CHAPTER 3

REVIEW OF LITERATURE

Technology in the banks is presently catching up with a high level of development around the world. The gaps between the Indian banks and their counterparts in the technologically advanced countries are gradually narrowing down. The world has witnessed an information and technological revolution of late. This revolution has touched every aspect of public life including banking (Siam, 2006). Since two decades, due to an increasingly competitive, saturated and dynamic business environment, retail banks in many countries have adopted customer-driven philosophies to address the rapid and changing needs of their customers (Walker et al., 2008). Technological advances have changed the world radically, altering the manner in which individuals conduct their personal and business affairs. Over the past two decades in particular, the banking industry has invested substantial resources in bringing ICT to customers. The banking industry is undergoing through the significant technological changes; it has several impacts on customer satisfaction and loyalty —It has revolutionized every industry including banking in the world by rendering faster and cost effective delivery of products and services to the customers. According to Chakrabarty, (2007) core banking solution enables banks to extend the full benefits of ATM, tele-banking, mobile banking, internet banking, card banking and other multiple delivery channels to all customers allowing banks to offer a multitude of customer-centric services on a 24x7 basis from a single location, supporting retail as well as corporate banking activities. Now, Indian banks are investing heavily in the technologies such as branch automation and computerization, core banking, tele-banking, mobile banking (M-banking), internet banking, automated teller machine (ATMs), data warehousing etc. ICT innovations in the previous few years have changed the landscape of banks in India (Mittal and Dhingra, 2007; Kour and Kour, 2011). Today public sector and private sector banks are offering online banking services. Various alternative channels to provide easy and any where banking are properly thought of. The process of bank computerization was started since 1985 in
public sector banks in India. However, some private sector banks have started computerization prior to the public sector banks in India. The banks in India are using ICT not only to improve their own internal processes but also to increase facilities and services to their customers. A customer satisfaction is an ambiguous and abstract concept. Actual manifestation of the state of satisfaction will vary from person to person, product to product and service to service. The state of satisfaction depends on a number of factors which consolidate as psychological, economic and physical factors. The quality of service is one of the major determinants of the customer satisfaction, which can be enhanced by using ICT available to survive. The banks in India are using Information Technology (IT) not only to improve their own internal processes but also to increase facilities and services to their customers. Particularly, in the banking sector ICT is one of the most important tools, because it provides many suitable alternative banking channels to the customers. It brings connivance, customer centricity, enhance service quality and cost effectiveness in the banking services. Even now, customers are evaluating their banks based on availability of high-tech services. Therefore, implementation of ICT in the banking business continues to improve the banking service. Many researchers from USA, UK, Finland, Malaysia, Taiwan, etc. have proved that the use of technology positively affects the customers'satisfaction in banking industry. But some researches evidenced that technology based banking service can't satisfy the each and every need of the customers' and each type of customers'. There are may be some possibilities of gaps between customers'expectations and actual service perception in ICT based banking service, which leads to customer dissatisfaction. Hence, there is a need to assess the impact of alternative banking services on customers'satisfaction in Indian context to study the level of satisfaction, problems and areas of further improvements.

The Indian Banking Industry has already started making sufficient progress in automation. In fact, most of the new Private Sector Banks such as ICICI Bank, HDFC Bank, etc. are already in the forefront making wonderful use of the way banking is carried out. Various eminent personalities, scholars
and authors have conducted studies on various aspects of banking industry. Some of the studies conducted by them are reviewed as under: -

**Bhaumik and Sarkar (1996)** reveal that towards the end of 1980s, the de-regulation process gained momentum with growth in the high-tech sector in India. The de-regulation became an important mechanism for generating competition in the banking system in many developing countries.

**Roy (1996)** pinpointed that the slow growth of technology in banks is not only due to lethargy of Indian public sector banks but the average Indian customer is also responsible for this. The average customer of public sector bank is comfortable with traditional banking system and is not keen on adopting an electronic model. Lack of skills in using ATMs and inaccessibility has been identified as major causes for this slow uptake by majority of banks. The average Indian citizen is yet to get comfortable with impersonal machines such as ATMs.

**O'Connell (1996)** found that availability of access to the internet is an essential prerequisite for adoption of internet banking. The more widespread the access to computers and the internet, the greater the possibility of the use of internet banking. O'Connell identified lack of access to computers as one of the possible reasons for slow adoption of internet banking.

**Cronin (1998)** pinpointed that the implementation of SEI, the standard for secure electronic transactions on the internet and its widespread adoption including security measures like encryption, digital authentication and verification of online identity, increase consumer confidence.

**Jeevan (2000)** revealed that internet banking is giving competitive advantage to banks by providing them an unlimited distribution network. The future holds wide vistas in terms of what technology can do. Banks, through technology, are now able to provide services electronically and such services are lowering transactions costs and adding the value to customer – banker relationship. Internet enables banks to offer low cost, high value-added financial services. Finally, banks are finding that a comprehensive online banking strategy is essential for success in the increasingly competitive financial service market. Competition and changes in technology and lifestyle
have changed the face of banking and banks, in the present environment, are seeking alternative way to provide and differentiate their services.

**Davies (2000)** advocated that in this high-tech environment, it is important for the government to keep its regulatory system under review. Many countries are responding to changes in financial market by rationalizing their regulatory systems. In today’s highly mobile financial market, countries which do not ensure that their regulatory system remains up-to-date, may pay a serious cost in the form of lost business.

**Denny (2000)** observed that banks as well as consumers view security threats as perhaps the most serious threat. The security of internet access to client account is the biggest challenge which banks are facing. For success in the increasingly competitive financial services market, banks are realizing that a comprehensive online banking strategy is essential which also provides the essential security requirement. Security policy should include management commitment, technological support and effective dissemination of the policy and security awareness of all users.

**Vignestem et.al. (2000)** pinpointed that in any new venture there are setbacks in terms of issue of security and associated costs. As a consequence banks are working towards rectifying these shortcomings so as to take full advantage of the digital revolution.

**Reddy (2000)** found that the early 1990s saw plummeting hardware prices and advent of cheap and inexpensive but high-powered PCs and servers and banks went in for what was called Total Branch Automation (TBA) Package. The Narasimhamam Committee report in 1992, introduced new reforms, followed by Banking Regulation Act in 1993 which enabled new private banks to enter the arena. In 1996, full foreign investment was allowed. In 1997, the Tarapala Committee report on capital account convertibility launched a new mandate to support the full convertibility of rupee by turn of 2000. These developments were supported by growing levels of expertise in information technology, venture capitalism and increasing amounts of foreign investment.
Mahabharat (2000)\textsuperscript{10} studied that the problem in e-banking is that the internet is not a regulatory technology. It is readily accessible to millions of people and there will always be people who can manipulate it to make illicit gains. With the evolution of delivery channels relating to fund-based services such as Electronic Fund Transfer (EFT) and Electronic Clearing System (ECS), security measures need to be developed adequately. EFT is the safest and fastest way to transfer money, regardless of bank, branch, or city. ECS enables deposits of dividend into shareholder account, if the bank account is given. In September 2000, the Institute of Development and Research in Banking Technology (IDBRT) implemented its long-awaited EFT and Real Time Gross Settlement (RTGS) system, with services available throughout India.

