IBper	0.93	0.072	12.92	0.39
IB_Prompt Response	IBper	0.99	0.074	13.38	0.41
IB_Accurate transactions	IBper	1.03	0.088	11.70	0.33
IB_Reputed services	IBper	0.98	0.079	12.41	0.37
IB_Resolves problems	IBper	1.04	0.08	13.00	0.39
IB_Customer support	IBser	1.11	0.079	14.05	0.45
IB_Effective staff guidance	IBser	1.07	0.097	11.03	0.31
IB_Encouragement by staff	IBser	1.01	0.082	12.32	0.37
IB_Well trained staff	IBser	1.2	0.091	13.19	0.41

Source: Primary data

Figure 5.4 : SEM for Internet Banking users



The above model in figure 5.4 shows that two hidden variables are confirmed from the above data related to sustainability of Internet Banking, $\chi 2$:93.10.42 (P = 0.00), CFI : 0.98, NFI : 0.96 ,GFI : 0.96, SRMR 0.047 and RMSEA : 0.047 leads to the stable fit of the model. Two latent variables are observed in the data (IB_Per and IB_Ser : namely Performance and Service). The standardized loadings represent the correlation between each observed variable and the corresponding factor. Considering the most influencing indicators of IB_Service , the standardized loadings are IB_Customer support 0.67, IB_Well trained staff 0.64, IB_Encouragement by staff 0.61 . Considering the impelling indicators of IB_Performance the loading are IB_Prompt Response 0.64, IB_Resolves problems 0.63 and IB_Availability and IB_Attractive interface at 0.61 .

Internet banking is a virtual banking system that allows its customers to access and carry out banking transactions through a banks website. Most of the banks in India have adopted the system of Internet banking wherein a customer can login to his or her account through his computer, laptop or phone through the bank's website. Customers are usually forced by bank staff to register themselves for the internet banking, but the more significant problem is the

continuity of usage. The factor analysis and the structural equation model helps to understand the factors that will lead to sustainable use of such technology.

- Considering the Service component of primary importance due as it explains 56 % of variance over the performance component. Under the latent variable of service specific factors are identified as primary for sustainable use:
  - IB_Customer support – especially with regards to internet banking the customer support under whose staff do not directly come under the purview of the bank but a third party such as a BPO (Business process outsourcing). It is imperative that such staff get first hand and updated information about the consumer at the earliest as it is such BPO's that offer 24*7 support and not the bank. The more reputed BPO and well-trained employee better are going to be the support offered.
  - IB_Well trained staff – Most of the customers are just beginning to learn about the internet banking system hence have many have queries and difficulties about the same. Queries with regards to login, the opening of fixed deposit, recurring deposit, payment of direct and indirect taxes, adding a beneficiary, forgot the password, transaction rights and many more. The staff offering such services should be well trained with regards to the same to build trust, reputation and request clients to further usage.
  - IB_Encouragement by staff – Some banks merely register customers for internet banking without the customer knowing exactly what is he registering for thinking of it as a bank formality. Such practices are done only to report on a daily basis a high number of registered users but no follow up or further encouragement to use the same is provided. Attractive interest rates, internet banking discounts, communicating to the customer about the advantages of the same could be a considerable boost to sustainable use.
- Under the latent variable of performance almost similar factors as compared to Mobile banking for the same reasons are identified as key to sustainable use of internet banking.

➢ FACTORS IN GENERAL INFLUENCING SUSTAINABLE USE OF E-BANKING TECHNOLOGY AS A WHOLE.

A list of factors was noted down in general that create an influence on the usage of e-banking technology as a whole. In order to list out the factors creating the most impact, the following analysis was conducted.

- ***Testing of data for suitability for Factor analysis:***

In order to run a factor analysis test firstly, the dataset was tested with Kaiser-Meyer Olkin and Bartlett's test (KMO and Bartlett's test) which suggested that data collected was suitable enough for factor analysis. The results determined were as follows:

Table 5.57: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.919
Bartlett's Test of Sphericity	Approx. Chi-Square	13267.22
	df	91
	Sig.	0.000

Source: Primary data

The above table 5.57 indicates that Principal component factor (PAF) with a Varimax (orthogonal) rotation of the 14 variables such as 24×7 service, Comprehensive banking is conducted. The Kaiser-Meyer Olkin measure of sampling adequacy for the variables under study was found to be .919 . The ideal measure for this test is KMO > .50 (Malhotra, 2004). the strength of the relationship among variables is studied with the help of Bartlett's test , Bartlett's test of sphericity is significant that is, its associated probability is less than 0.05 , it indicates intercorrelation matrix is factorable, and it comes from a sample in which variables are noncollinear.

Data analysis – Exploratory Factor Analysis (EFA):

The Exploratory Factor Analysis (EFA) has been used in order to uncover the underlying structure of a relatively large set of variables. EFA is a technique within factor analysis

whose predominant goal is to identify the underlying relationships between measured variables.

Table 5.58: EFA - Explained variation in data - General e-banking Features

Total Variance Explained									
Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	7.857	56.119	56.119	7.857	56.119	56.119	6.130	43.788	43.378
2	1.204	9.089	65.248	1.224	9.099	65.218	3.000	21.430	65.218
3	.868	6.201	71.419						
4	.758	5.412	76.831						
5	.554	3.955	80.786						
6	.485	3.465	84.251						
7	.419	2.992	87.243						
8	.357	2.552	89.794						
9	.329	2.351	92.146						
10	.308	2.197	94.343						
11	.265	1.892	96.235						
12	.237	1.694	97.929						
13	.173	1.238	99.167						
14	.117	.833	100.000						

Source: Primary data

The above table 5.58 shows the extractable factors from the analysis along with their Eigenvalues along with the percentage of variation explained by each factor individually. We observe that 56.11% of total variation is explained by a 1st factor, followed by the second factor which has explained 9.09% of total variations. Altogether both the factors have explained 65.22% of total variation in the given data. The Varimax rotated component matrix has brought clarity in identifying the underlying factors.

Table 5.59: EFA - Latent variables- General e-banking features

Sr. no	Question	Factor Loading	Name of component
1	Sense of superiority / trendy	0.883	**Decisive features**
2	Save time & money on traveling by not visiting the bank personally	0.831	
3	Possibility to earn more by investing time for productive work rather than visiting the branch	0.822	
4	Real-time fund transfers	0.821	
5	Privacy, no need for a teller	0.777	
6	Quick account details inquiry	0.752	
7	Better management of finances	0.736	
8	Online bill payments / mobile recharges saves time and money	0.684	
9	Full picture of the comprehensive banking services on one website	0.626	
10	Receive discounts, rewards points for using E-Banking technologies	0.543	
11	Free of charge services	0.791	**Cost & Ease of use**
12	Fast and convenient, time-saving	0.719	
13	24-hours and 7- days a week service	0.708	
14	Anywhere access, no need to visit branches	0.704	

Source: Computed data

The above table 5.59 shows the confirmatory factor analysis and confirms the two latent variables. The former which explains 56% of the total variance while the later which

explains 9% of the total variance. The first component highlights a few factors such as sense of superiority / trendy, Save time & money on travelling by not visiting the bank personally, Possibility to earn more by investing time for productive work rather than visiting the branch and real-time fund transfers are considered most essential factors by a customer when it comes to the general reasons for using e-banking technologies. The second critical component under which we have essential factors such as Free of charge services, Fast and convenient, time-saving, 24-hours and 7- days a week service and anywhere access and no need to visit branches were considered as the most critical factors for the sustainable use of e-banking technologies for the future.

Data analysis – Interpretation of CFA

Factor analysis has suggested there is an existence of two clear underlying factors namely Decisive Features and Cost & ease of use. Further, we analyzed ATM users, Mobile Banking users and Internet Banking users with the help of model mentioned above using confirmatory factor analysis (CFA) which is a particular form of factor analysis that is used to test whether measures of a construct are consistent.

Table 5.60: List of general features influencing e-banking with SEM code

Particular (General features of banking)	Coding
24-hours and 7- day a week service	EB1
Anywhere access, no need to visit branches	EB2
Free of charge services	EB3
Full picture of the comprehensive banking services on the website	EB4
Fast and convenient, time-saving	EB5
Privacy, no need for a teller	EB6
Better cash management	EB7
quick account details inquiry	EB8
Sense of superiority, trendy	EB9
I save money on traveling by not going to the bank personally	EB10

I can earn more money by investing more time for productive work rather than personally visiting the bank	EB11
Real-time fund transfers	EB12
Online bill payments / mobile recharges saves time and money	EB13
Received discounts, rewards points for using E-Banking technologies	EB14

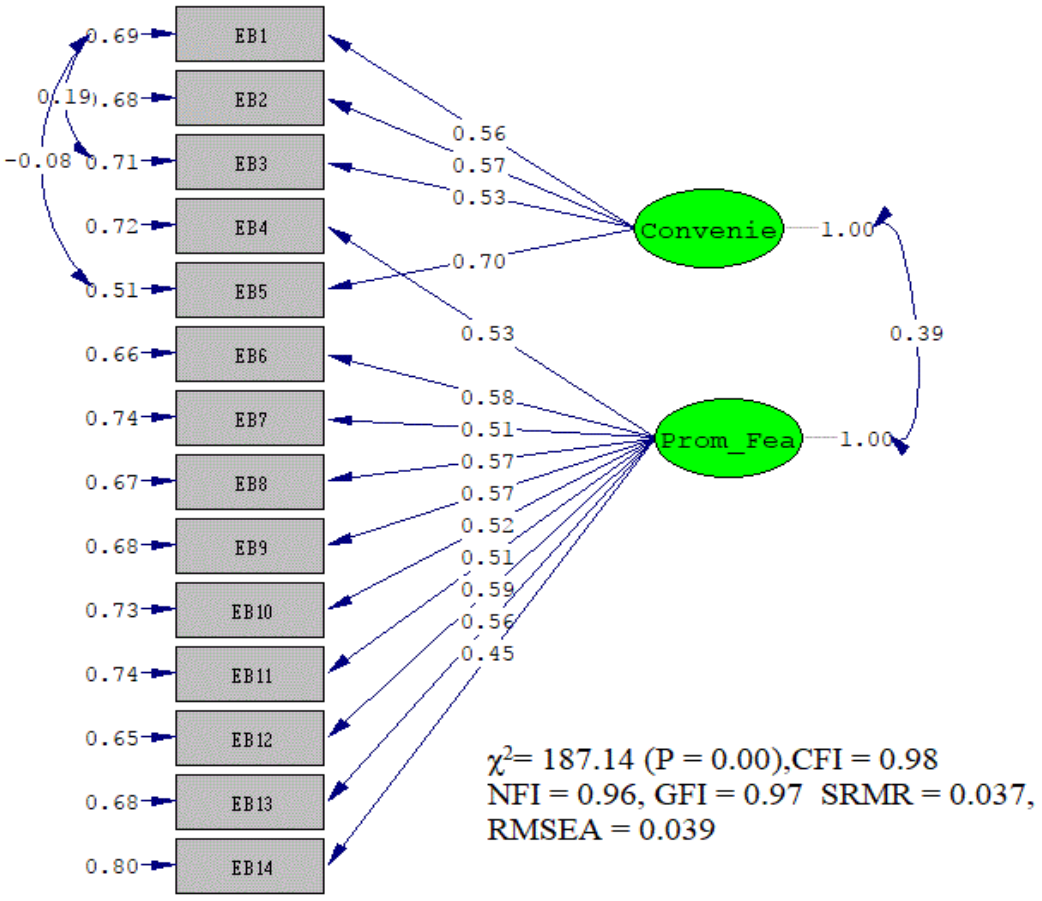
iv. Interpretation of CFA for ATM users

Table 5.61: CFA - General e-banking feature - ATM user

Variables	Latent	Beta	SE	T	R-sqr
EB1	Cost_Ease	0.57	0.048	11.88	0.31
EB2	Cost_Ease	0.51	0.033	15.45	0.32
EB3	Cost_Ease	0.51	0.036	14.17	0.29
EB4	Decis_Fea	0.62	0.038	16.32	0.28
EB5	Cost_Ease	0.58	0.033	17.58	0.49
EB6	Decis_Fea	0.7	0.036	19.44	0.34
EB7	Decis_Fea	0.6	0.038	15.79	0.26
EB8	Decis_Fea	0.58	0.032	18.13	0.33
EB9	Decis_Fea	0.73	0.041	17.80	0.27
EB10	Decis_Fea	0.61	0.04	15.25	0.26
EB11	Decis_Fea	0.67	0.036	18.61	0.35
EB12	Decis_Fea	0.67	0.036	18.61	0.35
EB13	Decis_Fea	0.65	0.036	18.06	0.32
EB14	Decis_Fea	0.62	0.042	14.76	0.2
Error covariance					
EB3 and EB1		0.18	0.035	5.142857	
EB5 and EB1		0.07	0.03	2.333333	

Source: Computed data

Figure 5.5: SEM - General e-banking features - ATM users



The above model in figure 5.5 shows that, two hidden variables are confirmed from above data related to general useful features of e-Banking in relation with ATM users, $\chi 2$:187.14 (P = 0.00), CFI : 0.98, NFI : 0.96 ,GFI : 0.97, SRMR 0.037 and RMSEA : 0.039 leads to stable fit of the model. Two latent variables are observed in the data (Decisive Features and Cost & Ease of use)

It is noted from the figure 5.5 that the SE model that EB1 (24-hours and 7- day a week service), EB2 (Anywhere access, no need to visit branch) , EB3 (Free of charge service) and EB5 (Fast and convenient, time-saving) have loaded on Cost & Ease of use latent variable , whereas remaining variables have loaded on another factor Decisive features.

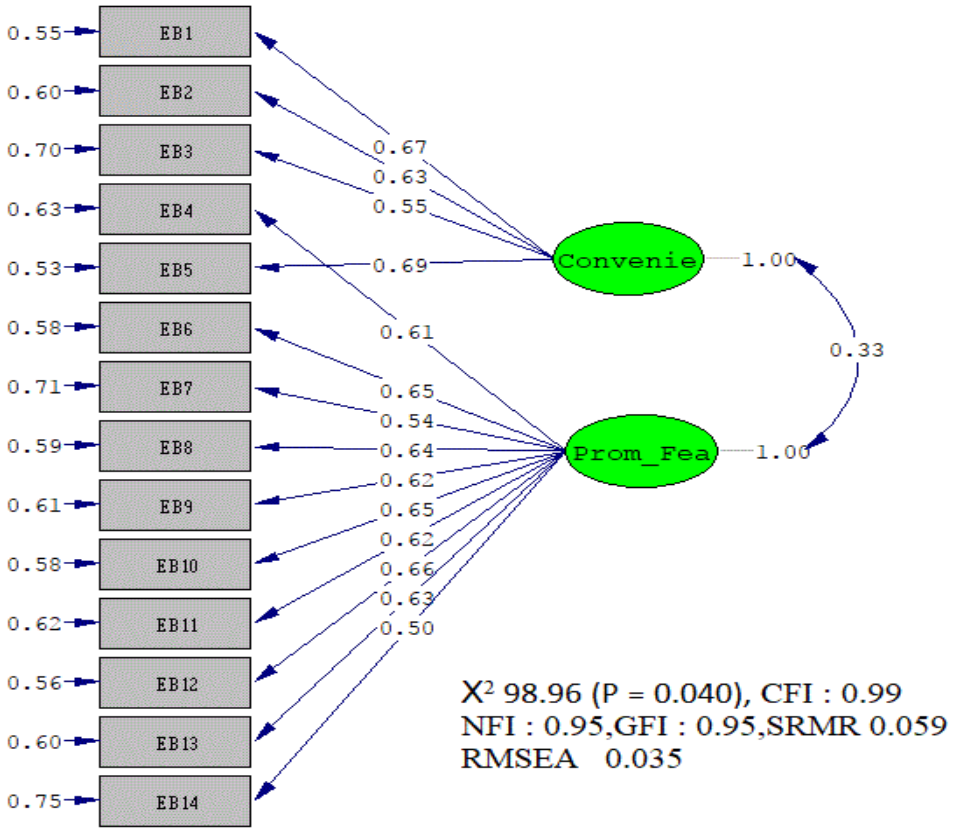
v. Interpretation of CFA for Mobile Banking users

Table 5.62: CFA - General e-banking feature - Mobile Banking users

Variables	Latent	Beta	SE	T	R-sqr
EB1	Cost_Ease	0.94	0.094	10.00	0.45
EB2	Cost_Ease	0.9	0.097	9.28	0.4
EB3	Cost_Ease	0.94	0.12	7.83	0.3
EB4	Decis_Fea	0.83	0.083	10.00	0.37
EB5	Cost_Ease	0.99	0.096	10.31	0.47
EB6	Decis_Fea	0.94	0.088	10.68	0.42
EB7	Decis_Fea	0.81	0.095	8.53	0.29
EB8	Decis_Fea	0.88	0.083	10.60	0.41
EB9	Decis_Fea	0.9	0.088	10.23	0.39
EB10	Decis_Fea	0.84	0.078	10.77	0.42
EB11	Decis_Fea	0.84	0.083	10.12	0.38
EB12	Decis_Fea	0.9	0.081	11.11	0.44
EB13	Decis_Fea	0.85	0.082	10.37	0.4
EB14	Decis_Fea	0.72	0.091	7.91	0.25

Source: Computed data

Figure 5.6: SEM - General e-banking features - Mobile banking users



The above model in figure 5.6 shows that, yet again two hidden variables are confirmed from above data related to general useful features of e-Banking in relation to Mobile Banking users, $\chi 2$:98.96 (P = 0.040), CFI : 0.99, NFI : 0.95 ,GFI : 0.95, SRMR 0.059 and RMSEA : 0.035 leads to stable fit of the model. Two latent variables are observed in the data (Decisive Features and Cost & Ease of use) It is noted from the figure 5.6 that the SE model that EB1 (24-hours and 7- day a week service), EB2 (Anywhere access, no need to visit branch) , EB3 (Free of charge service) and EB5 (Fast and convenient, time-saving) have loaded on Cost & Ease of use latent variable , whereas remaining variables have loaded on the factor Decisive features.

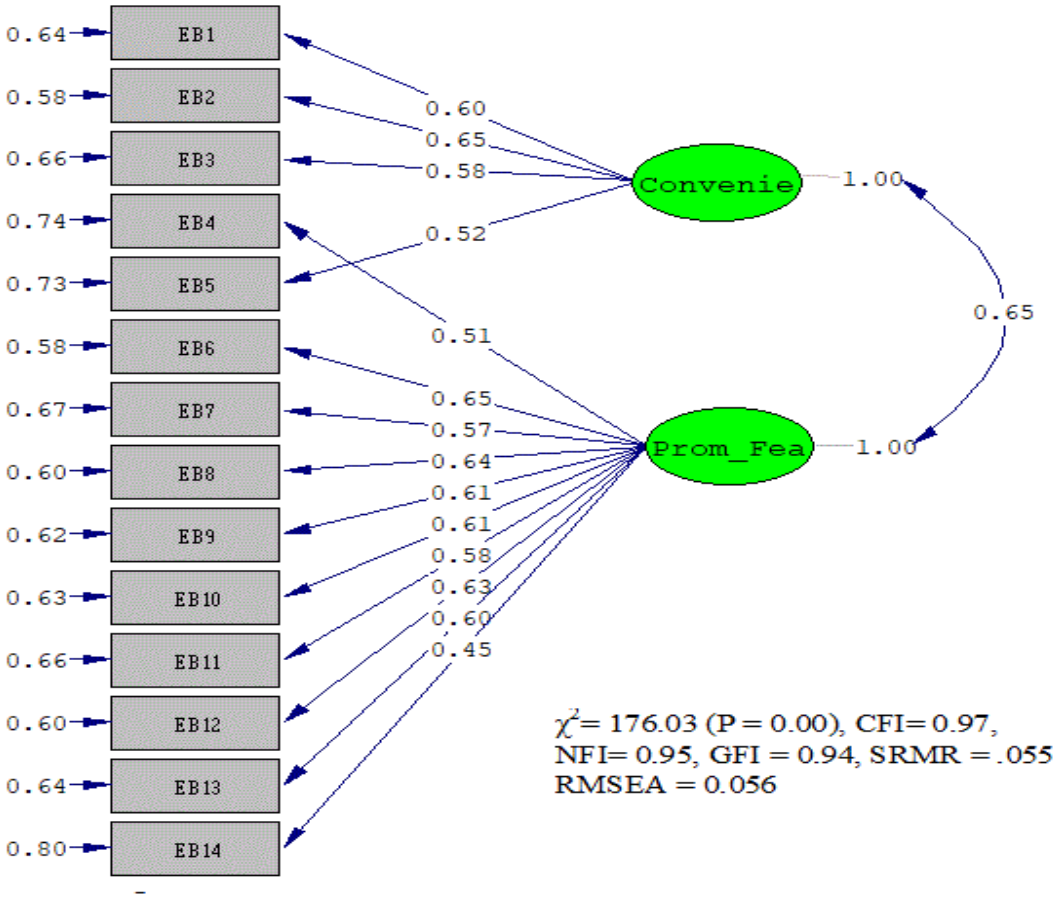
vi. Interpretation of CFA for Internet Banking users

Table 5.63: CFA - General e-banking features - Internet banking users

Variables	Latent	Beta	SE	T	R-sqr
EB1	Cost_Ease	0.74	0.066	11.21	0.36
EB2	Cost_Ease	0.69	0.056	12.32	0.42
EB3	Cost_Ease	0.74	0.067	11.04	0.34
EB4	Decis_Fea	0.53	0.051	10.39	0.26
EB5	Cost_Ease	0.52	0.053	9.81	0.27
EB6	Decis_Fea	0.78	0.056	13.93	0.42
EB7	Decis_Fea	0.73	0.061	11.97	0.33
EB8	Decis_Fea	0.58	0.042	13.81	0.4
EB9	Decis_Fea	0.69	0.054	12.78	0.38
EB10	Decis_Fea	0.61	0.08	7.63	0.37
EB11	Decis_Fea	0.68	0.056	12.14	0.34
EB12	Decis_Fea	0.62	0.047	13.19	0.4
EB13	Decis_Fea	0.66	0.052	12.69	0.36
EB14	Decis_Fea	0.53	0.059	8.98	0.2

Source: Computed data

Figure 5.7: SEM - General e-banking features - Internet banking users



In case of Internet baking the figure 5.7 shows two latent variables are confirmed, It is noted that general useful features of E-Banking in relation to Internet Banking are fit with the following indices : $\chi 2$ =176.03 , (P = 0.00), CFI : 0.97, NFI : 0.95 ,GFI : 0.94, SRMR 0.055 and RMSEA : 0.056 leads to stable fit of the model. It is noted from the model that EB1 (24-hour and 7- day a week service), EB2 (Anywhere access, no need to visit branches) , EB3 (Free of charge services), EB5 (Fast and convenient, time saving) have loaded on the factor Cost & Ease of use while all other variables such as Full picture of the comprehensive banking services on the website (EB4), Privacy, no need for a teller (EB6), Better cash management (EB7), quick account details enquiry (EB8), Sense of superiority, trendy (EB9), I save money on travelling by not going to the bank personally (EB10), I can earn more money by investing more time for productive work rather than personally visiting the bank (EB11), Real-time fund transfers (EB12), Online bill payments / mobile recharges saves time and money (EB13), Received discounts , rewards points for using E-Banking technologies (EB14) have loaded on Decisive Features.

