Chapter – 2

Review of Literature
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Review of Literature

2.1 Introduction

Information and Communication technology is a very powerful tool in today’s world for all round development. ICT revolution is putting India on the growth path. Banking Sector in India has picked up the magical wand of ICT tools to provide attractive services to its customers and also to enhance the business opportunities. The literature Collected pertaining to the present study area reflects that ICT is a key factor to bring Considerable changes in Urban Cooperative Banks and Commercial Banks in India. This review has enabled to search the existing facts. The review has also helped to find new directions of the Study and to interpret it with new thoughts and ideologies. Therefore, this Chapter highlights a good number of National and International studies mentioned below.

2.2 Reviews related to ICT and Development

ICT has become an integral part in the modern scenario. ICT strategy is used in a variety of sectors to achieve success. The latest technological tools are showing brighter parts of development. Many Research articles and studies have thrown some lights on this concept.


John.D.C. Little (1990) Stated that ICT affects marketing strategies in different ways with the latest technology organizations to reduce their operational costs and enhance their markets. There is a positive relationship between the size of the market and ICT infrastructure in any Economy.

Bresnahan and Trajtenberg (1995) in their study “General Purpose of Technologies; Engines of Growth” explained the relationship between ICT tools and
Productivity. According to them, technologies can be applied to production processes. It allows organisations to innovate new products/services and ICT acts as an important factor to increase the productivity of labourers in the economy.

Lehr and Lichtenberg (1999) in their study “Information Technology and its Impact on Productivity” found that ICT enabled services in life Insurance firms and other financial institutions had enhanced the performance and increased the productivity of staff. ICT tools have better coordination with the growth of Insurance Sector.

Black and Lynch (2001) conducted a survey by taking 600 US Manufacturing firms between 1987 and 1993 and they found that in all these manufacturing firms in the US economy. In their paper “Modeling Customer Choice Of Distribution Channels: An Illusion From Financial Services” found that employees were comfortable with ICT Strategy and after the adoption of computerized tools in the units the productivity of the workforce increased and Employees felt relaxed and stress free. There Employees had higher productivity level.

Warana a ‘wired village’ project 2002 in the state of Maharashtra is the best example of ICT and development model. Warana which is located 30kms North West of the city of Kolhapur has the Main occupation of sugar cane growing. But poverty and low productivity made the villager’s Condition worst. Then the project in 2002 was made ready to provide a Wide range of Information and services to 70 villages around Warana. The Project was launched in 1998 with collaboration of National Informatics Centre (NTC) The Government of Maharashtra & Warana group of Cooperatives local Cooperative society started using ICT to connect sugarcane growth to provide them a loan and market facilities. The Project became Successful. Today Warana is a well developed rural area. There is hundred percent computerisation in the village. Therefore, the village is called ‘Wired Village’.

Devaraj and Kohli (2003) in their study “Information Technology Pay Off In the Health Care Industry” found that ICT in hospitals helped in many ways to provide better services.

- To maintain records on E-File.
- To provide quicker information to patients.
- To apply Hi-tech applications.
To avoid delays in providing reports to patients.

To analyse the impact of IT in health sector they took the help of financial and non-financial institutions in India.

Bob Keefe (2004) explained the tribal digital village project in southern California in his paper “Use of Electronic Technologies to Promote Community and Personal Health for Individuals Unconnected to Health Care Systems”. The project has helped the village to have a fast wireless broadband service. With this project youth in that region has got a better education and job opportunities. An effort has been made to develop the health care system with the help of ICT tools to provide cost saving services to people.

Ryan Wells and Susan Wells (2007) explained that ICT solutions in secondary schools in Uganda had helped to build bridges across the digital divide in their paper “Challenges and Opportunities in ICT Educational Development: A Uganda Case Study”. To provide quality Education and Information for students of Uganda People used technological resources. ICT project passed through transitional periods and many challenges had to be faced.

Giedre and Dalia (2009) in their study “Development of Children’s Communicative Competence Using ICT Practical Training Example in Primary Schools” addressed the issue of integration of ICT drama and language for the development of children’s communicative competence in their paper. According to them ICT acts as a promoter of education and in order to use new methods of teaching ICT application must be used.

Chrisanthi Avgerou (2010) “Discourses on ICT and Development” in his study Opined that ICT innovation contributes to development. ICT is subject to progressive transformation. It brings Socio-economic development. It empowers the life style of people and cultural as-well-as Social integrities are possible.

