CHAPTER 3

LITERATURE REVIEW

3.1 Introduction

Information Technology (IT) is very powerful in today’s world, and financial institutions are the backbone of the Indian economy. Indian Banking Industry today is in the midst of an IT revolution. Nearly, all the nationalised banks in India are going for information technology based solutions. The application of IT in Banks has reduced the scope of traditional or conventional banking with manual operations. Nowadays banks have moved from disbursed to a centralised environment, which shows the impact of IT on banks. Banks are using new tools and techniques to find out their customers need and offer them tailor made products and services. The impact of automation in banking sector is difficult to measure.

The literature available to the researcher on the application of Information technology in Indian banks are classified according to the related topics as mentioned below:

1. Technological development in banking sector
   1. Application of IT in banking
   2. IT framework for Indian banking
   3. Technological developments in cooperative banks
   4. Indian banking sector : challenges and opportunities

3.2 Technological development in the banking sector [1] [2] [3] [4]

The technological development in the banking sector began with the use of Advanced Ledger Posting Machines (ALPM) in the 1980s and nowadays banks are using core banking solution (CBS) for providing better services to their customers. Over the years several studies have been conducted both at the industry and academic level to examine the impact of IT on banking productivity and profitability.
Dos et al. [1993] studied statistical correlation between IT spending and performance measures such as profitability or stock’s value. It is found that there is an insignificant correlation between IT spending and profitability measures, implying thereby that IT spending is unproductive.

Brynjolfsson and Hitt [1996], however, cautioned that these findings do not account for the economic theory of equilibrium which implies that increased IT spending does not imply increased profitability. More recent firm level studies, however, point a more positive picture of IT contributions towards productivity. These findings raise several questions about mis-measurement of output by not accounting for improved variety and quality and about whether IT benefits are seen at the firm level or at the industry level. Such issues have been discussed in detail by Brynjolfsson [1993] and to a lesser extent by Brynjolfsson and Hitt [1996].

The study conducted by Gotlieb, and Denny [1993], is one of the studies that deals with the impact of IT on banking productivity per se. Computerisation is one of the factors which improves the efficiency of the banking transactions. They concluded that higher performance levels have been achieved without corresponding increase in the number of employees. Also, it has been possible for Public Sector Banks and Old Private Banks to improve their productivity and efficiency by using IT.

3.2.1 Committee Reports

Information Technology and the Communication Networking Systems have revolutionized the functioning of banks and other financial institutions all over the world. Reserve bank of India has played an important role in implementation of information technology in banking sector. Various researchers have also contributed in this regard. In addition to the work done by various scholars in the area of Information Technology and Banking organization, RBI had appointed various committees to work in this area. The reports of various committees are briefly summarized below:
1) Dr. C. Rangarajan Committee [1983]

Dr. Rangarajan committee had drawn up in 1983-84 the first blueprint for computerisation and mechanisation in banking industry and looked into modalities of drawing up a phased plan for mechanisation for the banking industry covering period 1985-89. The committee in its report in 1984 recommended introduction of computerisation and mechanisation at branch, regional office / zonal office and head office levels of banks.

In 1988 another committee was constituted under the chairmanship of Dr. Rangarajan for making plans for computerisation for the next five years from 1990-94 for the banking industry. It identified the purpose of computerisation as improvement in customer service, decision making, house keeping and profitability. The committee observed that banking is a service industry and improved efficiency will lead to a faster rate of growth in output and help to expand employment all around. The work force in the banking industry must, therefore, look upon computerisation as a means to improve customer service and must welcome it in that spirit.

2) W.S. Saraf Committee [1994]

In 1994, the Governor, Reserve bank of India had appointed a committee on technology issues under the chairmanship of W. S. Saraf. The committee looked into technological issues related to the payment system and to make recommendations for widening the use of modern technology in the banking industry. The Saraf committee recommended to set up institutions for electronic funds transfer system in India. The committee also reviewed the telecommunication system like use of BANKNET and optimum utilization of SWIFT by the banks in India.

3) Shere Committee [1995]

In 1995, RBI formed a committee under the chairmanship of K. S. Shere, to study all aspects relating to electronic funds transfer and propose appropriate legislation. The Shere committee had recommended framing of RBI (EFT system) regulations under
section 58 of the Reserve bank of India Act 1934 (RBI Act.), amendments to the RBI act and to the bankers book evidence act, 1891 as short term measures and enacting of a few new acts such as EFT act, the computer misuse and data protection act etc. as long term measures.

4) Narasimhan Committee [1998] [9]
In order to examine the various issues related to the technology upgradation in the banking sector, the Reserve Bank of India appointed Narasimhan committee in September 1998. The committee consists of representatives from the Government, Reserve Bank of India, banks and academic institutions associated with the information technology. The committee dealt with the issues on technology upgradation and observed that the most of the technology that could be considered suitable for India in some form or the other has been introduced in some diluted form or as a pilot project, but the desired success has not been achieved because of the reasons inter-alia lack of clarity and certainty on legal issues. The committee also suggested implementation of the necessary legislative changes, keeping in the view the recommendations of Shere committee. The need for addressing the following issues was also emphasised:-

- Encryption on Public Switching Telephone Network (PSTN) lines
- Admission of electronic files as evidence
- Treating Electronic Funds Transfers on par with crossed cheques / drafts for purposes of Income Tax etc
- Electronic Record keeping
- Provide data protection
- Implementation of digital signatures
- Clarification on payment finality in case of EFT

Taking into consideration the recommendations by various committees appointed by RBI and guidelines of RBI, banks have started using IT to automate banking transactions and processes.
3.2.2 Waves in banking technology [8] [9] [10]

As per the Reports of RBI [8] [9], the first wave in banking technology began with the use of Advanced Ledger Posting Machines (ALPM) in the 1980s. The RBI advised all the banks to go in for huge computerisation at the branch level. There were two options: automate the front office or the back office. Many banks opted for automating the front office in the first phase. Whereas banks like State Bank of India also concentrated on the back office automation at the branch level.