With the help of the above analysis, it is clear that if a bank aims at achieving sustainability of its e-banking technologies the influencing factors are

- The sense of superiority / trendy: Most of the customers in the age group of 18 – 45 years felt that adopting e-banking technology made them feel superior / trendy as compared to their friends and colleagues especially while making payments at social gatherings like movies, visit restaurants, malls, and fuel stations.
- Save money on travelling by not visiting the bank personally: Customers of the age group between 45 – 60 years coming mostly from salaried class of private and public sector that they firstly had no much time to visit the banks during their working hours and secondly that usage of e-banking would save a lot of their time and money as they could carry out any daily or urgent transaction at the comfort of office place or home.
- Possibility to earn more by investing time for productive work rather than visiting the branch: Most of the customer in the age group of 28 – 60 years and specially males, with the occupation of business or professionals were mostly of the same opinion that going to the bank, standing in queue, filling of forms and formalities was a waste of their time and energy and therefore could earn more money by investing the same time saved for productive work.
- Real-time fund transfers: Customers in general whether from business, salaried, professionals all felt that real-time fund transfer as compared to the clearing of the cheque was a significant advantage may be for business, transferring money to family or friends across long distances urgently or for that matter making payments to purchase a new house or vehicle instantly.
- Free of charge services: Respondents were of the opinion that the e-banking services should be free of charge or very minimum charges as they felt banks had reduced their cost of operation to a large extent and while many services are offered for free at present they were of the opinion that the same maybe be charged in the near future.
- Fast and convenient, time-saving: Several customers were of the opinion that the reason for adopting e-banking technology would be that the service is fast, convenient and time-saving.
- 24-hours and 7- days a week service: Respondents were also of the opinion that 24 hours and 7 days a week was a very welcome and generous service provided by the

most of the banks, as a result, could increase the usage toward the respective e-banking technology to avail of the same benefit.

- Anywhere access, no need to visit branches: as most of the e-banking services provide the facility at your fingertips whether at home, office, tour or anywhere in the world. Customers found it as a significant factor influencing them to use the particular e-banking technology in the future.

5.5 ANALYSIS - THIRD OBJECTIVE

To determine the customers' cognizance and level of risk involved in using of e-banking technologies.

5.5.1 CONCEPTUAL OUTLINE

In the era of globalization, banks are expanding their business opportunities across the length and breadth of the country and cross borders the entire world. Adoption of latest technology helps every organization continuously thrive on achieving success but with it also comes different types of risk. Undoubtedly technology helps a bank to gain a competitive advantage to meet business goals but only after proper scrutiny and management of risk promptly.

The risk is a challenge faced by every organization and the same indeed faced by banks as well. There is no way forward by avoiding risk total but instead managing risk in the most prudent manner. Successful banks make constant efforts to update their administrative, frameworks, technological systems. Ignoring risk could have the following impact on any bank:

a) Lack of customer confidence in the bank
b) Reduce credibility, reputation, and status
c) The financial loss for both bank as well as customer

Therefore this objective helps to study and understand the risk level of customers to avoid the negative impact of risk by taking corrective measures and risk awareness among customers who use different types of e-banking technologies.

A. DETERMINING THE CUSTOMERS RISK LEVEL AND THEIR RELATIONSHIP WITH OTHER FACTORS INFLUENCING RISK LEVEL.

B. CUSTOMERS COGNIZANCE OF RESPECTIVE E-BANKING TECHNOLOGY SERVICES / FACILITIES OFFERED

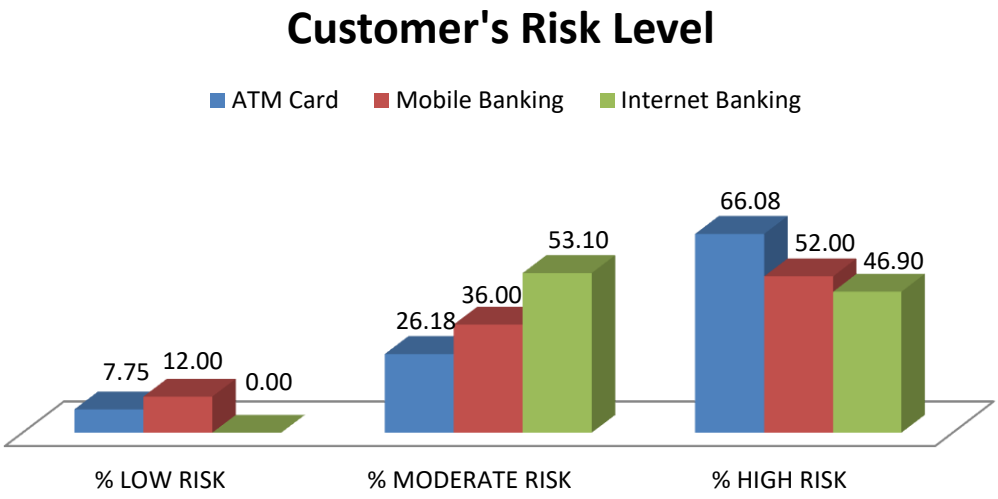
5.5.2 DETERMINING THE CUSTOMERS RISK LEVEL AND THEIR RELATIONSHIP WITH OTHER FACTORS INFLUENCING RISK LEVEL (based on security measures adopted while using respective e-banking technology)

Table 5.64: Summary of e-banking users risk level

Sr. No.	Type of e-banking technology	No. of Customers - Risk Levels						Total Users
		Low	%	Moderate	%	High	%	
1	ATM Card	79	7.75	267	26.18	674	66.08	1020
2	Mobile Banking	30	12.00	90	36.00	130	52.00	250
3	Internet Banking	0	0.00	223	53.10	197	46.90	420

Source: Primary data

Figure 5.8: E-Banking users Risk Level



Source: Primary data

The above bar diagram in figure 5.8 shows the overall risk level of those customers who use each particular e-banking technology. It is to be noted that no internet banking user is falling into the low-risk category which is supposed to be the best level for any e-banking customer. As shown in the diagram there are handful customers in the low-risk category and majority of the users in the high-risk customers which is a significant threat to any e-banking technology. The customers at the highest risk are the ATM card users at 66% followed by mobile banking users the least followed by internet banking users at 47% which is yet a problem of grave importance.

The table 5.64 shows that barely 10% of the users are well protected and falling into the low-risk category.

- High-risk category customers are evidence that such customers do not know to use their respective technology in a correct manner hence could be most vulnerable to frauds as well as the customer is not making frequent use of such technology as well as all services and facilities available on the respective technology are not put to optimum use.
- Secondly, the use of this technology is going prove costly to the bank as they have invested an enormous sum of money into development and maintenance of such e-banking technology and not enough customers are making use of the same to recover the cost. The other important reason is when a customer is a victim of fraud there may sometimes arise a liability on behalf of the bank due to different security lapses by the bank
- Lastly, customers at high risk do not use the e-banking technology for long for various reasons like witnessing a lousy experience, lack of awareness and hence not promoting the sustainable use of the same e-banking technology.

➢ **ESTABLISHING A RELATIONSHIP WITH OTHER FACTORS INFLUENCING RISK LEVEL.**

➢ ***RELATIONSHIP BETWEEN SOCIO-ECONOMIC ATTRIBUTES WITH RISK LEVELS***

Socio-economic Attributes

- Gender
- Residential Status
- Age
- Education qualification
- Occupation
- Income earned
- Standard of living

- ***RELATIONSHIP BETWEEN INTERNET & TECHNOLOGY ATTRIBUTES WITH RISK LEVELS***

Internet & Technology Attributes

- Internet usage
- Device used for internet
- Place of use of internet
- Number of years internet has been used

- ***RELATIONSHIP BETWEEN BANKING / ATM ATTRIBUTES WITH RISK LEVELS***

Banking & technology Attributes

- Type of bank A/c operated
- Frequency of use of ATM; Mobile Banking; Internet Banking (per month)
- Duration of use of ATM; Mobile Banking; Internet Banking

- ***Null hypothesis on ATM risk levels:***

$H0_{(21)}$: There is no significant difference between gender and the risk level of users of ATM card.

$H0_{(22)}$: There is no significant difference between age and the risk level of users of ATM card.

$H0_{(23)}$: There is no significant difference between education qualification and the risk level of users of ATM card.

$H0_{(24)}$: There is no significant difference between occupation and the risk level of users of ATM card.

$H0_{(25)}$: There is no significant difference between income earned in rupees and the risk level of users of ATM card.

$H0_{(26)}$: There is no significant difference between income earned in foreign currency and the risk level of users of ATM card.

$H0_{(27)}$: There is no significant difference between the standard of living and the risk level of users of ATM card.

$H0_{(28)}$: There is no significant difference between internet usage and the risk level of users of ATM card.

$H0_{(29)}$: There is no significant difference between the device used for internet and the risk level of users of ATM card.

$H0_{(30)}$: There is no significant difference between place of use of internet and the risk level of users of ATM card.

$H0_{(31)}$: There is no significant difference between the type of bank account operated and the risk level of users of ATM card.

$H0_{(32)}$: There is no significant difference between frequencies of use of ATM and the risk level of users of ATM card.

$H0_{(33)}$: There is no significant difference between the duration of use of ATM and the risk level of users of ATM card.

- ***Null hypothesis on Mobile Banking risk levels:***

$H0_{(34)}$: There is no significant difference between gender and the risk level of users of Mobile Banking.

$H0_{(35)}$: There is no significant difference between age and the risk level of users of Mobile Banking.

$H0_{(36)}$: There is no significant difference between education qualification and the risk level of users of Mobile Banking.

$H0_{(37)}$: There is no significant difference between occupation and the risk level of users of Mobile Banking.

$H0_{(38)}$: There is no significant difference between income earned in rupees and the risk level of users of Mobile Banking.

$H0_{(39)}$: There is no significant difference between income earned in foreign currency and the risk level of users of Mobile Banking.

$H0_{(40)}$: There is no significant difference between the standard of living and the risk level of users of Mobile Banking.

$H0_{(41)}$: There is no significant difference between internet usage and the risk level of users of Mobile Banking.

$H0_{(42)}$: There is no significant difference between the device used for internet and the risk level of users of Mobile Banking.

$H0_{(43)}$: There is no significant difference between place of use of internet and the risk level of users of Mobile Banking.

$H0_{(44)}$: There is no significant difference between the type of bank account operated and the risk level of users of Mobile Banking.

$H0_{(45)}$: There is no significant difference between frequencies of use of Mobile Banking and the risk level of users of Mobile Banking.

$H0_{(46)}$: There is no significant difference between the duration of use of Mobile Banking and the risk level of users of Mobile Banking.

- ***Null hypothesis on Internet Banking risk levels:***

$H0_{(47)}$: There is no significant difference between gender and the risk level of users of Internet Banking.

$H0_{(48)}$: There is no significant difference between age and the risk level of users of Internet Banking.

$H0_{(49)}$: There is no significant difference between education qualification and the risk level of users of Internet Banking.

$H0_{(50)}$: There is no significant difference between occupation and the risk level of users of Internet Banking.

$H0_{(51)}$: There is no significant difference between income earned in rupees and the risk level of users of Internet Banking.

$H0_{(52)}$: There is no significant difference between income earned in foreign currency and the risk level of users of Internet Banking.

$H0_{(53)}$: There is no significant difference between the standard of living and the risk level of users of Internet Banking.

$H0_{(54)}$: There is no significant difference between internet usage and the risk level of users of Internet Banking.

$H0_{(55)}$: There is no significant difference between the device used for internet and the risk level of users of Internet Banking.

$H0_{(56)}$: There is no significant difference between place of use of internet and the risk level of users of Internet Banking.

$H0_{(57)}$: There is no significant difference between the type of bank account operated and the risk level of users of Internet Banking.

$H0_{(58)}$: There is no significant difference between frequencies of use of ATM and the risk level of users of Internet Banking.

$H0_{(59)}$: There is no significant difference between the duration of use of ATM and the risk level of users of Internet Banking.

➢ ANALYSIS AND HYPOTHESIS TESTING:

Analysis of ATM Risk Levels:

Table 5.65: Analysis of ATM risk levels

ATM Risk Levels						
Particulars		**Low**	**Moderate**	**High**	**Total**	**Value of test statistics**
Gender	Male	54 (68.4) [10.1]	118 (44.2) [22.1]	362 (53.7) [67.8]	534 (52.4) [100]	$\chi2$= 15.730, df = 2, p-value = 0.000 H0(21)= Rejected
	Female	25 (31.6) [5.1]	149 (55.8) [30.7]	312 (46.3) [64.2]	486 (47.6) [100]	
	Total	79 (100) [7.7]	267 (100) [26.2]	674 (100) [66.1]	1020 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Age	18-27 Years	50 (63.3) [7.6]	170 (63.7) [25.8]	438 (65) [66.6]	658 (64.5) [100]	$\chi2$= 22.447, df = 6, p-value = 0.001 $H0_{(22)}$= Rejected
	28-45 Years	19 (24.1) [9]	54 (20.2) [25.5]	139 (20.6) [65.6]	212 (20.8) [100]	
	46-60 Years	3 (3.8) [2.7]	41 (15.4) [37.3]	66 (9.8) [60]	110 (10.8) [100]	
	More than 60 Years	7 (8.9) [17.5]	2 (0.7) [5]	31 (4.6)	40 (3.9)	

				[77.5]	[100]	
	Total	79 (100) [7.7]	267 (100) [26.2]	674 (100) [66.1]	1020 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Education	Less than High school	0 (0) [0]	6 (2.2) [60]	4 (0.6) [40]	10 (1) [100]	$\chi2$= 38.753, df = 8, p-value = 5.462e-06 $H0_{(23)}$= Rejected
	High school and Higher Secondary	4 (5.1) [3.2]	16 (6) [12.8]	105 (15.6) [84]	125 (12.3) [100]	
	Bachelors	42 (53.2) [8.8]	117 (43.8) [24.6]	316 (46.9) [66.5]	475 (46.6) [100]	
	Post-Graduation	33 (41.8) [8.7]	113 (42.3) [29.7]	234 (34.7) [61.6]	380 (37.3) [100]	
	Professional	0 (0) [0]	15 (5.6) [50]	15 (2.2) [50]	30 (2.9) [100]	
	Total	79 (100) [7.7]	267 (100) [26.2]	674 (100) [66.1]	1020 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Occupation	Student	26 (32.9) [8.3]	100 (37.5) [31.9]	187 (27.7) [59.7]	313 (30.7) [100]	$\chi2$= 73.921, df = 16, p-value = .0000 $H0_{(24)}$= Rejected
	Govt./ Public	26 (32.9)	67 (25.1)	117 (17.4)	210 (20.6)	

		[12.4]	[31.9]	[55.7]	[100]	
	Bank Emp.	4 (5.1) [20]	1 (0.4) [5]	15 (2.2) [75]	20 (2) [100]	
	Private Sector	8 (10.1) [3.7]	58 (21.7) [27]	149 (22.1) [69.3]	215 (21.1) [100]	
	Business Person	1 (1.3) [1.5]	11 (4.1) [16.4]	55 (8.2) [82.1]	67 (6.6) [100]	
	Profession -al	7 (8.9) [12.7]	15 (5.6) [27.3]	33 (4.9) [60]	55 (5.4) [100]	
	Housewife	0 (0) [0]	0 (0) [0]	30 (4.5) [100]	30 (2.9) [100]	
	Retiree	0 (0) [0]	0 (0) [0]	30 (4.5) [100]	30 (2.9) [100]	
	Working abroad	7 (8.9) [8.8]	15 (5.6) [18.8]	58 (8.6) [72.5]	80 (7.8) [100]	
	Total	79 (100) [7.7]	267 (100) [26.2]	674 (100) [66.1]	1020 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Income in Rupees (Per Month)	less than 10k	23 (31.9) [6.4]	97 (38.5) [26.9]	240 (39) [66.7]	360 (38.3) [100]	$\chi 2$= 16.993, df = 8, p-value = .030
	11k-30k	23 (31.9)	79 (31.3)	183 (29.7)	285 (30.3)	$H0_{(25)}$= Rejected

		[8.1]	[27.7]	[64.2]	[100]	
	31k - 60k	21 (29.2) [14]	31 (12.3) [20.7]	98 (15.9) [65.3]	150 (16) [100]	
	61k-100k	2 (2.8) [2.1]	32 (12.7) [34]	60 (9.7) [63.8]	94 (10) [100]	
	more than 101k	3 (4.2) [5.9]	13 (5.2) [25.5]	35 (5.7) [68.6]	51 (5.4) [100]	
		72 (100) [7.7]	252 (100) [26.8]	616 (100) [65.5]	940 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Income in Dollars (Per Month)	below 5000$	0 (0) [0]	7 (46.7) [14]	43 (74.1) [86]	50 (68.5) [100]	Fisher test : p = .1366 $H0_{(26)}$= Accepted
	5001-10000$	0 (0) [0]	8 (53.3) [34.8]	15 (25.9) [65.2]	23 (31.5) [100]	
	Total	0 (0) [0]	15 (100) [20.5]	58 (100) [79.5]	73 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Standard of living	Low	0 (0) [0]	9 (3.4) [30]	21 (3.1) [70]	30 (2.9) [100]	Fisher test ,p = .2346 $H0_{(27)}$= Accepted
	Medium	54 (68.4) [8.9]	150 (56.2) [24.6]	406 (60.2) [66.6]	610 (59.8) [100]	

	High	25 (31.6) [6.6]	108 (40.4) [28.4]	247 (36.6) [65]	380 (37.3) [100]	
	Total	79 (100) [7.7]	267 (100) [26.2]	674 (100) [66.1]	1020 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Usage of Internet	No	3 (3.8) [6]	7 (2.6) [14]	40 (5.9) [80]	50 (4.9) [100]	Fisher exact test : p =.099 $H0_{(28)}$= Accepted (95% confidence level)
	Yes	76 (96.2) [7.8]	260 (97.4) [26.8]	634 (94.1) [65.4]	970 (95.1) [100]	
	Total	79 (100) [7.7]	267 (100) [26.2]	674 (100) [66.1]	1020 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
A device used for internet	Computer / Laptop	65 (85.5) [9.6]	196 (75.4) [29]	414 (65.3) [61.3]	675 (69.6) [100]	Rao & Scott chi-square test 24.85, 8 df p = .0016 $H0_{(29)}$= Rejected
	Mobile	76 (100) [7.9]	254 (97.7) [26.5]	630 (99.4) [65.6F]	960 (99) [100]	
	Others	0 (0) [0]	0 (0) [0]	8 (1.3) [100]	8 (0.8) [100]	
		76 (100) [7.8]	260 (100) [26.8]	634 (100) [65.4]	970 (100) [100]	