Mahmud A.J, Olandre, Exiksens. S and Haglund B.J (2013) in their study “Health Communication in Primary Health Care – A Case Study of ICT Development for Health Promotion Supported ICT in Public Health Care Centre” They applied multi – methods approach to know the importance of ICT in health care and
this is the most important challenge in developing an ICT supported health communication channel for promoting health services successfully.

2.3 Reviews related to ICT and Commercial Banks

Core Banking Solution and other Banking services in the banking sector have helped Banks to come out of conventional atmosphere to cling to modern approaches. Increased IT spending in Banks has helped to enhance both quality and productivity. RBI has also taken bold steps to implement ICT in Banks.

Alpar and Kim (1990) investigated how the demand for inputs has changed with the use of ICT in the Banking sector. According to them Introduction of Technological tools has helped Banks to reduce operational costs.

Frischtase (1992) studied the Brazilian Commercial Banks. His study findings are:

- Commercial Banks with ICT application found high productivity
- IT improved the customer base in the Banks
- It avoided operational cost in the branches

The outcome of the study showed that the use of computer systems benefited Banks in Brazil.

Harold and Jeff (1995) stated in their study “Don’t Let Technology Pass you by” that Banking institutions come out of traditional operating practices, they have to apply ICT tools. It also helps banks to become more competitive and stronger. He also found that during his period in Nigeria senior managers in Banks failed to grasp the significance of technology cater they included them in their strategic plans.

Khalite (2000) opined that ICT in Banking business facilitates the automation of Banking services. Using computers, software packages, telecommunications, etc. helps the Banking industry to quest for new financial products/services.

Agboola (2001) in the study “Information and Communication Technology in Banking Operations in Nigeria: an Evaluation of Recent Experiences” found the impact of technological innovation in the Banking industry and he also discovered that E-Banking has brought tremendous improvements in services of Banks in Lagos. He took only six Banks and made a comparative analysis between old and new generation Banks.
and restricted his study to Commercial Banks of Lagos and he found that old generation Banks were lagging behind in accepting automation in their Banking services. He also used three categories of variables for his study

- Adoption of innovative technologies
- Degree of utilisation of available technologies
- Impact of ICT tools on Banking services.

Vij madhu (2003) in his study “The New World of Banking: a Paradigm Shift” conducted a study on Indian Banks and ICT tools. He made a comparative study of the three Private Sector Banks namely ICICI Bank, HDFC Bank and IDBI Bank and he concluded that future challenges of Banks have to be faced with the help of technological advancement and he also suggested the following strategies.

- Development of advanced technological tools,
- Innovation of new products and services.
- Strategic alliances.
- Setting up of an effective software system for Banks.

He also found that the changing profile of Indian Banks has helped to win our competitive edge.

Hebbar Ravindranath (2004) in the study “Building Trust in E-Banking” explained that advanced technology has revolutionised the financial sector but some issues related to ICT strategy in Banking sector have to be addressed they are:

- Are ICT strategies reliable and accurate?
- Non repudiation (Denying ICT service)
- Confidentiality
- Integrity

He explained that Banks are developing IT delivery channels like ATM, Tele-Banking, Net Banking, etc. But he opined that the above issues need to be answered. Security has become an important issue in E-Banking services.
Nickerson & Sullivan (2004) in the study “Financial Innovation, Strategic Real Options and Endogenous Competition: Theory and an Application to Internet Banking” found that Banks are coming forward to adopt Internet Banking because.

- Customers are demanding new technology
- To increase profitability
- To avoid delays in transactions
- To face cut throat competition

They also stated that the Internet Banking application has positively affected the business activities in Banks.

Beccalti (2007) found that investment on hardware and software in European Banks has a Positive impact on the performance and profitability of these Banks.

- ICT helps to increase the overall efficiency
- It minimises operational cost
- It enables financial institutions to face business environment challenges.

The author has analysed the investment scenario of banking business with advanced technology. He also tried to identify the various factors that affect the performance of Banks. They are:

- Safety deposits
- Interest rate
- Product innovation
- Market size

According to him ICT strategy indirectly has influenced the capability of Banks in Europe.