The Second wave of development was in Total Branch Automation (TBA) which came in late 1980s. This automated both the front-end and back-end operations within the same branch. TBA comprised of total automation of a particular branch with its own database.

In the third wave, the new private sector banks entered into the field of automation. These banks opted for different models of having a single centralized database instead of having multiple databases for all their branches. This was possible due to the availability of good network infrastructure. Earlier, banks were not confident of running the whole operation through a single data center. However, when a couple of private sector banks showed that it can be done efficiently, other banks began to show interest and they also began consolidating their databases into a single database. The banks followed up on this move by choosing suitable application software that would support centralised operations.

The fourth wave started with the evolution of the ATM delivery channel. This was the first stage of empowerment of the customer for his own transactions. The second stage was the Suvidha experiment in Bangalore. This showed the power of technology and how the reach can be increased amazingly at a great pace. Seeing these, all the banks started revamping their retail delivery channels. Their core focus became increasing the number of customers they can service at a lower cost. The main channels for these were internet banking and mobile banking. After this, came the alliances for payment through various other gateways. The third important development happening now is the real-time gross settlement system of the RBI. Once this was in place, transactions between banks could
be done through the settlement system, online, electronically thereby, ensuring faster collection. The process of computerisation had started from Back Office Application, after that Total Branch Automation and nowadays it is the period of implementation of Core Banking Solutions (CBS).

A key trend in the last couple of years has been the focus on core banking systems. With the implementation of core banking systems across the banks, the usage level of IT for customer management has increased. Core banking systems have enabled banks to launch new products and services targeting specific customer segments after understanding their banking and investment requirements.

ATM, internet banking and mobile banking have improved customer convenience by providing anywhere any time banking services. The utility bill presenting and payment has helped customers to pay their bills online at the click of a button. Electronic clearing system and electronic funds transfer have facilitated faster funds movement and settlement for the customers of different banks and different centers. The electronic data interchange and cash management service facilities have enabled better funds management for the customer.

Very few banks offered customers the ability to access their accounts and perform at least simple money transactions using internet banking. Advancements in information technology have made it possible for the banks to use the internet as a delivery channel for banking services. Technological developments have introduced tremendous changes in the ability of financial and non financial firms to efficiently collect, store, use and sell information about their customers.

Balasubramanya S.(2002) \cite{10} in his study analysed that the automation in the banking sector has come a long way starting with the Rangarajan Committee report on the banking sector reforms during the eighties, followed by reports of the Narasimhan Committee in the nineties. With over 65,000 branches of the banks (public, private and the cooperative sector) in the country, the author found that the percentage of branches
covered by automation was very low. Though many banks had claimed that more than 70% business has been automated due to the enforcement of RBI guidelines, in reality it was much lower, as many functions in each branch were still done manually or with partial automation. Hence, there was a significant amount of automation work to be achieved in the banking sector.

3.2.3 Reserve bank of India and impact of liberalisation on banking system [11]

With liberalisation in the telecom industry and its improved reliability at a reduced cost, many banks and financial sectors at that time were going forward with large-scale networking of their branches and implementing the centralised core banking solutions. As a result, banks were able to provide their products and services to their customers anywhere, any time. With these developments, bank customers could avail these services across different locations with improved transaction realisation and reduced cost. With increasing proliferation of ATMs, telebanking, and availability of internet banking facilities, the customer contact points had increased enormously, thereby resulting in increased services to customers. This has been possible solely due to the implementation of technology.

RBI has set up Department of Information Technology (DIT) which works for:

- Computerisation in RBI (Regional Offices and Central Office Departments)
- Design and development of projects for use of banks and financial institutions and
- Monitoring progress of technology in banks

Current Focus of DIT:

(i) Computerisation in RBI

DIT has been concentrating on computerisation of all activities undertaken in the Banking Department (Deposit Accounts Department, Public Accounts Department, Public Debt Office, Establishment Section and Central Accounts Section) and the Issue Department (Currency Chest Management and Accounting) which impact on the balance
sheet of the Reserve Bank. These departments also extend customer service. Computerisation of these departments, therefore, aims at ensuring better house keeping and efficient customer service.

