CHAPTER-III

A BREF STUDY ON
EVOLUTION OF
TECHNOLOGY IN INDIAN
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Banking is the business of playing go-between the lenders and borrowers. It is middling or intermediation function between the savings surplus and saving deficit economic units within a society. However, before one ventures on a study of banking law and practice, it appears necessary to tackle its definitional problem. Unless its meaning and contents are understood together with its field coverage, a true appreciation of the subject will hardly be possible. Though by now it has been well settled what a bank means, there is still a wide controversy so far as its semantics are concerned. A wide range of definitions has been preferred by writers over the past two centuries but no simple, all purpose one could be given. This difficulty however is genuine and happens with almost all disciplines and subjects which are in the process of evolutionary development. In fact, a modern bank is heading towards a typical conglomerate organization having its fingers on every class of business financing. It has diversified itself into complementary areas such as merchant banking, investment credit and insurance banking. It is rightly called today a ‘department store of financing’ or a sophisticated post office. Incidentally it may be mentioned that modern banking began with the English goldsmiths of the 17th century. Earlier history apart, it was the
goldsmiths who first evolved the essential process of receiving money on deposit for a consideration and lending it at interest\(^1\).

### 3.1 The concept and Definition:

According to some writers the word "bank" was derived from "Banco", "Bancus," "Bangue" or "Banc" all of which mean a bench upon which the early bankers, viz., the medieval European money lenders and moneychangers used to display their coins and transact business across the bench, in the marketplace. According to some others the word “Bank” seems to be a derivative from the German word “Back” which means a joint stock funds. Anyhow this word has been in use from the middle ages in connection with the business of the bank.

### 3.2 Definitions:

The Bill of Exchange Act, 1882 in England says, “a banker includes any body of persons, whether incorporated or not, who carry on the business of banking.”

The Agricultural Credits Act, 1928 states that a bank includes,” any firm, incorporated company or society, carrying on banking business and approved by the Minister.”

Section 3 of the Negotiable instruments Act, 1881 says that the term “banker includes persons or a corporation or a company acting as bankers.”

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\(^1\)B.M.Lall Nigam,Banking Law and Practice,Konark Publishers Pvt Ltd,1988,p-2
Kinlay writes, “A bank is an establishment which makes to individuals such advances of money as may be required and safely made and to which individuals entrust money when not needed by them for use.”

Walter leaf says, “A bank is a person or corporation which holds it out to receive from the public deposits payable on demand by cheque”.

Horace white submits, “A bank is a manufacturer of credit and a machine for facilitating exchanges”.

It was left to the royal commission on Indian currency and finance 1925 to propose concrete ideas about a modern bank in its report it suggested that the term bank or banker should be interpreted as meaning every person, firm or company using in its description or its title bank or banker or banking and every company accepting deposits of money subject to withdrawal by cheque, draft or order.

The Banking Regulation Act, 1949 (then known as the Banking Companies Act) following more or less the above lines defines a banking company as “a company which transacts the business; of banking in India”.

According to Macleod, “The essential business of a banker is to buy money and debts by creating other debts. A banker is essentially a dealer in debts or credit.”

“A bank is an institution whose debts are widely accepted in settlement of other people’s debts to each other” R.S. Sayers

“Banks are not merely purveyors of money but in an important sense manufacturers of money” – Prof. Sayers.
3.3. History and origin of Banking:

3.3.1 European History:

Early European banking was carried on by the Jews who had to keep their possessions in a more or less liquid state because they were not allowed to hold lands. The Jews are said to have introduced Bills of Exchange in Europe which were soon discovered to be the most convenient method of transmitting money from one country to another.

European banking has a very old history, dating back from the days of Greece and Rome, where various functions known to modern banking were being performed by these ancient bankers. The Babylonians are known to have used their temples as banks as early as 2,000 B.C. and the priests acted as the financial agents until public confidence was destroyed by spread of disbelief in religion. Banking in ancient times of course, was largely confined to money, changing and money-lending as conducted in medieval times. These money lenders were busy conducting the simple operations of lending money from their own private property and also borrowing from the people in order to lend out to others.

In medieval Europe, the bankers of Lombardy were famous. Lombard a province in North Italy, boasted of a large number of prominent bankers the most prominent; of whom were the Medici, who were famous not only in banking, but also in the political history of Europe.
3.3.2 English Banking History and Development:

English banking has a very old history. In the early days of the great rebellion or civil war when the cavaliers and the round heads were fighting, people were compelled to deposit for safety their valuables with goldsmiths who had strong boxes and other arrangements for the purpose; this resulted in a regular custom for merchants to deposit also their daily taking or cash with these goldsmiths. These goldsmiths used to charge a commission for these articles bailed with them as they were not permitted to use this in their business but had to return the same. Later this custom was altered and the goldsmiths began to use this money and keep current accounts. Thus it is stated that banking in England began to grow somewhere between 1642 and 1645.

The goldsmiths, of course used the money deposited with the objective for earning a profit by lending it to business men both local and foreign as well as to the Government or crown on various securities. The crown frequently gave them the security of taxes for such loans. This gradually resulted in the goldsmiths ultimately giving up their business of goldsmiths and confining themselves that of bankers, pure and simple. The profit making possibility this type of business soon began to be noticed by others, who were not goldsmiths with the result that a number of Merchant as well as a number of firms of bankers who came out to do exclusively banking business entered the field in competition with those old goldsmiths, thereby bringing into existence the growing body of influential and private bankers all over the country.
3.3.3 Early Indian Banking History:

Banking is also of ancient origin in India. It is stated by authoritative writers that as the Vedic period say between 2000 and 1400 B.C records of taking and giving of credits is to be found. All throughout the period of Indian history money lenders who were called either Bankers, or Seth’s, or Shroffs are recorded to have existed and are stated to have carried on a roaring business in money lending and banking. The great Hindu lawgiver, Manoo, who is said to have flourished and the famous Dilwara on mount Abu, is said to have been built by two Join bankers somewhere between 1197 and 1247 A.D.

The famous French traveler, I.B Tavernier, writes in the seventeenth century that almost every village had a money changer called the shroff, who, according to him, acted as a banker to make remittances of money and issue letters of exchange.