Abdullah Kammani (2011) in the study “Technology Adoption and Indian Consumers- A Study on Mobile Banking” examined the impact of net Banking adoption in the banking business. He also advocated that net Banking is considered to be the key factor for bringing benefits to Banks. Anywhere and anytime Banking services can be provided only with this modern technology and it is said that net Banking ensured profitability & reduces cost of transaction.
N. Jamaluddin (2013) explained that E-Banking growth and development have facilitated Banks to face challenges and created opportunities in the study “E-Banking: Challenges and Opportunities”. He made an attempt to understand the experience in providing E-Banking services of Banks in India. He opined that ICT tools are becoming popular in India and he found opportunity for E-Banking services in India. They are:

- Back office processing
- Data mining
- Customer relationship management
- IT networking

He found in his survey that during 2010-11 7% of account holders in Indian economy were using internet Bank.

2.4 Reviews related to ICT and Urban Cooperative Banks

ICT strategy is also changing the business environment of cooperative Banks. Cooperative Banking Sector is also realising the fruitful results of latest technology. They are also coming forward to be modern Banks and attracting new generation customers.

Juagle V. B (1997) studied the cooperative credit institutions and technological impact. He opined that to improve their performance cooperative Banks need to adopt modern technology.

- It increases transparency in the Cooperative Banks
- It provides faster services
- It avoids the barriers of growth
- It enables cooperative Banks to be stronger and more competitive

Most of the Cooperative Banks are characterised by lack of professional management, Complexity and ambiguity. ICT helps these Banks to be competitive.

Mishra A. K. (2003) in the study “Internet Banking in India” examined the relationship between the satisfaction of customers of urban Cooperative Banks and advanced technology. He suggested that UCBs need to take care of customer requirements and branches of UCBs. He endorsed the use of modern technologies in Urban Cooperative Banks.
Jadhav Anil (2004) discussed the various E-Banking services such as:

- ATM Services
- Tele-Banking
- Mobile Banking
- Net Banking

In his study “Status of E-Banking in India”, he focused on three important aspects in his analyses:

- E-Banking Opportunities
- E-Banking Challenges
- E-Banking Security aspects

He took Banking sector at the macro level for his study and some observations they are as follows:

- None of the cooperative Banks at that time were not offering E-Banking Services
- Very few public sector Banks adopted IT solutions
- Private and foreign Banks were fast in adopting new technology.

He Supported ICT solution to Cooperative Banks because the ICT model affects positively the profitability of Cooperative Banks.

Jhamtani et. al. (2004) conducted a study to examine the performance of ICT projects in India. These projects were made to improve the delivery of information to farmers and other rural people with Cooperative Societies. Especially in Maharashtra state Rural Cooperatives are eager to adopt ICT tools to expand their services to growers.

Edwin raj (2005) in the study “Information Technology: The Emerging Driving Force in Cooperative Banks” described the role of ICT in Cooperative Banks. He opined that with the help of technological innovations Cooperative Banks need to change their

- Vision
- Mission
- Strategy
- Governance
He also stated that very few states like Maharashtra, Gujarat, Karnataka and Goa are leading in computerization and said Computerisation of Cooperative Banks as compared to state and district cooperative Banks are leading in ICT implementation.

Prasad (2005) in his study “Cooperative Banking in a Competitive Business Environment” explained that technology is posing many opportunities in the Banking sector. Cooperative Banks are no exception to this new trend. Cooperative Banks are subject to many drawbacks. Therefore, Cooperative Banks need to face challenges. The best combination of latest technology and credit policies help cooperative Banks to manage risks.

Hesse. H. and M. Cihak (2007) wrote a working paper titled “Cooperative Banks and Financial Stability” clearly stressed the need for IT tools in cooperative Banks. Because cooperative Banks at all levels are reaching gross root levels in the Country, Banks to have high profile and to Banks there is a need to adopt ICT applications successfully.

Survey (2007) conducted by saral services, Hyderabad as part of Engineering and Physical Science Research Council (EPSRC). The survey examined the usage of ICT at different levels of cooperative Banks including head offices (HO), local branches and field staff and micro finance institutions. It was found that micro finance institution and DCCBs had applied ICT tools, but as compared to microfinance institutions DCCBs were lagging behind in adopting ICT strategy at all levels.

B. Muniraju sekhär and DR. B. Sudheer (2012) found in their study “Core Banking Solutions in UCBs –Issues and Challenges” found that technology laggard UCBs have come to know the importance of ICT tools to provide favourable environment board of members and management being decision makers need to frame definite time frame to use these new business parameters of course deployment of computer based technology in UCBs is not an ordinary task. They too have some financial constraints. Hence UCBs need to redesign their strategies to incorporate modern technology in their business activities.