(ii) Design and Development of Projects for use of Banks and Financial Institutions

The projects developed so far and those listed for developments are as under:

Projects already developed:

- MICR cheque processing at four metros (Mumbai, New Delhi, Calcutta and Chennai) with image technology (July - October 1999)
- Electronic Clearing Services (debit and credit) at 15 centres where RBI has its offices and 30 centres managed by SBI.
- Electronic Funds Transfer at four metros and its extension to Hyderabad, Ahmedabad and Bangalore

Projects in the Process of Development:

- Indian Financial Network (INFINET)
- Securities Settlement System (SSS) and Negotiated Dealing System (NDS)
- Centralised Funds Management System (CFMS)
- Structured Financial Messaging Solution (SFMS)
- Real Time Gross Settlement (RTGS)

(iii) Monitoring

- Progress in computerisation and networking to achieve targets set by the Central Vigilance Commission of coverage of 70% of their business by computerisation.
- Setting up MICR Cheque Processing centers at non-metros
- Adoption of standardisation in the area of hardware, operating system and communication platforms
- Development of generic architecture (tree or star topology for domestic and cross border connectivity)
3.3 Applications of IT in the banking sector \cite{12} \cite{13} \cite{14}

Rajshekhara K. S. (2004) \cite{12} described the adoption of IT in banking has undergone several changes with the passage of time. Today IT has become an inseparable segment of banking organization. The application of information technology in the banking sector resulted in the development of different concepts of banking such as – E-banking, Internet Banking, Online Banking, Telephone Banking, Automated teller machine, universal banking and investment banking etc. Information technology has a lot of influence on banking transactions. It ensures quick service with low transaction cost to the customers. The real success of IT in the banking sector depends upon the customer’s satisfaction. Therefore banks should organize and conduct customer awareness program in their service area. Security is an important issue in the context of E-banking. The development of technology for the identification of customers with different means of communication devices is a must for successful business and also to reduce frauds in banking. In this paper the author has studied customer related aspects only. This paper do not present any study related to the bank employees and their problems regarding bank computerisation.

The study conducted by Vij Madhu (2003) \cite{13}, presents the changing profile of Indian banks with the help of a comparative study of three private sector banks in India namely ICICI bank, HDFC bank and IDBI bank. The comparative analysis of the three private sector banks shows that HDFC stands out as a clear winner with ICICI at number two. In the study the researcher concludes that the challenge for the future will be the synergetic use of internet, proper understanding, measuring of risk management as also nurturing and retaining the intellectual capital. The author suggested the following strategies that need to be focused on:

- Develop and innovate new products so as to widen customer base
- Strategic alliances
- Setting up of an effective software system for ALPM the way banks in most of the developed countries are using
This study is limited only to 3 private sector banks. This paper do not present any information related to the problems of bank computerisation and future of the computerised banks.

Gulati V. P. \cite{14} listed the following possible applications that can be easily complimented by the Indian financial sector.

- Quick disposal of loan/investment proposal
- Forex information from branches to the office dealing with forex
- Fund information from clearing centers to the fund management office for optimal allocation of funds
- Inter-branch inter bank reconciliation
- Fund transfer/payment messages (EFT/EDI) (intra-bank and inter-bank)
- E-mail
- Organisational bulletin boards may contain the following: circulars, undesirable parties, hot list, bulletins, missing security items, confidential circulars on attempted frauds
- Organisational/customers database may include statutory returns, control returns, standardised returns, adhoc reports
- Banks-corporate customers connectivity
- Management information systems: Borrower’s profile; Branch profile; employee’s analysis; products/services profile; business profile of branches
- Banks owned ATM/credit-debit card and other applications on the financial network

### 3.3.1 Customer Services \cite{15} \cite{16} \cite{17} \cite{18} \cite{19}

Ananthakrishnan G. (2005) \cite{15} described customer’s services in the banks. The discriminating customer’s expectations have begun to change in terms of quality and service. With the advent of computers and ATMs, the gap between the customers and the banking personnel is widening. Unless a change of heart occurs, even the largest banks will find it hard to survive on their assumed false glory. Banks which take care to see the
reality and react early will survive and prosper, while those who continue the traditional path will find their market share eaten away.

Nowadays customers are no longer willing to wait in long queues or tolerate arrogant behaviour of the employees. As applicable to banking, “customer service” may be defined as the ability to satisfy the customer’s requirements and needs to the fullest extent and be able to replicate this on an on-going basis. The four factors for ensuring customer service are:

- What satisfies the customer?
- Devising quantifiable determinants.
- Continually monitoring and improving these parameters.
- Seeking customer feedback to ensure alignment with customer needs.

These four approaches can go a long way in helping the banks to achieve its quality goals.

Customers, who are central to the banking service, are not a homogeneous class. They come from varying socio-economic and cultural backgrounds. Their perception about the banking services is so dynamic that it may differ from customer to customer and even for the same customer at different points of time, depending on their mood and mind-set. Successful banking relationships are formed at a human level. Factors which help in retaining the existing customers are:-

- Past experiences with the bank.
- Familiarity with the services offered by the bank and simplified procedures.
- Knowledge of or experience with competitor’s products and services.
- Brand image-banking with a particular bank is regarded as a status symbol.
- Overall ambience at the bank premises.
- Extra services or value addition provided by the bank.
In this article the author also studied the factors which irk (trouble) the customers and they are:

- Poor service attitude
- Long queues
- Inability of the bank to meet customer needs
- Lack of proper ambience
- Lack of humility that prevents banks from meeting customer needs

Author also mentioned that by adhering to the following factors customer’s complaints could be avoided:

- Prompt collection of cheques
- Faster payment/receipts in cash counter
- Positive attitude of the counter staff
- Proper adherence to the standing instructions to the customers
- Correct crediting of interest on deposit accounts and avoiding fraudulent withdrawals
- Timely honouring of invoked LCs, guarantees, etc.
- Seeking only required documents for processing loan applications
- Timely sanctioning of loans at reasonable market related interest rates.