It may be stated with regard to our ancient Indian bankers that their banking operations largely resembled those of modern private bankers in as much as they have from the earliest period been known to perform almost all the operations of the modern banker from the early Vedic period right through the mogul period as well as that of the East India company’s rule one finds evidence of their conducting business resembling that of modern private bankers.

The Mogul period is said to be distinguished for its system of coinage -coins having been struck in a large number of mints scattered over the empire. The coins were both of gold and silver, though naturally the silver coins were in larger use.
It is recorded however, that Indian Banking received a certain amount of set back during the long reign of the emperor Aurangzeb who as an orthodox Mohamedan objected to the idea of taking interest on money as being unnatural and consequently immoral and prevented his co- religionists from deriving any advantage which would be classified as interest on the investment of their capital. The imperial Treasury in his reign stopped money lending transactions. This resulted naturally in dislocation of traders and set-back to Indian Banking for a time.

3.4 Constituents of the Indian Banking System:

“It would be incorrect to categorize the Indian banking system into modern and indigenous, or into organized and unorganized sectors. If at all it has to be classified, the basis should be nothing else than functional, where its constituents are.”

1. Commercial Banks

   (a) Indian commercial Banks - Scheduled and Non-scheduled

   (b) State Bank of India and its Associates

   (c) Foreign Banks

   (d) Merchant Banks

2. Institutional Agencies of Rural Finance

   (a) Cooperative Banks

2. Ibid., p-15
3. Specialized Agencies of Industrial Finance

(a) Industrial Finance Corporation of India

(b) Industrial Credit and Investment Corporation of India

(c) Industrial Reconstruction Corporation of India

(d) State financial Corporations

(e) State Industrial Development Corporation

(f) Industrial Development Bank of India

4. Other Non- bank Financial Intermediaries

(a) Life Insurance Corporation of India

(b) General Insurance corporation of India

(c) Unit Trust of India

(d) Export- Import Bank of India
5. Post office Savings Banks

6. Reserve Bank of India

Let these be explained a little in detail

3.4.1. Commercial Banks:

Commercial banks as monopolists of the administration of payments. They are the principal suppliers of credit to the business, and the principal depository for the funnels of house holds, corporation and other institutions. As successors to agency houses, combining banking with their commercial and trading activities, they are the oldest banking institutions in India. The two basic functions of these banks consist of receiving deposits payable on demand and otherwise and satisfying the short-term credit needs of business. However, recently they have entered the medium and long-term financing too. Among the forms of advances, cash credit is most important followed by overdraft, loans and bills purchased and discounted. The following chart 3.1 represents the classification of commercial banks.
3.4.1.1 Functions of Commercial Banks:

Commercial Banks provide various services to individuals, commerce and industry. Functions of Commercial Banks are given below in the chart 3.2.
3.4.2 Institutional Agencies of Rural Finance:

In industrially advanced countries, by far the largest institutional sources of credit for agriculture are the joint stock banks. But in India it has centered round the
cooperative societies and land development banks. While the former finance the short-
term needs of the rural population, the latter specialize in catering to its medium and long
term requirements. The Institutional agencies are,

A. Cooperative Banks

The cooperative credit movement was officially launched in India in 1904 after the famous prescription of Nicholson to “find Raiffeisen”. It represents a three-tier structure- primary agricultural credit societies (PALCS) forming the ground floor, the central cooperative banks (CCBs) the middle level, and the state cooperative banks (SCBs) the top floor as the apex institutions, whereas the primary societies deal directly with individuals, the central banks deal with primaries and are in turn dealt with by the state co-operative banks. To begin with, the primary credit societies were established with unlimited liability, but now limited liability is the accepted principle as it is with central and state co-operative banks and land development banks. The below chart 3.3 clearly explains about the structure of cooperative banks.
Chart-3.3

Co-Operative Credit Institutions

Agricultural credit Institutions

Short term Credit Institutions

State Co-operative Bank

Primary Land Development Banks

Non Agricultural Credit Institution

Long term credit Institutions

Central co-operative Bank

Primary Agricultural Credit societies

State Land Development Banks
**B. LAND DEVELOPMENT BANKS:**

As their name indicates, these grant medium and long-term advances against the conveyance of land as security. The duration of such loans is generally 5 to 20 years, and their common purposes are:

i) Purchase of land.

ii) Purchase of livestock and costly agricultural equipments.

iii) Consolidation and improvement of holdings.

**C. REGIONAL RURAL BANKS:**

A development which will have a far-reaching effect on the extension of banking facilities to rural areas is the setting up of new statutory agencies known as Regional Rural Banks (RRBs). The RRBs ordinance 1975 was replaced by an Act of parliament which came into force with effect from February 9, 1976. In Terms of the provisions of this Act, the Central Government has set up till the end of June 1986, 193 RRBs covering 341 districts spread over all the states. These had in all 12,612 branches. The sixth plan programme was of 170 RRBs covering 210 districts by March 1985. The deposits and advance of 188 reporting RRBS aggregated to Rs 1,286 crores and Rs 1,408 crores respectively as on the last Friday of March 1986. Their advance to weaker section formed 92% of the total direct advances.³

³Ibid., p-29
D. Agricultural Finance Corporation Ltd:

Soon after the scheme of social control over banks was finalized, the Agricultural Finance Corporation was established on April 10th, 1968 as a consortium of commercial banks. The main thrust of the AFC’s activities is in the area of “project formulation” with special attention to backward areas and the weaker sections. For this purpose, two regional offices have been established at Calcutta and Lucknow. In view of the experience and expertise gained in the field of technical appraisal of projects the corporation emerged as a technical consultancy organization for commercial banks. It has also been decided that the corporation should not normally undertake direct loaning but endeavor to secure extensive participation of its member banks in financing agriculture.