Dr. Martuti Rao and Mrs. Jyoti Biradeir (2013) stated in their study “ICT Practices of Banks: A Study of Cooperative Banks in Belgaum, Karnataka” that many of the employees and management team of Belgaum district were unaware of the E-
Banking services available to Cooperative Banks. Even Banks did not have their own websites like other Commercial Banks. The respondents were not aware of the E - Pass book, Internet Banking, Mobile Banking, Credit Cards and RTGS Services. Therefore, it is stated that Cooperative Banks are still lagging behind in accepting and installing modern software.

2.5 Reviews Related to Customers and Employees in Banks

Customer satisfaction is a crucial factor in the development of the banking sector. Rapid technological developments have attracted customers. Customers are also keen on using ICT – Based services, most of the customers feel happy and prestigious in using them because latest technology provides convenient and quality services.

Loudon (1991) opined in his study “Business Information System: A Problem Solving Approach” that Introduction of ICT tools makes the Banking sector strong enough to operate in a complex and competitive environment. Therefore, He argued that the managers and employees of Banks should not ignore the role of ICT in the organisation ICT influences the Banking industry to customers prefer ICT based services because the transaction does not need the physical appearance of customers in the Banks.

M. C. Kendrisk (1992) conducted a survey by taking 31 Indonesian Commercial Banks. He argued that an automation in these Banks did not improve the financial performance between 1980 and 1987 but it improved customer service. Customers felt comfortable by utilising ICT based services and it also increased employees’ satisfaction in the study area.

Rugimbana (1995) found that people are very much comfortable in using mobile phones and other telecommunications. Therefore, He advocated that anywhere, anytime services could be tagged with modern technological tools. Customers would be ready to use new access methods for banking services.

Meuter (2000) in his study “Self Service Technologies: Understanding Customers’ Satisfaction with Technology Based Service” dealt with two important aspects such as,

- Customer Satisfaction
- and
- Customer Dissatisfaction
The study identified that technology based services have helped Banks to sweep out the risk factors of customer dissatisfaction and he also advocated that Banks by increasing security measures are targeting to increase their customer base.

Wohern (2000) explained that Banks in Nigeria applied ICT to improve their payment and delivery systems. The Banking industry in Nigeria with the help of ICT has witnessed tremendous changes. Management and employees were comfortable with these latest technological advancements in their Banking business operation.

Aladwani. A.M (2001) in his study “Online Banking: A Field Study of Drivers” development challenges and expectations found in his study that ICT practices in Banks have made Banking services faster, easier and reliable for customers and has increased competitive spirits among employees in Kuwait. This trend has enhanced the efficiency and satisfaction level among labour forces.

S. Balasubramanya (2002) Stated in his study “IT Wave Breaks over Banking, THE CITY” that the Banking sector in India is entering into the new world and changing the face of the Banking sector. It has revolutionised the Banking industry in a big way. During his study period he found that very few Banks come under the coverage of automation. ICT has helped Banks to increase customer base, productivity and profitability. He made some Observations:

- When Banks adopt technologies it ensures continued customer service.
- It meets customers increasing demand.
- Banks need to give priority to the safety of customers.
- Employees feel comfortable to use this advanced technology
- Employees with stress can work in their place

A wide scale of information technology services aim at satisfying the growing and changing needs of customers.

Allen. N. Berger (2003) in his study “The Economic Effects of Technological Progress: Evidence from the Banking Industry” examines the impact of technology on the Banking sector of USA. According to them the innovations in telecommunications and technology helped the strong growth in the US economy. Banks in USA significantly used financial technologies to gain maximum benefits. He also suggested some improvements in Costs due to developments in Bank office technologies and also the
front office technologies. Research strongly endorsed the opinion that progress in technology had facilitated the Banking sector to find fruitful results.

Hannan.M ,Blundell.B (2004) in his study “Electronic Crime-It’s Not Only The Big End Of Town” by taking two case studies discussed security issues involved in ICT application in Banking services. Customers of these selected Banks were afraid of these hacking and other security related issues. They also stressed an effective law enforcement to avoid such conditions in the economy.