Particulars		Low	Moderate	High	Total	Statistics
Place of use of internet	Home	76 (100) [8.1]	242 (93.1) [25.7]	622 (98.1) [66.2]	940 (96.9) [100]	Rao & Scott chi-square test 39.12 12 df p = .0031 $H0_{(30)}$= Rejected
	Work	48 (63.2) [9]	132 (50.8) [24.7]	355 (56) [66.4]	535 (55.2) [100]	
	School / College	3 (3.9) [1.3]	62 (23.8) [25.8]	175 (27.6) [72.9]	240 (24.7) [100]	
	Library	5 (6.6) [4.5]	33 (12.7) [30]	72 (11.4) [65.5]	110 (11.3) [100]	
	Internet café	4 (5.3) [6.7]	15 (5.8) [25]	41 (6.5) [68.3]	60 (6.2) [100]	
	Other	0 (0) [0]	5 (1.9) [71.4]	2 (0.3) [28.6]	7 (0.7) [100]	
	Total	76 (100) [7.8]	260 (100) [26.8]	634 (100) [65.4]	970 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Type of bank A/c operated	Saving A/c	79 (100) [8.3]	263 (98.5) [27.7]	608 (90.2) [64]	950 (93.1) [100]	Rao & Scott chi-square test 22.11, 6 df p = .00471 $H0_{(31)}$= Rejected
	Current A/c	7 (8.9) [4.8]	38 (14.2) [26.2]	100 (14.8) [69]	145 (14.2) [100]	
	NRE /	0 (0)	4 (1.5)	36	40	

	NRO A/c	[0]	[10]	(5.3) [90]	(3.9) [100]	
	Total	79 (100) [7.7]	267 (100) [26.2]	674 (100) [66.1]	1020 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Frequency of use of ATM (per month)	More than 10 times	0 (0) [0]	17 (6.4) [17.9]	78 (11.6) [82.1]	95 (9.3) [100]	$\chi2$= 24.71 df = , p-value= .000 $H0_{(32)}$= Rejected
	4 to 9 times	46 (58.2) [10.3]	102 (38.2) [22.9]	297 (44.1) [66.7]	445 (43.6) [100]	
	1 to 3 times	33 (41.8) [6.9]	148 (55.4) [30.8]	299 (44.4) [62.3]	480 (47.1) [100]	
	Total	79 (100) [7.7]	267 (100) [26.2]	674 (100) [66.1]	1020 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Duration of use of ATM	Last 6 months	0 (0) [0]	0 (0) [0]	10 (1.5) [100]	10 (1) [100]	$\chi2$= 17.619 df = 8, p-value= .024 $H0_{(33)}$= Rejected
	6 months to 1 year	3 (3.8) [3]	20 (7.5) [20]	77 (11.4) [77]	100 (9.8) [100]	
	1 to 3 years	18 (22.8) [6.5]	84 (31.5) [30.5]	173 (25.7) [62.9]	275 (27) [100]	
	3 to 5 years	23 (29.1)	67 (25.1)	190 (28.2)	280 (27.5)	

		[8.2]	[23.9]	[67.9]	[100]	
	More than 6 years	35 (44.3) [9.9]	96 (36) [27]	224 (33.2) [63.1]	355 (34.8) [100]	
	Total	79 (100) [7.7]	267 (100) [26.2]	674 (100) [66.1]	1020 (100) [100]	

Source: Primary data

Note: ( ) represents vertical percentages

[ ] represents horizontal percentages

The above analysis in table 5.65 shows the following results:

- **Socio-economic Attributes:**

- There is a substantial association between gender and risk levels of ATM card users. The Chi-square test result shows a value of 15.730 with the p-value of .00 which is ≤ .05. Therefore the alternative hypothesis is accepted, and the null hypothesis is rejected. The results reveal that a more significant percentage of females are at moderate and high risk while using an ATM card as compared to their male counterparts.

- The relationship between age and risk levels of ATM card users is highly significant with a value of 22.447 with p-value 0.001 which is ≤ .05. Therefore once again the alternative hypothesis is accepted, and the null hypothesis is rejected. The simple percentage shows that customers at the highest risk were those in the age group of 60 years and above with a percentage of 77.5% while the age group within 28-45 years was within the low and moderate risk taking their combined total of 34.5%.

- The computed value of chi-square between the education qualification of a customer and the risk levels of ATM is 38.753 while the p-value is ≤ .05. Therefore we can accept the alternative hypothesis and reject the null hypothesis. The respondents with the highest risk were considered to be those with education qualification of higher secondary schooling and less with nearly 100% of the respondents falling in the combined total of high and moderate risk, with the majority under the high risk.

While those with bachelors, post-graduation and professional degrees were comparatively lower with an average of about 60% falling under the high-risk category.

- Occupation shows that it has a substantial relationship with the risk levels of an ATM card user with computed chi-square value at 73.921 and a p-value ≤ .05. Thus the null hypothesis is rejected. Housewives and retirees were prone to a 100% high risk while businessmen were also highly prone to risk with 82.1%. The respondents working in government offices and banks were comparatively less prone to risk with a percentage of 12.4 % and 20 % respectively.
- The income of the customer is calculated separately for those earning in India and those earning abroad. For those earning in India, the chi-square analysis has been used, and the computed value is 16.993 which shows a significant relationship between income earned and risk level of ATM card usage with p-value ≤.05. The percentages calculated showed that an average of about 65% of the respondents was at very high risk while using ATM card irrespective of the income bracket.
- For those earning abroad, in foreign currency, the Fisher test has been used and the p-value, is ≥ .05 thus the null hypothesis is accepted, and the alternative hypothesis has been rejected.
- The standard of living shows that there is no relationship with the risk levels of ATM card users after computing the same with the Fisher test after deriving a p-value ≥ .05. Thus we reject the alternative hypothesis and accept the null hypothesis.

➢ **Internet and Technology Attributes:**

- The Fisher exact test was used to study the relationship between usage of internet by a bank customer and his risk level with regards to ATM usage. The p-value was .099 which is ≤ .05 and therefore can be rejected at 95% confidence level or can be accepted at the 90% confidence level. Therefore we can accept the null hypothesis at 95% confidence level. The percentages indicate that 80% of those not using internet was at high risk as compared to 65.4 % of those using the internet.
- The Rao & Scott chi-square analysis showed a significant relationship between the device used for internet and the risk levels of ATM card users with a value of 24.85

and a p-value ≤ .05. Therefore we reject the null hypothesis. A total of 61.3% respondents using a computer or laptop were reported at high risk while 65.6 % of those using mobile for internet banking were at high risk.

- The relationship between place of use of internet and risk levels of ATM card users showed a significant relationship with the Rao & Scott chi-square analysis giving a value of 39.12 and p-value of ≤ .05. Therefore the null hypothesis is rejected, and the alternative hypothesis is accepted. From those using the internet at schools/college and internet café, 72.9% and 68.3% were the highest to be reported at high risk, while those using the internet at home and at workplaces were considered the lowest with 8.1% and 9% considered at low risk.

➢ **Banking and Technology attributes:**

- The relationship between the type of bank account operated and risk levels of ATM card users is significant. The Rao & Scott chi-square determined value is 22.11 and p-value is .0047 which is ≤ .05. Thus the null hypothesis is rejected, and the alternative hypothesis is accepted. Those customers having an NRE/NRO account and using an ATM card were considered at highest risk, while those having an ordinary savings account were stated to have the lowest and moderate risk.

- The frequency of use of ATM card and the association with its risk levels were very significant with a chi-square value of 24.71 and a p-value ≤ .05. Therefore we accept the alternative hypothesis and reject the null hypothesis. Surprisingly the respondents carrying out ATM transactions more than 10 times in a month were at very high risk at 82.1%, while those using an ATM card barely 1 to 3 times a month were at 62.3%. This could also mean that those using ATM card too often would ignore and overlook the precautionary measures due to overconfidence which could prove to be fatal.

- There is a significant relationship between the risk level and the extent of ATM card usage. The chi-square value is 17.61 with a P-value of .024 which is ≤ .05. Therefore the null hypothesis is rejected, and the alternative hypothesis is accepted. The percentages reveal that those who have just started using the ATM card for the past 1 year, 80% of them on an average were at very high risk, whereas comparing those who used the ATM card for more than 6 years, 63.1% of them were at high risk.

Analysis of Mobile Banking Risk Levels:

Table 5.66: Analysis of Mobile Banking risk levels

Mobile Banking Risk Levels						
Particulars		**Low**	**Mode rate**	**High**	**Total**	**Test statistics**
Gender	Male	20 (66.7) [13]	55 (61.1) [35.7]	79 (60.8) [51.3]	154 (61.6) [100]	$\chi2$= 0.37 df = 2, p-value = 0.83 $H0_{(34)}$= Accepted
	Female	10 (33.3) [10.4]	35 (38.9) [36.5]	51 (39.2) [53.1]	96 (38.4) [100]	
	Total	30 (100) [12]	90 (100) [36]	130 (100) [52]	250 (100) [100]	
Particulars		**Low**	**Mode rate**	**High**	**Total**	**Statistics**
Age	18-27 Years	30 (100) [16]	60 (66.7) [31.9]	98 (75.4) [52.1]	188 (75.2) [100]	$\chi2$= 50.38 df = 6, p-value = 0.00 $H0_{(35)}$= Rejected
	28-45 Years	0 (0) [0]	10 (11.1) [23.8]	32 (24.6) [76.2]	42 (16.8) [100]	
	46-60 Years	0 (0) [0]	10 (11.1) [100]	0 (0) [0]	10 (4) [100]	
	More than 60 Years	0 (0) [0]	10 (11.1) [100]	0 (0) [0]	10 (4) [100]	
	Total	30 (100) [12]	90 (100) [36]	130 (100) [52]	250 (100) [100]	

Particulars		Low	Moderate	High	Total	Statistics
Education	Less than High school	0 (0) [0]	0 (0) [0]	0 (0) [0]	0 (0) [0]	$\chi2$= 33.33, df = 4 , p-value = 0.000 $H0_{(36)}$= Rejected
	High school and Higher Secondary	0 (0) [0]	10 (11.1) [40]	15 (11.5) [60]	25 (10) [100]	
	Bachelors	30 (100) [19.4]	40 (44.4) [25.8]	85 (65.4) [54.8]	155 (62) [100]	
	Post-Graduation	0 (0) [0]	40 (44.4) [57.1]	30 (23.1) [42.9]	70 (28) [100]	
	Profession-al	0 (0) [0]	0 (0) [0]	0 (0) [0]	0 (0) [0]	
	Total	30 (100) [12]	90 (100) [36]	130 (100) [52]	250 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Occupation	Student	18 (60) [18.8]	32 (35.6) [33.3]	46 (35.4) [47.9]	96 (38.4) [100]	$\chi2$= 134.21, df = 12, p-value < 2.2e-16 $H0_{(37)}$= Rejected
	Govt./ Public	0 (0) [0]	10 (11.1) [50]	10 (7.7) [50]	20 (8) [100]	
	Bank Emp.	10 (33.3) [100]	0 (0) [0]	0 (0) [0]	10 (4) [100]	
	Private Sector	2 (6.7) [5.4]	27 (30) [73]	8 (6.2) [21.6]	37 (14.8) [100]	

	Business Person	0 (0) [0]	1 (1.1) [8.3]	11 (8.5) [91.7]	12 (4.8) [100]	
	Profession-al	0 (0) [0]	0 (0) [0]	15 (11.5) [100]	15 (6) [100]	
	Working abroad	0 (0) [0]	20 (22.2) [33.3]	40 (30.8) [66.7]	60 (24) [100]	
	Total	30 (100) [12]	90 (100) [36]	130 (100) [52]	250 (100) [100]	
Particulars		**Low**	**Mode rate**	**High**	**Total**	**Statistics**
Income in Rupees (Per Month)	less than 10k	0 (0) [0]	30 (42.9) [31.6]	65 (72.2) [68.4]	95 (50) [100]	$\chi 2$= 116.123, df = 8 , p-value = 0.000 $H0_{(38)}$= Rejected
	11k-30k	10 (33.3) [100]	0 (0) [0]	0 (0) [0]	10 (5.3) [100]	
	31k - 60k	0 (0) [0]	10 (14.3) [50]	10 (11.1) [50]	20 (10.5) [100]	
	61k-100k	7 (23.3) [17.9]	17 (24.3) [43.6]	15 (16.7) [38.5]	39 (20.5) [100]	
	more than 101k	13 (43.3) [50]	13 (18.6) [50]	0 (0) [0]	26 (13.7) [100]	
	Total	30 (100) [15.8]	70 (100) [36.8]	90 (100) [47.4]	190 (100) [100]	

Particulars		Low	Moderate	High	Total	Statistics
Income in Dollars (Per Month)	below 5000$		10 (50) [25]	30 (75) [75]	40 (66.7) [100]	$\chi 2$= 3.75, df = 1 , p-value = 0.053 $H0_{(39)}$= Accepted (at 95% confidence level)
	5001-10000$		10 (50) [50]	10 (25) [50]	20 (33.3) [100]	
	Total		20 (100) [33.3]	40 (100) [66.7]	60 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Standard of living	Low	0 (0) [0]	0 (0) [0]	10 (7.7) [100]	10 (4) [100]	$\chi 2$= 36.325, df = 4, p-value = .000 $H0_{(40)}$= Rejected
	Medium	10 (33.3) [8.3]	30 (33.3) [25]	80 (61.5) [66.7]	120 (48) [100]	
	High	20 (66.7) [16.7]	60 (66.7) [50]	40 (30.8) [33.3]	120 (48) [100]	
	Total	30 (100) [12]	90 (100) [36]	130 (100) [52]	250 (100) [100]	
Particulars		**Low**	**Moderate**	**High**	**Total**	**Statistics**
Usage of Internet	No	0 (0) [0]	0 (0) [0]	0 (0) [0]	0 (0) [0]	NA $H0_{(41)}$= Cannot be proved
	Yes	30 (100) [12]	90 (100) [36]	130 (100) [52]	250 (100) [100]	

	Total	30 (100) [12]	90 (100) [36]	130 (100) [52]	250 (100) [100]	
Particulars		**Low**	**Mode rate**	**High**	**Total**	**Statistics**
Device used for internet	Computer / Laptop	20 (66.7) [20]	90 (100) [90]	75 (57.7) [75]	185 (74) [185]	Rao & Scott chi-square test 55..41, 4 df p = .000 $H0_{(42)}$= Rejected
	Mobile	30 (100) [30]	90 (100) [90]	130 (100) [130]	250 (100) [250]	
	Others	30 (100) [30]	90 (100) [90]	130 (100) [130]	250 (100) [250]	
	Total	30 (100)	90 (100)	130 (100)	250 (100)	
Particulars		**Low**	**Mode rate**	**High**	**Total**	**Statistics**
Place of use of internet	Home	30 (100) [12]	90 (100) [36]	130 (100) [52]	250 (100) [100]	Rao & Scott chi-square test 38.90, 10 df p = .000 $H0_{(43)}$= Rejected
	Work	20 (66.7) [12.9]	60 (66.7) [38.7]	75 (57.7) [48.4]	155 (62) [100]	
	School / College	10 (33.3) [14.3]	30 (33.3) [42.9]	30 (23.1) [42.9]	70 (28) [100]	
	Library	10 (33.3) [33.3]	10 (11.1) [33.3]	10 (7.7) [33.3]	30 (12) [100]	
	Internet café	0 (0) [0]	0 (0) [0]	10 (7.7)	10 (4)	

				[100]	[100]	
	Total	30 (100) [12]	90 (100) [36]	130 (100) [52]	250 (100) [100]	
Particulars		**Low**	**Mode rate**	**High**	**Total**	**Statistics**
Type of bank A/c operated	Saving A/c	30 (100) [14.3]	90 (100) [42.9]	90 (69.2) [42.9]	210 (84) [100]	Rao & Scott chi-square test 119.39, 6 df p = .000 $H0_{(44)}$= Rejected
	Current A/c	0 (0) [0]	0 (0) [0]	55 (42.3) [100]	55 (22) [100]	
	NRE / NRO A/c	0 (0) [0]	0 (0) [0]	20 (15.4) [100]	20 (8) [100]	
	Total	30 (100) [12]	90 (100) [36]	130 (100) [52]	250 (100) [100]	
Particulars		**Low**	**Mode rate**	**High**	**Total**	**Statistics**
Frequency of use of Mobile Banking (per month)	4 to 9 times	10 (33.3) [25]	0 (0) [0]	30 (60) [75]	40 (36.4) [100]	$\chi2$= 116.261 , df = 8, p-value = .000 $H0_{(45)}$= Rejected
	1 to 3 times	20 (66.7) [28.6]	30 (100) [42.9]	20 (40) [28.6]	70 (63.6) [100]	
	Total	30 (100) [27.3]	30 (100) [27.3]	50 (100) [45.5]	110 (100) [100]	
Particulars		**Low**	**Mode rate**	**High**	**Total**	**Statistics**
Duration of	Last 6 months	0 (0)	0 (0)	10	10	$\chi2$= 57.48 , df = 4,

use of Mobile Banking		[0]	[0]	(7.7) [100]	(4) [100]	p-value = .000 $H0_{(46)}$= Rejected
	6 months to 1 year	10 (33.3) [33.3]	10 (11.1) [33.3]	10 (7.7) [33.3]	30 (12) [100]	
	1 to 3 years	10 (33.3) [7.7]	30 (33.3) [23.1]	90 (69.2) [69.2]	130 (52) [100]	
	3 to 5 years	10 (33.3) [25]	10 (11.1) [25]	20 (15.4) [50]	40 (16) [100]	
	More than 6 years	0 (0) [0]	40 (44.4) [100]	0 (0) [0]	40 (16) [100]	
	Total	30 (100) [12]	90 (100) [36]	130 (100) [52]	250 (100) [100]	

Source: Primary data

Note: ( ) represents vertical percentages

[ ] represents horizontal percentages

The above analysis in table 5.66 shows the following results for the relationship between various attributes like socio-economic, internet & technology and banking and technology attributes with the risk levels of mobile banking:

- **Socio-economic Attributes:**

- There is no primary association between gender and risk levels of Mobile banking users. The Chi-square shows a value of 0.37 with the P-value ≥ .05. Therefore the alternative hypothesis is rejected, and the null hypothesis is accepted
- The relationship between age and risk levels of Mobile Banking users is highly significant with a value of 50.38 with p-value ≤ .05. Therefore once again the alternative hypothesis is accepted, and the null hypothesis is rejected. Further

analysis showed that 76.2% of those in the age group 28-45 years were at high risk when using mobile banking as compared to 52.1% of those from the age group of 18-27 years.

- The computed value of chi-square between the education qualification of a customer and the risk levels of Mobile Banking is 33.33 while the P-value is ≤ .05. Therefore we can accept the alternative hypothesis. Review of each cell showed that those who had a qualification of high school and higher secondary school were at 60% high risk, whereas those with bachelors were at 54.8% high risk. Those with less than high school education did not show any risk as there were no responses recorded in the same category.
- Occupations show that it has a healthy relationship with the risk levels of Mobile Banking user with computed chi-square value at 134.21 and p-value ≤ .05. Thus the alternative hypothesis is accepted, and the null hypothesis is rejected. Those students who were using mobile banking had recorded high risk levels at 47.9%, public servant at 50%, bank employee at 0% and private sector employees at 21.6%, while those from the business profession were at 91.7% high risk, professional at 100% and those working abroad at 66.7% high risk.
- The income of the customer is calculated separately for those earning in India and those earning abroad. For those earning in India, the chi-square analysis has been used, and the computed value is 116.123 which shows a significant relationship between incomes earned in India with a p-value ≤ .05. A separate analysis of each cell revealed that lower the income higher was the risk level of using mobile banking at 68.4%, reducing to 0% for income bracket from 11,000 to 30,000, and for income bracket 61,000 to 1, 00,000 at 38.5%.
- For those earning abroad in other currency the chi-square test, has been used and the p-value is ≤ .05. Thus the null hypothesis is accepted, and the alternative hypothesis is accepted. Thus concluding that there is no significant relationship between income earned abroad and the risk levels in using mobile banking.
- The standard of living shows that there is a substantial relationship with the risk levels of Mobile Banking users after computing the same with Pearson's chi-square test and deriving a p-value ≤ .05, thus rejecting the null hypothesis. Those in a higher standard of living had comparatively lower high-risk levels at 33.3%, increasing to

66.7% for those from the prevailing standard of living and increasing further to 100% to those from the low standard of living.

- **Internet and Technology Attributes:**

- The relationship between usage of internet by a bank customer and his risk level with regards to that of Mobile Banking cannot be determined as all the users of Mobile banking were using the internet.
- The Rao & Scott chi-square analysis showed a significant relationship between the device used for internet and the risk levels of mobile banking users with a value of 55.41 and a p-value ≤ .05. Therefore we reject the null hypothesis. Since it was a multiple response question independent examinations of the cell stated that those using computer and mobile for internet were comparatively less prone to high risk than those who used mobile phones alone for the internet.
- The relationship between place of use of internet and risk levels of mobile banking users showed a significant relationship with the Rao & Scott chi-square analysis giving a value of 38.90 and p-value of ≤ .05. Therefore we accept the alternative hypothesis and reject the null hypothesis.

