Chapter 2

Literature Review
Chapter 2. Literature Review: Need for Study

2.1 Literature Review Books

Bank Management by Timothy W. Koch, S. Scott

The Author in this book writes about Financial Services. The author says that the financial services differ from country to country. It highly depends on the rules and regulations in the country. The author differentiates between Transaction Banking verses Relationship Business Models. They say that the banks facilitate the customer by reducing the transaction cost and increase the amount of information for the customer. They mention that large banks provide transactions at lower cost and the products are highly standardized. Though this is true, there are many community banks which are functioning equally strongly. One of the reasons mentioned is that the community banks depend more on relationship banking. Relationship banking refers to giving value added services like tax planning, credit policies. They emphasize more on relationship with the customer and providing them more customized support. This is in addition to the standard transaction services given by and large to all the customers of the bank.

The book also mentions about Universal Banking. i.e. generic services that are expected by customers. E.g. brokerage services, loan services.

The book mentions about branch banking. The authors say that many banks have expanded their network by operating extensive branch bank networks. This is done in two ways:

1. Interacting Face to Face with the customer.
2. Electronically via ATM machines.

The book also mentions that there are two types of branches:

2. In-store branches.
Brick-and-Mortar branches offer a complete set of baking services. In store branches are located in retail outlets like supermarkets and offer limited services e.g. withdrawal, balance check, mini statement etc. They are characterized by high volume traffic.\(^2\)

The book also mentions about ATM’s. The customers can do a limited set of transactions via ATM’s regardless of the geographical location or sometimes even irrespective of the bank. Many banks allow customers of other banks to do their transactions without charging any kind of transaction fees. Some banks do charge some transaction fees for customers from other banks.

The book mentions about Internet Banking which allows the customers to access their account information virtually from anywhere and conduct routine banking business via secured web sites. Typical services include account review, bill payments, funds transfer and applications for loans and opening of a new account. This has been risky since there are many hackers who hack accounts and transfer funds to some other accounts.

The book also mentions about mobile banking. The typical transaction that can be done via mobile banking are balance checks, funds transfer, bill payments, loan payments, ticketing.

The author emphasizes on call centers which form the backbone for the above mentioned services. The author also says that all call centers are not so effective to provide better services.

**Banking and Financial Services**

Melanie L. Fein, Esq Fein

In this book the authors mention about the Brokerage Services. The authors have written about the transactions in shares and mutual funds. The authors have also mentioned about banking transactions with affiliates. They also mention about the legalities in transactions via affiliates. They have emphasized on the legal norms and agreements with affiliates.\(^3\)

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The book does not mention much about technology and its role in the transaction activities.

Financial Services Information Systems Jessica Keys

Section 2 of this book contains Banking trends in technology. This section mentions the best practices in banking technology. It also mentions about the merits and demerits of technology in banking. It also mentions about the emerging trends in Retail Banking and how new methods of transactions and banking are adopted by the banks and how the customers are exploiting the same for their own benefits. Sub topic 3 (chap 35) of this section mentions about systems that are required for serving global customers and facilitating global transactions, multi country transactions in different forms and different currencies.  

Subtopic 4 (chap 36) gives a brief history of Internet banking. It mentions about the evolution of internet technology and its use in Banking systems and Retail Banking. It also mentions about the transactions that are possible via internet and the methods for the same. It talks about the limitations of internet banking. The advantages and disadvantages about internet banking are also highlighted. The author emphasizes on technologies like data mining and distributed computing.

Subtopic 5 (chap 37) mentions about electronic bill payments. It mentions about the origin of bill payments via internet. It also mentions about how internet bill payments changed the process of home banking and in turn added to online payment systems.

Subtopic 6 (chap 38) mentions about Customer Self Service. It talks about the use of ATM networks by the customer to solve their own queries e.g. balance checks, transaction statements, changing the pin etc. It also mentions about the additional services that can be facilitated via ATM networks.

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Subtopic 8 (chap 40) mentions about Community Banking. It mentions about how internet banking has become a plain field for multiple transactions for group of people or community.

The book does not mention much about security in ATM, internet banking or online payment systems.

Introduction to Banking G Vijayaragavan Iyengar

In this book the author mentions about the change in banking due to implementation of technology. In last decade banking has changed a lot as compared to the entire period of banking in India. Profit, today has just became a buzzword for banks today. The competition is driven by technology. Computerization of branches, introduction of cash management products, remote access logins for corporates, mobile banking, internet banking and atm banking are few ways with the help of which bankers beat competition.

History of ATM: Barclays bank in UK was the first to install cash dispensers in June 1967. This was working through paper vouchers which were fed to the machine. Within a year similar machines were installed in France, Sweden and Switzerland. In 1969, USA and Japan installed their own machines. in 1972 Lloyds bank installed their first line “Cash Point” machine developed by IBM. These machines used plastic cards with magnetic stripe, which identified the customer’s account. Further Americans and Japanese extended their ideas beyond just cash dispensing and implemented machines which had facilities of Customer self-service. These were further referred to as “Automatic Teller Machines”.

The Indian Scene: Today the customers in India are more demanding. They want services of global standards. They are ready to shift loyalty based on the amount of services provided by the bank. They want to be empowered with self-service channels like ATM’s, Internet banking and Tele banking.

ATM’s can do cash a well as non-cash transactions. ATM withdrawals are restricted to a certain limit fixed by the individual banks.

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Benefits for the Bank due to ATM’s:

1. Competitive edge/improved image
2. Reduction in staff workload
3. Reduction in transaction cost and overheads
4. Reduction of crowd in branches
5. Improved customer satisfaction
6. Improved housekeeping
7. Improved customer base
8. Possibility of advertisement on ATM’s
9. Product Information on ATM’s
10. Increase in miscellaneous business
11. Substitute for Branch banking

Internet Banking: It is an additional delivery channel for banking. The customer can access his account from anywhere and anytime via internet.

Advantages:

1. Convenience Banking
2. Available anytime/anywhere
3. Low cost, unlimited access
4. Better customer relationship
5. Wider reach

Modern Banking: Theory and Practice by D. Muraleedharan

This book mentions about the advent of Information technology and its role in banking sector. Like any social sector, banking is also undergoing a rapid transformation. Technology has become central to banking. This is one of the reasons why private and multinational banks are able to survive and adapt in increasing competitive space. These banks were able to leverage on low-cost channels such as ATM’s and net banking to the
optimum levels contributing to low operating costs. Banks are looking out for newer ways to make customers banking experience more convenient, efficient and effective. They are using new technologies and tools to identify customers’ needs and offering tailor-made products to match them.⁶

Centralized operations and process automation using core banking applications and IP-based networks improve efficiency and productivity levels tremendously. Core banking applications help a bank in shifting from ‘branch banking’ to “bank banking”. This basically means that a customer will be treated as a banks customer than just a customer of a particular branch which was the case earlier. Also, IP-based networks let a bank offer multiple services over the same network, resulting in costs savings. CRM solutions, if implemented and integrated correctly, can help significantly in improving customer satisfaction levels. Data Warehousing can assist in providing better transaction experiences for customers over different transaction channels, by bringing all the transactions coming from different channels under one roof. Data Mining helps banks analyze and measure customer transaction patterns and behavior. This can help a lot in improving service levels and finding new business opportunities.

Using technology, banks are able to better assess risks like internet risks, liquidity risks and foreign exchange (FOREX) risks. The other driver for using IT is that banks can reduce costs, thereby reducing the time to market. Technology makes it easier for any company with the right channel infrastructure and money reserves to get into banking.

ATM’s, Internet banking, and telebanking are replacing traditional service channels .The core issues faced by banks today are on customer’s service expectations, cutting operational costs, managing competition. Technology can help banks in meeting these objectives. IT has become central to banking. It has moved from being just a business enabler to being a business driver, in a manner the banking and financial services sector-being the early adopters of any new technology-defines the roadmap for future technology adoption.

In this book the author mentions about the trends in technology and banking. The author writes that information technology in banking industry has undergone several changes during the post-reform period. Most of the banks have adopted PC-linked technological services to boost their banking business.\footnote{Shroff, D. F. (2007). \textit{Modern Banking Technology}. Northern Book Centre}

In banks there are typically three distinct phases for introduction of technology:

First Phase: “Back Office” data processing is automated by installing strong centralized data processing functions.

Second Phase: The focus is shifted from the “back office” to pushing delivery of the service out of the bank. The emphasis is in automating branch operations. The basis for investment in technology begins to migrate from cost reduction to maintenance of market position.

Third Phase: Service delivery to customer accelerated as a means of gains control over account relationships and assets. Banks which become low cost and high quality processors are able to gain market position, particularly in international corporate services.

Banks which invest wisely in IT and turn their investments into successful application will be the leaders in the competitive economy of twenty-first century. Advancement in communication and technology has changed the banking industry to maintain back office activities but also to provide better and innovative services to customers. Banking industry requires timely and accurate information access to managerial decision, control on accounts and information maintained by banks.

Technology in banking has been used in a number of ways, mainly-
(a) To manage the accounts for a very large number of customers.
(b) To bring out cost effectiveness in handling payments.
(c) To get over constraints of customers having to transact business during limited banking hours at the branch where the account is maintained.
(d) To introduce new services.

Lead Role of RBI:
For mechanism of banking industry as a whole RBI itself has made massive investments in various tools and equipment's of banking based IT. The RBI initiated action on setting up of VSAT network to provide reliable communication backbone for exclusive use of banking and financial sector.