Vij (2000)\textsuperscript{11} studied that in India, the Information Technology Act, 2000 provides for a particular technology (viz., the asymmetric crypto system and hash transactions) as a means of authenticating electronic record. Any other method used by banks for authentication should be recognized as a source of legal risk. Regarding regulatory and supervisory issues, only such banks are licensed and supervised which have a physical presence in India and are given permission to offer e-banking products to resident of India See 3(2) (Information Technology Act, 2000). With institutions becoming more and more global and complex, the nature of risk in the international financial system has changed. Though the Indian government has announced the cyber-laws, most corporates are not clear about them and feel that they are insufficient for the growth of e-banking and e-commerce. Lack of consumer protection laws is another issue that needs to be tackled, if the people have to feel more comfortable about transacting online.

Verma (2001)\textsuperscript{12} observed that in technology-based banking world, it's the CIO (Crucial decision maker) who is fast becoming the key to banks' success or failure. With increasing needs to gear up to the fast changing technology, the onus to implement right banking solutions lies on CIO. He further adds that at the end of the day, the quality of banking services will win long-term customer loyalty. Of course, technology will continue to play the enabler.
Verma (2001) pinpointed that banks are using technology as an enabler to provide innovative products, multiple delivery channels and have efficient service mechanisms.

Gupta (2001) advocated that the IT initiative was only for large matters and has not visibly affected semi-urban or rural areas, given the fact there are constraints of a limited backbone.

Karbin (2001) found that the field of banking has made considerable progress and the use of technology has become a very powerful force changing the very core of traditional banking.

Jayadev (2001) observed that India is still in early stages of internet banking, growth and development. Until, the advent of automatic teller machine (ATMs), people were unaware or not directly affected by technological revolution happening in banking sector. ATMs became a major revelation for customers for it offered the facility to avoid long queues in front of cashier in a bank. It also provided them the flexibility in withdrawing money any time, anywhere.

Mishra (2001) found that software packages for banking application in India had their beginning in early 1980s, when banks started computerizing branches in a limited manner. This set the pace for computerization and mechanism, following the formation of Rangarajan Committee.

NASSCOMs Internet Survey (2001) reveals that internet usage trends depicting the number of active internet subscribers in India is expected to increase over 18 million and the user base over 30 million by 2004-05. It is also found that more than 200 cities and towns in India have internet connectivity. The NASSCOM – Mckensey study in 2002 revealed that despite global economic challenges faced by the IT software and service sector, the outlook of the Indian sector remains optimistic.

RBI (2001) reveals that various other concepts such as digital signatures, certifications, storage of informations in a secure and tamper-proof manner assume significance and will be part of practices and procedures in the day to day functioning of the banks in future. With increased dependence on technology, the need for information system audit also assumes
significance coupled with the availability of skilled personnel not only for implementing technology but also for manning such technology based activities and conducting audit thereof. The security issue can be addressed at three levels. The first is the security of customer PC to web server. The second is security of environment which the internet banking server and customer information database requires. Third, security measure must be in place to prevent unauthorized users from the attempting to log into online banking section of website. From legal perspective, security procedure adopted by banks for authenticating users needs to be recognized by law as a substitute for signature. In this regard, the RBI is about to become the first government owned digital signature certifying authority. The move is expected to initiate the electronic transaction process in the banking sector and will have far-reaching results in terms of cost and speed of transactions between the government-owned banks.

Verma (2001)²⁰ observed that the Indian public sector banks which constitute about 65 percent of the sector are still plagued by union issues, inertia in the lower ranks and a general apathy towards technological innovations, especially the internet.

State Bank of India.com and annual report (2001-02)²¹ reveals that SBI’s internet banking initiative, launched in July 2001 is in fact quite clearing, one can only imagine the complexities involved in deploying a core banking solution for an entity the size of the State Bank of India. With more than 13600 branches spread across the length and breath of the country, the project was huge in size and complicated in its implementation. The project involved deploying a centralized core banking system, throughout the SBI group, consisting of SBI and the seven associate banks. In this group, the SBI alone has more than 9000 branches with 51 foreign offices in 31 countries. The estimate of investment for the SBI is Rs.500 crores. This mammoth task is said to be one of the largest of its kind in the world in terms of number of branches, customers and transaction volume undertaken by ICS India.

Ghaisas (2002)²² noted that banks should go in for a BPR before they embark on a centralized solution. Satyen (2002)²³ studied that the RBI is making rapid progress towards setting up the real time gross settlement
(RTGS). The RTGS, when operational, would provide a new generation of a high value payment system that would enable the core banking. A favourable impact of the IT initiative is evident on the transaction costs and inventory-carrying cost.

Kamesam (2002) pinpointed that one of the prime thrust areas for future would be completion of branch computerization and networking of banks.

Dinesh (2002) found that SNS is undoubtedly emerging as the killer application for connecting people and remote banking in particular. In offering anytime, anywhere banking this application potential needs WBC fully exploited whereas

Gates (2002) pinpointed that society needs banking not banks.

Verma (2002) stated that if the technology is only reason for the private sector's chipping away at its market share, then its time to ramp up technology on warpath. The IT drive should come from top man agreement, else it is doomed to fail. Mindset issues need to be handled and there needs to be an acute focus on the training of employees.

Jeevan (2002) advocated that banks and customers need to define appropriate legal measures covering among other things: service levels, indemnities, limitation of liability and acceptability of digital signature. In India, all of these are conspicuous by their absence and Public Key Infrastructure (PKI) could hamper the growth of internet banking. Poor infrastructure and dismal PC Penetration make internet banking a long shot in India today.

Rajneesh and Padmanbhan (2002) pinpointed that most PSU banks have majority of their customer base in smaller cities or towns and even in remote villages. Even in bigger cities, a large proportion of customers are either senior citizens or at least in the age group of fifty plus who have natural aversion towards adopting new technology. This is not the case with private or MNC banks, where client is mostly urban based falling in 20-40 age groups and have higher exposure to technology. Even the IDC survey seems to confirm this premise. Among the alive internet banking users, those customer who belong to Socio-Economic Class A1 (SECA1) in top five cities,
it has been found that people access their account through internet once every week. Similarly user visit their ATM centre on an average of two times per week. The workplace happens to be the most favoured place to access internet for banking purpose. The home comes second and cyber cafes take the third place. ATM in close vicinity to the office is the most preferred among users for banking. The users (24 percent) who access the ATM near their office mostly go during the first half of the day between 9 am to 12 pm, but the most preferred time by all users (41 percent) is between 6-9 pm.

Microsoft Corporation India (2002) reveals that HDFC Bank Ltd. has made e-shopping online and real time with launch of its payment gateways. It has tied up with a number of portals to offer (B2C) e-commerce transactions. The first online real time e-commerce credit card transaction in the country was carried out on Easy 3 shoppe.com shopping mall, enabled by HDFC Bank Ltd. on VISA card.