- **Banking and Technology attributes:**

- The relationship between the type of bank account operated and risk levels of Mobile Banking users is significant. The Rao & Scott chi-square determined value is 119.39 and P-value is ≤ .05. Thus the null hypothesis is rejected, and the alternative hypothesis is accepted. The ones holding an NRE/NRO account and current account reported the high-risk level of 100% each while using mobile banking.
- The frequency of use of Mobile Banking and the relationship with its risk levels is very significant with a chi-square value of 116.261 and a p-value ≤ .05. Therefore we reject the null hypothesis. Data showed that those using the mobile banking application more frequently in the category of 4 to 9 times a month were more prone to high-risk levels of 75% rather than those using the application between 1 to 3 times a month of a risk level of 28.6%.

- There is a significant relationship between the duration of use of Mobile Banking and its risk level. The chi-square value is 57.48 with a p-value ≤ .05. Therefore we reject the null hypothesis. Bank customers using the mobile banking application for the past 6 months were at 100% high-risk levels reducing the level for those using mobile banking for more than 6 years to a 100% moderate risk level.

Analysis of Internet Banking Risk Levels:

Table 5.67: Analysis of Internet Banking risk levels

Internet Banking Risk Levels					
Particulars		**Moderate**	**High**	**Total**	**Test statistics**
Gender	Male	131 (58.7) [51.4]	124 (62.9) [48.6]	255 (60.7) [100]	$\chi2$= 0.773 df = 1, p-value = 0.379 $H0_{(47)}$= Accepted
	Female	92 (41.3) [55.8]	73 (37.1) [44.2]	165 (39.3) [100]	
	Total	223 (100) [53.1]	197 (100) [46.9]	420 (100) [100]	
Particulars		**Moderate**	**High**	**Total**	**Test statistics**
Age	18-27 Years	139 (62.3) [44.8]	171 (86.8) [55.2]	310 (73.8) [100]	$\chi2$= 37.883 df = 3, p-value = 0.000 $H0_{(48)}$= Rejected
	28-45 Years	64 (28.7) [71.1]	26 (13.2) [28.9]	90 (21.4) [100]	
	46-60 Years	10 (4.5)	0 (0) [0]	10 (2.4)	

		[100]		[100]	
	More than 60 Years	10 (4.5) [100]	0 (0) [0]	10 (2.4) [100]	
	Total	223 (100) [53.1]	197 (100) [46.9]	420 (100) [100]	
Particulars		**Mode rate**	**High**	**Total**	**Test statistics**
Education	High school and Higher Secondary	11 (4.9) [36.7]	19 (9.6) [63.3]	30 (7.1) [100]	$\chi2$= 3.69 df = 2, p-value = 0.1577 $H0_{(49)}$= Accepted
	Bachelors	112 (50.2) [53.3]	98 (49.7) [46.7]	210 (50) [100]	
	Post-Graduation	100 (44.8) [55.6]	80 (40.6) [44.4]	180 (42.9) [100]	
	Profession-al	223 (100) [53.1]	197 (100) [46.9]	420 (100) [100]	
Particulars		**Mode rate**	**High**	**Total**	**Test statistics**
Occupation	Student	79 (35.4) [63.7]	45 (22.8) [36.3]	124 (29.5) [100]	$\chi2$= 21.498, df = 6, p-value = 0.001492 $H0_{(50)}$= Rejected
	Govt./ Public	34 (15.2) [48.6]	36 (18.3) [51.4]	70 (16.7) [100]	
	Bank Emp.	16 (7.2) [80]	4 (2) [20]	20 (4.8) [100]	

	Private Sector	38 (17) [41.8]	53 (26.9) [58.2]	91 (21.7) [100]	
	Business Person	13 (5.8) [52]	12 (6.1) [48]	25 (6) [100]	
	Profession-al	10 (4.5) [33.3]	20 (10.2) [66.7]	30 (7.1) [100]	
	Working abroad	33 (14.8) [55]	27 (13.7) [45]	60 (14.3) [100]	
	Total	223 (100) [53.1]	197 (100) [46.9]	420 (100) [100]	
Particulars		**Mode rate**	**High**	**Total**	**Test statistics**
Income in Rupees (Per Month)	less than 10k	74 (38.9) [56.9]	56 (32.9) [43.1]	130 (36.1) [100]	$\chi2$= 67.59, df = 4, p-value = 7.321e-14 $H0_{(51)}$= Rejected
	11k-30k	10 (5.3) [14.3]	60 (35.3) [85.7]	70 (19.4) [100]	
	31k - 60k	40 (21.1) [57.1]	30 (17.6) [42.9]	70 (19.4) [100]	
	61k-100k	28 (14.7) [58.3]	20 (11.8) [41.7]	48 (13.3) [100]	
	more than 101k	38 (20) [90.5]	4 (2.4) [9.5]	42 (11.7) [100]	

	Total	190 (100) [52.8]	170 (100) [47.2]	360 (100) [100]	
Particulars		**Moderate**	**High**	**Total**	**Test statistics**
Income in Dollars (Per Month)	below 5000$	23 (69.7) [57.5]	17 (63) [42.5]	40 (66.7) [100]	$\chi2$ = 0.075758, df = 1, p-value = 0.7831 $H0_{(52)}$=Accepted
	5001-10000$	10 (30.3) [50]	10 (37) [50]	20 (33.3) [100]	
	Total	33 (100) [55]	27 (100) [45]	60 (100) [100]	
Particulars		**Moderate**	**High**	**Total**	**Test statistics**
Standard of living	Low	12 (5.4) [60]	8 (4.1) [40]	20 (4.8) [100]	$\chi2$= 15.743, df = 2, p-value = 0.0003815 $H0_{(53)}$= Rejected
	Medium	102 (45.7) [44.3]	128 (65) [55.7]	230 (54.8) [100]	
	High	109 (48.9) [64.1]	61 (31) [35.9]	170 (40.5) [100]	
	Total	223 (100) [53.1]	197 (100) [46.9]	420 (100) [100]	
Particulars		**Moderate**	**High**	**Total**	**Test statistics**
Usage of Internet	No	0	0	0	NA
	Yes	223	197	420	

		(100) [53.1]	(100) [46.9]	(100) [100]	$H0_{(54)}$= Cannot be determined
	Total	223 (100) [53.1]	197 (100) [46.9]	420 (100) [100]	
Particulars		**Moderate**	**High**	**Total**	**Test statistics**
Device used for internet	Computer / Laptop	199 (89.2) [58.5]	141 (71.6) [41.5]	340 (81) [100]	Rao & Scott chi-square test = 340.90 df = 4 , p-value = .0000 $H0_{(55)}$= Rejected
	Mobile	223 (100) [53.1]	197 (100) [46.9]	420 (100) [100]	
	Others	223 (100) [53.1]	197 (100) [46.9]	420 (100) [100]	
Particulars		**Moderate**	**High**	**Total**	**Test statistics**
Place of use of internet	Home	223 (100) [53.1]	197 (100) [46.9]	420 (100) [100]	Rao & Scott chi-square test = 8.751, df = 6 , p-value = .1888 $H0_{(56)}$= Accepted
	Work	148 (66.4) [52.9]	132 (67) [47.1]	280 (66.7) [100]	
	School / College	68 (30.5) [56.7]	52 (26.4) [43.3]	120 (28.6) [100]	
	Library	36 (16.1) [51.4]	34 (17.3) [48.6]	70 (16.7) [100]	
	Internet café	6 (2.7)	14 (7.1)	20 (4.8)	

		[30]	[70]	[100]	
	Total	223 (100) [53.1]	197 (100) [46.9]	420 (100) [100]	
Particulars		**Moderate**	**High**	**Total**	**Test statistics**
Type of bank A/c operated	Saving A/c	210 (94.2) [55.3]	170 (86.3) [44.7]	380 (90.5) [100]	Rao & Scott chi-square test = 10.19, df = 4 , p-value = .037 $H0_{(57)}$= Rejected
	Current A/c	28 (12.6) [46.7]	32 (16.2) [53.3]	60 (14.3) [100]	
	NRE / NRO A/c	10 (4.5) [33.3]	20 (10.2) [66.7]	30 (7.1) [100]	
	Total	223 (100) [53.1]	197 (100) [46.9]	420 (100) [100]	
Particulars		**Moderate**	**High**	**Total**	**Test statistics**
Frequency of use of Internet Banking (per month)	More than 10 times	64 (28.7) [71.1]	26 (13.3) [28.9]	90 (21.5) [100]	$\chi2$= 23.946, df = 2 , p-value = .0000 $H0_{(58)}$= Rejected
	4 to 9 times	62 (27.8) [60.8]	40 (20.4) [39.2]	102 (24.3) [100]	
	1 to 3 times	97 (43.5) [42.7]	130 (66.3) [57.3]	227 (54.2) [100]	
	Total	223 (100) [53.2]	196 (100) [46.8]	419 (100) [100]	

Particulars		Mode rate	High	Total	Test statistics
Duration of use of Internet Banking	Last 6 months	34 (15.2) [42.5]	46 (23.5) [57.5]	80 (19.1) [100]	$\chi 2$= 37.563, df = 4 , p-value = .0000 $H0_{(59)}$= Rejected
	6 months to 1 year	26 (11.7) [65]	14 (7.1) [35]	40 (9.5) [100]	
	1 to 3 years	34 (15.2) [34.3]	65 (33.2) [65.7]	99 (23.6) [100]	
	3 to 5 years	55 (24.7) [55]	45 (23) [45]	100 (23.9) [100]	
	More than 6 years	74 (33.2) [74]	26 (13.3) [26]	100 (23.9) [100]	
	Total	223 (100) [53.2]	196 (100) [46.8]	419 (100) [100]	

Source: Primary data

Note: ( ) represents vertical percentages

[ ] represents horizontal percentages

The above analysis in table 5.67 shows the following results for the relationship between various attributes like socio-economic, internet & technology and banking and technology attributes with the risk levels of internet banking, there are no respondents falling under the low-risk level category and has not been shown in the table:

- **Socio-economic Attributes:**

- There is no significant association between gender and risk levels of Internet banking users. The chi-square shows a value of 0.773 with the p-value ≥ .05. Therefore the alternative hypothesis is rejected, and the null hypothesis is accepted.

- The relationship between age and risk levels of internet banking users is highly significant with a value of 37.883 with p-value ≤ .05. Therefore the alternative hypothesis is accepted, and the null hypothesis is rejected. Distinct examination with the help of percentages reveals that the younger age group between 18 to 27 years was at a higher risk level at 55.2% while using internet banking, which gradually decreased with older age group of 28 to 45 years at 28.9% and those in the age group of 46 years and above at a 100% moderate risk level.
- The computed value of chi-square between the education qualification of a customer and the risk levels of Internet Banking is 3.69 while the p-value is ≥ .05. Therefore the alternative hypothesis is rejected, and the null hypothesis is accepted. Hence a commanding relation could not be established with the risk level of using internet banking and the education of a banking customer.
- Occupations show that it has a healthy relationship with the risk levels of Internet Banking user with computed chi-square value at 21.498 and p-value ≤ .05. Thus the alternative hypothesis is accepted, and the null hypothesis is rejected. Students, bank employees, business persons and those working abroad reported a comparatively less high risk level at 36.3%, 20%, 48% and 45%, whereas those from the public sector, private sector and professional stated higher risk level while using internet banking at 51.4%, 58.2% and 66.7% correspondingly.
- The income of the customer is calculated separately for those earning in India and those earning abroad. For those earning in India, the chi-square analysis was used, and the computed value is 67.59 which shows a significant relationship between income earned in India with a p-value ≤.05. The highest risk was borne by those in the income bracket of Rs. 11,000 to 30,000 at 85.7% and reducing further with the increase in income brackets.
- For those earning abroad in other currency, the chi-square test had been used, and the p-value was ≥ .05. Therefore the alternative hypothesis is rejected, and the null hypothesis is accepted. Hence a great connection between income earned in foreign countries and their risk level while using internet banking could not be determined.
- The standard of living shows that there is a sizeable affiliation with the risk levels of Internet Banking users after computing the same with Pearson's Chi-square test and deriving a p-value ≤ .05, thus accepting the alternative hypothesis. The average

standard of living has the highest risk level when using internet banking at 55.7% with a total number of 230 respondents using the same, while the low standard of living has had slight deep of 40% while only 20 respondents have been reported using the same.

- **Internet and Technology Attributes:**

- The relationship between usage of internet by a bank customer and his risk level with regards to of Internet Banking usage could not be determined as all the users of Internet banking were compulsorily using the internet.
- The Rao & Scott chi-square analysis showed a significant relationship between the device used for internet and the risk levels of internet banking users with a value of 340.90 and p-value ≤ .05. Therefore we reject the null hypothesis. Those using internet on mobile phones and using internet banking services were prone to higher risk levels at 46.9% as compared to those using laptops / computers at 41.5%.
- The relationship between place of use of internet and risk levels of Internet Banking users showed a significant relationship with the Rao & Scott chi-square analysis giving a value of 8.751 and p-value of ≤ .05. Therefore we reject the null hypothesis. Respondents who would use internet facilities at home, workplace, colleges, the library had an average moderate risk level of around 50% while those using internet facilities at internet cafes have a high-risk level at 70% while using internet banking services.

- **Banking and Technology attributes:**

- The relationship between the type of bank account operated and risk levels of Internet Banking users is significant. The Rao & Scott chi-square determined value is 10.19 and p-value is ≤ .05. Thus the null hypothesis is rejected, and the alternative hypothesis is accepted, and the null hypothesis is rejected. Those possessing current accounts as well as those with NRE / NRO accounts were at higher risk levels at 53.3% and 66.7% correspondingly while accessing internet banking.
- The frequency of use of Internet Banking and the relationship with its risk levels is very significant with a chi-square value of 23.946 and a p-value ≤ .05. Therefore we accept the alternative hypothesis and reject the null hypothesis. Frequency of use of internet banking was directly related to the risk level of internet banking, it was

found that those who used internet banking 1 to 3 times a month were susceptible to high-risk level at 57.3%, it reduced with the increase in frequency of use with respondents who were using internet banking more than 10 times a month devouring a condensed high-risk level of 28.9%.

- We can conclude that there is a sizeable correlation between the duration of use of internet banking and its risk level. The chi-square value determined is 23.946 with a p-value $\leq .05$. Therefore we reject the null hypothesis and accept the alternative hypothesis. Those who have been using internet banking for the past 6 months have a reported high risk of 57.5% whereas those who have been using internet banking for more than 6 years have a reduced high-risk level of 26%. The fact which comes to light is that risk of using internet banking is comparatively greater when internet banking has been used for a short period of time.

5.5.3 CUSTOMERS COGNIZANCE OF RESPECTIVE E-BANKING TECHNOLOGY SERVICES / FACILITIES OFFERED

➢ **CUSTOMERS COGNIZANCE OF SERVICES/FACILITIES OFFERED OVER AN ATM CARD:**

Table 5.68: Customer's cognizance of services/facilities on ATM card

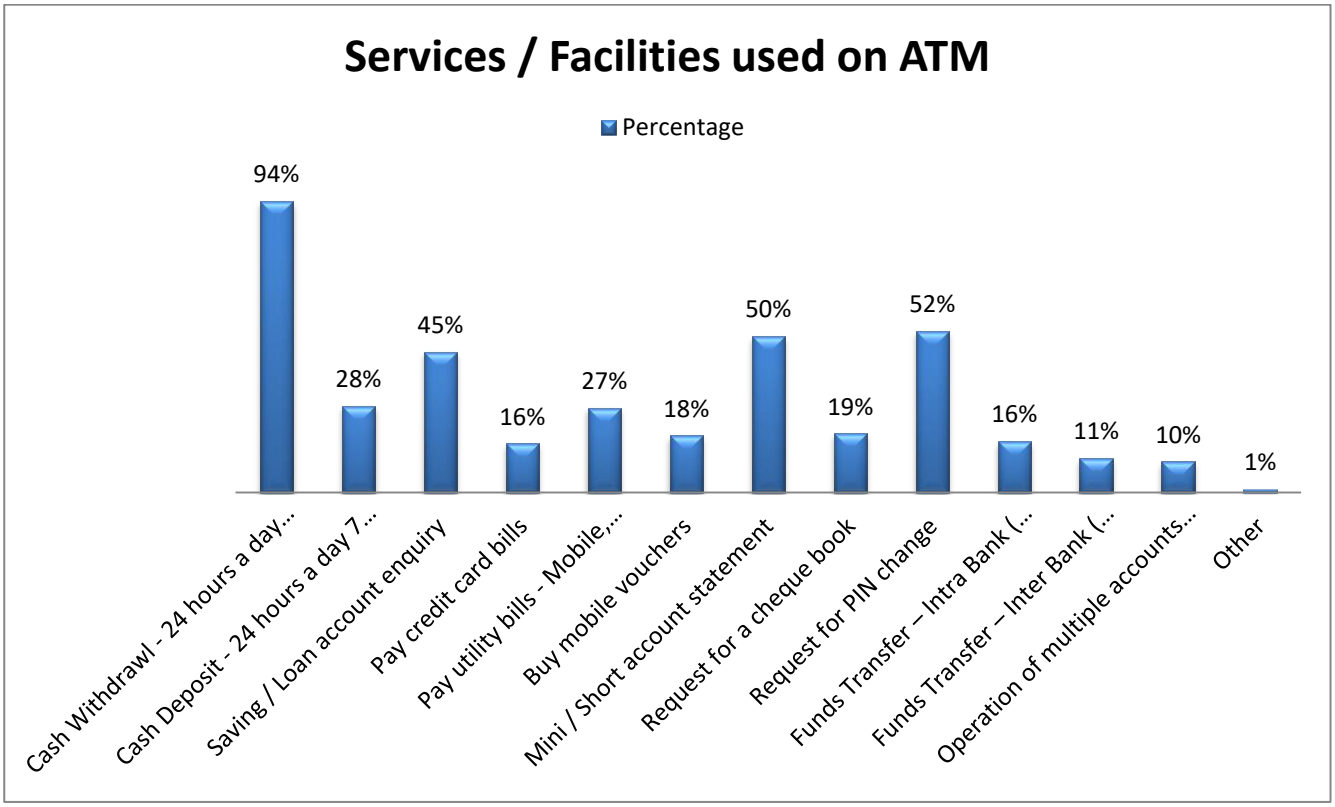
Services / Facilities used on ATM	Frequency Count	Percentage
Cash Withdrawal - 24 hours a day 7 days a week	954	94%
Cash Deposit - 24 hours a day 7 days a week	283	28%
Saving / Loan account inquiry	461	45%
Pay credit card bills	160	16%
Pay utility bills - Mobile, Electricity, School	277	27%
Buy mobile vouchers	186	18%
Mini / Short account statement	512	50%
Request for a cheque-book	193	19%
Request for PIN change	529	52%

Funds Transfer – Intra Bank (within the bank)	168	16%
Funds Transfer – Inter Bank (other banks)	113	11%
Operation of multiple accounts with a single card	101	10%
Other	10	1%

Total Number of respondents possessing/using ATM cards	1020

Source: Primary data

Figure 5.9: Services / Facilities used on ATM



Source: Computed data

The table 5.68 and figure 5.9 shows the customer's awareness of the various facilities available on their ATM card. The cash withdrawal service is the only and most commonly used service at 94% of the respondents while the next best-known services at 52%, 50%, and 45% are requested for PIN change, mini / short statement and saving/loan account inquiry respectively. While services such as cash deposit, payment of credit card bills, utility bills, mobile vouchers, request for cheque-book, Inter & Intra-bank fund transfer, and operation of

multiple accounts were not used by the majority of the customer and to many these services were also not known. The above chart highlights the facilities used by customers on their ATM card, which also highlights that banks have to carry out an extensive awareness drive to encourage customers to start using other services that are available on their ATM cards.