Investment on the part of RBI:
IDRBT and RBI own the HUB,NMS and 25 VSATs for RBI. This part would involve the following investments:

- **HUB**: ₹ 30.00 crore
- **25 VSATs for RBI**: ₹ 5.00 crore
- **Total**: ₹ 35.00 crore

Investment on the part of Banking Sector (Public sector banks)

- Cost of 500 VSATs for banks @ ₹ 13 lakh per VSAT ₹ 65 crore

- **Total investment during the first year**: ₹ 100 crore

Ongoing Developments in Banking & Financial Sector: Volume -2: Raj Kapila & Uma

In this book the author writes that the banks in India which grew by leaps and bounds by increasing their branch network have to seriously think on consolidation and reorganization of such network by enforcing on stricter reporting system and head office controls over the branches. Control over such large network branches would require extensive use of Information Technology. To bring in better controls and monitoring standards for sensitive
transactions, the Central Vigilance Commission has directed that at least 70 percent of bank’s business should be computerized. Such infrastructure upgradation along with early adoption of asset liability management system and risk management guidelines would facilitate Indian banking to migrate to better operational standards on par with global ones, and enhance their MIS capabilities for optimization of earnings.  

There are many which have poor IT network and processing capabilities. They are also short of capital resources to go for upgradation of their operating levels. They need to adopt new products and strategies calling for massive deployment in infrastructure and IT skills. Some of the newly established private banks with their initial capital resources invested in such infrastructure have overtaken the old establishes private banks both in business volumes and quality of operations and they are highly competitive as foreign banks.

Some old banks are already showing signs of fatigue because of their traditional style of functioning and are not equipped to face competition.

The banks in India will have to improve their quality of assets by vigorous pursuit of better credit appraisal skills and treasury management, recovery procedures, adopt new technologies and diversify their product range. This calls for cost cutting measures, motivation and upgrading skills of staff, concentration on core business competencies, augmentation of own funds through approach to market as well as by retained earnings through improved profits, consolidation of existing business and branch network, and tightening of internal control and transparency in their operations.

Managing Bank Conversions: Thomas D. Steiner, Diogo

In this book the author writes about Conversion of Banks from a non IT to IT systems implementations. The systems that are to be converted are as follows:

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1. Deposit operations.
2. Loan Operations.
3. ATM/EFT operations.
4. Information systems (telephone, network and end user computing).
5. Accounts processing.
6. General ledger and finance.\(^9\)

The author also mentions about the project management activities to be done to achieve success in the conversion process. The author also mentions about the testing and implementation of the devices. The programming and installation is also mentioned as a part of conversion. The technologies recommended are ATM’s, IVR, Call centers, LAN and WAN networks.

Most banks own and operate ATMs. Some of the ATMs deployed by a bank may be on site whereas others may be standalone remote placements. The later could include supermarket locations, remote kiosks, or other locations outside of the bank building. When this is the case, circuits are required to connect the ATM back to the closest branch owned by the bank. Circuits should be installed and available when the actual conversion occurs. These circuits will likely involve modems to be installed at each site with an analog circuit. Since remote ATM does not require the bandwidth of a physical branch, digital circuits will probably not be required. In this regard a circuit needs to be installed by the bank’s circuit provider.

Conversion of banks has helped efficiency on banking operations. It has brought transparency and authenticity in transactions. Data Warehousing and Data Mining makes the accessibility faster.

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The Pillars of Banking Dr. John Chibaya Mbuya

In this book the author mentions about the banking system in South Africa. The author wrote about the Electronic Banking Products and Services.

Developments in the field of computer equipment and technology have made electronic banking on the buzz words of recent times. Electronic banking is changing the nature of retail banking and the financial instruments that we are familiar with. It is more secure due to personal identification number or PIN which is unique to every specific customer. It is faster and facilitates transactions, finality of payment, the transfers between different accounts and dispensing of cash by means of the automated teller machines (ATMs). Since the introduction of multinet, customers can as of their account from most ATMs-even ATMs belonging to other banking institutions. Customers are thus not restricted to ATMs of their own banking institutions.10

Electronic banking has also seen introduction of more electronically-based products and services available to customers. The latest technology has made the smartcard – a microchip card which can store even more information on a database.

In order to cater for constantly changing customer needs and to cut down on bank costs in the light of greater competition amongst banks and other financial institutions, banks have been compelled to develop a wider range of flexible electronic products and banking services capable of being adapted to suit specific customer needs. Many banks have expanded their business internationally by using cost effective ways by implementing technology.

Automated Telling Machines (ATMs):

South Africa was introduced to the era of electronic banking in 1981 with the introduction of the first ATM. With the use of ATM plastic magnetic stripe cards almost every bank in South Africa offers its customer 24-hour banking services.

Home Banking:

This facility allows the account holder to access his bank account/s via the use of telephone, an electronic system like Beltel and most recently the internet.

Cash Management:

An on-line real time cash management facility allows the customer direct electronic access to group company accounts maintained at the bank thus making transfers between inter-company accounts or accounts of companies within the same group.

Statement Details:

Current Account statements can reflect information and reports in the format required by the customer to facilitate the account reconciliation procedures for the customer.

Risk Management in Electronic Banking: Concepts and Best Practices by Jayaram Kondabagil

This book is about risk management in electronic banking which focuses on security measures while doing the transactions using electronic banking.

In this book the author mentions about the evolution of e-Banking. The idea of direct customer service as less clear, but the first ATM came in commercial use in 1968. ATMs were the first visible face of electronic banking. From being mere currency dispensers they have now evolved into multifunctional devices enabling customers to conduct whole range
of transactions from account management, funds transfer, to bill payments. It took nearly 16 years for the first 100,000 ATMs to be operational, whereas the next 100,000 were in place in mere four years. The day of smart ATMs that use biometrics to recognize customers and cross-sell financial products with a fair knowledge of the investment and purchasing preferences of customers is not far off.

The next step in providing direct customer service came with the extended use of debit and credit cards in merchants’ chops through EPOS (electronic point of sale) technology. Electronic fund transfer was another application where technology was used extensively, mainly to cut down on costs and to speed up payments. This led to the development of specialized products like corporate cash management.11

The proliferation of the interned gave a boost to the electronic banking and moved banking services from back-end applications to customer-centric front ends. The open networked environment provided instant global access to information, products, and services, so now customers can bank from the comfort of their homes. Today approx. 20% of the world’s population are internet users which is a potential customer base for online banking.

The advancement in telecommunication technology have helped the development of new facet of electronic banking; namely, mobile banking. Wireless is estimated to be growing at more than three times the rate of landlines globally.

With the increase in number of users using mobile phones, mobile banking is set to become a major delivery channel.

Information Technology, Data Communications and Electronic Banking: V.Ramesh, K S Kang, P.Jagannathan, Smt Sudha Venkat Ram

In Chapter 1 of this book the author writes about the basics of computers, generation of computers and the overall evolution of computer technology. The author has also written

about input-output devices, operating systems, disk drives and the way to measure the capacities of storage (primary and secondary). It also mentions about how computer works.

In Chapter 2 of this book the author elaborated more about input and output devices. Even a monitor acts as an input device an in any information kiosk. In these kiosks or even at some automated teller machines (ATMs) you can access information or get your banking service done not through the keyboard but by directly touching the monitor screen.

Information is carried into the system through several modes each used to suit requirement. These modes are also called the Input Media.

The American Bankers’ Association, in the mid-1950s introduced the computerized cheque processing system called the Magnetic Ink Character Recognition (MICR). The system involved printing of numerals and some special characters in the bottom of the instruments in magnetic ink. These numerals and characters contain details such as the account number, name of the bank, its branch and its location. The technology permits even encoding of amount of the instrument. In the clearing office, the cheques are processed through a device called the magnetic character reader which used a two-step cycle to electronically read the MICR data.12

MICR technology has been welcomed widely both by bakers and the customers because of its proven efficiency in clearing large volume of cheques and other instruments.

The plastic card has become a popular input media nowadays. The quest for user convenience led the way to the development of plastic card technology and computers have greatly helped in making the so called plastic money easy to use anywhere in the world. But cards technology has encompassed not only banking but also various other applications.

The popularly used card types are as follows:

1. Access Cards: Used for building and door security.
2. ATM Cards: Transaction connected to the user’s bank account.
3. Charge Cards: Allows the user to pay his charges through the card and settle his account with the card company every month.
4. Credit Cards: Provides the user with a revolving credit account.
5. Debit and Checks Cards: User’s bank account is debited directly whenever a purchase transaction is made.
6. Digital Cash/e-Money/Stored Value Cards: Systems by which cards are pre-loaded with set money values to be deducted at the point of purchase.
8. Health Cards: Stores patient’s personal medical history or acts as a key to a system that stores such information.

E-Banking and Emerging Multidisciplinary Processes: Mohammad Ali Sarlak & Asghar Hastini

In this book the author write that E-banking is defined as web based banking. Deployment of retail or wholesale banking services over the internet is often referred as e-banking which involves individual and corporate clients, and includes bank transfers, payments and settlements, documentary collections and credits, corporate and household lending, card businesses and some others. Other researchers related banking to type of products and services through which bank customers request information and carry out most of their retail banking activities through computer, television or mobile phone. E-banking is described as an electronic connection between bank and customers in order to prepare manage and control financial transactions.¹³

There are several benefits associated with the introduction of e-banking. Benefits might vary depending upon various perspectives. From the banks perspective, provision of e-banking service delivery channel to customers would enhance their opportunity to

maximize their profits. The chief goal of many businesses in monetary terms is associated with profit maximization. Moreover, from the banks’ point of view, proliferation of the e-banking service delivery channels is an essential requisite not only in terms of cost savings by reducing the human interaction improving competitiveness by way of differentiation and retaining existing customer base as well as attracting potential customers. Banks throughout the world face an increasingly tough challenge of boosting their revenues while controlling their costs. Therefore the common trend followed by many banks globally is streamlining their branch networks and redirecting their consumers to alternative service delivery channels and encouraging consumers to adopt self-service technologies. Thus, banks are reducing the costs incurred in maintaining their bank staff. Also, banks often build better brand image by way of responding to the rapid market changes and would therefore be perceived as leaders in adoption of technologies.