E. Agricultural Refinance and Development Corporation:

A notable event in the field of agricultural financing was the setting up of the Agricultural Refinance Corporation on July 1st, 1963. However, inorder to reflect more clearly the promotional and development role being played by the corporation in agricultural; its name was changed to Agricultural Refinance and Development Corporation (ARDC). The Corporation essentially was a refinancing agency and provided assistance to these agricultural development projects which could not be financed by other institutions either because of the large outlay involved or because the projects could not be brought within the normal rules of business of those institutions. The main objectives of the corporation were:-
1. Provision of medium and long term credit by way of refinance to the primary lenders for facilitating agricultural development. This covered a wide field such as development of animal husbandry dairy forming, poultry forming and stock breeding, plantation crops, and mechanized farming. The primary lenders were central land mortgage banks, state corporative banks and scheduled banks.

2. Grant of credit otherwise than by refinanced up to a maximum period of 25 years to approved cooperative societies.

3. Subscribe to the debentures of any eligible institution, whose payment of interest and repayment of principal were fully granted by the concerned State Government.

4. Perform certain development and promotional functions such as locating growth pockets and rendering necessary expertise for formation appraisal and implementation of development projects.

With the establishment of the National Bank for Agricultural and Rural Development (NABARD) in July 1982, all the functions of ARDC have been taken over. But in respect since its inception in 1963 up to the end June 1982, the corporation sanctioned 19611 schemes. With the commitments and disbursements amounting to 4,650 crores and 2,808 crores respectively.\(^4\)

\(^4\)Ibid., p-32
F. National Bank for Agricultural and Rural Development:

The establishment of National Bank for Agricultural and Rural Development (NABARD) on July 12, 1982 is a landmark in the field of rural finance. This new significant statutory financial institution is to operate as National farm bank. Conceived as the official agency to meet the exclusive demands of the integrated rural development programme it is bound to exercise considerable influence on the economy. It has an authorized capital of Rs.500 crores and a paid-up capital Rs.100 crores, contributed equally by the Reserve Bank of India and the Union Government. For its short-term operations, it will draw funds mainly from the Reserve Bank. For its term loan operations it will draw funds from the Government of India flout bonds in the open market and also draw to the extent needed from the National Rural Credit (Long-term operations) Fund and the National Rural Credit [Stabilizations Fund]. The assets and liabilities maintained so far by the Reserve bank have since been transferred to the NABARD. To begin with this apex development body has 16 regional offices covering every nook of the country. As the ‘Rural Reserve Bank’ it has absorbed the existing Agricultural Refinance and Development Corporation (ARDC). It has also taken over from the Reserve Bank the total functions of review and monitoring of the entire rural credit system including credit for rural artisan and village industries and the statutory inspections and refinancing of State co-operative banks and regional rural banks. The RBI however retains the essential controls and nurtures the new banks. In fact NABARD has been conceived as an exercise in decentralization of Reserve Bank’s functions in the sphere of rural credit.
3.4.3 SPECIALISED AGENCIES OF INDUSTRIAL FINANCE:

The developments banks established in this country and called specialized financial corporation have been set up to fill in the granule left vacant by commercial banks. Besides the short-term credit for working capital needs, business enterprises also require medium and long-term funds for the creation and acquisition of fixed assets. Commercial banks did take care of these needs but in a negligible proportion. Further, the investment required in basic and heavy industries is so huge which commercial banks and individual and group investors even if they were willing, could not support for obvious reasons. This necessitated the channeling of funds being supplied by Government through the agency of development banks to both private and public sector industrial enterprises. The below chart 3.4 shows the classifications of Development Banks.
Development Banks may also be classified as follows in the chart 3.5.
3.4.4 NON-BANK FINANCIAL INTERMEDIARIES:

In addition to the above banking institutions, a host of non-bank financial intermediaries have been established in the post-independence period. Their liabilities are close substitutes for money and represent, in part a desire of the community to hold more of its savings in the form financial claims. Over the years these have recorded a phenomenal growth and have come to serve as apex institutions. The operations of lending amongst them are described below.

A. Life Insurance Corporation of India:

Formed in January 1956 as a result of the nationalization of 250 odd private life Insurance Companies and Societies, the Life Insurance Corporation of India (LIC) has emerged as the biggest and most powerful financial institution of the country. Though its main function is to insure the lives of policyholders against further contingencies, it
acts simultaneously as an agency for the collection of savings and as an institutional investor.

**B. General Insurance Corporation of India:**

It is yet another state-run enterprise which concentrates on such general Insurance business as fire, marine and miscellaneous comprising motor, burglary, cattle and engineering. An important objective of GIC after the nationalization of general insurance companies in late 1972 has been to provide prompt and efficient service to the common man by ensuring quick issuance of documents and settlement of claims.

**C. Unit Trust of India:**

The basic idea behind the promotion of the Unit Trust of India (UTI) in July 1964 was to afford the common man a means to acquire a share in the widening industrial prosperity of the country. Combining the advantages of a minimum security and a reasonable return, the UTI has succeeded in mobilizing savings of the community and channeling them into productive investment.

**D. The Export – Import Bank of India:**

The most significant step in the provision of a comprehensive package of financial and allied services to the exporters/importers is the setting up of the Export-Import Bank of India (Exim Bank) on January 1, 1982. It is a statutory Corporation wholly owned by the Union Government and has been designed to operate as a development bank in the area of Indian foreign trade. The main objectives of Exim Bank
are to promote finance and facilitate export and import of goods and services with a view to encouraging Country’s international trade.

The following flow chart explains about the procedural of EXIM BANK.

Chart-3.6

Procedural of EXIM Bank

1. Exim Bank signs agreement with Borrower and announces when effective.
2. Exporter checks procedures and Service fee with Exim Bank and negotiates contract with Importer.
3. Importer consults borrower and signs contract with exporter.
4. Borrower approves contract.
5. Exim Banks approve contracts and advise borrower and also exporter and commercial bank.
7. Commercial bank negotiates shipping documents and pays exporter.