Satyam (2003) revealed that India’s private sector financial powerhouse’s main challenge was to have system scaling up commensurate with its growth rate. The numbers of transactions were growing by leaps and bounds. The ‘risk’ involved in business grows with each additional consumer and transaction. In the event of any disaster system continuity has to be guaranteed as a part of overall business continuously plan.

Kunkalienkar (2003) pinpointed that the SAW system is strategic to the business. The SAW is very scalable and designed keeping in mind our growing business volumes. It is as easy as plugging in additional storage boxes as you run out of capacity.

Khanna (2003) observed that technology has changed the contours of major functions performed by banks i.e. access to liquidity, transformation of assets and the communications networking system have a crucial bearing on efficiency of money, capital and foreign exchange markets.

Pareek (2003) found that technology has become the driving force of financial sector reforms. Entry of new generation banks has resulted in a paradigm shift in ways of banking in India. IT has introduced new business standards and is increasingly playing a significant role in improving the
service in banking industry. Internet, wireless technology and global straight through processing have created a paradigmatic shift in banking industry – from brick and mortar banks to virtual banking across time zones, geographical locations, access points and delivery channels. Another key impetus for change has been increasing competition among a broad range of local and global institutions in providing banking and related financial services, addition; financial activity has become larger relative to overall economic activity in most economies.

Gupta and Mani (2003)\(^{35}\) revealed that PNB has also come a long way since March 2000, when IT systems were deployed only at 500 branches and were very inadequate. Only 35% of the banks business was computerized and a number of small software packages ran on standalone PCs. In 2003, PNB had more than 101 branches on WAN, deployed a core banking infrastructure and has 175 networked ATMs. It also deployed a reliable security infrastructure that helped it conduct transactions within its branches.

PNB Annual Report (2003-04)\(^{36}\) revealed that as on March 31, 2004, the PNB achieved 100 percent branch computerization. 97% of the banks business is captured through computers. Core Banking Solutions (CBS) have been implemented in 504 Service Outlets (SOLs) covering 101 centers of the country. The plan is to achieve connectivity in 1500-2000 branches in 3 years time. The bank implemented Structured Financial Messaging Solution (SFMS) for funds transfer from any of the CBS branches at 101 centers. The bank has also introduced internet banking which has 8300 users as of now. This service is available to all retail customers of CBS branches. These customers can also book their railway reservations tickets online. This facility would be further extended for payment of bills of utility companies, airlines tickets, etc. The bank is a part of Real Time Gross Settlement System (RTGS).

Pryag et.al. (2003)\(^{37}\) revealed that the current statistics show that less than 10 percent of Indian banking customers use the Net for banking purposes. The services should range from checking balance facility and request for cheque books to slightly advanced interactive services such as
paying utility bills and at the highest level, executing transactions and transferring funds.

Sharma (2004)\textsuperscript{38} studied that information technology has basically been used under two different avenues in banking. One is communication and connectivity and other is business process re-engineering. Information technology enables sophisticated product development, better market infrastructure and implementation of reliable techniques for control of risks and helps the financial intermediary to reach geographically distant and diversified market.

Perumal and Shamugam (2004)\textsuperscript{39} revealed that the literature on 'banking with aid of information technology' seems to suggest that currently, the main multimedia delivery channel in banking is the internet accessed via PC. The terms, multimedia banking, internet banking, e-banking and on line banking are often used in literature interchangeably to refer to same technology form.

Af-Tamini and Labnoun (2006)\textsuperscript{40} compares service quality and bank performance between national and foreign banks in the UAE. In addition, the paper compares the importance of the dimensions of the instrument between the two sets of the banks. Financial performance is compared using Whitney non-parametric test. The results of this study will serve as a benchmark for UAE bankers from the 800 questionnaires, 480 responses were received.

Kumar, (2006)\textsuperscript{41} studied that bank nationalization in India marked a paradigm shift in the focus of banking as it was intended to shift the focus from class banking to mass banking. Internationally also, efforts are being made to study causes of financial inclusion and designing strategies to ensure financial inclusion of the poor and disadvantaged. The banks also need to redesign their business strategies to incorporate specific plans to promote financial inclusion of low-income group treating it both a business opportunity as well as a corporate social responsibility. Financial inclusion can emerge as commercially profitable business.

Khandelwal (2006)\textsuperscript{42} pinpointed that even in the era of high-technology customer would continue to place premium on human banking and
personal touch. As banking is all about relationship, it is hardly conceivable that technology can totally be a substitute for human interface. At best, high-technology may be used largely in respect of liability product. In matter of asset products, the principle of one to one banking will continue to remain valid. A smart banker of future will succeed when he employs a right mix of “High Tech and Hi-touch”.

Chakraborty (2006)\(^{43}\) advocates that “Mouse” and “brick and mortar” based banking will co-exist. Banks need customer for being in the business. It is for the customers to decide what type of banking they need. Today, only ‘technology’ banking is done. The use of “information” is really missing in the “IT” banking.

Chopra (2006)\(^{44}\) advocated that it would not be a healthy situation where the staff has to sit idle, but alternative channels have been developed for the convenience of our customers only, while keeping cost of operations to minimum.

Shetty (2006)\(^{45}\) pinpointed that depending on customer segment, customer requirement and product category, a bank needs to serve the customer both, through its branch network and also through impersonal channels.

Harold (2006)\(^{46}\) has abstracted the balance score card (BSC) framework to develop a comprehensive performance measurement and management tool for IT in banking. In this paper, the author illustrates how a cascade of balanced scoreboards can be instrumental in the banking technology effectiveness of banks in India to ensure better performance measurement. Mariappan (2005-06) analyzed that IT revolution has brought stunning changes in the business environment perhaps no other sector has been influenced by advances in technology as much as banking and finance, as a result, the banking poses a totally new look today. Technology has been used a strategy to win market and customers.

Srivastava (2006)\(^{47}\) concluded that post nationalization period witnessed an unprecedented expansion of banking industry in India, however accompanied by inefficiency and poor financial health. To over come this
problem and improve the efficiency of banks, various tectonic measures have been taken since 1991. This has resulted in improvement in productivity, profitability and strengthening of financial position of the banks so much that they are outshining those of advanced nation's. However, banks have still to go a long way to sustain their Competitive success. Indian Commercial Banks also need to enhance their system and procedure to international standards and also simultaneously fortify their financial position.

Tiwari et al. (2006) explore the various avenues using mobile technology for expanding online banking services, as mobile based applications gain popularity. The paper presents the global scenario and technology used in mobile financial services. The paper provides a global overview of services offered and simultaneously analyses various MFS technologies. Using case studies it shows how successful offers may be conceptualized and implemented in a real world setting.

Uppal (2006) analyzes profitability of four major bank groups that is SBI and its associates (G-I), Nationalized banks(G-II), New private sector banks (G-III) and foreign banks (G-IV) in the second post -banking sector reforms era and concludes that there is a significant difference in the profitability of various major bank groups. The average profitability is the highest in the foreign banks and new private sector banks. the Public sector banks are far behind in many parameters due to the significant and negative effects of burden whereas new private sector banks have higher profitability and the lowest burden with positive impact of interest income and expenditure. The paper suggests some strategies for the survival of PSBs in the liberalized and globalized environment.