From the customers’ point of view, automation of banking services by introducing e-banking service delivery channels provides 24 hours accessibility, reduced costs in accessing and using of banking products and services, proper cash management, reduced time demands, increased comfort as well as quick continuous access to the information.

Banking sector Efficient in Globalized Economy: Pramod Kumar

In this book the author mentions about the efficiency in banking due to technology implementation. The author also writes about the parameters to measure efficiency.

The relation of technology and productivity has been analyzed by some studies in the recent past. The role of information technology has been debated. A review of some studies:

Kolhi (2001) emphasized on the importance of technology and issues emerging from this technology. According to him, technology is emerging as a key driver of business in the financial service industry. The advancement in computing and telecommunications has revolutionized the financial industry and banking on the net is fast catching on.14 As e-

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commerce gets transformed into m-commerce with the increasing use of technologies like WAP, banking business is in for a major overhaul.

B. Janki (2002) analyzed the effect of technology on labor productivity. There is no doubt that banking needs to upgrade technology to improve operating efficiency and customer services. The study concludes that harnessing employee technology synergy is crucial for unleashing productivity and reaching out to the huge base of retail customers, who are also dispersed in rural and semi-urban areas. Banks can use technology to address customer needs and improve their interaction with customers, keeping in touch through telephone and internet. The study predicts that focus on technology will increase like never before to add value to customer service, develop new products, strengthen risk management, asset liability management and improve profitability. But it cautions that technology is only an enabling tool and whether banks actually achieve what they want to achieve will be determined by the drive and motivation of their work force and response of the staff.

Rao (2002) has analyzed the impact of technology on banking sector. The advent of technology both in terms of computers and communications has been changing totally the ways and doing banking business. Technology has opened new vistas and in turn brought new possibilities every day for doing the same work differently and in a most cost-effective manner. Telebanking and internet banking are making forays such that branch banking may give way to home banking.

Banking System Frauds and Legal Controls: R.P. Nainta

In this book the author mentions about the recent trends and security issues regarding the electronic transactions.

Recent Trends of Banking System in India

In the banking and financial sectors, the introduction of electronic technology for transactions, settlement of accounts, book-keeping and all other related functions is now an imperative. Increasingly, whether we like it or not, all banking transactions are going to be
The thrust is on commercially important centers, which account for 65 percent of banking business in terms of value. There are now a large number of fully computerized branches across the country.

A switchover from cash-based transactions to paper-based transactions is being accelerated. Magnetic Ink character recognition clearing of cheques is now operational in many cities, beside the four metro cities. In India, the design, management and regulation of electronically-based payments system are becoming the focus of policy deliberations. The imperatives of developing an effective, efficient and speedy payment and settlement systems are getting sharper with introduction of new instruments such as credit cards, telebanking, ATMs, retail Electronic Funds Transfer (EFT) and Electronic Clearing Services (ECS). We are moving towards smart cards, credit and financial Electronic Data Interchange (EDI) for straight through processing.

An Expert Committee on Bank Frauds (Chairman: Dr.N.L.Mitra) submitted its Report to RBI in September 2001. The Committee examined and suggested both the preventive and curative aspects of bank frauds.

The important recommendations of the Committee include:

1. A need for including financial fraud as a criminal offence;
2. Amendments to the IPC by including a new chapter on financial fraud;
3. Amendments to the Evidence Act to shift the burden of proof on the accused person;
4. Special provision in the Cr. PC for properties involved in the Financial Fraud.
5. Confiscating unlawful gains; and preventive measures including the development of Best Code Procedures by banks and financial institutions.

Thus it can be concluded that following measures should necessarily be adopted by the Ministry of Finance in order to reduce cases of Fraud.

1. There must be a Special Court to try financial fraud cases of serious nature.

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2. The law should provide separate structural and recovery procedure. Every bank must have a domestic enquiry officer to enquire about the civil dimension of fraud.

3. A fraud involving an amount of ten crore of rupees and above may be considered serious and be tried in the Special Court.

Strategies of Competition in the Bank Card Business: Jarunee Wonglimpiyarat

In this book the author mentions about various cards that are innovated and use as an event of technology implementation in the banking sector.

Innovations in financial services—specifically ATM/cash cards, credit cards, debit cards and smart cards have brought about major changes in the global banking and commercial sectors. The book traces the innovations, examining their commercial and industrial impact since their introduction.16

The ATM/cash card innovation is the development of an ATM network using automated cash machines to dispense banking services to customers on the basis of magnetic (swipe) card and a personal identification number (PIN). An ATM network consists of data terminals linked to host processors by leased lines. ATMs replace the function of tellers in receiving and dispensing cash, funds transfer between accounts, balance enquiries etc. ATMs provide convenient services unrestricted by banking hours. The ATM type of services allows customers to have a quick, convenient way to access money in their accounts. All cards issued with VISA or Master card logos can be used in any cash machine worldwide that displays those logos. The adoption of ATM technology in banking is intended to provide better access to cash, through extending the times at which cash withdrawals can be made, and improve efficiency in service delivery.

The debit card innovation is the development of a card-based electronic payment system, which allows an instant payment directly debited from the customer’s account by using debit cards. The system enables the customer to make payments securely since the card is

linked to the customer’s account. The debit card provides convenient services by directly debiting customers’ accounts at the point of sale, avoiding the need to carry cash. Thus, the complexities of using the machine (terminal) are transferred to the service providers. Consumers can use these services at both financial institutions and retailers.

The ATM technology, software and networking technologies can be purchases from a third-party operator (technology push product). In other words, the launch of proprietary ATM services is not difficult since innovators could similarly buy the required technology if they choose to do so. The provision of cash withdrawal service only involved connecting accounts via banks’ networking and data communication for inter-branch service. However, the problem lies in the strategy towards owning customers. There are difficulties in respect of service differentiation since the provision of a money withdrawal service was same across the financial service providers as a result of common technology across innovators. Therefore, in order to satisfy customers’ demands for widely available cash provisioning from the ATM-based service, innovators needed to employ the strategies of cooperative competition.

The integration to form the shared network, whereby any innovator could join, then became open system. This open system allows the innovator to enjoy the benefits in terms of expanded ATM scope of service, that is, the card issued by one financial institution can be used for cash withdrawal at other network members. This has helped to attain competitive advantage.

Customer Relationship Management: Organizational and Technological Perspectives: Federico Rajola

In this book the user has highlighted the change in the marketing and customer relationship process due to technological implementations.

Evolving technology and constant changes affecting the banking industry are increasingly pushing toward research into integrated solutions, in order to maintain and enhance customer relationship. It is not about seeking technically updated solutions: the practical
issue is how to intervene in the banks’ business processes so as to turn banks into customer-centered organizations.\textsuperscript{17}

In the past, the banks have invested a lot in developing and maintaining operational systems. In the last few years they have allocated increasing proportions of their budgets to the implementation of applications for marketing decision support. Most of these have been “offline” initiatives aimed at improving the information base and finding the best possible way of using the existing huge databases. That is to say that there have never been any major systematic information restructuring projects, much less data warehouse or data-mart projects that would have made it possible to use modern decision support systems.

A bank’s information system is made up of a number of subsystems and application layers, developed time after time from different databases which are not integrated or have proved hard to integrate.

Moreover, there are number of factors leading banks to reconsider their own marketing strategies in search of a lasting competitive advantage. This is due to many factors, but also the escalating acceptance of Internet and e-business.

The banks have reacted promptly to this new scenario: there are significant cases of banks who have implemented different effective marketing and customer relationship strategies to get better share of the market to do effective business.

Key Factors

A number of factors have contributed to the growing relevance of CRM as a source of competitive advantage. They can be subdivided into four classes:

1. Market Drivers,
2. Customer-related Drivers,
3. Business Drivers,

4. Technological Drivers.

An evaluation of impact by way of bank can be made for each of the above classes.

Some banks have developed separate systems for the same.

Innovative Banking: Competition and the Management of a New Networks Technology

In this book the author writes about the competition, cooperation and design of EFTPOS: Electronic Funds Transfer Point of Sale Terminal.

Implementing various technologies for Banking purpose triggered competition between various banks. The banks which were technically incompetent started losing business since they were not able to satisfy customer requirements. Banks started exploiting technology to give better service and satisfy customer requirements. The demands went on increasing and it became a big challenge for banks to innovate new methods for banking processes especially on the retail side.

The relationship between banks, retailers and consumers can sometimes work to the interest of one party and to disadvantage of third. In case of credit cards, by competing fiercely to provide customers with a credit card service, the banks imposed a duplication of equipment and procedures for dealing with these transactions on to the retailers.\(^\text{18}\)

Retailers were irritated by the interchange fees that the banks paid each other when they cleared transactions. In the case of credit card schemes, the fee is paid by the card acquirer to the card issuer and VISA set this fee at approximately 1% of the credit card transaction values. For retailers, the interchange fee prevents retailers negotiating down the merchant commission on transaction, since they negotiate with, and pay commission to, the acquiring banks, who must then pay the issuing banks. For an acquiring bank to make profit

on transaction, it must charge retailers the value of interchange fee, its own costs, and what is considered a reasonable return for itself.