- **CUSTOMERS COGNIZANCE OF SERVICES/FACILITIES OFFERED OVER MOBILE BANKING:**

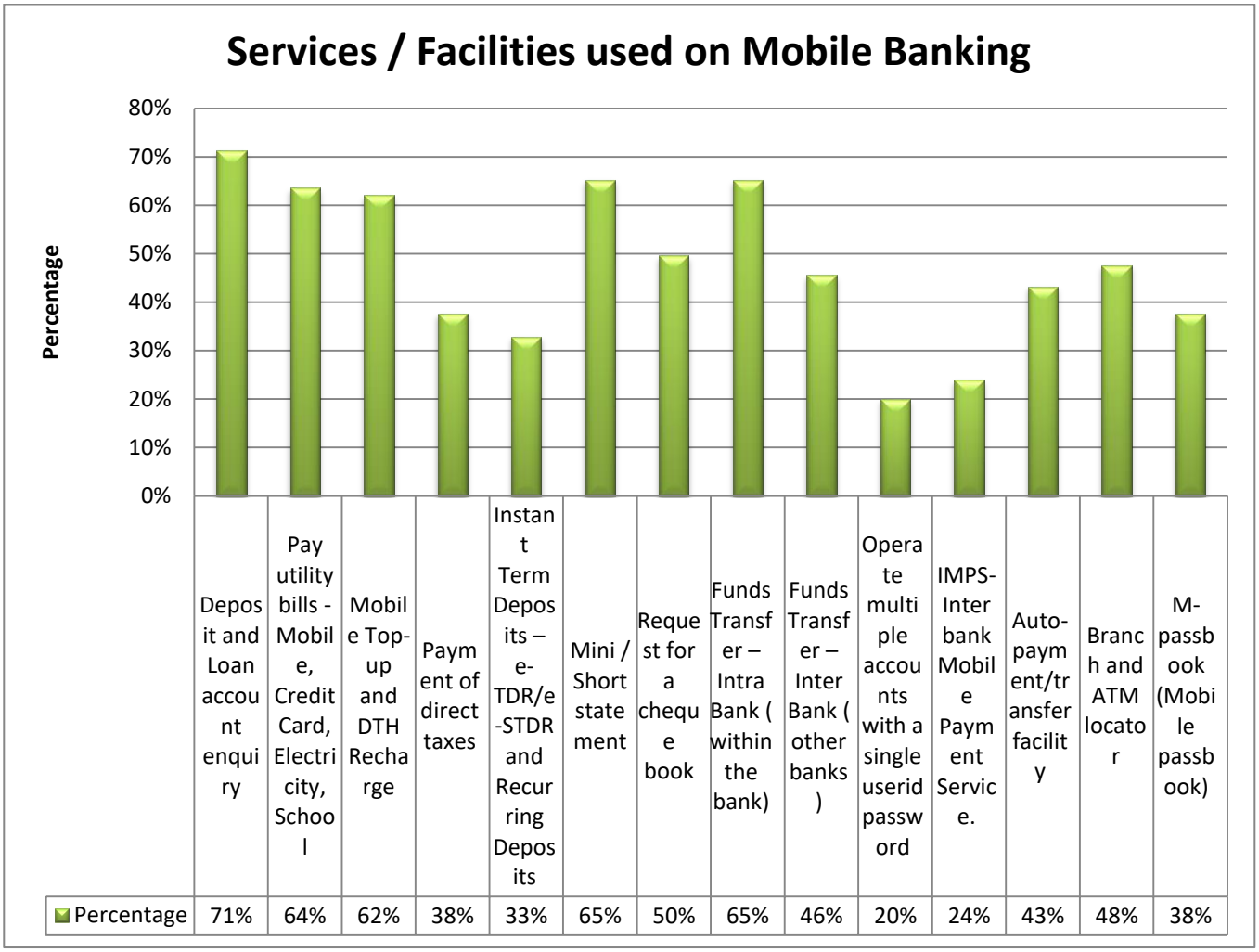
Table 5.69: Customer's cognizance of services/facilities on Mobile Banking

Services / Facilities used in Mobile Banking	Frequency Count	Percentage
Deposit and Loan account inquiry	178	71%
Pay utility bills - Mobile, Credit Card, Electricity, School	159	64%
Mobile Top-up and DTH Recharge	155	62%
Payment of direct taxes	94	38%
Instant Term Deposits – e-TDR/e-STDR and Recurring Deposits	82	33%
Mini / Short statement	163	65%
Request for a cheque book	124	50%
Funds Transfer – Intra Bank (within the bank)	163	65%
Funds Transfer – Inter Bank (other banks)	114	46%
Operate multiple accounts with a single userid password	50	20%
IMPS- Interbank Mobile Payment Service.	60	24%
Auto-payment/transfer facility	108	43%
Branch and ATM locator	119	48%
M-passbook (Mobile passbook)	94	38%

Total Number of respondents possessing/using Mobile Banking	250

Source: Primary data

Figure 5.10: Services / Facilities used on Mobile Banking



Source: Primary data

The above tabulation in figure 5.10 is a representation of the customer's awareness and the type of services and facilities he uses on a mobile banking application offered by the bank. Majority of the customers, i.e., 71 % use the mobile banking application for deposit and loan account inquiry, 65% of the respondents use it for a mini/short statement, 64 % of the respondents would use the same for payment of utility bills such as mobile, credit card, electricity, school fees, etc. Facilities like payment of taxes, opening of instant term deposits, operation of multiple accounts, Interbank Mobile Payment System and Mobile passbook were sparingly used as many customers were not aware and even though the option was available the customers were hesitant to explore new options available due to the fear of money accidentally getting debited from their account. The figure below is a bar graph which shows the services and facilities the customer is aware of while using mobile banking application.

- **CUSTOMERS COGNIZANCE OF SERVICES/FACILITIES OFFERED OVER INTERNET BANKING:**

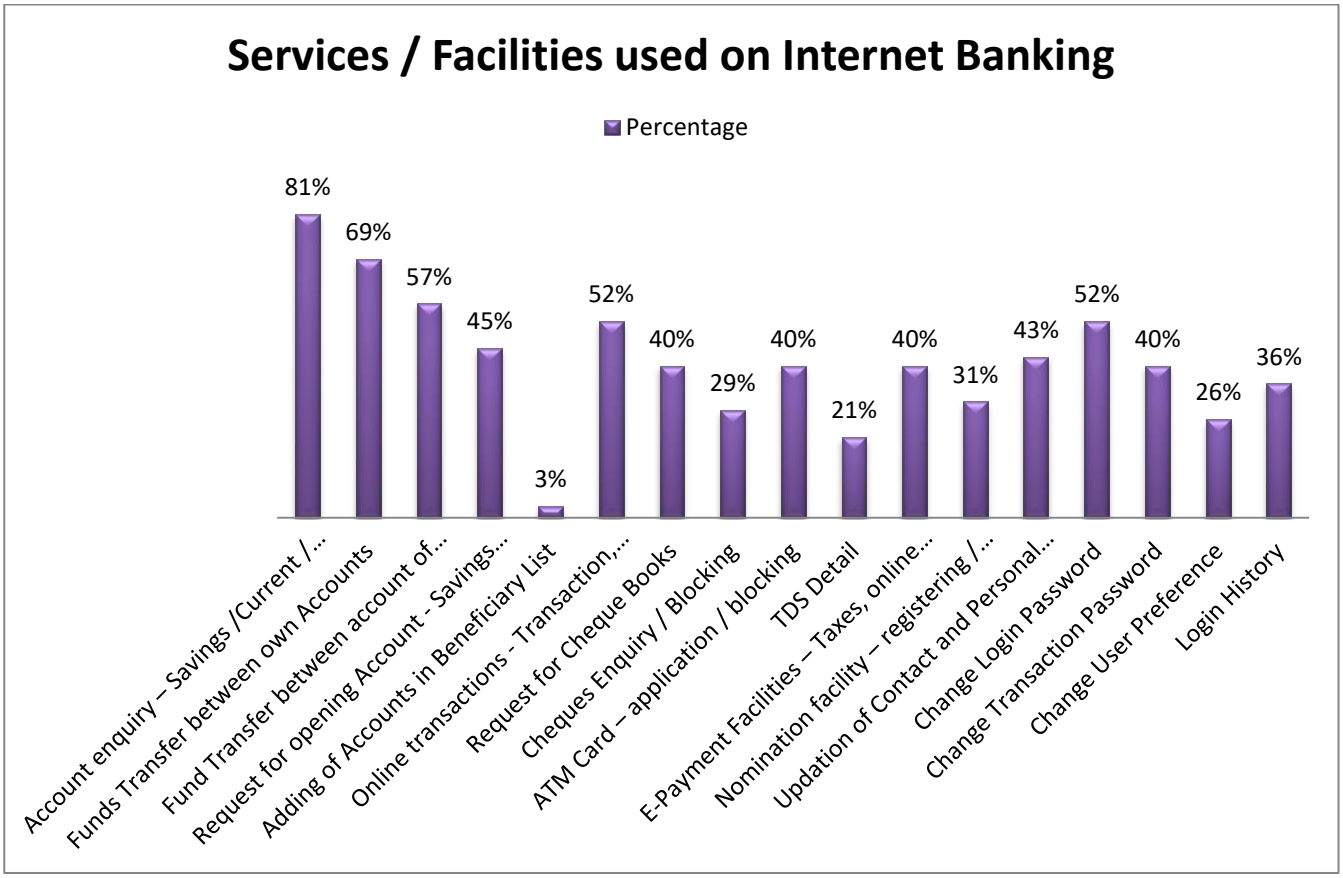
Table 5.70: Customer's cognizance of services/facilities on Internet Banking

Services / Facilities used in Internet Banking	Frequency Count	Percentage
Account enquiry – Savings / Current / Overdraft / Term Deposit / Loan Accounts	340	81%
Funds Transfer between own Accounts	290	69%
Fund Transfer between account of others – Inter Bank transfers & Intra Bank transfers (RTGS, NEFT)	240	57%
Request for opening Account - Savings /Current / Overdraft /Term Deposit / Loan Accounts	190	45%
Adding to Accounts in Beneficiary List	12	3%
Online transactions - Transaction, Deposit, Loan accounts	220	52%
Request for Cheque Books	170	40%
Cheques Enquiry / Blocking	120	29%
ATM Card – application / blocking	170	40%
TDS Detail	90	21%
E-Payment Facilities – Taxes, online utility bills, recharges	170	40%
Nomination facility – registering / updating / change	130	31%
Updating of Contact and Personal Details	180	43%
Change Login Password	220	52%
Change Transaction Password	170	40%
Change User Preference	110	26%
Login History	150	36%

Total Number of respondents possessing/using Internet Banking	420

Source: Primary data

Figure 5.11: Services / Facilities used on Internet Banking



Source: Primary data

The analysis is shown in the above table 5.70 and figure 5.11 gives a detailed description of the various types of services and facilities to the customers who are already using e-banking technologies are aware. The most used facility is the account inquiry of saving, current, loan, overdraft accounts which is at 81%. About 69% of the respondents used their internet banking to transfer of funds within own accounts while just 57% of the customers using internet banking used it for interbank transfers. While services such as request for cheque book, cheque enquiry, ATM card application/blocking, TDS details, E-payment of taxes and utility bills, nomination facility, updating of contact and personal detail, change of user's faces were some of the facilities rarely used by the customers which were all below the 50% mark. This shows the customers awareness about the facilities and services they are already using over a period which needs to be given due importance if the banks want to reduce their cost even further. The chart below gives a little depiction of the various facilities and services the customers are aware with regards to the internet banking facilities they use.

5.6 ANALYSIS - FOURTH OBJECTIVE

To ascertain the customer's awareness level of Green Banking initiatives and to study their perception of the effectiveness of such initiatives.

5.6.1 CONCEPTUAL OUTLINE

The current age of globalization and industrialization has brought about added comfort to our day to day lives which has also lead to environmental degradation at a distressing rate. The challenge the world faces today with regards to environmental pollution is so vast that there is no time to assess the sector which is causing harm and accordingly take action but on the contrary it is the duty of all the sector any economy worldwide to adopt green initiatives in every little way possible even if its contribution of degradation is negligent.

Many banks have started realizing the importance of green banking, and as per directives of RBI, many have started modifying their actions to ensure the protection of scarce resources. The concern for the sustainability of our environment has given rise to the concept of green banking. This objective looks to analyses the awareness of the respondents of various initiatives introduced by the banks towards green banking (initiatives on lines of benefiting the customers) and their perception about the contribution of these green initiatives towards protecting our environment.

5.6.2 DATA ANALYSIS

The following are some of the initiatives benefiting the customers and environment introduced by banks with respect to green banking: Promotion of ATM, Mobile Internet banking, so as to endorse paperless banking:

- Inspire automatic payments: e.g., ECS, auto debit to reduce the need to write cheques and fill additional forms thereby saving paper
- Encouraging Electronic (paperless) statements, product information, guides: eg. Email of the statement of accounts, interest certificates, information about loans and other information will help reduce paper wastage.
- Offering concessional rates for energy-efficient and environment-friendly home loan borrowers: Home loans borrowers investing in homes which use energy-efficient

appliances and are built up of materials which are environmentally friendly materials are given loans at concessional rates as compared to regular rates.

- Offering concessional rates to energy-efficient and renewable energy driven vehicle loan borrowers: Bank customers who buy vehicles which are energy-efficient, eg. Hybrid or even use renewable energy like solar, water is given loans at concessional rates as compared to standard rates.
- Concessional loans rates to organizations for the adoption of environmentally friendly methods: Business or any organization investing in energy efficient appliances, machinery and are built with materials which are environmentally friendly materials are given loans at concessional rates as compared to standard rates.
- Offering credit /debit cards co-branded with environmental charities: A certain percentage of fees charged on such credit or debit cards are given to environmental charities to promote environmental conservation.
- Facility of Green Channel Counter or similar initiatives in branches: Banks have started branches or specific counters in a branch which goes digital without the use of any paper.

- **AWARENESS LEVEL OF RESPONDENTS ABOUT GREEN BANKING INITIATIVES:**

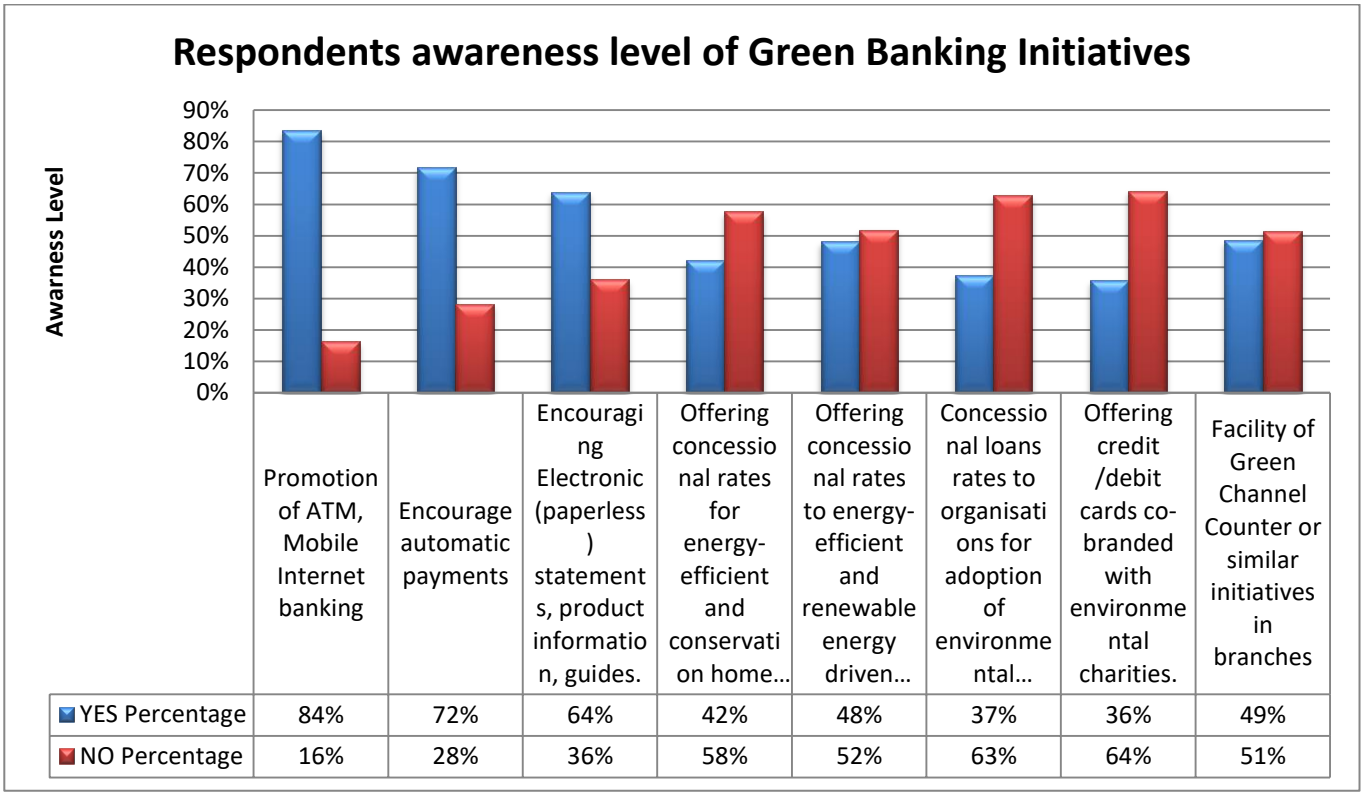
Table 5.71: Awareness level of green banking initiatives

Sr. No	Green Banking Initiatives	YES	Percentage	NO	Percentage	Total
1	Promotion of ATM, Mobile Internet banking	1083	84%	213	16%	1296
2	Encourage automatic payments	930	72%	366	28%	1296
3	Encouraging Electronic (paperless) statements, product information, guides.	828	64%	468	36%	1296
4	Offering concessional rates for energy-efficient and conservation home loan borrowers	547	42%	749	58%	1296

5	Offering concessional rates to energy-efficient and renewable energy driven vehicle loan borrowers	624	48%	672	52%	1296
6	Concessional loans rates to organizations for the adoption of environmentally friendly methods	483	37%	813	63%	1296
7	Offering credit /debit cards co-branded with environmental charities.	463	36%	833	64%	1296
8	Facility of Green Channel Counter or similar initiatives in branches	629	49%	667	51%	1296

Source: Primary data

Figure 5.12: Respondents awareness level of Green Banking Initiatives



Source: Primary data

The above table 5.71 displays the awareness level of the respondent who possesses a bank account. The same respondents have said Yes to the list of green banking initiatives they are aware of and No to the list of those initiatives they are not aware of. A total of 1296

respondents have answered the same question irrespective of the type of e-banking technology they use or do not use.

- For the first green banking initiative of Promotion of ATM card, Mobile Banking, Internet Banking etc. as a drive to go green, 84% of the respondents knew that adopting such e-banking technology does protect and save the environment while the rest 16% although some would use the same did not know that it was a part of the green banking initiative.
- While the second option of encouraging automatic payments such as ECS, auto debit facilities as a part of green banking initiative where the need for writing of cheques accompanied by a pay-in slip would no longer be required, as in this case, 72% of the respondents were well aware of it as a green banking initiative while the rest 28% did not think of the facility as a green banking initiative.
- The initiative of offering concessional rates for Encouraging Electronic (paperless) statements, product information, guides / broachers was known among 64% of the total respondents while 36% of the respondents did not know why banks were encouraging e-statement such as an e-interest certificate, e-home loan interest certificate, guides in the electronic form, etc.
- Offering concessional rates for energy-efficient and conservation home loan borrowers have reduced further to 42% as only a few banks had introduced this concept as well as only those customers who purchased flats or houses recently were aware while the rest 58% were not aware of the recent innovative green banking initiative offered by some banks.
- As compared to the 42% awareness level for the energy-efficient and conservation home loan borrowers there was a slight increase to 48% of the respondent's awareness level with regards to offering concessional rate to energy-efficient and renewable energy driven vehicle loan borrowers. This green banking initiative was comparatively heard of more by the respondents due to the various advertisement by automobile companies advertising for such energy-efficient automobiles.
- The green banking initiative of concessional loan rates to organizations for the adoption of environmentally friendly methods was heard by a few respondents especially those in business or those respondents working for the huge multinational

companies. Majority of the respondents, i.e., 63% were not aware of such green banking initiatives offered by various banks.

- Initiatives such as offering credit / debit cards co-branded with environmental charities were the least heard off among the list of various other green banking initiatives. Only 36% of the respondents were aware of the same while a whopping 64% respondent had never heard of anything like it before.
- The green banking initiative of the facility of green channel counter or similar counter in various banks has increased marginally to 49% while yet a majority 51% respondents claim that they did not hear about such green channel counter in any bank they have visited so far.
- The chart drawn below gives us a graphical representation of the awareness level of green banking initiatives the respondents are aware of.

➢ **PERCEPTION LEVEL OF RESPONDENTS ABOUT GREEN BANKING INITIATIVES:**

Table 5.72: Perception about green banking initiatives

Sr. No	Green Banking Initiatives	Very significant difference	Significant difference	Moderate Difference	Less moderate difference	Marginal difference	Mean	SD
1	Promotion of ATM, Mobile Internet banking	513 (39.89)	440 (34.21)	170 (13.22)	121 (9.41)	42 (3.27)	3.98	1.1
2	Encourage automatic payments	403 (31.34)	467 (36.31)	203 (15.79)	193 (15.01)	20 (1.56)	3.81	1.08
3	Encouraging Electronic (paperless) statements, product information, guides.	451 (35.07)	418 (32.5)	230 (17.88)	145 (11.28)	42 (3.27)	3.85	1.12
4	Offering concessional rates	436 (33.93)	380 (29.57)	297 (23.11)	99 (7.7)	73 (5.68)	3.78	1.16

	for energy-efficient and conservation home loan borrowers							
5	Offering concessional rates to energy-efficient and renewable energy driven vehicle loan borrowers	505 (39.3)	332 (25.84)	283 (22.02)	99 (7.7)	66 (5.14)	3.86	1.17
6	Concessional loans rates to organisations for adoption of environmental friendly methods	469 (36.47)	308 (23.95)	306 (23.79)	131 (10.19)	72 (5.6)	3.76	1.21
7	Offering credit /debit cards co-branded with environmental charities.	315 (24.31)	349 (26.93)	355 (27.39)	189 (14.58)	88 (6.79)	3.47	1.2
8	Facility of Green Channel Counter or similar initiatives in branches	459 (35.69)	321 (24.96)	298 (23.17)	151 (11.74)	57 (4.43)	3.76	1.18

The above table 5.72 shows the calculation of the Mean and Standard deviation for the perception of the respondents about the impact, each green banking initiative will have irrespective of their awareness level about the same. The green banking initiative with the highest mean was Promotion of ATM, Mobile, Internet banking with 3.98 and standard deviation of 1.1. While the second most crucial initiative considered by the respondents was offering concessional rates to energy-efficient and renewable energy driven vehicle loan borrowers with a mean of 3.86 and standard deviation of 1.17. Initiatives such as Encourage

automatic payments, Offering concessional rates for energy-efficient and conservation home loan borrowers, Concessional loans rates to organizations for the adoption of environmentally friendly methods and Facility of Green Channel Counter or similar initiatives in branches were considered equally important. But the initiative with the least impact thought by the respondents was offering credit /debit cards co-branded with environmental charities with a mean of 3.47 and a standard deviation of 1.2. This showed that the respondents were not very keen about the initiative of offering credit / debit card co-branded with environmental charities as the customers did not know how much money contributed would go entirely towards the cause of safeguarding the environment.