Jham and Garg (2006) examine the factors which enhance satisfaction with internet banking services with the help of factor analysis. The study concludes that customers do not prefer to use internet for many transactions, therefore least satisfied for foreign exchange requirements, credit card payments but privacy and trust play an important role in usage of internet but satisfaction is very low. Customers are highly satisfied with buying and selling of stocks and the internet is used maximum for applying loans.
Indian customers’ satisfaction depends on reliability and efficiency. The study suggests the banks to satisfy customer needs on priority basis.

**Chopra (2006)**\(^{51}\) highlights the importance of IT and business re-engineering in achieving the objectives of the banks. The paper concludes that PSBs and old private sector banks are slow in imbibing technology in their operations, whereas new private sector banks and foreign banks are early adopters of technology and increasing the competition. The paper emphasizes that IT along with business process re-engineering can provide ideal technological environment catering to the stated business objectives.

**Consumer Voice (2006)**\(^{52}\) conducted a survey to study customer satisfaction level of 3100 serving banks, credit and debit card holders, who are covered during the period September 2005 to November 2005. The survey is conducted in eight cities, where the maximum numbers of respondents come from SBI (17.10 pc) followed by ICICI Bank (8.80 pc) and the maximum surveyed customers belong to the age group of 26-34 years. The study reveals that Citibank has the most dissatisfied customers and most of the customers are shifting from public sector banks to private sector banks, mainly due to their convenient availability and due to restricted functioning hours of public sector banks. Overall, only 6 pc of respondents use internet banking and most of them (16.3 pc) are registered with HSBC followed by ICICI Bank (12.6 pc). Overall, the study concludes that Standard Chartered Bank, Vijaya Bank and Syndicate Bank steal the march, the little known United Western Bank performs impressively and Citibank is the most overrated bank.

**Garg and Jham (2006)**\(^{53}\) investigate factors that influence Indian customers to adopt ATMs by using factor analysis and focus on the influence of demographic and psychological variables of 296 customers of six selected banks such as SBI, PNB, ICICI, HDFC, ABN and IDBI. It is examined that most of the respondents are below the age of 35 years and users with lesser experience face more problems in comparison to others and they look for reliability of information. There are problems of dim vision of screen and they use ATMs maximum for withdrawals and rarely for deposits.
Kasman and Kasman (2006)\(^{54}\) study the impact of technical change on the costs as well as environmental factors of banking firms operating in 11 Central European Countries by using Fourier-flexible cost function specification for the period 1995-2002. It is concluded that technical progress, on an average, reduced banks’ total cost in five countries that ranges between 0.48 pc and -0.25 pc. The decline in technical change during 2000-02, indicates that introduction of new technology has been fully utilized starting from 2000. The study again concludes that larger banks have benefited significantly more from cost savings than smaller banks; It suggests consolidation of smaller banks to get more benefits of cost reduction due to technical change.

Krishnaveni and Prabha (2006)\(^{55}\) recognize the need to develop long term relationship with customers to prosper in a competitive environment. Banks have realized the need to adopt a people oriented approach as compared to solely the profit oriented approach towards improving customer service. In this study, a sample of 27 banks is selected at random from the list of 49 public and private sector banks. The study reveals that among different internal service quality dimensions taken up for the study, offering the right information and facilities to the employees will improve internal service quality perceptions better than the other dimensions.

Kukkudi and Deene (2006)\(^{56}\) study the impact of ATMs on customer satisfaction with special reference to SBH in Gulbarga district with sample size of 100 respondents. The study concludes that ATMs are used mostly by the age group of 25 – 35 years comprising more male members. 79 pc uses ATMs weekly where 85 pc are aware about the restrictions concerning ATMs usage. The numbers of ATMs are sufficient to meet current needs. It suggests popularizing ATMs among maximum customers.

Kuma (2006)\(^{57}\) discusses various phases of computerization from automating the accounting process and back office function to the current phase of inter-bank connectivity through Real Time Gross Settlement (RTGS). The study emphasizes on some key IT issues like driving factors, IT budget, process re-engineering, outsourcing etc. It concludes that although IT has been introduced in banking but compared to the automation level adopted in
some developed countries, it is imperative to further improve and stabilize the mechanization process in Indian banking industry

**Kumar and Sujit (2006)** explain the importance, usage and implementation of e-purse in different countries including India. The study highlights some issues related to e-purse as well as its implementation in Indian context as compared to foreign countries. It concludes that e-purse is still at a nascent stage in India as compared to other e-facilities like credit/debit cards, ATMs etc. The study suggests making e-purse more user friendly like credit cards, providing wider base in terms of issuer, location and service providers to facilitate its usage at transportation services, educational institutions, shopping malls etc.

**Kumar and Walia (2006)** produce information on integrated approach adopted by Indian banks and discuss how Indian banks are aligning their services as per global requirement. The study visualizes per transaction cost through various channels and concludes that it is the least i.e. Rs.0.10 per transaction through internet-banking while Rs.1.00 if transacted manually. The percentage of computerization in all Indian banks is only 24 pc up to 2003 and 52 pc branches of public and old private sector banks have been computerized whereas 100 pc computerization is made in new private sector banks and foreign banks, This is mainly due to less spending only (0.5 pc) of its revenue on information technology by the public sector banks where new private sector banks spend 4-5 pc and foreign banks spend 9 pc on IT. Very few banks like SBI, Bank of Baroda, and Bank of India etc. are reorienting their strategies to become more focused. The study suggests that given the confidence and competence to public sector banks too, Indian banking sector will surely touch new heights in the years to come

**Nair (2006)** explores future challenges of technology in banking and reveals that automation of 20 pc branches covering 80 pc business followed by large banks conveniently ignores their rural branches. The study concludes that technology usage has improved the efficiency of operations in banks and reduced the cost as ATM transaction costs 25-30 pc of a counter transaction and electronic system has made banking easy and more attractive but also
risky because of ignorance of human touch. It also points out how IT poses a bright future in rural banking

**Radhakrishna et al. (2007)** examined legal issues specific to internet banking, focusing on the incidence of fraud and its prosecution. The objective of the research was to investigate three questions in relation to Malaysia. Firstly, the incidence of fraud in internet banking; secondly, the adequacy of 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 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 applicability of various existing laws and banking practices to internet banking has not been fully tested in Malaysia and is still evolving.

**Hanudin (2007)** studies technology acceptance of internet banking among undergraduate students in Malaysia based on modified version of Technology Acceptance Model (TAM) and develops a technology acceptance model for internet banking. The results suggest that perceived usefulness (PU), perceived ease of use (PEOU) and perceived credibility (PC) have a significant relationship with behavioral intention. Further, these measures are good determinants for undergraduate acceptance of internet banking. Results also suggest that PU and PEOU have a significant relationship with computer self-efficacy (CSE). The study is useful in providing the understanding of the TAM among undergraduates from Malaysians' perspective.