Facilities like cash-back provided an opportunity for giving benefit to the customer, but it also raised security stakes to some extent. Almost all the customers are happy with the cash-back offers given by the retailer on usage of a certain card of a certain bank. This motivated the customer to make maximum use of his card to do shopping. In this case the retailer is working as an ATM on behalf of the bank.

The retailer benefits from cash-back because cashing up, the collection and bundling up of retailer cash takings, is reduced. Customers benefit because a visit to the ATM can be combined with the week’s shopping. If the service proves very popular, retailer cash reserves may have to be deliberately replenished, in which case the retailer incurs a cost rather than a benefit, while the bank loses further slice of the money transmission business. Some banks oppose the cash-back offers because it becomes an additional service and overhead for the banks.

Information Intelligence, Systems, Technology and Management: 5th Edition
Sumeet Dua, Sartaj Sahni, D.P. Goyal

In this book there is a paper: Resolving Productivity Paradox of Fully and Partially IT Oriented Banks: Evidence from India

In this paper the author says that Technology has become the buzzword in Indian Banking sector. It has been, now more than 15 years since the Indian banking sector is liberalized, privatized and globalized. All the bank groups in India are rapidly embracing Information Technology (IT). However, it is a matter of debate whether technology provides better financial results. There is no conclusive evidence that IT improves financial performance. It is generally believed that the technology provides efficiency, hence improves working and performance of an organization (Productivity Paradox). This implies that with the technology induction, the financial performance of an organization should also improve.
Findings show that the fully IT oriented Indian Banks are financially better off than the partially IT oriented Indian banks. This implies that technology does provide an edge which leads to better financial performance.

It is possible that additional IT investments may negatively contribute to financial productivity. Also it is evident that there is insignificant correlation between IT spending and profitability measures, which means IT investment, is unproductive. Thus it is difficult to determine whether banking technology has a significant impact on bank performance. There are also studies which have found that there is significant contribution from IT toward financial growth.¹⁹

The observation is that the profits of Indian banks have increased significantly from low technology era to high technology era.

Security and Access Control Using Biometric Technologies: Robert Newman

In this book the author writes about how security can be implemented using biometric system.

The Payment Card Industry data Security Standard (PCI DSS) was developed by the major credit card companies as a guideline to help organizations that process card payments prevent credit card fraud, hacking and various other security issues. A company processing, storing, or transmitting credit card numbers must be PCI DSS complaint or it risks losing the ability to process credit card payments.²⁰

A smart card is a device that includes an embedded integrated circuit that can be either a secure microcontroller or equivalent intelligence with internal memory or a memory chip alone. The card connects to a reader with direct physical contact or with remote contactless radio frequency interface. With an embedded microcontroller, smart cards have unique ability to store large amounts of data or their own on card functions, such as encryption and

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mutual authentication, and interact intelligently with a smart card reader. A contact card is
the most common type of smart card. Electrical contacts located on the outside of the card
connect to a card reader when the card is inserted.

Many card readers include a device that communicates information or assists in
communications from a card, token or other identity document and transmits the
information to a host system, such as control panel/processor or database for further action.

Some of the Biometric Identification Systems:

1. Fingerprint Identification.
3. Palm Vein Authentication.
4. Retina Scan.
5. IRIS Scan

New Trends in Banking Management: Constantin Zopounidis

In this book the author compares ATMs with a Cashier.

Automated Teller Machines or ATMs are a part of the new banking technology (Electronic
Banking). They are capable of doing a variety of transactions without the support of human
cashiers (Direct Bankind). These machines operate with a magnetic stripe on the back of
plastic cards and with the personal identification number typed by the customer. They can
offer 24 hour-service, every day of the year. Barclays Bank in the UK claims to have
installed the first Cash Dispenser in the world at Enfield in June 1967. National Bank of
Greece installed the first ATM in Greece approximately in 1992.

On the other hand, tellers interact with the majority of customers (80%) and generally
handle a wide range of banking transactions. The variety of activities performed by tellers
started changing since the beginning of 80’s. That has occurred because a lot of people
don’t perceive any more branches like the point of their banking activities. Electronic
banking gives them the opportunity to do easy transactions away from teller windows. So,
tellers are free from performing simple, standardized financial services and enrich their roles with more complex functions. 21

21. The Future of Banking in a Globalized World: Chris Skinner

In this book, the author writes about the various challenges in banking due to globalization. The author also writes about the countries like India and China and the way they developed in the banking process in last 30 years.

1. The author mentions primarily about the challenges for bankers today due to the following reasons: Regulatory challenges
2. Customer Challenges
3. Technology Challenges
4. Challenges due to profitability

The retail client is totally different beast today when compared with the humble branch visitor of yesteryear. Thirty years ago, banks had close personal relationships with their retail customers who regularly visited the branch to deposit cheques and meet staff and managers for advice. Gradually, these customers have been pushed out of the branch through technology, specifically ATMs and telephones and, more recently, the internet. This has dramatically changed the relationship between retail banks and their customers, as bankers no longer see the customer. The customer is remote online. The result is that the bank is a commodity product provider, as service has moved to self-service. Today, the retail customer is pushing back as customers no longer accept what the bank gives them. Today, they have total choice, based upon what their home can access. 22

Similar are the challenges for bank’s corporate clients. The technology based services, and processes allow them to manage the business on a globalized, 24*7*365 basis.


Retail banking changed more in the last few years of the 20\textsuperscript{th} century than in the decades that proceeded, due to the explosion of communication introduced by the internet. Bankers invested a lot in technology for online and integrated services. The call centers became a contact center for email ad instant messaging.

In the payments market, most fast cycle change is occurring. Traditionally, banks have organized their payments groups in lots of different silo operations: cash management, cheque processing, credit cards, clearing and settlement, treasury, SWIFT, custody and so on. Prepaid and credit cards are gaining importance. Instead of cheques, customers prefer using Electronic Clearing, Fund Transfer kind of systems. Mobile payment systems are also gaining momentum. SMS banking has improved the status communication.

India - Technology and A Vision For The Future: Nagarajan Vittal

This book talks about how information technology has blessed as well as given challenges to management. The book says that if banks don’t use IT they will lose their business. If they use IT they face the problem of decreasing profits themselves and increasing benefits to the customer. As any other business, banks have to go in for IT to improve benefit to the customer because in competitive market the customer is the king. At the same time, the banking business has become unbundled with declining profits. Reconciling this conflict of interests is a challenge to all managers in industry. There is also another challenge of IT. This arises from the new dimension to security issue. While IT may make our life easier and faster and allow the management of information in a manner which was not previously thinkable, it also adds to the risk of operations. It is mainly because; information technology is essentially a knowledge tool. It attracts the best brains to this sector. For many of the best brains, the breaking into a system is an attractive intellectual challenge.

The same challenges today are posed by the hackers. Meeting the challenge of the information security has the double dimension of ensuring that one does not lose profits by
using information technology in one’s business at the same time meet the challenges to security forced by clever hackers.\textsuperscript{23}

IT is increasingly used for the governance in e-governance and also in business. Bulk of the business operations today as in banking depends on IT. One method of tackling the security problem is to make intelligent use of audit. In Indian government, audit has always been post-audit and by the time the fraud is detected the perpetuators had already covered their tracks. This is why, we find that in spite of the elaborate system of CAG and agencies like Public Accounts Committee, we find very few brought to book. But it is necessary that agencies like CAG appreciate the emerging new dimensions of frauds and the need for auditing the system which is increasingly information technology. ISACA is designed to create a set of professionals who will have domain knowledge in this area which is going to be increasingly critical as the use of IT increases in our life both in government and the economy.

Principles and Practices of Banking (2 Edition)

In this book the author mentions about how the banking structure and process changed due to liberalization in Indian Economy.

With the ushering in of economic reforms in India during the early 1990, the banking sector was opened up to the private sector and the entire sector has been deregulated gradually. This resulted in operational flexibility and functional autonomy for the banks but competition also become very keen amongst the players. With liberalization, the Indian economy also started growing fast and helped by the huge flow of foreign direct investments and foreign institutional investment into India, the liquidity in the banking system has improved a lot. The retail lending, especially, in emerging economies, showed a remarkable growth in the 1990s mainly due to rapid advances in information technology. With world-class technology, the private sector banks became very aggressive in business

and to keep pace with them and to effectively counter competition, the public sector banks also followed them.

Today’s retail banking sector is characterized by three basic features:

1. Multiple products (deposits, credit cards, insurance, investments and securities);
2. Multiple channels of distribution (call center, branch, internet and kiosk); and
3. Multiple customer groups (customer, small business, and corporate).

Convenience banking in the form of debit cards, internet and phone banking, anywhere and anytime banking has attracted many new customers into the banking field. Technological innovations relating to increasing use of credit/debit cards, ATMs, direct debits and phone banking has contributed the growth of retail banking in India.24

There is also immense competition in Corporate/Commercial Banking. With competition even open to even multinational banks, in servicing this segment of customers, banks are vying with each other in providing a wide array of commercial, transactional and electronic banking products. Banks achieve this through innovative product development and well-integrated approach to relationship management. Every bank promises to provide superior product delivery, industry benchmark service levels and strong customer orientation. The product offerings are suitably structured taking into account a client’s risk profile and specific needs.

The following Internet banking services are gaining importance:

1. Payment Gateway Services.
2. Corporate Internet Banking.
3. Supply Chain Management.
4. Supply Chain Partners.

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In this book the author mentions about the changing face of banking in India and the contemporary challenges faced by the bank.