8. Exim Bank reimburses Commercial bank on receipt of claim by debit to borrower.


Functions of EXIM Bank are as follows in chart 3.7

**Chart-3.7**

**Functions of EXIM Bank**

**Lending Operations**

- Funded Assistance
- Non-Funded Assistance

- Loans to Indian Companies
- Loans to Foreign Government
- Loans to Commercial Banks in India and Financial Institution

3.4.5 Post Office Savings Banks:

The post office savings banks, a branch of the postal administration, are important depositories of public savings. The lower and/or conservative Strata of Society
which want the stamp of the Government for their deposits have traditionally banked with them. They also issue postal cash certificates, purchase and sell Government Securities, maintain safe deposit boxes, and render some other services. They may or may not make loans and advances an essential function of money. The POSBs offer the benefits of convenience and security of fast and efficient on-hire Services. Then, they give competitive interest rates, and the interest earned on deposits is tax-exempt.

3.4.6 RESERVE BANK OF INDIA:

The Reserve Bank of India is the hub of the Indian banking system which keeps a close watch on the credit situation and regulates the supply availability and cost of money. It is the central banking institution of India and controls the monetary policy. The institution was established on 1st April 1935 during the British Raj in accordance with the provisions of the Reserve Bank of India Act, 1934. The share capital was divided into shares of Rs.100 each fully paid which was entirely owned by private shareholders in the beginning:

Reserve Bank of India plays an important part in the development strategy of the government. It is a member bank of the Asian Clearing Union. Reserve Bank of India was nationalized in the year 1949. The general superintendence and direction of the Bank is entrusted to Central Board of Directors of 20 members, the Governor and four Deputy Governors, one Government official from the Ministry of Finance. Ten nominated Directors by the Government to give representation to important elements in the economic life of the country, and four nominated Directors by the Central
Government to represent the four local Boards with the headquarters at Mumbai, Kolkata, Chennai and New Delhi. Local Boards consist of five members each Central Government appointed for a term of four years to represent territorial and economic interests and the interests of co-operative and indigenous banks.

3.5 INITIATIVES OF RBI IN IMPLEMENTING TECHNOLOGY

The use of technology in expanding banking has been a key focus area of the Reserve Bank. Technological innovation not only enables a broader reach for consumer banking and financial services, but also enhances its capacity for continued and inclusive growth.

As an apex bank of India, The Reserve Bank has adopted many steps to implement technology in banking sector. Reserve bank of India has played an important role in implementation of information technology in banking sector. It fixes various committees and working groups for implementing technology in banking sector. It decided that technology is the only ability of banks to provide innovative services to the customers. The RBI felt that Technology solutions only would make flow of information much faster, more accurate and enable quicker analysis of data received because of the following reasons.

1. Banking is an industry that provides vital service and support to the economic and financial sectors. As such, it has to cater to all the diverse segments of society. However, more than 50 per cent of the adult population in our country is still excluded from the financial sector. Technology will have been the potential to influence financial inclusion
in a big way. The use of technology in extending banking outreach is an area of contemporary focus in India.

2. One of the areas where technology will be facilitated significant revolution is payment systems. RBI has already initiated work towards introduction of new generation RTGS, which will be able to handle rising volumes, provide better functionalities and has better technological adaptability.

3. Another important benefit will be derived from information technology deployment is the ability of banks to provide innovative delivery channels. Online banking, debit & credit card payments, ATM access to other bank customers, Point of Sales terminals etc.

4. Technology solutions will make flow of information much faster, more accurate and enable quicker analysis of data received. This will make the decision making process faster and more efficient.

Thus RBI decided that technology is the only key for developing the productivity of banking sector, improving the customer service, reducing the cost of financial transactions and increasing the competitiveness of financial institutions from the above reasons. So it fixes various committees and working groups for implementing technology in banking sector.

3.6 APPOINTED COMMITTEES FOR IMPLEMENTING TECHNOLOGIES:

As a central bank in a developing country, the RBI has adopted development of the banking and financial market as one of its prime objectives. In the
1980s the RBI focused on “improvements in the productivity” of the banking sector. Being in productivity, the reserve bank took several initiatives to popularize usage of technology by banks in India

Periodically, almost once in five years since the yearly 1980s, the Reserve Bank appointed committees and working groups to deliberate on and recommend the appropriate use of technology by banks give the circumstances and the need. Those committees are as follows

- **Rangarajan committee – in early 1980s**
- **Rangarajan committee – in late 1980s**
- **Sharaf working group – in early 1980s**
- **Narasimham committee – in 1990s**

### 3.6.1 RANGARAJAN COMMITTEE-IN THE EARLY 1980S:

In the early 80s, a high level committee was formed under the chairmanship of Dr.C. Rangarajan, then Governor of the Reserve Bank of India, to draw up a phased plan for computerization and mechanization in the Banking Industry over a five year time frame of 1985-89. The focus by this time, justifiably, was on customer service and two models of branch automation were developed and implemented

The other members of the committee were Shri Marc Hollanders, Special Adviser on Financial Stability & Market Infrastructure, Bank for International Settlements; Shri T.V. Mohandas Pai, Head, Human Resources, Infosys Ltd; Prof. H.
3.6.1.1 Recommendations of Rangarajan committee:

The Rangarajan committee has made valuable recommendations and a snapshot of the key recommendations is as under:

- Focus on four major areas of research, viz., Financial Networks and Application, Electronic Payments and Settlements Systems, Security Technologies for the Financial Sector, Financial Information Systems and Business Intelligence.
- Focus on the systemic requirements of the banking system which have large scale implications on the effective maintenance and running of the system.
- The primary goal of the Institute is research. The focus should be to conduct applied research and experimental development in the of Banking Technology. The Institute should become a research based institute working at the intersection of banking and technology focused on applied research.
- Conduct collaborative research programmes with reputed national/international universities in the relevant areas
- Faculty to be encouraged to submit research proposals to funding agencies in India and abroad.
- Offer tailor made programmes based on the roles of the banking professionals.
Ensure the quality of training through standardization of course contents, peer review of presentations, audit of training sessions, feedback from participants, guest faculty with practical experience, etc.