A study conducted by Mishra A. K. [16] examined the reasons for the satisfaction of the customers with the services rendered by the Urban Cooperative Banks. The author described that, urban cooperative banks are operating in a more competitive environment and therefore, the need to take care of customer requirements has become more important. The branches of UCBs must cater to the betterment of the customers. They should also improvise on their own image, customer satisfaction and their profits. The time norms for specific business transactions should be displayed prominently in the banking hall so that it attracts the customers’ attention. In the ultimate analysis, what is necessary for improving customer services is the active participation of employees at all levels in the bank functions. The author also raised some points which can be a plus point for UCBs to impress & attract their customers. These points are: effective board of
management, efficient employees/staff, cordial personalised services, proper guidance, provision of loan facilities, good systems, computer systems, prompt services, good work culture, convenient timings, proper clearing services for outstation cheques and demand drafts, split hour facilities, Sunday working day, discounting facilities for outstation cheques, and good location of the bank.

Uppal R. K. [17] described that in the post-LPG (Liberalization, Privatization and Globalization) era and Information Technology (IT) era, transformation in Indian banks is taking place with different parameters and the curves of banking services are dynamically altering the face of banking, as banks are stepping towards e-banking from traditional banking. The paper empirically analyzes the quality of e-banking services in the changing environment. With different statistical tools such as weighted average method and ranking, the paper concludes that most of the customers of e-banks are satisfied with the different e-channels and their services, but the lack of awareness is a major obstacle in the spread of e-banking services. The paper also suggests some measures to make e-banking services more effective in the future.

Kamakodi et al. [18] discussed that, it is almost 15 years since the Indian banking sector was liberalized and paradigm shift happened in the Indian banking services. All banks have either totally implemented ‘core banking systems’ or halfway through. The results of a survey, obtained from 292 respondents about their views on electronic banking channels, indicate that the banks are exceeding the expectations in technology based services; and their perceived service level on branch network is below the expected levels of the respondents. This result is in tune with the respondents’ opinion on the perceived ‘gap’ with the bank because of the introduction of technology, and on the necessity of human contact with the clients by the banks. This throws up a challenge to banks. Technology alone cannot give a sustainable competitive advantage for the banks. When all banks introduce IT, it will lose its position as a differentiator. Beyond a point, IT along with ‘personal touch’ will be necessary for the banks to retain existing clients and to attract new ones. Banks have to incorporate this in their operational strategy.
Sakalya Venkata et al. [19] analyzed the factors that affect the choice of customers in choosing the retail banks by the customers. In the study, the authors have tried to identify various factors and also analyzed as to which of these factors exert the greatest, moderate and relatively lower influence as choice criteria. It is an attempt to study the consumer behavior with respect to the people’s choice of retail banks. Efforts are made to dwell deep in the psychology by talking to the customers surveyed, wherever possible. The 15 different factors that could be identified, approximately in the order of their importance, are (1) Safety of Deposits, (2) Size and Strength, (3) Accuracy, (4) General Service Quality, (5) Speed of Delivery, (6) Proximity, (7) Security of Environment, (8) Cordiality of Staff, (9) Price and Service Charges, (10) Product Packaging, (11) General Public Impression, (12) Peer Group Impression, (13) Face Lift (Structural), (14) Friendship with Staff and (15) Advertisement and Publicity. According to the findings, based on the empirical study, the first six factors exert the greatest influence, next four have moderate importance, and the rest five have relatively lower influence. Thus, retail banks must reorganize their activities to achieve their corporate mission through customer orientation. In the competitive and capitalistic markets consumer is sovereign and therefore the bankers must reengineer their view and recognize the predilection and tang of the retail customers.

3.3.2 IT and manufacturing industry [3] [20] [21] [22]

Morrison and Bernlt (1990) [20] found that in the manufacturing industry, estimated marginal benefits of investment in IT are less than the marginal cost, implying the problem of over investment. More specifically they found that for each dollar spent on IT, the marginal increase in output was only 80 cents. Similarly Loveman (1994) [21] found insignificant contribution of IT expenditure to the output of manufacturing firms. Lichtenberg (1995) [22], on the other hand, concludes that there are significant benefits from investment in IT to the firms. It is also found that one information system (IS) employee is equivalent to six non-IS employees in terms of marginal productivity. Brynjolfsson and Hitt (1996) [3] found that computerisation aids significantly, to the firm’s level of output. In fact they found that computer related capital investment
contributes 81 percent to the marginal increase in output, where as non-IT capital contributes only 6% to the marginal output. It is also found that IS labour is more than twice as productive as non- IS labour. Most of such studies related to the contribution of IT towards the firm’s level of productivity have been restricted to the manufacturing industry.

3.4 IT framework for Indian banking sector [23]

IT planning is an ongoing effort intended to match the bank’s technology capabilities with its changing strategic objectives. It is necessary for a bank to identify technology gaps and develop a plan that supports the bank’s long/medium term-strategic goals in order to bridge the gaps. It is imperative for banks to have a clearly defined technology planning process that is based on a well founded technology action plan for the following reasons:

- Increasing competition, new products and changing distribution channels.
- Banks currently spend a huge amount of their budget annually on technology. Such investments will only continue to escalate.
- Effective technology management requires an underlying technology plan. Without it, scarce resources are likely to be wasted and opportunities missed.