One of the most important challenges facing banking in India currently is the need for effective utilization of technology in the various facets of banking aimed at not only for improving customer efficiency but also for improving management information systems, better house-keeping including and empirical decision making. Technology has also brought in a sea change in payment and settlement systems which has resulted in the Reserve Bank initiating many measures aimed at reforms in this area. The immediate need in the current scenario is for computerization of branches of banks and the attendant standardization of hardware, operating systems and networking platforms to synchronize computerization with the ultimate goal of development of sound generic architecture model for interconnectivity between branches, the controlling offices and the Head Office, using the Indian Financial Network (INFINET) implemented by the Institute for Development Research in Banking Technology (IDRBT). The culmination of such efforts would be that almost all branches of banks in the commercially important centers would be interconnected and be able to transmit messages between themselves in the respective cities as also amongst other bank branches.25

Many new payment and settlement products are at various stages implementation by the Reserve Bank of India. The Centralized Funds Management System (CFMS), the Securities Settlement System (SSS), the Real Time Gross Settlement System (RTGS) and the Structured Financial Management System (SFMS) are some of the major projects which would be of high utilitarian value for banks. Once RTGS is in place, the system would take care of requirements of large value settlements on a gross basis. This will increase the velocity of money and cut costs.

All this will also increase Corporate Governance.

India’s Economy in the 21st Century: A Collection of Select Articles Raj Kapila, Uma Kapila

In this Book the author mentions about how the technology innovation in the world has affected the Banking environment globally.

Nobel Laureate Robert Solow had once remarked that computers are seen everywhere excepting in productivity statistics. Innovation in technology and worldwide revolution in information and communication technology (ICT) have emerged as dynamic sources of productivity growth. The relationship between IT and banking is fundamentally symbiotic. In the banking sector, IT can reduce costs, increase volumes, and facilitate customized products; similarly, IT requires banking and financial services to facilitate growth. As far as the banking system is concerned, the payment system is perhaps the most important mechanism through which such interactive dynamics gets manifested.  

Recognizing the importance of payments and settlement systems in the economy, the banks have embarked on technology based solutions for the improvement of the payment and settlement system infrastructure, coupled with the introduction of new payment products such as the computerized settlement of clearing transactions, use of Magnetic Ink character Recognition (MICR) technology for cheque clearing which currently accounts for 65% of the value of cheques processed in the country, the computerization od Government Accounts and Currency Chest transactions, operationalization of Delivery versus Payment (DvP) for Government securities transactions. Two-way inter-city cheque collection and imaging have been operationalized at the four metros. The coverage of Electronic Clearing Service (Debit and Credit) has been significantly expanded to encourage non-paper based funds movement and develop the provision of a centralized facility for effecting payments. The scheme for Electronic Funds Transfer operated by the Reserve Bank has been significantly augmented and is now available across thirteen major cities. The scheme,

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which was originally intended for small value transactions, is processing high value (up to 2 crore) from October 2001. The Centralized Funds Management System (CFMS), which would enable banks to obtain consolidated account-wise and center-wise positions of their balances with all 17 offices of the Deposits Accounts departments of the Reserve Bank has begun to be implemented in a phased manner from November 2001.

The approach to the modernization of the payment and settlement system in India has been three-pronged:

a. Consolidation,

b. Development, and

c. Integration

Information technology has immense untapped potential in banking. Strengthening of information technology in banks could improve the effectiveness of asset-liability management in banks. Building up of related database on real time basis would enhance the forecasting of liquidity greatly even at the branch level. This could contribute to enhancing the risk management capabilities of banks.

Studies in Money, Finance and Banking: Ed. Manoranjan Sharma

In this book the author writes about the Steady Growth of Retail Banking in India.

The financial sector today is in the throes of change. Against the backdrop of changes in the regulatory environment, proliferation of delivery channels, competition from traditional and non-traditional players, innovative technology products, retail banking has acquired a sharper focus in India.27 Cross-country experiences bring out the potential of the retail sector to transform economies by sub serving the larger socio-economic objectives and the avowed national desiderata. Hence an exploration of the present trends strongly suggest that despite the fast growth in retail finance in recent years, retail finance would continue to grow at fast clip in the future. The efficient players in the financial system have been orienting their policies and functioning in conformity with ongoing reform process.

The banks are nowadays focusing more on technology services. Cashing on their biggest USP and using the network to the optimum by banks require strategic thinking and rapid technology absorption to reduce transaction costs and efficiently deliver a wide range of loan products. But several retail products of the banking sector have struck a plateau. Accordingly, the banking sector in India needs to make retail a thrust area for incessant banking innovation, constant reinventing of winning games.

The task of enabling innovation to acquire a “critical mass” and a set of domino effect necessitates coordinated and concerted action to make use of new delivery channels, viz., ATM, Internet and Telebanking. Multi-Channel operations, ATMs, Interned Banking, Para Banking are the requirements today. According to the research done by NCR (ATM manufacturing company), bank customers in India are expecting more personal services from ATMs. They are the more preferred access points by the customers.

Intelligent Information Technology: Gautam Das, V.P. Gulati

In this paper the author has explained how internet became a medium of transactions in banking sector.

In last decade people started using internet. It was found to be easy to use and, slowly but surely the world quickly lapped up all that it had to offer. The banking industry also found ample potential in the Internet and decided to leverage its business by utilizing the Internet as one of its delivery channels. In the initial stage of its inception, though it was fraught with some amount of risk, the banking industry wanted to utilize the reach and capabilities of the Internet.

Internet banking started in two modes- a non transactional mode wherein the bank utilized the Interned as a medium of advertisement about its services and the transactional mode

wherein the bank allowed its customers to use the Internet to check details pertaining to their account viz. account balance, statements, enquiries and even transfer of funds and payment of bills. Though both the modes are susceptible to risk, the transactional ode of Internet Banking, referred to as online banking, was more prone to risk due to heterogeneous architecture, the involvement of various components and the involvement of the finances of the bank and its customers.29

The operational structure of the Internet banking changed the way in which banking was traditionally done. With no requirement of any geographically stationary teller and a brick-and-mortar building in the internet banking system, the ‘trust’ relationship that a customer enjoyed with the bank and its officials seemed lost.

Leadership in Indian Banking: Sampat Singh P

In this book the author writes about enhancing the processes in rural banking. Radical changes in world banking during recent years have been made possible because of the massive absorption of new electronic technology. Banking has been one of its biggest beneficiaries. On the other hand Indian banks happen to have one of the largest network of bank branches in the world, and also some of the largest banks in the world, they are still technologically, in global comparison, far behind the best, resulting not only in lower productivity and profitability but also in lower comparative competitive advantage. Indian banks need to go for heavier investment in automated machines, computer and telecommunication networks. They have to be more imaginative and bolder in their policies.

Bank customers in India, actual as well as potential, need more banking facilities, more financial services and better customer satisfaction. Banks need more and more of young manpower, more specialization and more skills, and a growing number of specialized superior positions. If we take the new wave in banking seriously, scope for expansion and up gradation is really immense. Three interrelated critical issues for future are: Leadership,

Human resource and Technology. If these are put in place, appropriate structures, strategies, systems and progressive banking would follow.

Security in Electronic Banking: IIBF

In this book the author writes about the security concerns regarding Electronic Banking. Considering the various possibilities and vulnerabilities that the electronic banking system may have, there should be appropriate security mechanisms implemented so as to make the electronic banking mechanism more secure, safe, consistent and authentic. It is already known that electronic banking is efficient as well as it works at a very low cost. More and more customers will prefer to use electronic banking method provided that they are convinced that it is safe and secure. Due to the hackers, many people are not confident to use the electronic banking methods though they know that they don’t have to pay any extra cost to use the same. Many banks don’t charge any fees for electronic banking. It is a facility given to the customers so that they can operate their accounts from anywhere where internet is available and also they can do the transactions 24*7*365.\(^{30}\)

The author suggests many different security measures for electronic banking processes. The primitive measures are:

1. Administrative level security
2. Physical level security
3. Logical level security

Apart from these the author also mentions about some other security measures like:

1. Biometrics
2. Encryption
3. Using Smart Cards
4. Data Centre Security
5. Network Security
6. Virtual Keyboards
7. Intrusion Detection Techniques

8. Firewall

The Author also suggests:
1. Enterprise Level Security
2. Disaster Recovery Plans
3. Hardware Security
4. Anti-Virus Policies

Business Process Automation: By Mohapatra

In this book the author has written about how the different processes were automated by the banks and what benefits they have achieved by them. The author also mentions about integration using the concept of ERP.