Anantha Krishna. G. (2005) in his study “Customer Service in Banks” described that the Introduction of ATM services has helped customers to get quick and quality services and also the gap between customers and Banking officials is shrinking by adopting automation in Banks. He said that Banks are hugging technology by analysing the following four factors.

- What satisfied it’s loyal customers
- Seeking the feedback of customers
- Ensuring customer needs to be satisfied
- Improving the business parameters

According to him technology based Banking sector to achieve business goals and to ensure quality services to its customers is inevitable to any economy.

Dr. Stephen Buse and Rajanish Tiwari (2006) examined in his study “The Mobile Commerce Prospects: A Strategic Analysis of Opportunities in the Banking Sector” the role of mobile technology in financial sector both at National and International level. For this empirical survey researchers had taken 50 Banks worldwide and selected 450 customers.

Outcome of the Study

- Mobile Banking is gaining importance in various categories of people in the world
- Mobile Banking is providing good opportunities to Banks to increase their profitability
- Mobile Banking is attracting new customers and increasing the customer base

He found in the study that customers were highly satisfied with E-Banking services in the study area.
Das Kamala (2006) in his research study “Electronic Banking, 2006” has said that globalization process has made Indians to accept E-Banking tools in their Banking transactions. He has listed some E-Channels such as NEFT, RTGS, and ECS etc. and has mentioned that conventional society is turning to be the Computer saving Society. Banking sector and technology are highly correlated and offering a variety of services to its customers. But on the other hand an Author expresses his fear towards security issues involved in E-Banking services because people get in to connect with this E-Banking services and deal with large amount of money but they should not face any frauds.

Gerrard P. Cunnigham, J. B. Delvin (2006) Stated that customers hesitate to use internet Banking. In his paper “Why Customers are Not Using Internet Banking?” He found an interesting thing that customers are not fully confident in using Internet Banking because.

- Hacking
- Fraud
- Misuse of Password
- Data encryption

Therefore, Banks should give importance to the security of customer’s account.

De young et al (2007) in his study “How the Internet Affects Output and Performance at Community Banks” observed that Internet Banking is increasing the profit of Banks at a faster rate and providing quick service to customers. It is believed that net Banking has become a powerful means to improve customer service. It has also become successful in increasing market share by attracting new customers and also reducing production cost.

Milton Webb. (2008) assessed the managers and employees’ perception with reference to the impact of electronic Banking on operational efficiency and profitability of commercial Banks in Zimbabwe. He followed an exploratory research method to address the research problem. According to him E-Banking services in Zimbabwe had enhanced operational efficiency and found a significant relationship between telecommunication infrastructure and financial performance of Banks.

Rueangthanakiet Paerot (2008) advocated modern technology for Banks to fulfil the needs of their customers in his study “Members Satisfaction of Fitness Service
Quality: A Case Study of California: Wow Xperience Public Company Ltd”. When a customer opens his account in a Bank he accepts Qualitative and Quick services, Fair prices, Complaint handling process etc and they have also demand high quality services at lower charges. Customers always expect to be updated with technological tools and feel a certain level of comforts.

Uppal R. K. (2008) Observed in his study “Customer Perception on E-Banking Services of Indian Banks: Some Survey Evidence” that among all E-Banking services ATM plays an important role. It is more economical and effective than others. He also advocated that Banks should concentrate more on security measures and adopt effective strategies to provide secured ATM service centers and mobile Banking services to customers.

Akjuobi, Linus Eze (2009) in their research paper “Information and Communication Technology And Bank Performance: The Case Study of Nigerian Commercial Banks” have observed that ICT in Nigeria has a positive trend. ICT upgradation in Nigerian Banks positively correlated. Banks have made heavy investments on ICT tools. In turn, it has helped customers and employees to get maximum benefits authors have taken the study period from 1970 to 2008 and have used ‘T’ test to know the impact of ICT on both the performance of Banks and Satisfaction of Customers and employees. They found that ICT tools implementation positively correlated with the performance of Banks.

Rao N. and Tiwari S. (2009) have studied that deposits, assets and advances are not significantly influenced by employee efficiency factors, but they have significant influence on branch efficiency, operating profits per branch. According to them financial performances of branches of Banks are not positively correlated to the productivity and efficiency of employees any country.