Gulati et al. (2002) [23] suggested IT policy framework for Indian banks as follows. IT strategies need to be formulated by banks taking into consideration the critical aspects of long/short-term planning to align technology systems with business objectives. Conscious efforts must be made to place the entire organization’s proper perspective and to have a holistic approach to planning. The following strategic evaluation needs to be made:

- Current state (Where are we?): There should be a self-assessment process which analyses the present/current technology in use. It also involves evaluation of staffing, training, organizational processes and controls, communication and management reporting. To successfully integrate new technologies, banks must objectively confront internal operating issues and be willing to make changes
wherever necessary. Business process re-engineering should be accorded top priority to successfully absorb new technology.

- Desired state (Where do we want to go?): Identification and prioritisation of the reasons behind technology adoption is vital. Technology goals should always be firmly grounded in an understanding of the marketplace. Sizing up the competition and measuring up to its pace, based on a SWOT analysis, must be the foundation of the decision on where to go.

- Destination (How do we get there?): This phase of the technology planning process, involves making decisions about, how to implement the technology action plan and the technology initiatives required to be pursued in the short/mid/long term.

As part of the planning of technology initiatives, a list of projects to be undertaken needs to be made. For this, the element of time span should be considered relative to the bank’s position and future needs (what initiatives are planned in short/mid/long term). A technology plan is a document that lays down the steps necessary for each action item. It serves as a road map for investment.

3.4.1. Internet Banking in India \textsuperscript{[24] [25] [26] [27] [28]}

Jadhav Anil (2004) \textsuperscript{[24]} described various channels of e-banking services such as ATM, Telephone banking (Tele-banking), Mobile banking, Internet banking and its features. The focus is also given on e-banking opportunities, challenges and security aspects while performing the banking transactions on the internet. Comparison of public, private, foreign and co-operative banks and barriers to the growth of e-banking in India are also discussed. Finally the paper discusses an overview of the major private sector banks such as ICICI, HDFC, IDBI, UTI & GTB banks which provides e-banking services.

The author’s observations are: Many Indian banks are yet to make a desirable progress in implementing the technology and gearing up to confront the challenges posed by the rapid changes that are sweeping the banking sector globally. Private and Foreign banks
have been fast in adopting and adapting to the Internet technology. Very few public sector banks offer Internet banking services whereas; none of the co-operative banks offer Internet banking services. ATM is becoming a most preferred delivery channel from the common banking services. In order to enhance the reach to the rural population in the remote areas, the banks will need to automate the delivery channels in the local language which could eventually lead to shrinking of the number of branches. The banking industry’s security is at a higher risk, due to the advent of e-banking. The banking organizations which provide e-banking services should take the following precautions/responsibility:

a) The Banks should hire the services of anti Cyber crime professional to avoid cyber crime
b) To take the responsibility of customer’s transactions
c) Create awareness of e-banking services amongst the customers and motivate/encourage them to use it.

Mishra A. K. [25] described that the Internet banking is a cost-effective delivery channel for financial institutions. The author also describes the advantages of internet banking, current status of internet banking in India, and the mechanism to protect the customer’s data. The advantages of internet banking are:

- To improve customer access
- To facilitate more services
- To increase customer loyalty
- To attract new customers
- To provide services offered by competitors
- To reduce customer attrition

Current status of internet banking is:

- Throughout the country, the Internet Banking is in the emerging stage of development
• In general, these Internet sites offer only the most basic services. 55% are so called 'entry level' sites, offering little more than company information and basic marketing materials. Only 8% offer 'advanced transactions' such as online funds transfer, transactions & cash management services.

• Foreign & Private banks are much advanced in terms of the number of sites & their level of development.

Geetika et.al. [26] discussed the concept of Internet Banking, perception of Internet bank customers, non-customers and issues of major concern in Internet banking. The state of Internet banking in India has been explored using various concepts like E-banking scale, and gap analysis related to the various services and the security features offered. In order to have a clear and focused insight about the perceptions of users (and non-users) about Internet banking a survey was conducted. The findings of the survey provide valuable insights into concern for security, reasons for lower penetration, and likeliness of adoption, which have been used to make useful recommendations.

Radhakrishna Geeta and Pointon Leo [27] examined the legal issues specific to internet banking, focusing on the incidence of fraud and its prosecution. The objective of research was to investigate three questions in relation to Malaysia. Firstly, the incidence of fraud in internet banking; secondly, the adequacy of the relevant regulations and statutes; and thirdly, whether the setting up of a cyber court would better facilitate the prosecution of such financial crimes in Malaysia. Technology and the borderless nature of the internet present fraudsters with manifold opportunities. ‘Phishing’ leads to identity theft and ‘money laundering’ has been found to be the main threat to internet banking. The newness of the subject and traditional banking secrecy have contributed to a dearth of legal literature pertaining to issues in internet banking, specific to Malaysia. It was found that the applicability of various existing laws and banking practices to internet banking has not been fully tested in Malaysia and is still evolving.

The study conducted by the authors Jain Abhay and Hundal B. S. [28] presented the rapid changes in the financial services environment—increased competition by new players,
product innovations, globalization and technological advancement—have led to a market situation where battle for customers has become intense. In order to rise up to the challenges, service providers are even more interested to enhance their understanding of consumer behavior patterns. This paper examines the forces that can act as barriers in mobile banking service adoption.