The decade of 90s has witnessed a sea change in the way banking is done in India. Technology has made tremendous impact in banking. ‘Anywhere banking’ and ‘Anytime Banking’ have become a reality. The financial sector now operates in more competitive environment than before and intermediates relatively large volume of international financial flows. In the wake of greater financial deregulation and global financial integration, the biggest challenge before the regulators is of avoiding instability in the financial system. Technology has become the tool for survival. Newly opened banks have a technological advantage over older banks as they have systems in place and are agile enough to react to the changing market quickly. Technology now is not just computerization of the branches, but has moved beyond that to laying a common platform by having core banking solution in all branches. The internet banking has become a norm and an important tool in the retail space.31

Through ERP and bank automations which have been implemented already in the major banks there is still a lot to be done in terms of intelligent systems that will track the customer movements and offer customized solutions to them. It is the new age of

innovative products where the customer is the king and survival would depend on offering the right mix of services to the right customers. Technology is both the enabler as well as the differentiator in the case of banks. It can help to expand the service delivery to growing customer base without creating a large branch network. It will also help in reaching out to new segments like customers of rural India. IT enables them to cross sell as well as improves the internal processes and most importantly to compete with the global competition it helps in building a global delivery platform. IT can be used in Banking mainly for the following processes:
1. Communication and connectivity
2. Business process engineering
3. Access to liquidity
4. Transformation of assets
5. Monitoring of risks

Economic Developments in India: Editors: Raj Kapila & Uma Kapila
The author in this book writes about the economic developments in India due to technology implementations in various sectors.
As new areas of business open up and demands for remote banking services rise, technology, particularly information technology, emerges as an important variable in profitable banking operations. The backbone of any banking system is its payment and settlement systems. Therefore special emphasis has been accorded to improvements in the payments and settlements systems. Important initiatives in these areas include Electronic Funds Transfer (EFT), Real Time Gross Settlement (RTGS), to substantially mitigate settlement risks and collapse of markets, Centralized Funds Management System (CFMS), the Negotiated Dealing System (NDS) and the Structured Financial Messaging Solution (SFMS). SFMS will be the backbone of all message-based communication over the Indian Financial Network (INFINET), which was created as a close user group communication network for banks in India with PSBs as members. The INFINET has been operational for two years and its membership was thrown open to banks.
With competition within banking industry increasing rapidly the volume of electronic and card based transactions are likely to increase manifold as banks compete with each other to offer their customers remote banking services including internet banking. Technology, therefore, is likely to assume greater importance than ever before. One may foresee the info-tech sector benefiting from a continuously increasing and changing demand for bank specific packages. The point to remember here is that, more than increasing volumes and speed of transactions cost, technology is likely to change the very way that banks work. The electronic channel for delivery of services will sharply lower transaction costs, in near future, but banks will have to first undertake large investments in information technology before they can reap the benefits of lower costs. A high degree of computerization will also throw into high relief the issue of security of records and transactions which need to be put in place simultaneously.

2.2 Literature Review: Technical Journals

Consumers’ perspectives on online banking services Maria Mavri and George Ionone Department of Management Science & Technology, Management Sciences Laboratory, Athens University of Economics & Business, Athens, Greece

In this paper the author mentions that the forces of economic change, coupled with advancements in technology, prompt banks to rethink their use of traditional branches and begin forming new partnerships to deliver financial services. The Internet seems to be the new delivery channel in the banking sector. Factors such as the security of personal data or the reliability of a financial institution have been identified by previous studies as the determinants of electronic-banking adoption. In this paper, a series of new factors, such as the difficulties of using the Internet, are shown to play a crucial role in the consumer’s

attitude – adoption or rejection – of this new alternative channel. We examine consumer behavior by modeling multivariate categorical response data using a generalized linear model. Our choice model is based on the assumption that an individual’s decision to use electronic services depends on a number of explanatory variables, and we try to estimate the factors that affect an individual’s decision to use online services.

Recent advances in communication technology, including the development of more powerful computers, are paving the way for new banking products and services, changing the way that traditional banking is done. The new world of electronic banking is changing day by day. Electronic banking uses more traditional technologies, such as personal computers (PC) or telephones, in order to pay bills, transfer funds and obtain Account information. Electronic commerce on the Internet and using technology to dispense federal and state benefits are only recently being considered.

Customer adoption is a recognized dilemma for the strategic plans of financial institutions. Several studies have investigated why individuals choose a specific bank. Important consumer selection actors include convenience, service facilities, reputation and interest rates. According to Delvin (1995), customers have less time to spend on activities such as visiting a bank and therefore want a higher degree of convenience and accessibility.

Technology Ushers Branch Design into a New Era: Keenan, Charles

This Paper talks about how Remote tellers, check imaging and other gadgets are revamping the way bank branches do business.

Remote teller systems allow employees to handle multiple customers at once, much like the system set up with drive-up tellers, helping to reduce the number of staff. In addition, banks can advertise on the machines, or run a television video that it used in the lobby. It allows for a little bit more efficiency as a way to service a customer as they come in the branch. Remote teller machines also shave space in the branch taking up 20 square feet vs. 60

square feet for a regular teller station. The units can also free up space in the branch by reducing the teller line.

While cost of technology can be sticking point for community banks, vendors advocate piecemeal approaches that can yield dividends quickly. By adding on new features to their existing platforms, community banks can catch up for even hopscotch over the technological know-how of larger financial institutions.34

While community banks’ niche is still the customer relationship, differentiating themselves from one another may depend on the technology of the branch itself.

Empirical Study of Internet Banking in India Ajay Prakash" and Garima Malik
The electronic revolution which has set the Banking sector in motion appears to be Internet banking. The tremendous advances in technology and the spread of information technology have brought in a paradigm shift in banking operations. The Internet seems to be the new delivery channel in the banking sector which offers firms a new frontier of opportunities and challenges. Despite these possibilities, there are various psychological and behavioral issues such as trust, security of Internet transactions, reluctance to change and preference for human interface, which appear to impede the growth of Internet banking. This paper examines the factors that affect the adoption of Internet banking in India. It also highlights the major services of I-banking in India. A quantitative survey sheds more light on this research issue.

Banks have always been in the forefront to harness technology for improving their products, services and efficiency. They have, over a long time been using electronic and telecommunication network for delivering a wide range of value added products and services. Recent trends show that most 'brick and mortar' banks are shifting from a 'product-centric' model as they develop their new E-banking capabilities citation required. The delivery channels include direct dial-up connections, provides networks, public networks etc and the device include telephone. Personal Computers, Automatic Teller

Machine etc, with the popularity of PCs, easy access to Internet and World Wide Web (WWW), Internet is increasingly used by banks as a channel for receiving instructions and delivering their products and services to customers. Banks view Internet banking as a powerful "Value added" tool to attract and retain new customers while helping to eliminate costly paper handling and teller interaction in an increasingly competitive banking environment.\textsuperscript{35}

However, the success of this new distribution channel for banking products and services depends on the rate at which the new technology is adopted by the Indian consumers both retail and corporate alike. Thus, the factors that affect the adoption of Internet banking in India will certainly be a concern to both bankers and policy makers.

Global Practices of Financial Services with Reference to Banking in India
Surlyamurthi S., Karthik R.' and Mahalakshmi V.

In this paper the authors highlight the competition that exists between the banks due to technology implementation. The author also mentions about the customer’s demands and the changes initiated due to the same.

The banking industry is facing a rapidly changing market, new technologies, economic uncertainties, fierce competition and more demanding customers and the changing climate which lead to an unprecedented set of challenges. The banking is a customer oriented service industry. There has been a radical shift in the market power from banks to their customers. The effectiveness and efficiency became the buzzword of the success of banking operation and proper functioning particularly in respect of providing services to the Customers. Service is an invisible thing which is indispensable from the person who extends it. An efficient or effective service is one which is extended appropriately by identifying and understanding the needs of the individual customer from time to time. The following hypotheses have been framed to meet the objective of the study.

1. The banks are rendering services to the fullest satisfaction of the customer in the area under study.
2. The innovative service quality of Indian Banks increases customer satisfaction over the years.
3. Channel experience
4. Finding: Customers in India are very satisfied with branches, internet banking and ATMs and are more satisfied than most with mobile banking.
5. Statistics: 85% are satisfied with the branch experience, 80% are satisfied with ATMs and 78% are satisfied with internet banking. 60% are satisfied with mobile banking - the highest percentage in our survey.36

Evaluation of Private Sector Banks in India A SWOT Analysis Dharmendra Singh and Garima Kohli

Technology in Banks 21st century banking has become wholly customer driven and technology driven. During the last decade, technology has been dramatically transforming in India. Driven by the challenges of competition, rising customer expectations and shrinking margins, banks have been using technology to reduce cost & enhance efficiency, productivity & customer convenience. Technology-intensive delivery channels like net banking, ATMs, tele-banking, mobile-banking...etc, have created a win-win situation by extending great convenience and multiple options for customers while providing tremendous cost advantages to banks. The positive impact of technology infusion is clearly visible now in almost all areas of banking operations, especially in the retail and payment system in the country. Banking products and services being highly information intensive, IT has emerged as a strategic resource for banks. No wonder almost all new banking products are highly technology driven. The strategies used by new generation private sector banks in the country are different from these traditional players, and introduced various e-

products to the delight of the customers. Banks like ICICI and HDFC boast of superior technology. Their success made the large traditional banks follow suit by inducting technology to retain profitable customers (Annexure - II furnishes a total number of branches and their ATMs). Private Sector banks are now also focusing on integrating IT strategies and business strategies for enhancement of efficiency and productivity. IT related services in banks include:

1. ATMs
2. Internet Banking
3. Tele Banking
4. Core Banking Solutions
5. Credit/Debit/Kisan/Smart Cards
6. Mobile Banking
7. Cash Management Services
8. Electronic Fund Transfer/Electronic Clearing System

What Indian consumers want from banks Sengupta, Joydeep; Thomas, Renny

Retail-banking customers in India, like their counterparts throughout Asia, are very loyal to their domestic banks and quite hesitant to incur debt. Our recent survey on the attitudes of Indian customers toward personal financial services reinforces these assessments. But the study also found, beneath this veneer, significant differences among customer segments. These differences could present foreign entrants with opportunities in this growing market.

Wealth-management services also represent a chink in India's loyalty armor. Only 10 percent of our Indian respondents have used a financial adviser — still a relatively large share compared with the percentage in other Asian countries. Yet more than half of our sample, in all age and income categories, said that they would like more assistance with managing their investments. A significant portion of these customers indicate that they would be willing to pay for such advice. Very few banks currently offer it, however, thus leaving the market to tax advisers and accountants.

Foreign entrants hoping to capitalize on these trends will have to accommodate a preference among Indian customers for dealing with people rather than machines.