3.6.2 RANGARAJAN COMMITTEE IN 1988

Having gained experience in the earlier mode of computerization, the second Rangarajan Committee constituted in 1988 drew up a detailed perspective plan for computerization in Banks and for extension of automation to other areas like funds transfer, electronic mail, BANKNET, SWIFT, ATMs etc. The Committee recommended the following road map for computerization over the next five years,

3.6.2.1 Recommendations:

- Around 2000 to 2500 large branches located at high activity (urban and metropolitan) centers to be fully computerized
- Regional Offices / Zonal Offices/Head Offices
- Inter- and intra bank transactions using the BANKNET set up by the RBI; and
- Installation of a network of cash dispensers / ATMs at strategic locations such as airports/railway stations etc., on a shared basis by banks.
Rangarajan committee had drawn up in 1983-84 plans for computerization and mechanization in the banking industry and looked into the modalities of drawing up a phased plan for mechanization for the banking industry covering the period 1985-1989. The committee in its report in 1984 recommended the introduction of computerization and mechanization at the branch, Regional office or Zonal office and Head office levels of banks. Now a day nearly all nationalized banks have implemented IT based solutions for their day to day transactions.

3.6.3 Narasimham Committee 1991:

Recommendations of the Narasimham Committee (1991) paved the way for the reform phase in the banking. Important initiatives with regard to the reform of the banking system were taken in this phase. Important among these have been introduction of new accounting and prudential norms relating to income recognition, provisioning and capital adequacy, deregulation of interest rates & easing of norms for entry in the field of banking.\(^5\)

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3.6.3.1 Recommendations of Narasimham committee:

The Narsimham Committee was set up in order to study the problems of the Indian financial system and to suggest recommendations for improvement in the efficiency and productivity of the financial institution.

The committee has given the following major recommendations:-

• Free entry of new private sector/foreign banks

• Introduction of prudential accounting norms

• Prescription of capital adequacy requirements

• Increasing trend towards deregulation of interest rates

• Diversification of activities

• Emphasis on fee-based services

• Increasing competition

• Increasing customer expectations

The Narasimham Committee felt that computerization and mechanization is a means to improve customer service efficiency in a competitive environment of highly computerized financial companies.
3.6.4 SARAF Committee on Technology Issues (1994):

The SARAF Committee was set up in order to suggest some recommendations for improvement in the efficiency and productivity of the financial institution.

3.6.4.1 Recommendations:

** MICR clearing be introduced at all centers with more than 100 bank branches. Priority should be given to centers such as Ahmedabad, Bangalore, Hyderabad, Pune and Surat which have relatively large volumes.

** Introduction of a Delivery versus Payment (DvP) system

** Introduction of Electronic Clearing Service Credit for low value repetitive transactions such as interest, dividend, salary, pension payments and an Electronic Debit Clearing for payments to utility companies.

** A uniform size for MICR instruments.

** Geographical expansion of the BANKNET network with nodes in all important branches of banks

** Switch over to on-line inter-bank clearing on a gross basis.

** Introduction of 'Clearing Bank' concept for decentralized cheque processing.

** Truncation of cheques up to the value of Rs.5, 000/-
** Large scale induction of computers and communication technology in service branches

** Optimal usage of SWIFT.

** NICNET, to be used for the reporting of currency chest transactions by the chest branches to their Link Offices and Issue Departments of the RBI.

** Promotion of a card culture, as well as enhanced training facilities.

3.6.5 Exclusive Research Institute for Banking Technology:

Institute for Development & Research in Banking Technology or IDRBT is a banking research institute, established in 1996 by Reserve Bank of India (RBI), and is located at Hyderabad, India. The RBI formed a committee on "Technology Upgradation in the Payment Systems". The committee recommended a variety of payment applications which can be implemented with appropriate technology upgradation and development of a reliable communication network. As a result of the committee's recommendations the institute was established.

Setting up of the Institute for Development and Research in Banking Technology (IDRBT), Hyderabad in the mid nineties, as a research and technology centre for the banking sector was a major step to facilitate and support the ‘technological revolution’ in banking. It was set up in the year 1996 as an apex level institute for spearheading technology absorption in the Indian Banking and the financial sector. It focuses on the training, research and development activities in the field of information
technology. The commissioning of INFINET as the backbone for financial communication has been a major achievement for IDRBT. IDRBT has also been active in dynamically assessing the needs of the banking community and in organizing trainings and workshops in relevant IT related areas to address such needs. It has been performing its designated role as an important component of RBI’s banking technology push and continues with its endeavor.

Based on the recommendations on these committees and working groups, the Reserve Bank issued suitable guidelines for the banks in the 1980s usage of technology for the bank office operations pre-dominated the scene.

Two important decisions of the RBI in 1980s changed the scenario for ever. They are:

- The prescription of compulsory usage of technology in full measure by the private sector banks as a pre condition of the License and
- The establishment of an exclusive research institute for developing the banking technology.
3.7 Steps Taken By RBI in Implementing Technology:

The first step of RBI towards bank computerization was implementation of the Back office application in the banking sector. The Back office application uses computers only for data entry operations and a few calculative operations. It also stores customer’s data and uses Dos base FoxPro to calculate interest and develop the pay roll system to calculate the employees’ salary. This application was not beneficial to the banks customers because it was not providing them any kind of service. Due to this system the working hours of bank employees were increased due to daily data entry of all/ few manual transactions. It is also observed that in this system daily/ weekly/ monthly back up was required. In case of failure in backup files, management may not get proper information at a given point of time. Overall observation is that, the back office application was not that beneficial to bank employees as well as bank customers.

Another step taken by RBI was Total Branch Automation in which the bank should have TBA being used in branches that are covering 80% of the total business of a bank. These branches should have a single customer ID concept using which all the accounts of the customer can be retrieved. The bank should start collecting the customer-related information for customer information system. Also training the employees in the areas of customer relationship, marketing at the customer touch points should be started. In case of TBA bank can also provide ATM facility.

After the turn of consolidated databases (Back office Application) and networks (Total Branch Automation) the next term is core banking applications. Core
banking applications (CBS) in Banks provide the complete front-end and backend automation of banks. These applications also help the banks to achieve centralized processing of each and every service of the customer. "Core banking applications provide anywhere, anytime 24 by 7 non-stop services, which is not possible with traditional localized branch automation systems. These applications also provide automation across multiple delivery channels.