3.4.2 Security aspects of banking transactions

Hebbar Raveendranath (2004) described that the advancements in computing and telecom have revolutionised the financial industry. Banks are developing alternative channels of delivery like ATM, telebanking, remote access, internet banking etc., Some questions that need to be answered are, how can one trust these channels, our personal data and transactions which are driven by technology. Are they reliable and accurate? Is there a way out to independently validate the integrity of information? If we analyse, why the lack of trust exists, we realize that the primary issues center on the following aspects of information security:

- **Authentication and identity of user:** The act of verifying the identity of a user. How to recognize the person dealing on the net? Can one be sure of his or her identity?
- **Confidentiality:** How can one be sure that the information transmitted has not been intercepted or viewed by any other party in transit?
- **Integrity:** How can one ensure that the information sent, received or stored has not been tampered with the modified at any time?
- **Non-Repudiation:** What is the guarantee that a particular transaction or action took place? Would this hold the tests of court of law?

V. Radha discussed about the technology based opportunities that the thieves take advantage of and how to limit the frauds by building the future technology accordingly. In her study, the author described the kind of fraud that can happen in the emerging banking scenario as follows:
Mail Spoofing: Sending wrong information to bank customers as if it is from authentic bank sources

Web Spoofing: Diverting the customers of a bank to an exactly duplicated forged web site and impersonating those customers on real bank site

Attacking the User Computer: To take control of that machine

Attacking a Bank’s Server: To take control of that machine

Media tapping: Recording the whole transactions of a bank, or customer etc. and replaying the same for their advantage

Denying Service: Though the server is available, making it not able to render service, by poisoning the Network Infrastructure

The author also described the prevention mechanism to minimize the frauds, by using public key infrastructure (PKI). The PKI assures confidentiality, authenticity, and integrity of information which two or more members’ exchange.

In a survey conducted by the Online Banking Association, member institutions rated security as the most important issue of online banking. There is a dual requirement to protect customer’s privacy and protect it against fraud. A multi-layered security architecture comprising firewalls, filtering routers, encryption and digital certification ensures that your account information is protected from unauthorized access. Firewalls and filtering routers ensure that only the legitimate Internet users are allowed to access the system. Encryption techniques used by the bank (including the sophisticated public key encryption) would ensure that privacy of data flowing between the browser and the Infinity system is protected. Digital certification procedures provide the assurance that the data you receive is from the Infinity system.

3.5 Technological developments in cooperative banks[7][31]

The co-operative bank is an important element of the Indian financial system. Co-operative movement is quite well established in India. The co-operative banks have a history of almost 100 years (www.rbi.com)[7]. The first legislation on cooperation was
passed in 1904. In 1914 the three tier structure for cooperative banks was designed like, primary agricultural credit societies (PACs) works at the grass root level, central cooperative banks at the district level and state cooperative banks at the apex level. The first urban cooperative bank in India was formed nearly 100 years back. Cooperative institutions are engaged in all kinds of activities namely production, processing, marketing, distribution, servicing and banking in India. The sources of funds for the co-operative banks are – Central and State government, the Reserve Bank of India and NABARD, other cooperative institutions, ownership funds and depositors and debenture holders.

The cooperative movement in India is a leading movement in the world. Among various sectors of cooperative movement, banking has recorded the fastest growth, since submission of All India Rural Credit Survey Committee (AIRCSC) report 1954. Edwinraj (2005) [31] described the role of information technology in co-operative banks. The information technology in cooperative banks plays a significant role in establishing and maintaining contact with potential customers. Rapid developments in communication and network system are set to change the operational environment of cooperative banks. An effective and efficient management information system (MIS) can make a major impact on deposits, loans and other services provided by cooperative banks. Technological innovations, both internal and external, brought about changes in cooperative banks. Its adoption has resulted in development of e-banking, on-line banking internet banking, telephone banking and automated teller machine. Cooperative banks shall have to change their vision, mission, strategy and governance in the context of information technology. Information technology has a lot of influence on cooperative banks and it will help them to face competition and new challenges to meet customer’s expectations in the context of globalization and structural readjustment.

Computerisation of cooperative banks is a very difficult task. Very few states like Maharashtra, Karnataka, Gujarat and Goa are leading in computerisation. Computerised urban cooperative banks have online branches and have succeeded in taking almost all the operational activities. Urban cooperative banks are leading in implementing
information technology, but state and district cooperative banks are still lagging in computerisation drive and are still in their infancy. Few urban cooperative banks in Maharashtra have started their customer services through tele-banking, inter branch transaction and providing 24 hours services through ATM. Measuring productivity of emerging information technology in cooperative banking sector is difficult, due to difficulty of measuring output accurately when quality of service is changing.

If information technology is used in a scientific manner, the co-operative banks can benefit in the following way:

- It could offer new and innovative financial products.
- Will benefit by getting accurate information
- They can maintain a good management information system (MIS)
- Improve head office perfection and reconciliation which will improve customer services.

The main benefit of computerisation to the employees of cooperative banks is that they can have information at their fingertips. The information technology has removed manual transactions and has replaced old control room with one operator. Another benefit of computerisation is that IT has increased the accessibility of customers to banks. This has improved customer service through new banking concepts such as telephone, online, internet banking, automated teller machine, and other innovative banking concepts. All the banking transactions are done through the computers.