India's retail-banking market is expanding rapidly, with total annual revenues expected to more than double, to $16.5 billion, by 2010, from about $6.4 billion today. An increasing number of banking customers in India value the skills and portfolios of products offered by multinational banks, whose experience in highly competitive markets could help them break through the wall of loyalty.38

Producing Financial Services: An Efficiency Analysis of Indian Commercial Banks. Mahesh, H. P.; Rajeev, Menasha

It has been around one and a half decade since financial sector reforms were initiated in India. As banks are the major segment of the financial sector in India, reform measures are primarily aimed at improving the performance of the banking sector. The importance of banking system in India is noted by the fact that aggregate deposits stood at 55 percent of GDP and bank credit to government and commercial sector stood at 26 percent and 33 percent of GDP respectively in 2004-05. An efficient banking system has significant positive externalities, as it increases the efficiency of economic transaction in general. Therefore, one of the important objectives of financial sector reforms was to improve the efficiency of banking system (RBI, 2002). In this backdrop it is essential to study the efficiency levels of Indian commercial banks to understand the impact of financial sector reforms on its performance.

The impact of deregulation on efficiency of different banking sectors has been found to be mixed across the globe. Liberalization has positively affected the efficiency and productivity of commercial banks. Most of the studies which look at the efficiency of Indian commercial banks concentrate on cost, profit, income or revenue efficiencies.

Productive efficiency of a commercial bank gives a measure of the Performance of a bank in producing financial services relative to the best performing bank.\(^{39}\)

Given the background it is important to examine how far such reform measures have been successful in their objective of improving the performance of the commercial banks. While performance of a bank can be measured in various ways, in the present study we use technical efficiency as a measure of the performance of Indian commercial banks.

Trust and its Determinants in Internet Banking: A Study of Private Sector Banks in India: Rajcev Kumra & R. K. Mittal

Rapid advancement in the area of information technology has drastically changed the landscape of the banking business around the world. In this age of information technology, where trade and commerce tend to be on electronic mode, banking cannot remain isolated. With the significant growth in electronic commerce, it is obvious that electronic banking and payments are likely to advance more or less in tandem with the growth in e-commerce. Analysis of the potential impact of internet banking on cost savings, revenue growth, and increased customer's convenience has generated considerable interest and speculation in the banking industry.

Internet banking today offers multi-dimensional advantages over traditional banking channels. It has enabled banks to reduce the cost of servicing customers significantly. It has made it possible to work with lesser manpower and introduce new products and services quickly and successfully. By understanding the customer's need better, internet banking has made it possible the banks to customize their products and personalize marketing initiatives. This helps in generating a greater degree of customer's loyalty and satisfaction. Today, the click of the mouse offers customer banking services at a much lower cost and

also empowers customers with unprecedented freedom in choosing vendors for financial services. Technology has, in recent years, became a part of life. The banking sector is one area where the technological revolution has brought sweeping changes in the medium of delivery and offering of banking services. Internet banking is the use of electronic channels to communicate and transact business with both domestic and international customers, primarily through the use of the internet and the World Wide Web. Banks use a variety of names for internet banking services, such as PC banking, home banking, online banking and non-branch banking.

Leveraging Information Systems Tools, Security and On-Line Usage in Banking and Insurance Sector: Mehta, Versha; Manhas, Parikshat Singh
Banks are playing increasingly important role in the economy and there has been an equivalent role of Information Technology in it. Systems in banks are becoming increasingly dependent upon IT. The most important thing to learn from Y2K problem that struck worldwide in the year 2000 has not been its direct cost but the warning about how companies’ software applications are becoming the central nervous system of the organization. Software tools and techniques are, as a result of this, increasingly determining the nature of the experiences the customers, the employees, the partners and the investors have with the organization, and its products, services and the operations. In this context, therefore, the software-mediated experiences are critical for retaining the customers, motivating the employees, collaborating effectively with the partners and communicating with the investors. The advent of the intranets and electronic commerce has further brought an upsurge in the demand for better tools of analysis, system security and communication irrespective of the setting in which the company is placed in. The ever changing landscape


of the market place demands that the company’s competitive advantage not only depends upon the sophistication of its software but also on the company’s information architecture, which includes, its data sources, databases, operating systems and the hardware. As a prelude to the discussion on technology issues in Banks and Insurance companies, Wal Mart has provided a meaningful insight into what a retail company can do by using an integrated information systems architecture for effective business decisions. Its integration of the supply chain software with data mining and data warehousing applications ensures on time and efficient delivery of products and services. For instance, a bank information about its customers in every transaction, should be able to track its customers throughout their lives and should be able to market appropriate products.

Customer Expectations and Perceptions across the Indian Banking Industry and the Resultant Financial Implications. Dutta, Kirti; Dutta, Anil

Banking Sector is the backbone of any financial system and economy. Commercial banks play an important role in the development of underdeveloped/developing economies by mobilization of resources and their better allocation. Indian Banking System is regulated by the central bank of the country i.e. Reserve Bank of India (RBI), which was nationalized in 1949. RBI is the primary regulator for the banking sector and the government exercises direct and indirect control over banks through RBI to protect the depositors and to stabilize the banking system. Extensive powers have been conferred on RBI under the RBI Act, 1934, and Banking Regulations Act, 1949. In 1969 the government nationalized 14 major banks to break the ownership and control of few leaders of commerce and industry over the economic power and banking system. This also enabled balanced geographical growth of banks especially in rural areas and small towns, which accounted for the majority of the population. Government as the owner of the banks decided the agenda for the banks and directed the flow of the credit. The focus changed from class banking to social banking. This social transformation process though resulted in unprecedented expansion of banking and financial system. However the regulated business environment, poor quality of credit portfolio due to social lending without adequate safeguards against defaults, thin margins
on social lending, disruptive tactics of trade unions, increasing number of loss making branches due to unmindful branch expansion in rural areas and other factors resulted in sacrifice of the service quality and the operational productivity and profitability of these organizations. The banks still managed to survive due to the regulated business environment which killed the scope for competition among banks. The Indian banking system has changed a lot over the last five decades especially in the last 15 years with India taking to the path of free market economy and globalization with clear commitments under WTO (World Trade Organization) regime. A journey from private ownership and control of commercial banks to government ownership and control by way of nationalization, has come in full circle in the wake of liberalization and introduction of new players in the shape of Private Sector Banks and Foreign Banks.\textsuperscript{42} Fresh induction of public stake and corporate governance in government owned banks has brought the element of stiff competition in the environment with greater adoption of the new technologies and ideas, renewed perception of service quality along with the high degree of professional management and marketing concepts in the Indian Banking system.

Efficiency change, technological progress and productivity growth of private, public and foreign banks in India: evidence from the post-liberalization era.

Rezvanian, Rasoul; Rao, Narendra; Mehdian, Seyed M

The recent increase in the level of economic integration across national borders caused by the reduction in trade barriers, decline in transportation costs and advances in communication technology has led to an acceleration of demand for international financial services.\textsuperscript{43} In response to this unprecedented demand, many countries have passed a series of deregulatory laws to improve the effectiveness of domestic financial institutions in


providing financial services and to facilitate the entry of foreign banks into domestic markets. Overall, three distinct trends can be noticed with regard to the global banking industry in recent years: privatization of publicly-owned banks, merger and acquisition of banks within and across borders and the international expansion of financial services providers. These trends have increased competition in the global banking industry. To survive and grow in an increasingly competitive banking environment, improvement in productive efficiency is seen as being of paramount importance. The overall technical efficiency of each bank is decomposed into two components, a measure of pure technical efficiency and a measure of scale efficiency, to identify the bases of technical inefficiency.


IT in Banking

Indian banking industry, today is in the midst of an IT revolution. A combination of regulatory and competitive reasons has led to increasing importance of total banking automation in the Indian Banking Industry. The bank which used the right technology to supply timely information will see productivity increase and thereby gain a competitive edge. To compete in an economy which is opening up, it is imperative for the Indian Banks to observe the latest technology and modify it to suit their environment. Information technology offers a chance for banks to build new systems that address a wide range of customer needs including many that may not be imaginable today. It is becoming increasingly imperative for banks to assess and ascertain the benefits of technology implementation. The fruits of technology will certainly taste a lot sweeter when the returns can be measured in absolute terms, but it needs precautions and the safety nets. The increasing use of technology in banks has also brought up ‘security’ concerns. To avoid any mishaps on this account, banks ought to have in place a well-documented security policy including network security and internal security. The passing of the Information Technology Act-2000 has come as a boon to the banking sector, and banks should now ensure to abide strictly by its covenants. An effort should also be made to cover e-business
in the country’s consumer laws. Some are investing in it to drive the business growth, while others are having no option but to invest, to stay in business. The choice of right channel, justification of IT investment on ROI, e-governance, customer relationship management, security concerns, technological Obsolescence, mergers and acquisitions, penetration of IT in rural areas, and

Outsourcing of IT operations are the major challenges and issues in the use of IT in banking operations.⁴⁴