Core banking is a newly developed concept adopted by banks. Core banking is a centralized system that provides accounting, customer information management and transaction processing functions. It provides a central operational database to bank’s assets and liabilities, a transaction processing engine and a system for the financial management of the bank. In core banking, a branch will become a service outlet like an ATM booth.

Thus, the importance of physical branches will be reduced. In case of core banking, customer can operate their account from various locations like- customer can open an account at one location and can deposit cheques, check bank balance, withdraw cash, get demand draft, get account statement, transfer funds, other transactions from various different locations of different cities. Implementation of core banking in banking sector allows inter connectivity of branches with the centralized data centre. Core banking is just one part of a fairly complex architecture of today’s banking which takes care of the essential banking activities. The major Banks in India, both in the private and public sectors are moving towards core banking solutions.
3.8 Implementation of Technology

Reserve Bank of India started this push with the Rangarajan Committee Report I & II (in early 1980s and in late 1980s) on Computerization in Banks, followed by Saraf and Narasimham Committee Reports. Some of the significant developments during this journey have been introduction of MICR based cheque clearing, automation of bank branches, computerization of Govt. business, setting up of IDRBT, commissioning of INFINET, launching of IT based delivery channels, providing guidelines for internet banking, implementation of NFS etc. The role played by the Reserve Bank continues.

While technology is a great enabler in the banking sector, it also brings along it new risks and concerns. As the banking sector deals in monetary resources and as banks are custodians of public money, there can be no room for frailties on any count. This necessitates the plugging of all vulnerabilities in technology enabled banking systems. So that the IT resources banking systems are dependable and data integrity is preserved risk are controlled and mitigated to ensure continued stability and growth of the bank.

With increasing proliferation of ATMs deployment of Tele-banking and availability of Internet banking facilities, the customer contact points have increased services to customers. This has been possible solely due to the implementation of technology.
3.9 Available Banking Technologies:

1. ATM Safety PIN software

2. ATMC

3. Automated Clearing House

4. Automated teller machine

5. Bankgiro

7. Cheque truncation

8. Contactless smart card

9. Cryptography

10. Currency-counting machine

11. Delivery versus payment

12. Direct access control

13. Electronic money

14. Electronic bill payment

15. Electronic bill presentment and payment
16. Electronic billing

17. Electronic funds transfer

18. Financial cryptography

19. Hardware security module

20. Instant payment notification

21. Magnetic ink character recognition

22. Magnetic stripe card

23. MNET

24. Mobile banking

25. Money changer

26. National electronic fund transfer

27. OneVu

28. Online banking

29. Open Payment Initiative

30. Public key withdrawal
31. RTGS

32. Smart card

33. SMS banking

34. SWIFTNet InterAct Real-time

35. Telephone banking

36. Tubas

37. Video banking

38. Wireless Public Key Infrastructure

These are the technologies that are available in the world of banking. In that certain banking technologies are discussed below.

3.9.1 ATM Safety Pin Software:

**ATM safety pin software** is a software application that would allow users of automated teller machines (ATMs) to alert the police of a forced cash withdrawal by entering their personal identification number (PIN) in reverse order. The system was invented and patented by Illinois lawyer Joseph Zingher.
3.9.2 Automated Teller Machines:

Automated teller machine (ATM), device used by bank customers to process account transactions.

3.9.2.1 Definition of 'Automated Teller Machine – ATM':

An electronic banking outlet, which allows customers to complete basic transactions without the aid of a branch representative or teller.

3.9.2.2 First ATM in the world:

The first use of ATM magstripe cards is said to have been made in 1969 when Docutel installed its Docuteller machine at New York's Chemical Bank. This is the first recorded use of magnetically encoded plastic. Donald C Wetzel is given credit for developing the machine for Docutel. Docutel was the first to apply for a patent and is credited by the Smithsonian Museum as inventor of the ATM.

3.9.2.3 First ATM in India:

HSBC -- the Hong Kong and Shanghai Banking Corporation -- was the first bank to introduce the ATM concept in India way back in 1987. Now, most of the banks have their ATM outlets in India.

3.9.3 Cheque Truncation:

Cheque truncation (check truncation in the United States) is the conversion of physical cheque into electronic form for transmission to the paying bank. Cheque
truncation eliminates cumbersome physical presentation of the cheque and saves time and processing costs.

3.9.4 **CURRENCY COUNTING MACHINES:**

A currency-counting machine is a machine that counts money—either stacks of banknotes or loose collections of coins. Counters may be purely mechanical or use electronic components. The machines typically provide a total count of all money, or count off specific batch sizes for wrapping and storage.

Capitalizing on our experience and excellent reputation in the field of money handling, the machines are designed to continually provide the superior performance demanded and expected by every operator of the equipment.

3.9.5 **DELIVERY VERSUS PAYMENT:**

DVP is a sale transaction of negotiable securities (in exchange for cash payment) that can be instructed to a settlement agent using SWIFT Message. Use of such standard message types is intended to reduce risk in the settlement of a financial transaction, and enable automatic processing. Ideally, title to an asset and payment are exchanged simultaneously. This may be possible in many cases such as in a central depository system such as the United States.

3.9.6 **ELECTRONIC MONEY:**

Electronic money (also known as e-currency, e-money, electronic cash, electronic currency, digital money, digital cash, digital currency, cyber currency) is
money or scrip that is only exchanged electronically. Typically, this involves the use of computer networks, the internet and digital stored value systems. Electronic funds transfer (EFT), direct deposit, digital gold currency and virtual currency is all examples of electronic money. Also, it is a collective term for financial cryptography and technologies enabling it.

3.9.7 ELECTRONIC FUNDS TRANSFER:

Electronic Funds Transfer (EFT) is a system of transferring money from one bank account directly to another without any paper money changing hands. One of the most widely-used EFT programs is Direct Deposit, in which payroll is deposited straight into an employee's bank account, although EFT refers to any transfer of funds initiated through an electronic terminal, including credit card, ATM, and point-of-sale (POS) transactions. It is used for both credit transfers, such as payroll payments, and for debit transfers, such as mortgage payments.