5.7 SUMMARY

The research methodology describes the intricate and systematic process that is followed for the purpose of analysis. Objectives that were outlined as a part of this study have been analyzed and the hypotheses framed have been tested from the collected data set with various statistical tools. The corresponding interpretations and inferences have followed the statistical analysis. The findings, conclusions, and suggestions have been established and centered upon the examination and exploration of each objective of the study.

CHAPTER VI

FINDINGS, CONCLUSIONS, AND SUGGESTIONS

6.1 INTRODUCTION

The findings have transpired as a result of the analysis conducted and deep extrapolations. Various aspects such as factors influencing adoption and non-adoption, factors influencing the sustainable use of e-banking technologies, risk levels of a customer and green banking initiatives have been studied. Based on the major finding and final conclusions and a few suggestions considered significant have been recommended for efficient functions of e-banking technologies.

6.2 FINDINGS

The present findings from the analysis and interpretation have been divided objective wise.

- **Based on the first objective of identifying factors leading to the adoption of e-banking technologies the following were the major findings.**
  - There is a significant relationship between the adoption or non-adoption of e-banking technologies and the gender of the customer. The results showed that the male gender had a higher adoption rate of e-banking technologies while the female gender had a higher non-adoption rate as compared to their male counterparts.
  - The analysis showed that there was a significant impact on the residential status of a bank customer upon the adoption or non-adoption of e-banking technologies. Further explaining that an Indian (Goan) had a higher non-adoption rate while an NRI (Goan working abroad) had a higher adoption rate of e-banking technologies.
  - The findings showed a noteworthy impact on the age of the customer and the adoption or non-adoption of e-banking technologies. It shows that customers from the age group of 18 – 27 years and 28 – 45 years had a higher adoption rate between the ranges of 30% to 80% for different types of e-banking technologies, while with the increase in the age group the non-adoption rate can be seen increasing drastically.

- Education of a customer shows a significant relationship with the adoption of e-banking technologies. The primary education like high school has a very high non-adoption rate. While educational qualification like higher secondary, bachelors, post-graduation and professionals showed a steady percentage and a comparatively high adoption rate. While the noteworthy point is that with regards to professionals using mobile banking and internet banking their non-adoption rate was 100%.
- Customers with education background from various fields showed an overall significant association with the adoption of e-banking technologies. Customers from the arts and elementary school had a very high non-adoption rate, while customers with science, commerce and professional background had a moderately average adoption rate. The customers with computer backgrounds showed a higher adoption rate comparatively.
- With respect to the occupation of a customer, housewives showed the higher non-adoption rate even as compared to the retired employee, while those working abroad and bank employees showed the highest rate of adoption of various e-banking technologies.
- Monthly income of a customer showed a significant impact on the adoption of e-banking technologies. Those customers are earning less than Rs. 10,000/- were considered to be influencing non-adoption. While those customers within the income group of Rs. 10,001 to Rs. 60,000/- did show an average influence. The customers in the income group of more than Rs. 60,001 per month showed a high rate of adoption of e-banking technologies. The customers earning in dollars did not show a significant relationship with adoption, but the noteworthy point is that all those earning in dollars irrespective of their income group had a very high rate of adoption of e-banking technologies.
- Those respondents earning abroad in foreign currency did not have any strong rapport with the adoption of ATM card, mobile banking or even internet banking. The main reason behind it was that the rate of adoption by such respondents working abroad with respect to all three e-banking technologies was very high.
- The consociation between electronic devices / facilities used by a bank customer in relation to the use of e-banking technologies was very noticeable. Although the number of respondents not using a smartphone, computer and internet facility was very nominal; they were the ones who had a significant impact on the non-adoption of e-banking technologies.

- The standard of living proved to have an extensive link with the adoption of mobile banking and internet banking but not ATM card usage as fairly an equal number of customers from all standards would use an ATM card. While with respect to mobile banking and internet banking there was an increase in the rate of adoption of e-banking technology.
- There is a significant difference between a customer's internet usage habits and their adoption of e-banking technologies. For those who used internet facility, they had a high rate of adoption of such e-banking technologies and vice-versa for those who did not use internet facility.
- The device on which internet was used like, computer, laptop, smartphones, smartwatches, smart television, and tablets had a sizeable association with the adoption of e-banking technology. Those who used a computer / laptop or smartphones were more likely to use an ATM card, mobile banking or internet banking.
- Place of use of internet facility had a significant impact on the adoption of e-banking technologies. Places of use such as school / college, library, and internet café had an impact upon the non-adoption of e-banking technologies.
- Number of years a customer has been using the internet facility showed a very significant difference in the adoption of e-banking technologies. For those customers who used internet for 1-3 years only had a high rate of non-adoption of e-banking technologies, while those customers who had used the internet facilities for more than 3 years had a higher rate of adoption of e-banking technologies.
- Analysis showed that there was a substantial relationship between the type of services used on the internet and the adoption or non-adoption of e-banking technologies. Services such as Whatsapp, email, online shopping showed and influence upon the adoption of e-banking technologies. While using Facebook and internet surfing showed an impact upon the non-adoption of e-banking technologies.
- Customer's preference on the type of bank had an influencing impact upon the adoption of e-banking technologies. Nationalized banks showed an average impact upon the adoption, while private and foreign banks showed a comparatively high rate of adoption of e-banking technologies. On the other hand, co-operative banks showed a high rate of non-adoption of e-banking technologies.
- Saving account holders showed an impact upon the non-adoption of e-banking technologies, while current account holders showed an impact upon the adoption of

e-banking technologies. NRE / NRO account holders showed a positive impact on the adoption of e-banking technologies which was much higher than current account holders.

- A number of transactions carried out by a customer did not show any influence upon the adoption or non-adoption of e-banking technologies except for ATM card non-adoption. This showed that customers who would carry out less than 5 transactions in a month influenced the non-adoption of e-banking technologies.
- Forms of advertisements / promotions showed a significant relationship with the adoption and non-adoption of e-banking technologies. Television commercials, internet commercials, newspapers, brochures in banks and promotional message over the mobile phone showed an impact upon the adoption of e-banking technologies. Advertisements through outdoor advertisements and magazines did not show any significant relationship.
- There was a significant relationship between the source of advice to use a particular e-banking technology and adoption or non-adoption of e-banking technologies. Source of advice from bank staff, family member, friends, and classmates showed a significant relationship. Source of advice from colleagues did not show any relationship.

➢ **Based upon the objective of exploring the significant factors that lead to the sustainable use of E-Banking technologies the following were the major findings.**

- Considering the sustainable use of ATM card a structural equation model was devised showing two hidden variables namely Performance and Service. Among the two latent variables, the most important was considered service as compared to performance. Variables like ATM_ Reputed services and ATM_ Customer support were found to be loading on both the latent variables. The analysis showed that variables like ATM_ Attractive interface, ATM_ Prompt Response, ATM_ Accurate transactions, ATM_ Accessible machines were highly correlated with ATM_Performance similarly ATM_ Effective staff Guidance, ATM_ Encouragement in usage and ATM_ Well trained staff showed a high degree of correlation with ATM_Service.
- In view of the sustainable use of Mobile Banking a separate structural equation model was conceived showing two latent variables namely Performance and Service.

Considering first the indicators of MB_Service , the standardized loadings were .63 for MB_ Reputed services, MB_ Effective staff Guidance .68 and MB_ Well trained staff .66 . Considering the indicators of MB_Performance they were MB_ Application Accessibility .66, MB_ Prompt Response .64 and MB_ Accurate transactions .58 which were all considered as important factors to achieve the sustainable use of mobile banking.

- Considering the sustainable use of Internet banking a structural equation model was developed showing two hidden variables namely Performance and Service. Considering the most influencing indicators as IB_Service , the standardized loadings were IB_Customer support 0.67, IB_Well trained staff 0.64, IB_Encouragement by staff 0.61 . Considering the impelling indicators of IB_Performance, the loadings were IB_Prompt Response 0.64, IB_Resolves problems 0.63 and IB_Availability and IB_Attractive interface at 0.61 all of which were the crucial factors for the sustainable use of internet banking.
- Bearing in mind the factors, in general, influencing the sustainable use of e-banking technologies the confirmatory factor analysis confirms the two latent variables. The former which explains 56% of the total variance while the later which explains 9% of the total variance. The first component highlighted a few factors such as sense of superiority / trendy, Save time & money on travelling by not visiting the bank personally, Possibility to earn more by investing time for productive work rather than visiting the branch and real-time fund transfers are considered most essential factors by a customer when it comes to the general reasons for using e-banking technologies. The second essential component emphasized on essential factors such as Free of charge services, Fast and convenient, time-saving, 24-hours and 7- days a week service and anywhere access, no need to visit branches were considered as the most critical factors for the sustainable use of e-banking technologies for the future.

➢ **Established upon the objective to determine the customer's cognizance and level of risk involved in using of e-banking technologies, the following were the major findings.**

- The findings showed that a handful of the customers were in the low-risk category and the majority of the users were in the high-risk customers which is a significant

threat to any e-banking technology. The customers at the highest risk were the ATM card users at 66% followed by mobile banking users, the least followed by internet banking users at 47% which is yet a problem of grave importance.

- The study shows that there is a significant relationship between the gender of the respondents and his risk levels when using an ATM card. In the high-risk level group, both male and female are found at 67.8% and 64.2% respectively.
- The percentage method showed that customers at the highest risk were those in the age group of 60 years and above with a percentage of 77.5% while the age group within 28-45 years was within the low and moderate risk taking their combined total of 34.5%. This highlights the age of the customer and their risk involved in using e-banking technologies.
- Respondents with the highest risk were found to be those with education qualification of higher secondary schooling and less with nearly 100% of the respondents falling in the combined total of high and moderate risk, with the majority under the high risk. Respondents with bachelors, post-graduation and professional degrees were comparatively lower with an average of about 60% falling under the high-risk category.
- Employees working in government offices and banks were comparatively less prone to risk with a percentage of 12.4 % and 20 % respectively of those banking customer lying in the low-risk category. Housewives and retirees were recorded to be in the high-risk level category with 100%.
- Irrespective of the income category calculations showed that an average of about 65% of the respondents was at very high risk while using ATM card while the only noticeable difference was within the low and moderate risk.
- There was significant relationship found to be with those earning abroad and their risk level while their high-risk levels were above 65% for all categories.
- The standard of living showed that there was no correlation with the risk levels of ATM card usage as all level of standard of living had a percentage of above 65%.
- The Fisher exact test that was used to study the relationship between usage of internet by a bank customer and his risk level with regards to ATM usage accepted the null hypothesis that there was no real association between the two, however those using

internet has a comparatively less high-risk level than those not using internet services while using their ATM card.

- The Rao & Scott chi-square analysis showed a significant relationship between the device used for internet and the risk levels of an ATM card user, about 61.3% respondents using a computer or laptop were reported at high risk while 65.6 % of those using mobile for internet banking were at high risk.
- Respondents using internet at schools/college and internet café 72.9% and 68.3% were the highest to be reported at high-risk levels, while those using the internet at home and at workplaces were considered the lowest with 8.1% and 9% considered at low risk.
- Customers having an NRE/NRO account and using an ATM card were considered at highest risk, while those having an ordinary savings account were stated to have the lowest and most moderate risk.
- Banking customer who carried out ATM transactions more than 10 times in a month were at very high risk at 82.1%, while those using an ATM card barely 1 to 3 times a month were at 62.3%.
- The percentages revealed that those who have just started using the ATM card for the past 1 year, 80% of them on an average were at very high risk, whereas comparing those who used the ATM card for more than 6 years, 63.1% of them were at high risk.
- There was no primary association between gender and risk levels of Mobile banking users with an average of 52% for both male and female.
- Analysis showed that 76.2% of those in the age group 28-45 years were at high risk when using mobile banking as compared to 52.1% of those from the age group of 18-27 years.
- Review and calculation of each cell showed that those who had a qualification of high school and higher secondary school were at 60% high risk, whereas those with bachelors were at 54.8% high risk. Those with less than high school education did not show any risk as there were no responses recorded in the same category.
- Students who were using mobile banking had recorded high risk levels at 47.9%, public servant at 50%, bank employee at 0% and private sector employees at 21.6%,

while those from the business profession were at 91.7% high risk, professional at 100% and those working abroad at 66.7% high risk while using mobile banking.

- For respondents working in India results showed that lower the income higher was at a higher risk level of using mobile banking at 68.4%, reducing to 0% for income bracket from 11,000 to 30,000, and 38.5% for income bracket 61,000 to 1, 00,000.
- While for those working abroad a great connection could not be drawn between their income earned and risk level of using mobile banking.
- A higher standard of living had comparatively lower high-risk levels at 33.3%, increasing to 66.7% for those from the average standard of living and increasing further to 100% to those from the low standard of living.
- The relationship between usage of internet by a bank customer and his risk level with regards to that of mobile banking could not be determined as all the users of mobile banking were all using the internet.
- An independent examination revealed that those using computer and mobile for internet were comparatively less prone to high risk than those who used mobile phones alone for the internet.
- The relationship between place of use of internet and risk levels of mobile banking users showed a significant association.
- Bank customers holding an NRE/NRO account and current account reported the high-risk level of 100% each while using mobile banking.
- Data showed that those using the mobile banking application more frequently in the category of 4 to 9 times a month were more prone to high-risk levels of 75% rather than those using the application between 1 to 3 times a month of a risk level of 28.6%.
- Respondents using the mobile banking application for the past 6 months were at 100% high-risk levels reducing the level for those using mobile banking for more than 6 years to a 100% moderate risk level.
- The chi-square analysis did not show any significant association between gender and risk levels of Internet banking users, but the risk levels of males were recorded at 60.7% while that of females was 44.2%.

- Distinct examination with the help of percentages revealed that the younger age group between 18 to 27 years was at a higher risk level at 55.2% while using internet banking, which gradually decreased with older age group of 28 to 45 years at 28.9% and those in the age group of 46 years and above at a 100% moderate risk level.
- A commanding relation could not be established with the risk level of using internet banking and the education qualification of a banking customer.
- Students, bank employees, business persons and those working abroad reported a comparatively less high risk level at 36.3%, 20%, 48% and 45%, whereas those from the public sector, private sector and professional stated higher risk level while using internet banking at 51.4%, 58.2% and 66.7% correspondingly.
- The highest risk was borne by those in the income bracket of Rs. 11,000 to 30,000 at 85.7% and reducing further with the increase in income brackets.
- For those earning abroad in other currency, the chi-square test had been used, and the p-value was $\geq .05$. Hence a significant connection between income earned in foreign countries and their risk level while using internet banking could not be established.
- The average standard of living had the highest risk level when using internet banking at 55.7% with a total number of 230 respondents using the same, while the low standard of living has had slight deep of 40% while only 20 respondents have been reported using the same.
- The relationship between usage of internet by a bank customer and his risk level with regards to of Internet Banking usage could not be determined as all the users of Internet banking were compulsorily using the internet.
- Respondents using internet on mobile phones and using internet banking services were prone to higher risk levels at 46.9% as compared to those using laptops / computers at 41.5% which was comparatively lower.
- Respondents who would use internet facilities at home, workplace, colleges, the library had a moderate risk level of around 50% while those using internet facilities at internet cafes had a high-risk level at 70% while using internet banking services.
- Bank customers possessing current accounts as well as those with NRE / NRO accounts were at higher risk levels at 53.3% and 66.7% correspondingly while accessing internet banking.

- Frequency of use of internet banking was directly related to the risk level of internet banking, it was found that those who used internet banking 1 to 3 times a month were susceptible to high-risk level at 57.3%, it reduced with the increase in frequency of use with respondents who were using internet banking more than 10 times a month having a reduced high-risk level of 28.9%.
- Respondents using internet banking for the past 6 months had a reported high risk of 57.5% whereas those who had been using internet banking for more than 6 years had a reduced high-risk level of 26%.

➢ **Established upon the objective to ascertain the customer's awareness level of Green Banking initiatives and to study their perception of the effectiveness of such initiatives, the following were the major findings.**

- From the total, 84% of the respondents were aware that Promotion of ATM card, Mobile Banking, Internet Banking etc. as a drive to go green and knew that adopting such e-banking technology does protect and save the environment while the rest 16% did not know that it was a part of the green banking initiative.
- While 72% of the respondents were aware that encouraging automatic payments such as ECS, auto debit facilities as a part of green banking initiative where the need for the writing of cheques accompanied by a pay-in slip, while the rest 28% did not think of the facility as a green banking initiative.
- Out of the total respondents, 64% of the total respondents were aware of the initiative of offering concessional rates for Encouraging Electronic (paperless) statements, product information, guides / broachers were known among while 36% of the respondents did not know about the same.
- Only 42% & 48% of the respondents were aware of green banking initiatives of concessional rates for energy-efficient home and vehicle loan borrowers respectively.

6.3 CONCLUSIONS:

The banking sector as we know is the backbone of any nation's economy and technology forms an integral core component of the banking sector. Although the same technology may

be the need of the hour to cater to an ever-increasing customer base, this same technology comes with its own disadvantages if not used within a well-structured framework, understanding, and care.

It is true that banks are investing a massive amount of capital in introducing the latest, fastest, and customer oriented technology in the most friendly way but it is also true that the rate of adoption is meager across all age groups and gender for these kinds of technologies although customers are already in an era of smartphones and internet. It is essential that's banks understand the factors that lead to adoption.

The gender creates a substantial influence on adoption of e-banking technologies with males considered to be having a higher rate. Although residential status did not show a significant association, yet there was ample of acceptance by those customers working abroad. Age also plays an extensive role when speaking about the adoption of various types of e-banking technologies with the younger age group most likely to adopt the same. Educational qualification along with education background is of prime importance while studying the usage habits of e-banking technologies. Those from the public, private and banking sector showed positive sign of adoption of e-banking technologies.

Facilities such as the internet, ownership of smartphones as well as the standard of living had ample of dependence upon the adoption of ATM card, mobile banking, and internet banking. Customer internet and technology attributes such as their internet usage habits, the device of use of the internet, place of use of the internet, number of years internet were used, and the various other types of services had a sizeable connection with a customer adopting e-banking technologies.

Type of bank such as nationalized, private, foreign along with the type of account such as ordinary savings account, NRE / NRO account along with a number of banking transactions carried out in a month had a considerable rapport with the usage and adoption of e-banking technology. While factors such as advertisements and advice from friends, colleagues and family member also played a considerable role. Banks need to understand the factors influencing adoption and non-adoption and prioritize and solve the difficulties faced rather than merely introducing technology as the cost to maintain these technologies could increase as a result of limited users.

Banks should use expertise manpower to concentrate on the sustainable use of e-banking technologies. It was found out that many banks so as to reach targets set by management

would merely install applications or register customers upon internet banking, mobile banking and other e-banking technologies without education the customer to use the same. Mere adoption may achieve a few targets but is not a long-term initiative or motive. SEM identifies the service component as the most influencing factor secondly followed by the performance variable. Therefore bank employees, as well as the upper-level management, need to draw strategies, long-term plans that will concentrate on better service along with increased performance.

The risk level of customers has to be given sufficient importance as it could provide fatal if this loophole is unplugged. It could be the root cause of reported losses suffered in the long run. The analysis shows that although ATM users had the highest acceptance rate, yet it was the ATM card users who were the most at the high-risk level, while the other users of mobile banking and internet banking were marginally lower. Therefore it is necessary for banking organization and RBI to concentrate on the safety of use and adopting precautionary measures while using any of the e-banking technology.

In the current age of globalization and industrialization, environmental degradation is a result of negligence and unsustainable growth. Customers need to be aware of various green banking initiatives on lines of customers' perspective such as use of e-banking technologies, paperless statements and information guides, concessional loan rates for energy efficient homes, concessional loan rates for purchase of energy efficient and renewable vehicles which could be a tremendous individual initiative by every bank customer to reduce pollution.

6.4 SUGGESTIONS

The suggestions are based on the following to improve e-banking technologies:

- To improve the rate of adoption of e-banking technologies.
- To improve the sustainable use of e-banking technologies.
- To reduce the risk level of respective e-banking technologies.
- To improve the green banking initiatives.