Musara. M. Fatoki. O (2010) in their study “Has Technological Innovations Resulted In Increased Efficiency and Cost Savings for Banks’ Customers?” explained the impact of technology on the efficiency of the banking sector. They argued that technology innovations bring successful service delivery in this sector on the other hand it also brings reduction in of costs of banking transactions to Customers. The study found that the technological innovations in the banking sector have become to Customers
in Alice, South Africa. Technological advancement has reduced costs of Banking transactions and meanwhile has improved the welfare of Customers.

Sundaram & J Premalatha (2012) surveyed various Banks in Vellore district and found that

- Customers expressed that Banks should provide safety and security measures to use ATM and other E-Banking services.
- Customers prefer to use modern technologies and they feel that using new technologies to increase their prestige and status.

Krishna Murari. Bindya Tater (2014) in their study “Employees’ Attitude towards Adoption of IT-Based Banking Services – A Case Study of Indian Private Sector Banks” aimed to study the attitude of employees towards the introduction and upgradation of ICT based Banking sector. The study was conducted on Bikaner and Jaipur region of Rajasthan. 180 employees of private Banks of that region were selected. They found that ICT implementation in private Banks has reduced transaction time, improved operational efficiency in Banks, increased the satisfaction of employees and also improves employees – customers’ relationships.

Lotitya Perumal Ramalingam (2014) observed that computerisation and E-Banking services saves time and provides 24x7 Services he found five factors in his study

- Convenient
- Easy Operation
- Prestigious
- Flexible
- Confident

When customers get in touch with the advanced technology the above five factors affect transactions.
2.6 **Committee Reports Related to ICT Tools in Banking Sector in India**

Reserve Bank of India had formed various committees related to ICT tools adoption in the Indian Banking sector. RBI has taken bold measures to implement IT strategy in Banks, Various reports of committees are summarised as follows.

**Working group on MICR for Cheque processing [1982]**

Dr. Y. B. Damle, convener of the group and other members recommended that sorting and listing of cheques with computerisation process i.e, MICR technology was recommended to metropolitan cities such as New Delhi, Chennai, Mumbai and Calcutta.

**Rangarajan Committee [1983]**

The Committee for the first time highlighting the importance of computerisation and mechanism in the banking sector. It also recommended computerisation of Banks at different levels of Banks. According to this committee report computerisation in the Banking sector

- Improves customer service
- Helps in decision making
- Increases profitability
- Leads to a faster rate of growth in output

Expands employment opportunities by increasing branches of Banks Technology plays an effective role to combat the drawbacks of the Banking Industry. The committee also recommended that Banks should adopt MICR technology and staff of the Banks should be trained well.

**Sri T.N Iyer Committee [1987]**

In 1987 RBI appointed “Committee on communication network for Banks and SWIFI implementation in Banks under the chairmanship of Sri T.N Iyer.” This committee suggested BANK NET for data communication and advised to join
SWIFI (Society for worldwide InterBank Financial Telecommunication) to receive International financial message.

- **Rangarajan Committee [1988]**

  RBI again in 1988 formulated a committee under the chairmanship of Sri. Rangarajan. C. Recommendations
  - Introduction of online Banking
  - Establishing automated teller machine in Mumbai. Later on in other cities and rural areas
  - Giving more importance of MICR technology
  - Standardisation of risk free transfer of funds electronically
  - Introduction of Single all branch credit card.

- **W.S Saraf Committee [1994]**

  Under the chairmanship of W.S Saraf RBI appointed the committee on technology issues in modern Banks. The Committee recommended to electronic funds transfer system in financial institutions. It also advocated widening use of BANK NET, Communication network, Electronic clearing services, extending MICR clearing in more than 100 Banks and also stressed on establishing an institution on Banking Technology in India.

- **Shere Committee [1995]**

  RBI appointed this committee under the chairmanship of K. S Shere to study the important aspects of electronic fund transfer. The committee advocated to frame EFT under 58 sections of RBI act of 1934 and also it recommended take short term and long term measures to avoid computer misuse and develop multiple EFT system live ATM and other consumer payment systems.
**Narasimham Committee [1998]**

The committee discussed various issues related to banking sector development. It also dealt with the issues on technology introduction and upgradation in Banking sector.

**Recommendations of the Committee Regarding technology upgradation in Banking Sector**
- Electronic record keeping
- Data Protection
- Implementation of digital signatures
- Admission of electronic files

The committee observed the significance of technology in Banks. This committee also recommended certain policies to address legal issues.