The growing popularity of EFT for online bill payment is paving the way for a paperless universe where checks, stamps, envelopes, and paper bills are obsolete. The benefits of EFT include reduced administrative costs, increased efficiency, simplified book keeping, and greater security. However, the number of companies who send and receive bills through the Internet is still relatively small.
3.9.8 MONEY CHANGER:

A money changer is a person who exchanges the coins or currency of one country for that of another. This trade is thought generally to be the origin of modern banking in Europe.

A money changer (or coin changer or coin dispenser) is also a device that changes/dispenses coins. It can take various forms. One type is a portable coin dispenser, invented by Jacques L. Galef, often worn on a belt, used by conductors and other professions for manual fare collection. It dispenses a single coin when a lever is depressed. Another type is a fixed coin dispenser that dispenses several coins at once, such as four quarters or five nickels, for making change at a venue for coin-operated devices, such as a penny arcade, pinball parlor, or Automat. These are typically found at teller windows in banks and sometimes in retail establishments. This type of change maker may also operate electromechanically under control of a cash register, automatically giving correct change for a customer's purchase.

3.9.9 MICR TECHNOLOGY:

MICR was invented in the 1950s by Kenneth R. Eldredge at the Stanford Research Institute. MICR is standardized by ISO 1004:1995.

Magnetic Ink Character Recognition, or MICR, is a character recognition technology used primarily by the banking industry to facilitate the processing of cheques and makes up the routing number and account number at the bottom of a check. The technology allows computers to read information such as account numbers of printed
documents. Unlike barcodes or similar technologies, however, MICR codes can be easily read by human beings.

MICR characters are printed in special typefaces with a magnetic ink or toner, usually containing iron oxide. As a machine decodes the MICR text, it first magnetizes the characters in the plane of the paper. Then the characters are passed over a MICR read head, a device similar to the playback head of a tape recorder. As each character passes over the head it produces a unique waveform that can be easily identified by the system.

The use of magnetic printing allows the characters to be read reliably even if they have been overprinted or obscured by other marks, such as cancellation stamps and signature. The error rate for the magnetic scanning of a typical check is smaller than with optical character recognition systems. For well printed MICR documents, the "can't read" rate is usually less than 1% while the substitution rate (misread rate) is in the order of 1 per 100,000 characters.

MICR characters are fixed width. Each number or symbol occupies exactly 1/8 of an inch. The actual numbers or symbols themselves have one of 5 different widths, and must be positioned exactly within the fixed character cell. If the numbers or symbols aren't positioned correctly, then certain pairs of numbers or symbols can not read correctly.

In the early 1980s the Reserve Bank of India introduced many new modes for safe and effective payments across the country. One such important mode introduced was the unique system of MICR based cheque clearing system.
Apart from being a security bar code to protect our transaction, the MICR code is also an indispensable part for online money transfers. Every bank branch is given a unique MICR code and this helps the RBI to identify the bank branch and speed up the clearing process.

The MICR code has nine digits in it with each three digits signifying some important information about the transaction and the bank. The first three digits in the MICR code represent the city code that is the city in which the bank branch is located.

In most cases it is in line with the PIN code of the postal addresses in India.

The next three digits stand for the bank code while the last three digits represent the bank branch code.

For example, if we have an account with State Bank of India (SBI) Mumbai (Central) then its nine digit MICR code will be 400002009 wherein:

400, the first three digits representing the city code for Mumbai;

002, the next three digits representing the bank code for SBI;

And 009, the last three digits representing the bank branch code for Andheri (West).

We can check the MICR codes of different banks and its branches by checking it out on the RBI website.

3.9.9.1 Processing of cheques:

Unlike the manual clearing of cheques where there is a possibility of many human errors and subsequent delay in clearing, the MICR code on the cheque
printed with a unique magnetic ink usually iron oxide has magnetic material present in it and thus makes it machine-readable and almost error proof!

Under this method the reading machine or a cheque sorting machine reads through a cheque when inserted and identifies the branch the cheque belongs to and activates the automation clearing process.

The MICR code is so clear and fine that the machine could read it even if the MICR code isn't visible due to other marks or stamps on it.

According to the Reserve Bank of India report (Payments in India: Vision 2009-2012), all bank branches will be enabled with MICR codes.

Also, the RBI intends to reduce paper-based clearing process by introducing MICR- Cheque Processing Centers that will process over 95 per cent of volume and value of cheques processed in the country.

3.9.10 MAGNETIC STRIPE CARD:

A magnetic stripe card is a type of card capable of storing data by modifying the magnetism of tiny iron-based magnetic particles on a band of magnetic material on the card. The magnetic stripe, sometimes called swipe card or magstripe, is read by physical contact and swiping past a magnetic reading head.

3.9.11 MOBILE BANKING:

Mobile banking (also known as M-Banking, mbanking, SMS Banking) is a term used for performing balance checks, account transactions, payments, credit
applications and other banking transactions through a mobile device such as a mobile phone or Personal Digital Assistant (PDA). The earliest mobile banking services were offered over SMS. With the introduction of the first primitive smart phones with WAP support enabling the use of the mobile web in 1999, the first European banks started to offer mobile banking on this platform to their customers.

Mobile banking has until recently (2010) most often been performed via SMS or the Mobile Web. Apple's initial success with iphone and the rapid growth of phones based on Google's Android (operating system) have led to increasing use of special client programs, called apps, downloaded to the mobile device

Consumers are increasingly going for Mobile Banking for many reasons. 12 million people used mobile banking services in 2009, according to Frost & Sullivan, a research firm. It is expected that this number may go to 45 million by 2014.