3.6 The Indian Banking Sector: challenges and opportunities

A distinguished panel of managing directors and chief executive officers of some of the well-known banks in the country responded to the theme on the challenges and opportunities faced by the Indian banking sector in the liberalized environment [K. V. Kamath et. al.]\textsuperscript{[32]}. The contributors addressed some of the following important issues regarding E-Banking and its importance:
The Indian banking sector is at an exciting point in its evolution. The opportunities to enter new business and new markets and to deliver higher levels of customer service are immense.

As the Indian bank’s position itself is that of a financial service provider, banking business is getting redefined. Technology is unsettling the earlier business processes and customer behaviour is undergoing a change. These have enhanced the focus of competition.

Competitive advantage can be achieved by harnessing the potential of the employees by creating a positive work culture and enlisting the support of all the employees to achieve the organisational goals.

Indian banks have adopted better operational strategies and have upgraded their skills. They have withstood the initial challenges and have become more adaptive to the changing environment.

In the complex and fast changing environment, the only sustainable competitive advantage for banks is to give the customer an optimum blend of technology and traditional service.

Four trends are fundamentally altering the banking industry: consolidation, globalization of operations, development of new technologies, and universalisation of banking.

The issues addressed by distinguished panel members are as follows;

N. Ravichandran (Professor, IIMA):
The Indian banking sector is going through major changes as a consequence of economic reforms. The changes affect the ownership pattern of banks, availability of funds, the cost of funds as well as opportunities to earn, range of services (fee based and fund based), and management of priority sector lending. The new rules of competition require recognition of the importance of consumers and the necessity to address the needs through the innovative products supported by new technology. As a consequence of competition, the managerial challenges include market segmentation, product positioning, innovative delivery channels and cross selling. The banks may have to
reorient their resources in the form of reorganized branch networks, reduced manpower, dramatic reduction in establishment cost, honing the skills of the staff, and innovative ways of attracting talented managerial pool. The Government of India and Reserve Bank of India on their part, would strengthen the existing norms in terms of governing and directing the functioning of these banks.

K V Kamath (MD and CEO, ICICI Bank):
The biggest opportunity for the Indian banking system today is the Indian consumer. Demographic shifts in terms of income levels and cultural shifts in terms of lifestyle aspirations are changing the profile of the Indian consumer. This is and will be a key driver of economic growth going forward. The Indian banking sector is at an exciting point in its evolution. The opportunities are immense – to enter new businesses and new markets, to develop new ways of working, to improve efficiency, and to deliver higher levels of customer service.

S S Kohli (CMD, Punjab National Bank):
With gradual deregulations, banks are now exposed to different types of risks. In view of the dynamic nature of the financial market, banks face various market risks like interest rate risk, liquidity risk, exchange risk, etc. In respect of lending, they face credit risk which includes default risk and portfolio risk. Besides, banks also face other risks like reputational risk and operational risk. Therefore, a robust risk management system is necessary.

As the Indian banks move gradually beyond universal banking and position themselves as financial service providers, banking business is getting redefined. Technology is unsettling the earlier business process and the customer’s behaviour is undergoing a change. These have enhanced the forces of competition. To survive under these conditions, the public sector banks will have to undertake business process reengineering, redefine their strategy and HR strategies to the overall business strategy. The technology will become a key driver of a financial business.
P S Shenoy (CMD, Bank of Baroda):
In the new business environment, banks have to be flexible enough to accommodate changes and at the same time have the necessary stability to retain the core competencies to deal with change. Electronic banking services have spread quickly in recent years. The threat of new entrants has lead many banks to offer e-finance ranging from basic to fully integrated internet services. The banks need to develop robust internal control systems, management information systems, and early warning triggers. Four trends are fundamentally altering the banking industry: consolidation, globalization of operations, development of new technologies and universalisation of banking.

Ranjana Kumar (CMD, Indian Bank):
On account of introduction of certain advanced technology, there would also be a strong case for recruiting fresh talent with attractive pay and perquisites. However, an organisation cannot afford to go on inducting talent without reviewing its existing manpower and how worthwhile it is to continue with some of them in the changed scenario. Even after equipping people with the latest knowledge, the results will not start flowing unless they are empowered to deliver the vision of the organization. The vision of the organisation should be exciting to the employees and a source to unleash their potential.

R M Nayak (MD and CEO, Lord Krishna Bank):
Some of the challenges that banks are facing today are: changing needs of the customers, coping with regulatory reforms, thinning spread, maintaining high quality assets, management of impaired assets, keeping pace with technology upgradations, sustaining healthy bottom lines and increasing shareholder value.

P T Kuppuswamy (Chairman and CEO, The Karur Vysysa Bank):
The Indian banking sector is faced with multiple and concurrent challenges such as increased competition, rising customer expectations and diminishing customer loyalty. The expectations from the consumers have been growing. Broadly, these expectations are swift service with minimal response time, efficient service delivery, tailor-made and
value added products to suit specific needs, hassle free procedures and minimum transaction costs, and pleasant and personalized service.