Beyond Core Banking

Increased adoption of e-payments and mobile banking are clearly the emerging areas which are bound to strengthen in the near future. In addition, the focus is shifting towards systems and processes needed in the maturity phase of the Technology needs curve. Banks will need to increasingly focus on cost and profitability management, business intelligence, dashboards/ executive information reports, data warehousing and analytics. Improving internal effectiveness and efficiency with integrated data warehouse and real-time access to all customer information will help the banks’ decision making and ability to deliver appropriate products and services to the customers. Banks must see beyond applications that provide solutions to today’s problems. They need to develop a vision of a comprehensive infrastructure— comprising internal and external networks instantaneously moving information from data stores to users and back again. The importance of the IT-business unit partnership cannot be overemphasized. The people and processes are just as critical to success as hardware and software. Undoubtedly, banks have made great technological advances in storing information. However, the full power to use that information to be more productive and make better decisions still goes unrealized. By continuing to emphasize only technology and the peripheral business processes it affects, banks have seriously neglected their personal and enterprise-wide intelligence. The effectiveness of the infrastructure is measured in the value it brings to the customer. That

value is diminished by business units and individuals that are not networked. Therefore, banks must provide access and training, to each member of the bank who directly or indirectly serves customers. To make this possible, clear standards and expectations must be published, so the information technology organization can bring individuals online in a consistent manner. Increasing Interconnectivity and Ease of Payments through Different Form Factors The economic role of payment systems is connected intimately to the economic role of money. Money is a unit of account, a store of value, and a medium of exchange. Cash, checks, electronic transfers, debit, credit and charge cards, as well as payment methods relying on mobile phones and on the internet are based on different systems for exchanging value between economic entities and on different form factors for engaging in this exchange. Anywhere anytime banking is becoming the norm due to the implementation of core banking solution (CBS), additionally increased efforts by the regulator in setting up Electronic Clearing Service (ECS), Real Time Gross Settlement (RTGS) and NEFT systems is leading to interconnectivity and ease of inter and intra-bank funds transfer. The increasing usage of credit/debit cards and mobile banking is facilitating the ease of payments through different factors linked to vendors and service providers. The trend is likely to strengthen with an increasing number of transactions moving online. Presently, a technological development is closely related to computerization in banks branches for adoption of the core banking solution (CBS). An important development in the percentage of branches of public sector banks implementing core banking solution (CBS). The percentages of such branches increased by 79.4 % at end March 2009 to 90% at the end of March-2010.
2.3 Basis for Hypothesis Development

Technology has brought a complete paradigm shift in the functioning of banks and delivery of banking services. Gone are the days when every banking transaction required a visit to the bank branch. Today, most of the transactions can be done from the home and customers need not visit the bank branch for anything. Technology is no longer an enabler, but a business driver. The growth of the internet, mobiles and communication technology has added a different dimension to banking. The information technology (IT) available today is being leveraged in customer acquisitions, driving automation and process efficiency, delivering ease and efficiency to customers. Many of the IT initiatives of banks started in the late 1990s or early 2000 with an emphasis on the adoption of core banking solutions (CBS), automation of branches and centralization of operations in the CBS. Over the last decade, most of the banks completed the transformation to technology-driven organizations. Moving from a manual, scale-constrained environment to a global presence with automated systems and processes, it is difficult to envisage the adverse scenario, the sector was in the era before the reforms, when a simple deposit or withdrawal of cash would require a day. ATMs, mobile banking and online bill payments facilities to vendors and utility service providers have almost obviated the need for customers to visit a branch. Branches are also transforming from operating as transaction processing points into relationship management hubs. The change has been very productive for banks bringing in an increase in productivity and operational efficiency to be more competitive. Better risk management due to centralization of information and real time availability of critical data for decision making. With most of the banks being technology-enabled, the focus is shifting to computerizing regional rural banks (RRBs). In addition, banks are moving toward decision making and business intelligence software and trying to optimize the IT infrastructure created.

Growth and Expansion

Over the last Decade, the size of the banking industry has grown by 7.5 times. The business per employee has increased from ₹ 27.6 million in 2005–06 to ₹ 62.7 million in 2009–10, while the profit per employee increased from ₹ 0.12 million in 2005–06 to ₹ 0.39 million in 2009–10. Indian banks are also no longer constrained by geography as they have worldwide
operations. IT has been instrumental in the global expansion of banks. It is a huge challenge for banks to maintain and keep the vast network operational. IT has helped banks put in place alternate delivery channels such as internet and phone. Mobile banking and ATMs are rapidly becoming the prime delivery channels. The consolidation and centralization of information is also providing banks with accelerated decision making and risk management capabilities. Electronic payments through credit and debit cards are also emerging as a fast-growing segment providing ease of use and convenience to customers. The banking sector is projected to grow at a strong pace over the next decade and will need to strongly leverage the IT infrastructure to acquire and service the customer base and risk management.

Computerization in Banks

Technology has charged the face of the Indian banking sector through computation, while new private sector banks and foreign banks have an edge in this regard. Among the total number of public sector bank branches, 97.8 percent are fully computerized at end – March 2010 whereas all branches of SBI are fully computerized.

Emerging Trends in Banking Technology

1. Financial Inclusion
2. Mobile Banking
3. Electronic Payments
4. CRM Initiatives
5. IT Implementation and Management
6. IT for Internal Effectiveness
7. Managing IT Risk
8. IT for business innovation
Energy Management and Move towards ‘Green Technology’

Most of the banks are conscious of the carbon footprint generated and are working towards energy management and use of ‘Green Technology’. Some of the measures adopted are:

1. Adoption of Server Virtualization technologies to save on floor space, power & cooling components,
2. Use of Data center enhancements and Best practices for optimum usage of space, hot air/cool air pockets etc.,
3. Adoption of Blade server technology to have higher computing power in smaller footprint.
4. Up gradation of older power hungry Servers, Storage and Networking equipments.
5. Dynamic power capping of Servers, Desktops by employing newer power saving Technologies like processor stepping
6. Solar powered ATMs
7. Use of windmill energy

Energy management and adoption of green technology will become increasingly important in the future and banks will have to streamline efforts towards accurately monitoring, measuring and optimizing the energy consumption.

Role of CRM Techniques

Customers have grown to expect comprehensive financial services from a single point of contact. They are attracted by many new products and services that non-banking institutions have been offering. The challenge for banks is to package these products and services and deliver them through convenient, user-friendly channels. Only by integrating people, processes, and technology across business lines will banks be able to forge a portfolio of virtual banking services based on the proclivities of specific customer market segments. Consumer behavior is an important factor that will change the functioning and business plans of banks in the next decade. The banking sector will increasingly move towards a CRM banking model where the banks will have to develop and service products suited/required at different phases of a consumers life. Banks have already started moving towards catching the
customers young by providing school and college going students with bank accounts. As the youngster grows banks will have to track and predict the financial needs using sophisticated analytical models and deliver focused products and services. It has always been difficult for large institutions to compile information on a single customer from multiple points of contact. Customers who choose services and products from multiple business areas typically are treated as separate relationships within each area. Because a customer-centric infrastructure does not exist at most banks, customer service representatives do not have the infrastructure support or the incentive to pull the information together. Without clearly understanding the strategic advantages of using a customer data warehouse, bank customer service representatives will not change their behavior, and any competitive advantage will be short-lived. The bank will gain minimal value from the significant investment required to develop the requisite technologies. Knowledge Management treats the behavior of people as an equal and essential component of effective information-sharing. Knowledge management also enables knowledge from similar previous situations to inform current decisions. Both managers and service teams must play a role in building a knowledge culture. Managers must codify relevant experiences, packaging them to maximize their relevance and reusing them in new situations that create value. Once the knowledge has been codified, it needs to be shared with appropriate individuals. An integrated approach to knowledge management enables the bank to group its products to serve specific market segments, such as lawyers, young professionals, retirees. The product groupings would be based on customer feedback as to which products are in demand and on the bank’s assessment of each product’s profitability. Once the bank identifies the product groupings, it can provide high-quality service, with high-quality support from front and back offices, cross-functional data bases, and customer service personnel. For banks, information technology plays an important role in informed decision-making by creating a means to collect and codify experiences and solutions from similar decisions in such areas as financial management, customer service, or relationship development. The enabling technologies include client/server technology, distributed computing, networking, and data warehousing. Knowledge of what customers need most and are willing to pay a premium to get, should be frequently updated and shared across the bank. Technology allows the bank to accomplish this enormously complex task.
Knowledge means more than just having information; it happens when information is put in proper context and shared. For customers, valuable knowledge might be reflected in the performance of their financial portfolio or in the ease and success of making transactions. The data warehouses and graphical interfaces that support the customer’s portfolio provide real-time access to all customer accounts and present them in an integrated, seamless interface. For the bank, technology creates a tool for gathering knowledge about customers’ financial behaviors, purchasing proclivities, portfolio performance, and market and competitive alternatives. Profitability analysis is crucial to the bank’s customer relationships, and it helps identify alternatives for delivering value to customers. At present, customer profitability is being redefined as customer relationship profitability. Customer relationship profitability includes not only a single customer account but the full relationship, which might extend to personal checking, a business account, an investment account, and more. For branch services to be mostly focused on marketing and cross selling, customer-centric knowledge will need to be leveraged in a well-teamed, highly automated branch platform.

Stronger Role of IT as Business Transformer/ Performer. The bank infrastructure is not immutable. New technologies surface every day, and new media (like Internet did) will force management to reconsider infrastructural objectives. Defining fundamental infrastructure goals will enable the bank to stay focused and adapt without being distracted by technologies that do not contribute to customer value. The IT function can play a central part in helping organizations adapt to and thrive in this new status quo. By aligning their teams with the needs of the business, chief information officers (CIOs) can provide strong strategic and operational support. IT also has to consider its most appropriate role. In some cases, particularly for larger, global companies, senior management may expect IT to provide innovation and transformation, whereas in certain smaller firms the emphasis could be upon a more basic service, to keep costs down and serve daily operational needs efficiently.
Hypothesis:

H$_1$: Use of technology in financial services is same across all type of the banks.

H$_2$: Use of Technology in financial services increases Consistency and Reliability in operations of Banks.

H$_3$: Use of Technology in Banks results in Increased Employee Productivity, Governance, and Improvement in Security and Reduced cost of operations.

H$_4$: Technology in financial services increases convenience and efficiency in banks.

H$_5$: Use of Technology in Financial Services of Banks Contributes to Globalization.

H$_6$: Use of Technology in Financial Services of Banks leads to increase in Baking Products.