**Vasudev Committee [1999]**

RBI appointed a committee on technology upgradation in the Banking sector in 1999 under the chairmanship of Sri Vasudev

**Recommendations**
- Giving importance to INFINET (Indian Financial network). The INFINET should be blended to satellite and microwave lines
- Improving V-Sat based network for both interBank and intra-Bank applications
- Outsourcing the technology and services
- Providing legal framework for electronic Banking

This committee also recommended the technology plan for Banks to work out for appropriate technology solutions.

**Mittal Committee [2001]**

RBI appointed a committee on Internet Banking under the chairmanship of Sri Mittal in 2001.

**Recommendations**
- It recommended a standing committee to monitor security issues
- Banks should use only certified solutions and products
- Banks should review their security infrastructure and policies
- Back up data should be periodically tested.

The committee expressed the view that Internet Banking acts as an important tool to facilitate customers, but some security measures need to be taken to avoid frauds and other technology related risks.

**Working group on IT support for Urban Cooperative Banks [2008]**

Under the chairmanship of Sri. R. Gandhi RBI appointed a working group on IT support for UCBs in Jan 2008.

Recommendations
- UCBs must be provided minimum levels of IT Infrastructural facilities.
  - It includes
    - Automated regulatory reporting
    - Computerised MIS reporting
    - Automatic back-end accounting
    - Computerised front-end services
- Small and weak UCBs should be supported by RBI for their IT efforts
- The core banking solution must be adopted by all UCBs
  The committee also suggested that to adopt IT tools UCBs need to be provided interest free loan repayable in 7 years by RBI.

**Damodaran Committee [2010]**

RBI in 2010 May constituted a committee on customer service in Banks under the chairmanship of Sri. M. Damadaran to study the expectations and reactions of customers regarding IT services applied in Banks. The committee received 1000 feedbacks and suggestions from customers through E-mail and messages. The committee also advocated hundred percent upgradation of advanced technology in Banks and found that customers of Banks also aspire to use.
- ATM Services
- Internet Banking
- Credit Cards
- Mobile Banking

The committee expressed the view that customers expect their Banks to be upgraded with the new technology to get prompt and efficient customer services and advised to provide a core banking solution for speedy services working group on.

Cloud Computing [2012]

The RBI set up a working group to think about the implementation of contest technology in small size UCBs. IT cell consists of senior officers of RBI, Software experts and academicians. This group suggested cloud shaped diagrammatic solution. The National Institute for Standard and Technology (NIST) proposed this cloud computing solution to increase computerisation services in UCBs with economies of scale and security concerns. Cloud computing in the banking sector brings application softwares which allows internet-enabled devices in the banking transactions.

Chart. No - 2.1 Cloud Computing

![Cloud Computing Chart](Self created chart)
• **Software as a service**
  Consumer Bank with this service provides application to end users. Here Banks have no control over network services, storage, individual application capabilities and operating system.

• **Platform as a service**
  The Bank does not manage or control the infrastructure such as operating system, storage, network services, but they have to develop, test and deploy the application.

• **Infrastructure as a service**
  The bank gets provision of fundamental computing resources such as storage, networks, processing, etc. here Banks act as a system administrator.

Under this cloud computing solution the service provider with adequate resources, hardware and software applications make UCBs strong enough to utilise these services at a fixed fee.

**B. Sambamurthy Committee [2014]**

RBI appointed MR. B. Sambamurthy Committee in February 2014 to look into mobile Banking technology in the Banking sector in India.

- Security related issues to be given priority
- Training facility providing to Bank staff
- Educating customers and providing awareness on various aspects of Mobile Banking
- Simplifying the process of M-PIN generation

The committee also suggested using multiple channels for Mobile Banking technology to maintain security issues of various committees and working groups under the chairmanship of eminent scholars. Academicians and reputed financial advisors have recommended ICT tools in the Indian Banking Sector to revolutionise the functions of Banks.
2.8 Summary

The RBI has given a free hand to develop ICT strategy in UCBs. Introduction of high tech tools in UCBs is not an easy task but this trend cannot be ignored because ICT solutions have become necessary as-well-as sufficient conditions in the Banking sector. Today Internet Banking, Mobile Banking, ATM usage and Credit card utilization are gaining momentum. E-Banking services are rapidly changing the environment of financial institutions. According to many experts. The ICT model would be the best suited model for Banking business in India. The same formula work’s out for UCBs in India.