S. Balasubramanya (2002) [33] described that a banking sector is entering into the new world and existing developments in banking sector are changing the face of banking. Technology has revolutionised the banking industry in a big way and banks all around the world are investing heavily in technology. Technology has also helped banks to improve their product’s delivery and profitability. When banks depend on technology for their day-to-day business, the complexity and risks of technology has to be understood and sufficient backup plan put in place to ensure continued customer service. In addition, as more technology based services are provided, the demand from customers will keep increasing and banks would thereby end up in a technology war. In order to win this war, investments in technology are going to increase and proper utilisation of these investments is essential for banks to ensure that the systems deployed are fully integrated with their operations.

With more and more centralized core banking solutions being deployed by major banks, there is a strongly felt (faith) need to provide comprehensive telebanking services either from a single location or from regional locations based on customer language preference. Further, a significant amount of back office processing can be centralised, relieving the branch staff for more customer interactions. This is expected to bring in large-scale economies of operations and better customer services.

The study conducted by Kunkalienkar Manoj [34] presented that though technology is a revolutionary agent, it will not be a cure for all inefficiencies. The main area of awareness for banks is going to be the re-skilling of the workforce, both in technology and non-technology areas. One of the major areas where re-skilling is needed is in the area of customer service and customer focus; how to manage customer expectation, his feedback; how to attract new profitable customers; how to package products and services to meet customer needs, create a hygienic branch environment and other contact points. Another major need is to ensure consistent customer experience, irrespective of the
channel used for interaction with him. Added to this is the security across all channels and distribution points for customer information and transactions. While technology may not be a cure-all, it is definitely an enabler. The tool has to be used efficiently and effectively to originate maximum benefits. This will definitely be a differentiator to offer products and services.

Mr V. M. Uchil, Chairman, Nextstep Infotech Pvt Ltd:
The Indian Banking industry has come a long way from those early days. The journey ahead, promises to be exciting and eventful. Developments and changes in the Indian economy have created an entirely new set of challenges in front of banking institutions. The application areas for the newer technology in banks can be by and large divided in two categories namely customer centered (Technology) applications and high end (Functionality) applications. Customer centered application includes the solutions like internet banking, anywhere branch banking, mobile banking, core banking solutions, whereas high end technology encompasses risk management solutions, straight through processing (STP), credit monitoring systems for the data collections etc.

Banks have computerised their branches individually through ALPMs, and TBAs, etc. This takes care of the individual branch requirements. Nowadays banks have realised the importance of core banking and are in the process of converting this from TBA atmosphere to centralise banking systems. Internet banking has become a buzzword in the banking industry. So far these applications are limited to metros. Still a large majority of Indian customers are out of the purview of this modernisation.

Mr Suheim Sheikh, Managing Director, SDG Software Technologies:
Money Laundering and Fraud is increasingly becoming a matter of concern for financial institutions including banks and investment houses all over the world, given the severe penalties imposed by the regulatory authorities for non-compliance of Anti-Money Laundering (AML) reporting requirements. With several co-operative banks and financial institutions collapsing due to mismanagement and fraudulent activities, a solution is
needed that can serve as an early warning system which will help to initiate the necessary preventive steps and ensure that a mechanism is in place to address these issues.

The banks as well as customers have a serious concern about the security of Internet access to client account which is the biggest challenge. Banking through the Internet is increasingly becoming necessary rather than innovative tool and with consumer demand banks have to upgrade and constantly think of new innovative customised packages and services to remain competitive [Anil Jadhav & Rajni Jadhav, 2004] [24]. Implementation of SET, the standard for Secure Electronic Transaction on the Internet and its wide spread adoption including security measures like encryption, digital authentication and verification of online identity increases the consumer’s confidence. Consumers are increasingly looking for services which they can access from a single entry point. Awareness of competition have motivated banks to move aggressively in seeking alliances and establishing joint ventures to maintain their claim to the part of e-commerce infrastructure. Adequate level of infrastructure and human capacity building are required before adopting the global technology for local requirement. Lack of regulatory framework, trust and privacy standards are also important challenges. Unless critical mass is achieved for PC, Internet connection and Telephones, e-banking will continue to slow the pace in India. However the growing demand of IT professionals in pressurising the Government and bureaucracy in the country to support and develop new initiative for the faster spread of e-banking in India.

Mittal R. K. and Dhingra Sanjay [35] discussed the issue that the transaction through technology channels cost much less to the banks than the customers reaching the bank and doing the transactions. In the last decade banks have invested heavily in the technology. In the use of information technology, the new private and foreign sector banks have taken lead over the public and old private sector banks. Today public sector banks are also investing heavily in technology to compete with the new private and foreign sector banks. In the study authors have identified the different technology issues and challenges such as choice of right channel, justification of IT investment in terms of ROI (Rate of Interest), e-governance, customer relationship management, security
concerns, penetration of IT in rural areas etc. Banks are required to address these issues and challenges effectively to stay in business and grow.

**Conclusion:**

Review of literature shows that different researchers and experts in the fields of banking have discussed various aspects of the bank computerisation like technology and Indian banking sector, channels of e-banking, technological revolution in banking sector, IT channels and customer service etc. It has been observed that none of the reviewed study addresses the issues such as technological developments (extent of computerisation) of co-operative banks, different aspects affecting the development of co-operative banks, problems and prospects of bank computerisation, responses of the employees and customers on bank computerisation, and different software solutions available for bank computerisation. Therefore, this study is an attempt to address these issues.
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