**Ebol and Mazzulla (2007)** propose a tool for measuring customer satisfaction in public transport. Specifically, a structural equation model is formulated to explore the impact of the relationship between global customer satisfaction and service quality attributes. The public transport service analyzed is the bus service habitually used by University of Calabria students to reach the campus from the urban area of Cosenza (southern Italy). To calibrate the model, some data collected in a survey addressed to a sample of
students is used. The proposed model can be useful both to transport agencies and planners to analyze the correlation between service quality attributes and identify the more convenient attributes for improving the supplied service

**Madhavankutty (2007)** concludes that the banking system in India has attained enough maturity and is ready to address prudential management practices as comprehensively as possible, which is an integral part of policy making. Banking in India is poised to enter yet another phase of reforms once the door opens further to foreign players in 2009. This requires further improvement in technology management, human resource management and the ability to foresee rapid changes in the financial landscape and adopt them quickly. At present, there is a huge hiatus between the top management earnings of state owned banks and private, as well as foreign banks. Banks have to lay down sound risk management strategies and internal capital adequacy assessment committees to ensure that they do not diverge from the prudential requirements.

**Geetika et al. (2008)** 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 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.

**Kamakodi et al. (2008)** discussed that, it has been almost 15 years since the Indian banking sector was liberalized and paradigm shift took place in the Indian banking services. All banks have either totally implemented ‘core banking systems’ or are 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. This throws up a challenge for the 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.

Uppal and Kaur (2007) analyse the efficiency of all the bank groups in post banking sector reforms era. Time period of study is related to second post-banking sector reforms (1999-2000 to 2004-05). The paper concludes that the efficiency of all the bank groups has increased in the second post-banking sector reforms period but these banking sector reforms are more beneficial for new private sector banks and foreign banks. This paper also suggests some measures for the improvement of efficiency of Indian nationalized banks. The sample of the study Indian banking industry which comprises five different ownership groups and ratio method is used to calculate the efficiency of different bank groups. New private sector banks are competing with foreign banks for continuous improvement in their performance.

Badoni (2007) studied that plastic cards with magnetic stripe technology have been in wide use the world over, especially in India and the USA. The data on stripe can be easily written, react, deleted or changed with off-the-shelf equipment. To protect consumer business on magnetic stripe cards, one has to invest heavily in extensive online computer networks for verification and processing. In case of smart cards, such an infrastructure is not required as the card itself carries the intelligence and ensures the security of data and transactions.

Sharma (2007) studied that core banking has brought about a paradigm shift in the way banking has been conducted. Integration of core banking with alternate channels like ATMs and internet banking has increased the convenience of the customer. He further adds that no technology can replace human interface. Computers cannot be made to work smarter than human beings in the foreseeable future. Personal choices, intuition, egos,
likes, dislikes, etc. will keep playing a dominant role in the way people interact with their service providers. Technology will facilitate transactions but it will be man and woman behind the technology who will matter the most and have the last word.

Leeladhar (2007) advocated that the most common premise is that for successful technological improvements people with right aptitude are required many organizations even conduct, aptitude test to select the ‘right’ type of personnel, his experience is that attitude is more important than aptitude. A person who is willing to learn is a better asset than one who is technology savvy but refuses to change.

Kalyanasundar (2007) advocated that in layman terms Core-Banking Solutions (CBS) is a platform where communication and information technology are merged to suit the needs of core banking. The new millennium has ushered in large scale technological advancement in the Indian sector. With the advent of new generation private sector banks having the latest technology, other banks have also started upgrading their technology to those levels. In a developed world, already having the technology of 80s, a need was felt to move away from predominately main frame based centralized system to a somewhat open architecture. The solution, which comes upto support this kind of centralized banking having the latest delivery channel, is core banking.

Rajendran (2007) found that banks have a very significant role to play in security issues. Care should be taken to ensure that ATM card and the pin-mailer are not kept in the same premises nor returned concurrently before delivery to customer. He further adds that at industry level, the Indian Banks Association (IBA) is reportedly setting up a website that will have information of frauds committed in banks.

Godse (2007) advocated that bank planner should now build plans around the technology power rather than taking IT as an input while planning for business in a traditional way. The history of Indian banking had been “brick and mortar” based but future would be ‘click and mouse’. He finds that a part
of technology cost the will be borne by customers for accurate and prompt services offered by banks.

Khanna (2007)\textsuperscript{74} pinpointed that technology has moved from being just business enabler to being a business driver for banks. Technology can help enhance the performance of banks, when effectively aligned with business strategy. Effective deployment of technology will be the key for banks in their effort to meet business challenges.

Radha (2008)\textsuperscript{75} discussed about technology based opportunities that thieves take advantage of and how to limit frauds by building future technology accordingly. In her study, the author described the kinds of fraud that can happen in the emerging banking scenario as follows:

\textit{Mail Spoofing}: Sending wrong information to bank customers as if it is from authentic bank sources

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

\textit{Attacking the User Computer}: To take control of that machine

\textit{Attacking a Bank's Server}: To take control of that machine

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

\textit{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.

Sehgal (2008)\textsuperscript{76} observed that during core banking solution, there were many hurdles, which were overcome with success. Major challenges during project implementation were problem in design freeze (requirement base lining), user training and poor connectivity. Requirement base lining problem was addressed by canalled customization and proper.
Ghose (2008) revealed that rural market presents a great opportunity for Indian banks. Properly targeted, it can serve as a secure source of business for the bank while at the same time leading to accelerated growth of rural economy. Technology initiatives can serve as allies in this matter and enable banks to reach population groups which were denied the benefits of banking until now.

Hugar and Vaz (2008) evaluate the customer orientation in public sector banks for 5 public sector, 3 new private sector and 3 foreign banks are selected. The study concludes that new private sector banks have more ATMs at the end of March 2006 followed by SBI group where 77.5 pc branches are fully computerized and 18.2 pc are partially computerized. Business per employee and profits per employee are higher in foreign banks whereas SBI has received more number of complaints followed by ICICI. The study also suggests adopting of CRM by public sector banks to stand strong in the competitive environment.

Kaleem and Ahmad (2008) aim to collect bank employees’ perceptions of the potential benefits and risks associated with electronic banking in Pakistan. The study shows that public bank employees who have professional degrees consider ‘minimizing transaction costs’ and ‘reduction in HR requirements’ as the most and the least important benefits of electronic banking respectively. Private bank employees having masters or bachelor degrees, and less than 10 years experience, perceive ‘time saving and minimizing inconvenience’ as the major benefits of electronic banking. Branch managers viewed ‘facilitates quick response’ as the most important benefit of electronic banking. Bankers in all segments consider ‘government access to data’ as the biggest risk associated to electronic banking. Empirical analysis suggests that bankers in Pakistan perceive electronic banking as tool for minimizing inconvenience, reducing transaction costs and saving time.

Migdadi (2008) aims to identify the quality of internet banking service encounter of the retail banks in Jordan and to identify the quality dimensions that should be improved or sustained. The study evaluates the banks' web sites by using the web site quantitative evaluation method (QEM) in March 2008 for sixteen retail banks in Jordan. Results indicate that the banks in
Jordan have significant positive quality of internet banking service encounter, further the banks' web sites are rich in their content and significant in the navigation, but the speed of home page down load and web site accessibility should be developed in the future.