It can be seen in the above analysis, although there are many factors influencing the adoption and non-adoption of e-banking technologies yet the acceptance rate, especially for mobile

banking and internet banking, is very low. This is why some of the below-mentioned suggestions would help:

- **To improve the rate of adoption of e-banking technologies:**
  - Firstly to increase the rate of adoption banks could give the e-banking technologies complimentary: most importantly it should be free of cost and only viewing rights (not transaction rights) to every customer whoever opens any type of account.
  - Applications should be designed in the following manner whether mobile banking or internet banking or for that matter any e-banking technology:
    - For a newcomer / beginner – the app should be very user-friendly, with a few limited options and options most preferably in the local language
    - After a customer uses the mobile or website application for at least a year - upgrade application on mobile and website interface, with more number of options.
    - For customers who have used the application for more than 3 years – upgrade even further to the best and advanced interface.

  In this manner firstly the customer gets familiar with the software application one step at a time. Secondly, since the options are few, the customer does not get confused and hence would use the application more often and lastly with limited options for a beginner his risk level is also under control (For those customers who are already using mobile banking application or internet banking of other banks or for even those who are techno-savvy can directly opt for the advanced version of mobile or internet banking).

  - For improving adoption, the type of advertisement would differ from the type of advertisement for sustainable use. Secondly, the advertisement should also differ based on the type of market segment which is targeted, e.g., gender, age, profession wise and others.
  - Improving adoption of e-banking technology among females would mean special bank account schemes only for female users with compulsory e-banking technologies to be accepted with a small benefit to the female user

like a small difference in the interest rate or a complimentary gift after specific usage of the e-banking technology.

- The most important way the news spreads across is obviously by word of mouth. Therefore any problem faced by any customers especially with regards to e-banking technologies has to be solved on a priority basis as a single customer could influence 10 more prospective customers.
- Colleges, schools, associations (such as Commerce Association of India, Accounting Association of India) and other educational institutes often organize events such as quiz, seminars, conference – such events should be sponsored by demanding an advertisement slot for the bank to give a live demonstration of its e-banking facilities and maybe if an e-banking topic for discussion could be incorporated as the theme or for presentation purpose.
- Banks could introduce the latest features like face unlock, voice recognition, fingerprint recognition which is very popular among the youth. The youth could be influenced to use the same as it is very trendy.

➢ **To improve the sustainable use of e-banking technologies:**

- Banks could change their interface regularly and make their application more customer friendly along with upgraded servers to give increased speeds. And a regular change of interface could improve the security, as well as the customer, is not bored at looking at the same application every single time.
- Banks should have more and more tie-ups and wealth management option with different services such as insurance, stock markets, government services, online marketing sites, CIBIL, medical stores such that various services are offered all under one roof. There is no need for a customer do download several applications, as well as all companies, can contribute towards the maintenance of the application by the bank for rendering their services.
- Very efficient and professional backend staffs have to be appointed on a regular basis in order to solve queries, technical errors and technical upgrade at the earliest.

- A dedicated team should be put to bring out continuous updates and conduct regular maintenance during off-peak banking hours.
- Continuous advertisements of e-banking facilities and services like those of Coke and Pepsi which will always remain in the back of the customer's mind.
- Features such as automated bill payments towards telephone, electricity, water, reminders such as personal assistants, e.g., Google assistant.
- Staff providing the same should be well trained, firstly about giving a demonstration of the available services, facilities of the same e-banking technologies and secondly should be well trained in-case of any difficulty in the later period such as reset of password, register beneficiary, change or update mobile number, or solve problems due to a technical error.
- Like all business have started with loyalty rewards similarly banks should start with loyalty rewards not just restricted to shopping from an e-banking technology but also carrying out any other banking transaction like online transfers, the opening of RD's, FD's over the e-banking technology.
- Usage of motivation and catchphrases – instead of "pay now" they could use "easy pay" or "instant pay" or "sit back and pay" or "comfy pay now" which also signifies the qualities or benefits of using such payment methods.
- Change of theme and user interface depending on gender, age, profession or customer's personal requirement.

➢ **To reduce the risk level of respective e-banking technologies:**

- Highlight the security measures in bigger font size and in RED color as a sign of being alert
- Advertise about how bank customers are being cheated and lured by fraudsters. The cost may look initially higher, but the money the bank would save by preventing the fraud would be more.

- RBI could form a separate audit committee specifically for assessing the e-banking facilities offered by each bank; this is similar to a bank statutory audit with the following characteristics.
    - Appointment of professionals with computer hardware and software backgrounds
    - The setting standards and minimum requirements for banks with regards to e-banking system. E.g., with regard to internet banking setting of a minimum standard of 256-bit encryption or else no license to the bank to offer the particular e-banking facility or service.
    - Keep a check only of the various e-banking services and facilities offered.
    - In case of any fraud reported with respect to a respective e-banking facility detailed report along with corrective measures adopted by each bank.
    - Continuous testing of the software and e-banking services.
    - Continuous testing of disaster management system with respect to e-banking services.
    - Award given to the most prompt, user friendly, most secured and update e-banking service (Since RBI will be giving the award a customer will have more faith and the acceptance towards the same will increase as well as each bank will try to achieve the award every year, award in monetary terms not required but just the tag of the best Mobile banking app or best e-wallet would suffice; similar to Car of the year award or Bike of the year)
- For the ones who are new to the e-banking technologies, irrespective limited transaction rights or for that matter only viewing rights should be given and based upon the progress or number of transactions carried out on the same the transaction rights should be upgraded.
- Many customers were of the opinion that if their PIN is entered in the reverse order, it triggers an alarm and calls for help from the nearest police station which is not true. But based on a similar concept in-case a customer is at

gunpoint or surrounded by gangsters looking to extort the cash. In this case, a customer could dial an emergency number which is of maybe 6 digits (as usually, PIN are of 4 digits) and the ATM machine could automatically shut-down from the server and give a message that the server is temporarily down until staff comes and restarts the machine after an investigation. In case of more than one false alarm a fee could be debited from the customer's account.

- The subject of banking could be introduced by the government as a compulsory subject for the students between 8^{th} to 10^{th} standard irrespective of which stream they come from similar to the environmental studies subject in-order to teach students the benefits and the security measures to be followed when using the same.
- As soon as a new customer applies for any of the e-banking technologies for continuously one year the bank should send different mobile notifications to the customer about the security measures and tips to be followed like the following:
    - The customer should be informed every two or three months always to use genuine anti-virus software's in order to protect their mobile phones and computers from phishing, malware and other security breaches as spyware can steal highly sensitive and confidential information.
    - Customers should be advised to stop using a public computer, libraries or even devices of their friends in order to access their online banking account. As public networks and other devices are most vulnerable to be hacked.
    - Should be recommended that regular installation of updates on the mobile phone and the personal computer is compulsory as it resolves and technical bugs and issues previously reported.
    - Advisory messages to treat the security high-risk security measures very seriously and change their passwords at regular intervals.
- The bank should give the service of mobile notifications for every transaction carried to account holder as well as a joint account holder or even nominee or any member of the family which the account holder may firstly approve of

which will keep the customer well informed just in case of poor connectivity or coverage (especially for NRI customers and those always travelling) thereby reducing the scope of the fraud.

- Banks could categorize the type of risk (precautionary measures) in using of e-banking technology in 3, i.e., high-risk, medium-risk and low-risk. The high-risk security measures should be mentioned on the front (kit with passwords given by the banks to access e-banking technologies), while the rest of medium and low-risk could be mentioned on the inside. Such categorizing of risk will draw the attention of the customer to the high risk, and there are more tendencies that the customer is interested in knowing the other risk as well unlike when precautionary measures are merely mentioned.

➢ **To improve the green banking initiatives:**

- Firstly the rate of cognizance of a customer with respect to the various e-banking technologies with respect to green banking initiatives with regards to the customer is meager especially concessional rates for energy-efficient home loan borrowers, concessional rates for buying energy-efficient or renewable energy driven vehicles, concessional rates to organizations for adopting environmental friendly methods. These are some of those initiatives that could make a more grieve impact on the environment. Therefore advertisement of the same through media like television, brochures and display board in the bank premise could improve the rate of awareness. Advertisements portraying the ill-effects should also be displayed, that could result due to non-adoption of green initiatives as fear plays a crucial role in the mindset.
- RBI could direct each banking organization to establish an environment-friendly cell constituting specialized personnel in the field of environment to carry out the following duties.
  - Annual environment audit
  - Recommendations based on the environment audit
  - Prepare a list of green banking initiatives from two different perspectives a) banking organization and b) customers

- Carry out a detailed study of the list of green banking initiatives from customers as well as banks standpoint and rank the same as per creating the highest impact on the environment.
- The list of initiatives creating the most impact on the environment should be displayed in a very prominent place at every branch so that the customer is well aware and can adopt the same initiatives in order to protect their mother earth.
- An annual report of the same to be submitted to RBI with respect to all the above duties.

- Very importantly RBI could propose a different set of base rate to banks for environment-friendly purchases or investments made by bank customers like an eco-friendly vehicle, adoption of solar energy for current at flats and houses or an environment-friendly business project.

6.5 AREAS FOR FUTURE RESEARCH:

Further suggestion with respect to scope for future research in the area of e-banking technology is given as below:

- E-Banking risk management under the Basel regulatory framework.
- A comparative study of RTGS and NEFT payment as compared to traditional payment methods.
- Influence of e-banking technologies on Non-Preforming Assets.
- Green banking and its impact on the banking sector.

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APPENDIX - I

Questionnaire: E - Banking Technologies

Dear Sir/Madam,

I am conducting a survey on various bank account holders in Goa as a part of my doctoral research work. I will be grateful if you spare a few minutes to participate in it. I assure you total anonymity for your answers. No individual responses will be released. All answers will be aggregated and will only be used for research purpose.

Thanking you for your co-operation.

Asst. Prof. Mr. ANSON L ALBUQUERQUE
Department of Commerce, Rosary College, Navelim, Salcete, Goa.
Research Scholar, Fr. Agnel Research Center, Pilar, Goa.

Kindly note (*) represents the required field

PART A - PERSONAL INFORMATION

To study the personal background of the respondents

1. Name of the respondent: _____

2. Gender *

- Male
- Female

3. Area of Residence *

4. State

- Goa
- Goan Working Abroad

5. District of Goa

- North Goa
- South Goa
- N.A. (as working abroad)

6. Type of area *

- Rural
- Urban
- N.A. (as working abroad)

7. Age *

- Less than 18 Years
- 18 - 27 Years
- 28 - 45 Years
- 46 - 60 Years
- More than 60 Years

8. Marital Status *

- Single
- Married
- Divorced
- Widowed
- Separated

9. Which of the following assets or facilities do you own ? *

- Smartphone (Mobile Phone)
- Computer/Laptop
- Internet facility on your Mobile or Computer or Laptop
- None of the above

10. Education *

- Less than High School
- High School & Higher Secondary School
- Bachelors
- Post-graduate
- Professional

11. What is your education background ? *

- Arts
- Science
- Commerce
- Specialized/Professional
- Computers
- Elementary School
- Other:

12. Occupation *

- Student
- Government / Public sector service
- Bank Employee
- Private sector
- Business person
- Professional
- Housewife
- Retiree
- Working Abroad **(*Skip to question 14*.)**

PART A.1. FOR THOSE WORKING IN INDIA

FOR THOSE WORKING IN INDIA

13. Income in Rupees - (Per Month) *

- Less than 10,000
- 10,000 - 30,000
- 31,000 - 60,000
- 61,000 - 1,00,000
- More than 1,00,000.

Skip to question 15.

Part A.2. FOR THOSE WORKING ABROAD

FOR THOSE WORKING ABROAD

14. Income in Dollars - (Per Month) *

- Below $ 5000
- $ 5001 - 10000
- $ 10001 - 15000
- $ 15001 & above

PART B: Background Information on - INTERNET USAGE

15. Do you use the internet *

- o Yes ***Skip to question 16.***
- o No ***Skip to question 20.***

PART B.1. For those who use the internet

16. On which of the following devices do you use internet services *

- Computer / Laptop
- Mobile Phone
- Other:

17. Where do you use the Internet ? (i.e. location of Internet use) *

- At home
- At work
- At school/university
- Library
- Internet cafe
- Other:

18. For how many years have you been using the internet ? *

- Less than 1 year
- 1 - 3 years
- 4 - 8 years
- more than 8 years

19. Which of the following services do you use over the internet ? *

- Whatsapp
- Facebook
- E-mail
- Online shopping
- Internet surfing
- Banking services
- Other:

Skip to question 21.

PART B.2. For those who DO NOT use internet

20. Please mark the reasons due to which you do not use internet facility ***(Multiple answers are allowed)*** *******

- o I'm not computer savy, I hate using the computer
- o I do not find any cost advantage by using the internet
- o The internet connection facilities are expensive and not worth it
- o The internet network in my area is not suitable
- o There is lack of organized rules and laws about using of internet in our country
- o Not beneficial because internet services are similar with traditional ones
- o I'm not clear about the advantages of using internet
- o It is risky, there are too many fraud cases on the internet
- o I feel I am too young to use internet
- o I feel I am too old to use internet
- o None of my friends, colleagues and family members use internet
- o Heard from others that internet is not good
- o I have a problem with the language over the internet as most of it is in english
- o Other:

PART B.3. To study the usage of internet in the environment around

21. How many of your colleagues, friends and family in the area you stay use services like Whatsapp Facebook, E-mail, Online-shopping, Internet-surfing ? *

Mark only one oval.

	1	2	3	
Most of them around				Few of them around

22. What is the standard of living of the people in your surroundings? *

Mark only one oval.

	1	2	3	
Low standard (do not have a house nor any vechile of their own)				High standard (owing more than 1 flat or house and more than 2 vechiles)

PART C - Background Information - Bank Accounts (KINDLY NOTE: financial records / account nos. is not asked)

23. Which of the following type of bank do you preferably bank with ? *

- Nationalised bank
- Private Bank
- Co-operative bank
- Regional banks
- Foreign Bank
- Other:

24. Name of the Bank

- Abu Dhabi Commercial Bank Ltd.
- Allahabad Bank
- American Express Bank Ltd.
- Andhra Bank
- Antwerp Diamond Bank N.V.
- Arab Bangladesh Bank Limited
- Axis Bank
- Bank Internasional Indonesia
- Bank of America N.A.
- Bank of Bahrain & Kuwait BSC
- Bank of Baroda
- Bank of Ceylon
- Bank of India
- Bank of Maharashtra
- Barclays Bank Plc
- BNP PARIBAS
- Calyon Bank
- Canara Bank
- Catholic Syrian Bank Ltd.
- Central Bank of India
- Chinatrust Commercial Bank Ltd.
- Cho Hung Bank
- Citibank N.A.

- City Union Bank Ltd.
- Coastal Local Area Bank Ltd.
- Corporation Bank
- Dena Bank
- Deutsche Bank AG
- Development Credit Bank Ltd.
- ICICI Bank
- IDBI Bank Limited
- IDBI Bank Industrial Development Bank of India
- Indian Bank
- Indian Overseas Bank
- IndusInd Bank Limited
- ING Vysya Bank
- J P Morgan Chase Bank, National Association
- Karnataka Bank
- Karur Vysya Bank Limited.
- Kotak Mahindra Bank Limited
- Krung Thai Bank Public Company Limited
- Mashreqbank psc
- Mizuho Corporate Bank Ltd.
- Oriental Bank of Commerce
- Punjab & Sind Bank
- Punjab National Bank
- State Bank of Bikaner and Jaipur
- State Bank of Hyderabad
- State Bank of India
- State Bank of Mysore
- State Bank of Patiala
- State Bank of Travancore
- Syndicate Bank
- Tamilnad Mercantile Bank Ltd.
- The Dhanalakshmi Bank Limited.
- The Federal Bank Ltd.
- The HDFC Bank Ltd.
- The Jammu & Kashmir Bank Ltd.

- The Lakshmi Vilas Bank Ltd
- The Nainital Bank Ltd.
- UCO Bank
- Union Bank of India
- United Bank Of India
- Vijaya Bank
- Yes Bank
- Any other bank

25. What type of an account do you operate? *

- Savings bank account
- Current account
- NRE / NRO account
- Other:

26. How many transaction would you carry out in a month? *

Mark only one oval.

	1	2	3	
Rare (less than 5 transactions)				Regular (more than 15 transactions)

27. How long do you have to wait when you visit your bank branch? *

- Less than 10 minutes
- 10 - 20 minutes
- 20 - 30 minutes
- More than 30 minutes
- N.A. as I carry out my transactions online

28. What do you feel about the waiting time? *

Mark only one oval.

	1	2	3	4	5	
Too long, feel very impatient						Very fast, I don't think it's a waste of time

29. How many times do you have to visit a branch for your banking transactions (eg. opening / closing, Saving/Fixed deposit/ Recurring Deposit) ? *

- In 1 visit
- 2 - 3 visits
- More than 3 times.
- N.A. as I open my accounts online
- Other:

30. How do you prefer withdrawing cash ? *

- Over the Cash Counter
- Through the ATM
- Other:

31. How do you maintain a record of your banking transactions? *

- Passbook update
- E-mail of E-statement
- Maintain a record through online banking
- Other:

32. How do you make payments while shopping or paying for a movie ticket? *

- Cash
- ATM Card
- Internet Banking
- Mobile Banking
- E-Wallets
- Other:

PART C. 1. PROMOTIONAL BACKGROUND

33. Do you remember any promotion of the following E-banking Technologies in the last 6 months? *

- ATM Cards
- Internet Banking
- Mobile Banking
- Did not hear of any of the above

34. Where have you seen the promotion / advertisement of ATM Cards? *

- TV commercial
- Internet commercials
- Outdoor advertising
- Magazine
- Newspaper
- Brochures in the bank
- Promotional Mobile Messages
- N.A. as not heard of any promotion

35. Where have you seen the promotion / advertisement of Mobile Banking ? *

- TV commercial
- Internet commercials
- Outdoor advertising
- Magazine
- Newspaper
- Brochures in the bank
- Promotional Mobile Messages
- N.A. as not heard of any promotion

36. Where have you seen the promotion / advertisement of Internet Banking ?

- TV commercial
- Internet commercials
- Outdoor advertising
- Magazine
- Newspaper
- Promotional Mobile Messages
- Brochures in the bank
- N.A. as not heard of any promotion

PART D - ATM CARD

37. Do you use a ATM Card *

- o YES ***Skip to question 38***.
- o NO ***Skip to question 48.***

PART D.1. FOR THOSE WHO USE ATM CARDS

38. Before using ATM Cards, from whom did you take advice? *

- o Bank Staff
- o Family members
- o Colleagues
- o Friends
- o Classmates
- o Other:

39. For how long have you been using ATM Cards? *

Mark only one oval.

- o Last 6 months
- o 6 months to 1 year
- o 1 – 3 years
- o 3 – 5 years
- o More than 5 years

40. How often do you use the ATM Card? *

Mark only one oval.

- o More than 10 times a month
- o 4 - 9 times a month
- o 1 - 3 times a month

41. Below are some factors influencing you to use an ATM Card, please tick the same on a scale of 5. *

Mark only one oval per row.

	1 - Creates alot of influence	2 - Creates an influence	3 - Creates an average influence	4 - Creates a marginal influence	5 - Does not create any influence
My ATM site launches quickly					
My bank's ATM is always available for transactions (not					

always under maintenance)					
My bank's ATM interface is attractive and user friendly					
My bank gives prompt responses to my banking transactions through SMS or any other means					
My bank's ATM machines are easily accessible					
My banks ATM transactions with the bank is always accurate					
My bank is well known and has reputated ATM services					
My bank quickly resolves problems I encounter with my ATM transactions					
My bank has a backend Customer Support service available promptly 24x7					
My bank's staff has good information and guides me effectively ATM services provided by them					
My bank's staff					

encourages use of ATM services provided by them					
My bank's staff are well informed about the latest changes in ATM services provided by them					

Please enter one response per row

42. Which of the following types of ATM Cards do you use ? *

Check all that apply.

- Magnetic Strip Card
- Magnetic Strip along with Chip Card

43. Which of the following services have you used while using your ATM card ? *

Check all that apply.

- Withdraw Cash 24 hours a day 7 days a week
- Depositing of Cash 24 hours a day 7 days a week
- Saving / Loan account enquiry
- Pay credit card bills
- Pay utility bills - Mobile, Electricity, School
- Buy mobile vouchers
- Mini/Short statement
- Request for a cheque book
- Request for PIN change
- Funds Transfer – Intra Bank (within the bank)
- Funds Transfer – Inter Bank (other banks)
- Operation of multiple accounts with a single card
- Other:

44. Which of the following security measures do you adopt while carrying out an ATM transaction (tick all those measures that you adopt) *

Check all that apply.

- o Activate SMS or e-mail alerts for each and every transaction
- o OTP for using the ATM card during shopping
- o Write the call center and ATM card number separately and keep at home (easily available) incase of theft and in order to block the card
- o Never write the PIN on the card or within the card pouch
- o Avoid taking help from others, especially unknown pretending to help
- o Never use a PIN identical to your birthdate, mobile no. or year of birth
- o Change your PIN regularly
- o Use the ATMs which have a security guard
- o Keep the transaction receipt with you until it matches with your bank statement
- o Shred the transaction receipt once you feel it is of no use to you
- o Press CANCEL before you leave the ATM
- o Avoid using the ATM if you find any unusual parts as they could be installed to fetch your account details
- o Sheild the screen and keyboard from others whenever you operate your ATM card
- o Use of Chip ATM card with more security instead of the normal magnetic ATM card
- o Other:

45. How many of your colleagues, friends and family members in the area you stay use ATM Card ? *

Mark only one oval.