Munusamy and Fong (2008) examine the level of customer satisfaction with regard to IBBM's training services. The study investigates the dimensions of service quality that have significant effect on customer satisfaction in IBBM's training services. The study finds that the dimensions of service quality and customer knowledge are positively correlated to customer satisfaction among IBBM's corporate clients. However, only four factors, namely, competence, credibility, accessibility and tangibles have significant effect on customer satisfaction. Therefore, the management of IBBM should focus efforts on upgrading areas of competence, credibility, accessibility and tangibles in order to continually increase customer satisfaction for continued profitability and success in training business.

Qureshi et al. (2008) evaluate the customer acceptance of online banking. Study concludes that majority of customers are accepting online banking culture because of many favorable factors, usefulness, security and privacy are the main perusing factors to accept online banking system in Pakistan. The other factor is amount of information which is provided to the customers by different means like advertisement through print and electronic media. This information is useful in customer acceptance of online banking in Pakistan. These factors have a strong and positive effect on customers to accept online banking system. Online banking system is getting appreciation in different parts of the country due to which almost 50 pc of the customers have shifted from traditional banking system to online banking system.

Ramalingam (2008) studies the usage pattern of credit card holders of SBI, ICICI and ABN banks of Kanchipuram town in Tamil Nadu. The study concludes that higher income group and married persons utilize the cards to the maximum mainly for impulse purchases due to convenience. Citibank cards are more popular because of dominance in advertising. The study also reveals that Master and Visa cards are the leading card brands in India and
suggests the banks to improve overall functioning to provide satisfied credit card services.

**Uppal (2008)**[^1] analyzes the quality of e-banking services in the changing environment. The sample size of bank customers is 25. The data is collected through pre-tested and well structured questionnaire in Ludhiana, Punjab in May 2006. The study concludes that the customers of ebanks are satisfied with the different e-channels and their services in the spread of ebanking services. It also suggests some measures to make e-banking service more effective in the future. The present study is mainly concerned with the Indian banking industry in general and particular those banks that are producing service through e-channels i.e. ebanks.

**Laxman et al (2008)**[^2] examined that banking industry is undergoing a paradigm shift in scope, content, structure, functions and governance. Their very characters, composition, contour and chemistry is changing. Information and communication technology revolution is radically and perceptibly changing the operational environment of the banks.

**Vanniarajan and Nathan (2008)**[^3] compare the SERVPERF scale on various service quality factors and analyze their impact on the customer’s satisfaction. A systematic random sampling technique is adopted. The findings of the study identify the reliability, responsiveness, assurance, tangibles and empathy as the various service quality factors. The study shows that there are significant variations regarding the respective effects of these observed dimensions on satisfaction and that satisfaction leads to different types of behavioral intentions. Providing reliable banking transaction with promises of reliability, responsiveness and assurance seem to be most appealing service criterion to the target consumers.

**Murali et al. (2008)**[^4] evaluate consumer perceptions on quality of e-services and Internet banking adoption in Malaysia. The data is collected from 150 retail banking customers of the Klang Valley area. Results show that Internet banking users and non-users have different expectations towards e-service quality preferences. Not all of the dimensions are preferable by the


respondents. The study also discusses implications and recommendations to improve Internet banking service quality in Malaysia.

Chandrasekhar et al. (2009) found that it has been the practice in the Indian Banking Sector to apply the usual accounting ratios and conventional performance measure to evaluate the impact of IT. These approaches are deemed inadequate and non-representative, in as much as they do not link the input to business output in any meaningful way. As a result, the contribution of IT to business has remained elusive and hence a topic for heated debate. IT functions in banks, on their part, have been coming up with metrics which indicate to an extent a measure of their own efficiency or productivity than of IT parse. To exemplify, metrics such as number of branches partially or fully computerized as a percentage of total, percentage number of branches net worked or migrated to a core (centralized) banking solutions, number of ATM installed or migrated to networked mode as a percentage of number of branches, standard applications computerized out of total are put forward as indicators of the extent of adoption and percolation of IT.

Kekre (2009) pinpointed that the most significant development in ATM market this year was much awaited RBI guideline in April 2009 that made ATM transactions free of charge across all the banks. While the initial speculations were that these guidelines might lead banks to rethink their ATM footprint, the growth figures proved otherwise, indicating that banks are now more bullish than ever about tapping the under-banked segment. And according to experts, ATM will continue to play a significant role in these broad objectives of inclusive banking that RBI has laid forth.

Abdullah et al. (2009) study the influence of service and product quality towards customer satisfaction. 149 respondents from one of the well known hotels in Kuala Lumpur, Malaysia are selected as a sample. Psychometric testing is conducted to determine the reliability and validity of the questionnaire. The study finds positive significant relationship between place/ambience and service quality with customer satisfaction. Although, relationship between food quality and customer satisfaction is significant, it is in the negative direction. Future researchers can concentrate on determining
attributes that influence customer satisfaction when cost/price is not a factor and reasons for place/ambience is currently becoming the leading factor in determining customer satisfaction.

Aktan et al. (2009)\textsuperscript{90} examine the usage of internet in Turkey to make a basic due-diligence investigation for the financial institutions, including banking, stock trading, insurance and provision of financial information over the period 2005 and 2008. The findings show that internet usage in Turkey with its young population has continued to grow dramatically in financial services in terms of customers and financial transactions of various natures.

Dhekra (2009)\textsuperscript{91} aims to check whether the current and prompt technological revolution altering the whole world has crucial impact on the Tunisian banking sector. On the basis of empirical analysis, the study concludes that panoply of factors is affecting the customers’ attitude toward e-banking. For instance age, gender and educational qualifications seem to be important and they split up the group into electronic banking adopters and traditional banking defenders and so, they have significant influence on the customers’ adoption of e-banking. It also shows that despite the presidential incentives and in spite of being fully aware of e-banking benefits, numerous respondents are still using conventional banking. Fear of loss because of transaction errors or hackers plays a significant role in alienating Tunisian customers from online banking. Finally, the study highlights limitations and suggests some research perspectives.

Ganesan and Vivekanandan (2009)\textsuperscript{93} describe a secured hybrid architecture model for internet banking using Hyper elliptic curve cryptosystem and MD5. This hybrid model is implemented with the Hyper elliptic curve cryptosystem (HECC) and performs encryption and decryption processes in an efficient way merely with an 80-bit key size. Various screen shots given in this contribution show that the hybrid model which encompasses HECC can be considered in the internet banking environment to enrich the privacy and integrity of the sensitive data transmitted between the clients and the application server.
Hua (2009) investigates online banking acceptance in China by conducting an experiment to investigate how users’ perception about online banking is affected by the perceived ease of use of website and the privacy policy provided by the online banking website. 110 undergraduate students in Chinese University are involved in the investigation. The study finds that both perceived ease of use and privacy policy have a significant impact on user’s adoption of online banking. The study also investigates relative importance of perceived ease of use, privacy, and security. Perceived ease of use is of less importance than privacy and security. Security is the most important factor influencing user’s adoption. The study also discusses the implications of these results and limitations.

Ismail et al. (2009) explore the relationships among service quality features (responsiveness, assurance, and empathy), perceived value and customer satisfaction in context of Malaysia. The empirical data is drawn from 102 members of an academic staff of a Malaysian public institution of higher learning using a survey questionnaire. The results indicate that the interaction between perceived value and responsiveness is not significantly correlated with customer satisfaction, the interaction between perceived value and assurance also does not correlate significantly with customer satisfaction and the interaction between perceived value and empathy correlated significantly with customer satisfaction. Thus the results demonstrate that perceived value has increased the effect of empathy on customer satisfaction, but it has not increased the effect of responsiveness and assurance on customer satisfaction.

Janson (2009) analyzes the consequences of major instability introduced by internet banking on the bank’s ability to manage a liquidity crisis in Northern Rock Bank. The study shows that inconsistency of the Bank of England policy lead to the initial bank ruin and that because it persist in that direction it further lead to the bank’s bankruptcy. Internet banking does not cause the failure of the bank but it certainly accelerates the fall of the bank which calls for a greater consistency of the central bank role as a lender of last resort. The study concludes that despite the existence of lender of last
resort and deposit insurance scheme, market participants and individual depositors in particular do not like confusing messages during uncertain times.

Kambl et al. (2009)\textsuperscript{97} aim to identify online service quality dimensions that facilitate the customer satisfaction for e-travel and e-mart online retail. Further, they evaluate how well these dimensions are perceived by the customers so as to provide an objective measure of service performance. Ten e-service quality dimensions are identified and the extent to which current online retailers provide online service attributes are analyzed to be low or moderate on most of the dimensions for both e-travel and e-mart service providers. The model tested for relationship between the service quality dimensions and customer satisfaction is also found to be correlated at a low level.

Oghenerukeybe (2009)\textsuperscript{98} describes a user study performed to investigate user's perception of factors influencing the effective implementation of existing SI objectives and to evaluate the effectiveness of SI in banking web browsers using the Communication-Human Information Processing Model (C-HIP) model, a model proposed by Wogalter in 2006 in the field of warning sciences. Findings reveal that SI is not very effective at alerting and shielding users from revealing sensitive information to spoofed sites. 27 pc participants do not understand the full meaning of the SI noticed in the banking sites while the attention of some users is not captured enough, for they ignore the warnings completely. Even with the presence of SI, 18.3 pc participants still go ahead to submit sensitive information. These outcomes may help the management of banks develop effective security strategies for the future of electronic banking in Nigeria.

Rao and Tiwari (2009)\textsuperscript{99} study the efficiency of 5 public sector banks selected on the basis of deposits size in 2005. The study concludes that all employee efficiency factors have insignificant influence on deposits, assets and advances, from branch efficiency, only operating profits per branch and from operating efficiency, cost of deposits have significant and positive impact. Liquidity influencing factors and ultimate profit factors do not influence deposits, assets and advances significantly although all profit factors have
negative effect. The study also suggests some measures to improve efficiency.

Riquelme et al. (2009) identify those customer service and online attributes predict overall satisfaction, determine that if satisfied customers use more online banking features than less satisfied customers and the characteristics of less satisfied customers. The sample of 185 customers is drawn from one of the main banks in Kuwait, the Middle East and multiple regression and discriminate analysis are used to analyze the data. The findings suggest that satisfaction can be generated by improving courtesy, content, timeliness and product and services offered. Majority of the customers in the sample are satisfied or very satisfied with the service and online systems attributes. The study explores that companies that offer a wide product portfolio and relevant website content accompanied by prompt and courteous response create satisfaction online.

Thulani et al. (2009) explore the extent of adoption and usage of internet banking by commercial banks in Zimbabwe. The study concludes that while majority of banks in Zimbabwe have adopted internet banking, usage levels have remained relatively low, as not many customers are using this innovation. Compatibility with existing legacy systems, cost of implementation and security concerns are the challenges faced by banks in the adoption of IB. The implications of the study are that banks in Zimbabwe should vigorously promote the usage of IB among customers while Government and the Reserve Bank of Zimbabwe should increase investments targeted at infrastructure development so as to encourage banks and individuals alike to adopt the innovation.

Uppal (2010) studies the extent of mobile banking in the Indian banking industry during 2000-2007. The study concludes that among all e-channels, ATM is the most effective while mobile banking does not hold a strong position in public and old private sector but in new private sector banks and foreign banks m-banking is good enough with nearly 50 pc average branches providing m-banking services. M-banking customers are also the highest in ebanks which have positive impact on net profits and business per employee of these banks. Among all, foreign banks are on the top followed by
new private sector banks in providing m-banking services and their efficiency is also much higher as compared to other groups. The study also suggests some strategies to improve m-banking services.

**Uppal (2011)**\(^{102}\) concludes that transformation is taking place almost in all categories of the banks. This transformation will be helpful to cope with new economic and financial policies of the banks. IT is playing a crucial role to create the drastic changes in the banking industry particularly in the new private sector and foreign banks. The private banks take a big share of cake; Public sector banks are still lagging behind regarding the various financial parameters. The immense opportunities are also available for the public sector banks if they change/modify and adopt new policies to combat different recent challenges. It can be concluded that mere introduction of IT alone will no be sufficient to bring necessary performance improvement and to get the competitive edge. Intelligent people are required to use such intelligent tools. Thus, even though IT management is a challenge in future banking scenario, marketing not technology is going to be the challenge.

**Gulati (2011)**\(^{104}\) reported that a weak ownership effect on the performance of banks since the efficiency differences between public and private sector banks are not statistically significant. A change in the orientation of PSBs from social objectives towards an accent on profitability may be the main cause of observed weak ownership effect. We also note that the differences in overall technical and pure technical efficiencies are statistically insignificant among the banks belonging to different size classes. However, some statistically significant differences among large and medium banks, with regard to scale efficiency, have been noted. The results of Tobit analysis reveal that (i) the exposure to off-balance sheet activities is the most influential determinant of overall technical efficiency; and (ii) the profitability has a strong link with the overall technical efficiency of banks.

**Uppal (2011)**\(^{105}\) indicated that a widening gap between the desirability and availability of the service quality parameters in banking industry. This gap between desirability and availability is an alarm bell for some banks, particularly, the public sector banks. Bridging of this gap is the need of the hour. The analysis of this study is very useful for the banking industry as well.
as for other organizations. Due to the problem of space, separate analysis of responses gender-wise, age-wise, and occupation-wise and bank group wise has not been shown in the paper. Due to the same reason, chi² test is not shown in the analysis. Only three banks working in Chandigarh are taken due to shortage of time. The analysis is based on the responses of customers.

Uppal (2011) found that public sector banks have improved their financial position but they still these banks need many changes. To make them world-class in the era of competitive environment, five factors are important to consider, vision, values, innovations, leadership and social commitment. These can convert the challenges of public sector banks into opportunities. On the basis of some important parameters of efficiency, paper concludes that among the Indian banks, efficiency of new private sector banks is quite high, but foreign banks have even edge over new private sector banks. New private sector banks are competing with foreign banks with continuous improvement in their performance. But our public sector banks should make effective, innovative policies/strategies to compete with foreign banks if they want to survive in this emerging competitive environment.