	1	2	3	
Most of them around use				Few of them around use

46. Do you use your ATM Card for foreign / international transactions ?

Mark only one oval.

- o YES ***Skip to question 47.***
- o NO ***Skip to question 48.***

PART D.1.1 ATM for international transactions

47. Do you disable your internatinal transaction facility as soon as you finish your international transaction over your ATM card ? *

Mark only one oval.

- o YES
- o NO

Skip to question 51.

7.1 PART D.2. THOSE WHO DO NOT USE ATM CARD

48. Why do you not use ATM services? *

Check all that apply.

- o Do not trust the security of ATM Card
- o Do not possess a card as the bank did not offer an ATM card on opening of account
- o There are too many formalities for replacement or blocking of Card
- o Had witness a bad experience where my money got deducted from the account
- o I was told by a friend or family member about their bad experience they had with a ATM Card
- o The ATM services charges are unreasonable and high
- o Not aware as to how to use a ATM Card
- o Never felt the necessity to use a ATM Card as I prefer visiting my branch
- o Other:

49. Which factors will induce you to use ATM Card in the future?

Check all that apply.

- o Bank provides enough information to guide me how to use
- o More types of services / facilities provided on ATM Card
- o Stricter laws and rules by RBI governing ATM Cards
- o Bank improves security measures of ATM Cards
- o Recommended by peer group or family member to start using ATM Card
- o If bank promotes and advertises for ATM Card
- o Monetary incentive for using ATM Cards such as higher interest rate, lower bank charges, cash back offers, discounts.
- o Goverment introduces schemes to encourage ATM Card
- o I will not use ATM Card no matter what

50. Will you start using ATM Card in the next 6 months ? *

Mark only one oval.

- o Yes I will use
- o I will NOT use no matter what
- o Not sure

PART E - MOBILE BANKING

51. Do you use Mobile Banking *

Mark only one oval.

- YES ***Skip to question 52.***
- NO ***Skip to question 60.***

PART E.1. THOSE WHO USE MOBILE BANKING

52. Before using Mobile Banking, from whom did you take advice ?

Check all that apply.

- o Bank Staff
- o Family members
- o Colleagues
- o Friends
- o Classmates
- o Other:

53. For how long have you been using Mobile Banking ?

Mark only one oval.

- o Last 6 months
- o 6 months to 1 year
- o 1 – 3 years
- o 3 – 5 years
- o More than 5 years

54. How often do you use Mobile Banking ?

Mark only one oval.

- o More than 10 times a month
- o 4 - 9 times a month
- o 1 - 3 times a month

55. Below are some factors influencing you to use Mobile Banking, please tick the same on a scale of 5. *

Mark only one oval per row.

	1 - Creates a lot of influence	2 - Creates an influence	3 - Creates an average influence	4 - Creates a marginal influence	5 - Does not create any influence
My Mobile banking application launches quickly					
My bank's					

Mobile Banking is always available for transactions (not always under maintenance)					
My bank's Mobile Banking interface is attractive and user friendly					
My bank Mobile Banking gives prompt responses to my banking transactions through SMS or any other means					
My bank's Mobile Banking is accessible through internet and through SMS					
My bank's Mobile Banking transactions with the bank is always accurate					
My bank is well known and has reputed Mobile Banking Software					
My bank quickly resolves problems I encounter with my Mobile Banking transactions					
My bank has a backend Customer Support service available					

promptly 24x7					
My bank's staff has good information and can guide me about the Mobile Banking services provided by them					
My bank's staff encourages use of Mobile Banking services provided by them					
My bank's staff are well informed about the latest changes in Mobile Banking services provided by them					

Please enter one response per row

56. Which of the following types of Mobile Banking services are you aware of *

Check all that apply.

- USSD eg. *111#
- Mobile banking - SMS based
- Mobile banking through Internet with a mobile banking application
- Mobile banking for Retail users
- Mobile banking for Corporate users

57. Which of the following Mobile Banking services have you used on your Mobile Banking ? *

Check all that apply.

- Deposit and Loan account enquiry
- Pay utility bills - Mobile, Credit Card, Electricity, School
- Mobile Top-up and DTH Recharge

- Payment of direct taxes
- Instant Term Deposits – e-TDR/e-STDR and Recurring Deposits
- Mini / Short statement
- Request for a cheque book
- Funds Transfer – Intra Bank (within the bank)
- Funds Transfer – Inter Bank (other banks)
- Operate multiple accounts with a single userid password
- IMPS- Inter bank Mobile Payment Service.
- Auto-payment/transfer facility
- Branch and ATM locator
- M-passbook (Mobile passbook)

58. Which of the following security measures do you adopt while using your Mobile Banking (tick all those security measures that you adopt) *

Check all that apply.

- Never store your Mobile Banking username and password on your mobile handsets and tablets.
- Install and update the latest anti-virus and anti-spyware software regularly on your mobile handsets and tablets, whenever they are available.
- Avoid sharing your mobile handsets and tablets with others and use your own handset or tablet to log on.
- Do not leave your handset or tablet unattended after login to Mobile Banking.
- Always log off properly when you are finished with it.
- Wipe data on your old phone or tablet before donation, reselling or recycling.
- If you lose your mobile phone or tablet, you should review your account transaction history through Personal Internet Banking (PIB).
- If there are any suspicious transactions, please contact Customer Service Hotline and report to them immediately.
- Better set up auto-lock and enable passcode lock to prevent unauthorized access of your handsets.
- When using Wi-Fi connection, use trusted Wi-Fi networks or service providers and enable security protection such as Wi-Fi Protected Access (WPA), if possible.
- Disable Bluetooth if you are not using or set the smartphone or tablet to non-discovery mode.
- Use default browsers originally provided by mobile handsets and tablets rather than newly installed browsers downloaded from other sources.

- Don't use any jailbroken handset or tablet which may have security loopholes to log on to Internet Banking
- Don't install applications on your mobile handsets or tablets from mistrusted sources. Don't use untrusted custom virtual keyboards.
- Install updates and patches to your smartphone and tablet timely, covering upgrade/update of OS and other mobile applications. Enable data encryption in handset or tablet if feasible.
- Always type in url address directly into the browser or download application from official application store only to avoid going to fraudulent websites.

59. How many of your colleagues, friends and family members in the area you stay use MOBILE BANKING ? *

Mark only one oval.

	1	2	3	
Most of them around use				Few of them around use

Skip to question 64.

PART E.2. THOSE WHO DO NOT USE MOBILE BANKING

60. Why do you not use mobile banking? *

Check all that apply.

- o I do not have a mobile phone
- o I have a mobile phone but it is not a smartphone
- o I do not use the internet
- o I like the branch banking service as I like personal, face-to-face service
- o I'm not clear about the advantages of mobile banking
- o It is risky, there are fraud cases on internet banking as I have witnessed it
- o It is risky, as there are fraud cases through mobile banking and my family or friends have witnessed
- o Mobile connectivity problems
- o Heard from others that mobile banking is not good
- o Never heard about anything called as mobile banking
- o Feel complicated, as it is not user friendly
- o Bank's staff members are not well versed with the services being offered
- o I don't feel the need of using mobile banking
- o Process to apply for mobile banking has too many formalities and time consuming

61. Which factors will induce you to use Mobile Banking in the future ?

Check all that apply.

- o Bank provides enough information to guide me how to use Mobile Banking
- o More types of services / facilities provided on Mobile Banking
- o Stricter laws and rules by RBI governing Mobile Banking
- o Bank improves security measures of Mobile Banking
- o Recommended by peer group or family member to start using Mobile Banking
- o If bank promotes and advertises for Mobile Banking
- o Monetary incentive for using Mobile Banking such as higher interest rate, lower bank charges, cash back offers, discounts.
- o I will not use Mobile Banking no matter what
- o Goverment introduces schemes to encourage Mobile Banking
- o Other:

62. Will you start using Mobile Banking in the next 6 months ? *

Mark only one oval.

- Yes I will use
- I will NOT use no matter what
- Not sure

63. Why do you prefer using applications like facebook, whatsapp on your mobile phone as compared to internet banking facilities provided on your mobile phones? (for those who use other mobile services and not mobile banking applications) *

Check all that apply.

- The applications or interface is very user friendly
- Using social apps I have no threat to my money where as using banking apps can be a direct threat if my account is hacked
- I do not use services like facebook, whatsapp or any other online services

PART F - INTERNET BANKING

64. Do you use Internet Banking *

Mark only one oval.

- o YES ***Skip to question 65.***
- o NO ***Skip to question 72.***

PART F.1. THOSE WHO USE INTERNET BANKING

65. Before using Internet Banking, from whom did you take advice ?

Check all that apply.

- o Bank Staff
- o Family members
- o Colleagues
- o Friends
- o Classmates
- o Other:

66. For how long have you been using Internet Banking ?

Mark only one oval.

- o Last 6 months
- o 6 months to 1 year
- o 1 – 3 years
- o 3 – 5 years
- o More than 5 years

67. How often do you use Internet Banking ?

Mark only one oval.

- o More than 10 times a month
- o 4 - 9 times a month
- o 1 - 3 times a month

68. Below are some factors influencing you to use an Internet Banking, please tick the same on a scale of 5. *

Mark only one oval per row.

	1 - Creates a lot of influence	2 - Creates an influence	3 - Creates an average influence	4 - Creates a marginal influence	5 - Does not create any influence
My Internet Banking application launches quickly					
My bank's					

Internet Banking is always available for transactions (not always under maintenance)					
My bank's Internet Banking interface is attractive and user friendly					
My bank's Internet Banking gives prompt responses to my banking transactions through SMS or any other means					
My bank's Internet Banking transactions with the bank is always accurate					
My bank is well known and has a reputed Internet Banking Portal (INB site)					
My bank quickly resolves problems I encounter with my Internet Banking transactions					
My bank has a backend Customer Support service available promptly 24x7					
My bank's staff has good information and can guide me					

about the Internet Banking services provided by them					
My bank's staff encourages use of Internet Banking services provided by them					
My bank's staff are well informed about the latest changes in Internet Banking services provided by them					

Please enter one response per row

69. Which of the following Internet Banking services have you used from your Internet Banking Facility ? *

Check all that apply.

- Account enquiry – Savings /Current / Overdraft /Term Deposit / Loan Accounts
- Funds Transfer between own Accounts
- Fund Transfer between account of others – Inter Bank transfers & Intra Bank transfers (RTGS, NEFT)
- Request for opening Account - Savings /Current / Overdraft /Term Deposit / Loan Accounts
- Adding of Accounts in Beneficiary List
- Online transactions - Transaction, Deposit, Loan accounts
- Request for Cheque Books
- Cheques Enquiry / Blocking
- ATM Card – application / blocking
- TDS Detail
- E-Payment Facilities – Taxes, online utility bills, recharges
- Nomination facility – registering / updation / change

- Updation of Contact and Personal Details
- Change Login Password
- Change Transaction Password
- Change User Preference
- Login History

70. Which of the following security measures have you adopted while using your Internet Banking facility (tick all those security measures you have adopted) *

Check all that apply.

- Access your bank website only after typing the URL in the address bar of your browser.
- Do not click on any links in any e-mail message to access the site.
- Never respond to email/SMS or calls which enquire about the your personal information, password or one time SMS (high security) password as any such e-mail/SMS or phone call is an attempt to fraudulently withdraw money from your account through Internet
- Ensure your computer is protected with the latest anti-virus and firewall protection software at all times. Download updates regularly to ensure you have the latest protection
- Choose a Password that is memorable to you but not easy to guess by someone else. Passwords that contain 8 to 12 characters, which include a combination of alpha and numeric characters, and at least one special character (e.g. a7g3@cy91#)
- Do not choose a Password that you use for other services. Your Password should be unique to Internet Banking
- Change your Internet Banking Password on a regular basis
- Never disclose your Internet Banking Password to anyone. No bank staff will ever ask you for your Password
- Do not write your Internet Banking Username together with your Password. Do not write your Password in a recognizable format and never leave your logon details with your Online Security Device
- Disable functionality on your computer or browsers that remembers logon details
- Keep your Web Browser updated. Use recognized browsers like Keep Web Browser updated. Use recognized browsers like IE 8.0 Mozilla Firefox, Opera, Google chrome,etc.)
- Enable Firewall.
- Check the site certificate. Use the site with HTTPS:// rather that HTTP:// which ensures that the connection is secure.

- Check your accounts regularly. If in doubt about any transactions, note the details and contact your Bank branch
- Always keep your Bank's customer service desk number handy incase of any doubt inorder to freeze or block the account until you confirm with the bank staff.
- Always log-out after using Online Banking. Just select the log-out button and never leave your PC unattended while you're logged in to the service.
- Avoid the use of public computers to do your banking, including those at libraries, internet cafes and schools.
- Log out if you leave the computer, even if it is just for a moment. If possible, do not leave the computer unattended while you are still logged in.
- Delete your browsing history before you log out of the computer: Internet browsers store information about your passwords and the pages that you visit. Go to the tools menu of the internet browser and select options or internet options. Make sure that the browser has any auto complete function turned off, delete any cookies, and clear the history.
- Dont type in sensitive information: Even if you take the precautions listed above, the public computer may have malicious software called a keystroke logger installed on it. These can steal your password, credit card number and bank details. Avoid doing financial transactions that could reveal sensitive information.
- Change your Internet Banking password at periodical intervals.
- Always check the last log-in date and time in the post login page.

71. How many of your colleagues, friends and family members in the area you stay use Internet Banking ? *

Mark only one oval.

	1	2	3	
Most of them around use				Few of them around use

Skip to question 76.

PART F.2. THOSE WHO DO NOT USE INTERNET BANKING

72. Why do you not use internet banking? *

Check all that apply.

- o I'm not computer savy, I hate using the computer
- o I do not use the internet
- o Not necessary because internet services are similar with traditional ones
- o I like the branch banking service as I like personal, face-to-face service
- o I'm not clear about the advantages of internet banking
- o It is risky, there are fraud cases on internet banking as I witnessed it
- o It is risky, as there are fraud cases on internet banking and my family or friends have witnessed Heard from others that internet banking is not good
- o Never heard about anything called as Internet banking
- o Feel complicated, as it is not user friendly
- o Staff members are not well versed with the services being offered
- o I don’t feel the need of using internet banking
- o Process to apply for internet banking has too many formalities and time consuming

73. Which factors will induce you to use Internet Banking ?

Check all that apply.

- o Bank provides enough information to guide me how to use Internet Banking
- o More types of services / facilities provided on Internet Banking
- o Stricter laws and rules by RBI governing Internet Banking
- o Bank improves security measures of Internet Banking
- o Recommended by peer group or family member to start using Internet Banking
- o If bank promotes and advertises for Internet Banking
- o Monetary incentive for using Internet Banking such as higher interest rate, lower bank charges, cash back offers, discounts.
- o I will not use Internet Banking no matter what
- o Goverment introduces schemes to encourage Internet Banking
- o Better internet connectivity in my area of residence
- o Other:

74. Will you start using Internet Banking in the next 6 months ? *

Mark only one oval.

- Yes I will use
- I will NOT use no matter what
- Not sure

75. Why do you prefer using services like facebook, whatsapp as compared to internet banking facilities? (for those who use other online services and not internet banking facility) *

Check all that apply.

- The applications or interface is very user friendly
- Using social apps I have no threat to my money where as using banking apps can be a direct threat if my account is hacked
- I do not use services like facebook, whatsapp or any other online services

PART G - FEATURES OF GENERAL BANKING

76. Below are some features of E-banking technologies, please RANK the features which are useful to you or not on a scale of 5. *

Mark only one oval per row.

	1- Very usefull	2 - Usefull	3 - Average	4 - Slightly usefull	5 - Not at all usefull
24-hour and 7-day a week service					
Anywhere access, no need to visit branches					
Free of charge services					
Full picture of the comprehensive banking services on the website					
Fast and convenient, time saving					
Privacy, no need for a teller					
Better cash management					
Quick account details enquiry					
Sense of superiority, trendy					
I save money on travelling by not going to the bank personally					
I can earn more money by investing more time for					

productive work rather than personally visiting the bank					
Real-time fund transfers					
Online bill payments / mobile recharges saves time and money					
Received discounts, rewards points for using E-Banking technologies					

Please enter one response per row

PART H - FEATURES OF GREEN BANKING

77. Which of the following initiatives of green banking are you aware of that is being undertaken by the banks with respect to its customers *

Mark only one oval per row.

	YES I AM AWARE	I AM NOT AWARE
Promotion of ATM, Mobile and Internet banking by bank to encourage paperless banking		
Encourage automatic payments to reduce the the need to write and send cheques		
Encouraging Electronic (paperless) statements, product information, guides and annual reports to customers		
Offering concessional rates to home loan borrowers who invest in buildings designed according to trees on site, energy-efficiency upgrades for their home, Building plans and windows designed for cross ventilation,		
Offering concessional rates to vehicle loan borrower owners investing in energy-efficient vehicle using alternate modes of energy such as LPG (Liquefied Petroleum Gas) and CNG (Compressed Natural Gas).		
Offering concessional rates loans for efficient air conditioning and solar heating systems to institutions and companies		
Offering credit /debit cards co-branded with environmental charities.		

Facility of Green Channel Counter or similar initiatives made available in the branches as an approach towards paperless banking		

Please enter one response per row

78. Rate the following initiatives of green banking that is being undertaken by the banks with respect to its customers on a 5 point. Irrespective of your awareness. *

Mark only one oval per row.

	1- Will make a DRASTIC difference	2- Will make SIGNIFICANT difference	3- Will make a MODERATE difference	4- Will make a LEAST difference	5- Will make NO difference
Promotion of ATM, Mobile and Internet banking by bank to encourage paperless banking					
Encourage automatic payments to reduce the the need to write and send cheques					
Encouraging Electronic (paperless) statements, product information, guides and annual reports to customers					
Offering concessional rates to home loan borrowers who invest in buildings designed according to trees on site, energy-efficiency upgrades for their home, Building plans and windows designed for cross ventilation,					
Offering concessional rates to vehicle loan borrower owners investing in energy-efficient vehicle using					

alternate modes of energy such as LPG (Liquefied Petroleum Gas) and CNG (Compressed Natural Gas).					
Offering concessional rates loans for efficient air conditioning and solar heating systems to institutions and companies					
Offering credit /debit cards co-branded with environmental charities.					
Facility of Green Channel Counter or similar initiatives made available in the branches as an approach towards paperless banking					

Please enter one response per row

The questionnaire had come to an end; you may kindly click the submit button to register your response.

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*** END***

DISSEMINATION

Research Papers Presented:

- "A STUDY OF THE PERCEPTION OF COLLEGE STUDENTS WITH REFERENCE TO THE USE OF E–BANKING TECHNOLOGIES" At 67 th All India Commerce Conference - 2014 of the Indian Commerce Association organized by KIIT University Bhubaneswar.
- "FACTORS AFFECTING ATM USAGE: AN EMPHIRICAL STUDY OF ATM BANK ACCOUNT HOLDERS OF SALCETE." AT the 69th All India Commerce Conference – 2016 of the Indian Commerce Association organized by Lucknow University, Uttar Pradesh.
- "SUSTAINABILITY OF E-BANKING TECHNOLOGIES IN THE DUSK OF DEMONITIZATION". At the 70th All India Commerce Conference – 2017 of the Indian Commerce Association organized by IIS University, Jaipur.

Research Papers Published:

- "A STUDY OF THE PERCEPTION OF COLLEGE STUDENTS WITH REFERENCE TO THE USE OF E–BANKING TECHNOLOGIES" in International Journal in Management and Social Science ISSN: 2321-1784 Vol.03 Issue-06, (June, 2015) Page no: 83-90. (Impact Factor- 4.358)
- "A STUDY OF THE RELATION BETWEEN SMARTPHONE USERS AND INTERNET BANKING APPLICATION USERS ON THE SMARTPHONES." In International Journal of Social Science & Interdisciplinary Research ISSN: 2277-3630, IJSSIR Vol. 4 (8), Page no: 114-122, August 2015, Online available at indianresearchjournals.com (Impact Factor: 5.313)
- "A CASE STUDY: THE USAGE OF ATM SERVICES OF SELECTED BANKS IN GOA" in Asian Journal of Research in Banking and Finance: Asian Research Consortium, ISSN 2249-7323, Vol. 7, No. 5, May 2017, pp. 168-178. A Journal Indexed in Indian Citation Index DOI NUMBER: 10.5958/2249-7323.2017.00038.4
- "SUSTAINIBILITY OF E-BANKING TECHNOLOGIES IN THE DUSK OF DEMONITISATION" in the Asian Journal of Research in Banking and Finance: Asian Research Consortium, ISSN 2249-7323, Vol. 8, Iss. 4, April, 2018, pg. 1 – 11. A Journal Indexed in Indian Citation Index DOI NUMBER: 10.5958/2249-7323.2018.00023.8