Uppal (2011) concluded that information technology in the banking industry has revolutionized the banking services. It is cost effective and time saving. It can be seen that in banking industry the productivity and profitability has improved in post-ebanking period as compared to per-e-banking period, but Still Indian banks have less profitability as compared to foreign banks. Indian banks are ready to enter the foreign markets. Therefore, the Indian banking industry adopts new revolutionary changes. This will be true of the financial service industry because the revolutionary change will come in the financial industry eventually. Successful organizations in such scenario will be ones who have future thinkers those which can think for ahead and constantly challenge the assumption about the future

Dhingra (2011) has on the basis of review of literature identified methods of measuring IT effectiveness in banks of India. There are at least five different types of approaches in the literature that have been employed in measuring IT effectiveness. Of those, three are econometric approaches i.e. stochastic frontier approach (SFA), distribution-free approach (DFA) and thick
frontier approach (TFA), which are parametric, and two linear programming approaches which are nonparametric i.e. data envelopment analysis (DEA) and free disposal hull (FDH). Most of the studies on banking have used either SFA or DEA approach to calculate the effectiveness. Advantages and disadvantages of each method are also discussed in the paper.

A group of studies undertaken by Roy (1996), Khandelwal (2006) and chakraborty (2006) advocated that value of brick and mortar banking continues to be cherished by customers, suggesting the centricity of emotional connect in the banker-customer relationship. Branches will continue to remain important and serve existing and potential customer. It is for the customers to decide what type of banking they need. As banking is all about relationship, it is hardly conceivable that technology can totally be a substitute for human interface.

Another set of studies conducted by Roy (1996), and Rajneesh De and Padmanbhan (2002) revealed that traditionally public sector banks are closer to their clients and they are available at every doorstep of Indian towns and villages. Therefore, this link cannot be easily dismantled even if the technology is being put in place. This is a matter which needs a very conscious decision on part of the public sector banks, as to which areas of banking activities can be carried out through impersonal channels.

The studies undertaken by Gupta (2001) and Ghose (2008) emphasized that the platform chosen or development of banking solutions for the rural populations should be done keeping the customer perspective in view i.e. the customer value addition in terms of ease of use and affordability and a viable business case.

Studies of Khanna (2007), Kalyasundar (2007) and Sehgal (2008) inferred that with the implementation of care banking solutions, the banks are able to render basic banking services including account enquiry, cash withdrawal, statement of account, etc. through electronic delivery channels in 24x7x365 mode.

Further group of studies such as O'Connell (1996), Mahabharat (2000) and Prayag, Anjali and N.S. (2003) observed that internet banking is not so
popular in India because there is no proper connectivity and software available for the people.

Jeevan (2000) and Karbin (2001) highlighted that the technologies have changed the face of old banking. Now, banking is an independent and open industry. It provides services in an open competitive environment on a global scale.

A group of studies undertaken by Cronin (1998), Denny (2007), Vignestem (2000) and Vij (2000) inferred that in any new venture there are setbacks in terms of issue of security and associated costs. As a consequence banks are working towards rectifying these shortcomings so as to take full advantage of the digital revolution. With institutions becoming more and more global and complex, the nature of risk in the international financial system has changed. Though the Indian government has announced the cyber-laws, most corporates are not clear about them and feel that they are insufficient for the growth of e-banking and e-commerce. Lack of consumer protection laws is another issue that needs to be tackled, if the people have to feel more comfortable about transacting online.

Studies of Jayadev (2001), NASSCOM (2001), RBI (2001) revealed that India is still in early stages of internet banking, growth and development. Various other concepts such as digital signatures, certifications, storage of information in a secure and tamper-proof manner assume significance and will be part of practices and procedures in the day to day functioning of the banks in future. With increased dependence on technology, the need for information system audit also assumes significance coupled with the availability of skilled personnel not only for implementing technology but also for manning such technology based activities and conducting audit thereof.

Jeevan (2002) and Satyam (2003) stressed that in India the IT infrastructure is very much poor. There should be particular hardware, operating system, communication protocol to support various channels.

The studies undertaken by Ghose (2008) and Qureshi (2008) and Uppal (2008) advocated that the customers of e-banks are satisfied with the different e-channels and their services in the spread of e-banking services.
Technology initiatives can serve as allies in this matter and enable banks to reach population groups which were denied the benefits of banking until now.

Hugar (2008) and Kalyansundar (2007) revealed that the new millennium has ushered in large scale technological advancement in the Indian sector. With the advent of new generation private sector banks having the latest technology, other banks have also started upgrading their technology to those levels. The study also suggests adopting CRM by public sector banks to stand strong in the competitive environment.

Another set of studies conducted by vanniarajan (2008) and Murali (2008) highlighted that Internet banking users and non-users have different expectations towards e-service quality preferences. Providing reliable banking transaction with promises of reliability, responsiveness and assurance seem to be most appealing service criterion to the target consumers.

Studies of Aktan (2009) and Azouzi (2009) inferred that panoply of factors is affecting the customers' attitude toward e-banking. For instance age, gender and educational qualifications seem to be important and they split up the group into electronic banking adopters and traditional banking defenders and so, they have significant influence on the customers' adoption of e-banking. Internet usage in Turkey with its young population has continued to grow dramatically in financial services in terms of customers and financial transactions of various natures.

Further group of studies such as Hua (2009), Kamble (2009) and Ismail. (2009) observed that that perceived value has increased the effect of empathy on customer satisfaction, but it has not increased the effect of responsiveness and assurance on customer satisfaction. Perceived ease of use is of less importance than privacy and security. Security is the most important factor influencing user's adoption.

Another set of studies conducted by Rao (2009), Thulani (2009) and Riquelme (2009) explored that companies that offer a wide product portfolio and relevant website content accompanied by prompt and courteous response create satisfaction online. There should be more investments in
infrastructure developments so as to encourage individuals to adopt the innovation.

KeKre (2009) and Uppal (2010) found that ATM will continue to play a significant role in these broad objectives of inclusive banking that RBI has laid forth. The study concludes that among all e-channels, ATM is the most effective while mobile banking does not hold a strong position.

Dhingra (2011) and Chandrashekhar (2009) in their studies advocated that it has been the practice in the Indian Banking Sector to apply the usual accounting ratios and conventional performance measure to evaluate the impact of IT. These approaches are deemed inadequate and non-representative, in as much as they do not link the input to business output in any meaningful way. There are at least five different types of approaches in the literature that have been employed in measuring IT effectiveness. Of those, three are econometric approaches and two linear programming approaches.

From the above analysis, it is found that all these studies have focused their attempts on the following areas: -

- Ignorance of rural sector.
- Poor infrastructure as a main problem in growth of technologies in banking.
- Core Banking.
- Comparative study of public sector and private sector banks.
- Security issues in transacting business through e-banking.
- Offers low cost, high value added financial services.
- Implementation of standard for secure electronic transaction.
- Digital revolution.
- Importance of technological banking as well as human banking.
- Availability of Internet.
- Different types of services provided by banks.
Keeping in view the above considerations, there is a need to undertake a study which could examine and evaluate the impact of adoption and diffusion of modern technology in the banking industry.
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