3.9.11.1 Services:

Mobile banking can offer services such as the following:

1. **ACCOUNT INFORMATION**:

   1. Mini-statements and checking of account history
   2. Alerts on account activity or passing of set thresholds
   3. Monitoring of term deposits
   4. Access to loan statements
   5. Access to card statements
6. Mutual funds / equity statements
7. Insurance policy management
8. Pension plan management
9. Status on cheque, stop payment on cheque
10. Ordering cheque books
11. Balance checking in the account
12. Recent transactions
13. Due date of payment (functionality for stop, change and deleting of payments)
14. PIN provision, Change of PIN and reminder over the Internet
15. Blocking of (lost, stolen) cards

2. PAYMENTS, DEPOSITS, WITHDRAWALS, AND TRANSFERS:

1. Domestic and international fund transfers
2. Micro-payment handling
3. Mobile recharging
4. Commercial payment processing
5. Bill payment processing
6. Peer to Peer payments
7. Withdrawal at banking agent
8. Deposit at banking agent
3.9.12 **NEFT:**

Reserve Bank of India has introduced an electronic funds transfer system called "National Electronic Funds Transfer” System. The objective of the NEFT System is to establish an electronic funds transfer system to facilitate an efficient, secure, economical, reliable and expeditious system of funds transfer and clearing in the banking sector throughout India, and to relieve the stress on the existing paper based funds transfer. National Electronic Funds Transfer (NEFT) is a nation-wide payment system facilitating one-to-one funds transfer. Under this Scheme, individuals, firms and corporate can electronically transfer funds from any bank branch to any individual, firm or corporate having an account with any other bank branch in the country participating in the Scheme.

Individuals, firms or corporate maintaining accounts with a bank branch can transfer funds using NEFT. Even such individuals who do not have a bank account (walk-in customers) can also deposit cash at the NEFT-enabled branches with instructions to transfer funds using NEFT. However, such cash remittances will be restricted to a maximum of Rs.50, 000/- per transaction. Such customers have to furnish full details including complete address, telephone number, etc. NEFT, thus, facilitates originators or remitters to initiate funds transfer transactions even without having a bank account.
Presently, NEFT operates in hourly batches - there are eleven settlements from 9 am to 7 pm on week days (Monday through Friday) and five settlements from 9 am to 1 pm on Saturday.

3.9.12.1 PROCEDURE FOR USING THE NEFT TECHNOLOGY:

Step-1:

An individual / firm / corporate intending to originate transfer of funds through NEFT has to fill an application form providing details of the beneficiary (like name of the beneficiary, name of the bank branch where the beneficiary has an account, IFSC of the beneficiary bank branch, account type and account number) and the amount to be remitted. The application form will be available at the originating bank branch. The remitter authorizes his/her bank branch to debit his account and remit the specified amount to the beneficiary. Customers enjoying net banking facility offered by their bankers can also initiate the funds transfer request online. Some banks offer the NEFT facility even through the ATMs. Walk-in customers will, however, have to give their contact details (complete address and telephone number, etc.) to the branch. This will help the branch to refund the money to the customer in case credit could not be afforded to the beneficiary’s bank account or the transaction is rejected / returned for any reason.

Step-2:

The originating bank branch prepares a message and sends the message to its pooling centre (also called the NEFT Service Centre).
Step-3:

The pooling centre forwards the message to the NEFT Clearing Centre (operated by National Clearing Cell, Reserve Bank of India, Mumbai) to be included for the next available batch.

Step-4:

The Clearing Centre sorts the funds transfer transactions destination bank-wise and prepares accounting entries to receive funds from the originating banks (debit) and give the funds to the destination banks (credit). Thereafter, bank-wise remittance messages are forwarded to the destination banks through their pooling centre (NEFT Service Centre).

Step-5:

The destination banks receive the inward remittance messages from the Clearing Centre and pass on the credit to the beneficiary customers’ accounts.

IFSC or Indian Financial System Code is an alpha-numeric code that uniquely identifies a bank-branch participating in the NEFT system. This is an 11 digit code with the first 4 alpha characters representing the bank, and the last 6 characters representing the branch. The 5th character is 0 (zero). IFSC is used by the NEFT system to identify the originating / destination banks / branches and also to route the messages appropriately to the concerned banks / branches.
3.9.12.2 CHARGES RELATED TO NEFT:

The structure of charges that can be levied on the customer for NEFT is given below:

a) Inward transactions at destination bank branches (for credit to beneficiary accounts)
   – Free, no charges to be levied from beneficiaries

b) Outward transactions at originating bank branches (charges for the remitter)
   - For transactions up to Rs. 1 lakh – not exceeding Rs 5 (+ Service Tax)
   - For transactions above Rs. 1 lakh and up to Rs 2 lakhs – not exceeding Rs 15 (+ Service Tax)
   - For transactions above Rs 2 lakhs – not exceeding Rs 25 (+ Service Tax)

With effect from 1st July 2011, originating banks are required to pay a nominal charge of 25 paise each per transaction to the clearing house as well as destination bank as service charge. However, these charges cannot be passed on to the customers by the banks.

3.9.12.3 PRE-REQUISITES FOR ORIGINATING A NEFT TRANSACTION:

Following are the pre-requisites for putting through a funds transfer transaction using NEFT –
• Originating and destination bank branches should be part of the NEFT network

• Beneficiary details such as beneficiary name, account number and account type, name and IFSC of the beneficiary bank branch should be available with the remitter

• For net banking customers, some banks provide the facility to automatically pop-up the IFSC once name of the destination bank and branch is highlighted / chosen / indicated / keyed in.

3.9.12.4 BENEFITS OF USING NEFT:

NEFT offers many advantages over the other modes of funds transfer:

• The remitter need not send the physical cheque or Demand Draft to the beneficiary.

• The beneficiary need not visit his / her bank for depositing the paper instruments.

• The beneficiary need not be apprehensive of loss / theft of physical instruments or the likelihood of fraudulent encashment thereof.

• Credit confirmation of the remittances sent by SMS or email.

• Remitter can initiate the remittances from his home / place of work using the internet banking also.

NEFT is the most suitable mode of payment for small value payments as the charges are cheaper and settlement is faster compared to other modes of payment. RBI has introduced NEFT system mainly to send small value payments at nominal cost. We can send funds from our bank to other bank, which is a part of NEFT network.
In NEFT, there are 11 hourly settlements (9 am to 7 pm) for a day. In order to complete the processing cycle on a near real-time basis, RBI has introduced the concept of return within 2 hours of completion of a batch. The payment instructions received by RBI within each settlement batch will be consolidated and distributed to payee’s bank after each settlement. Normally, payment transaction messages reach the receiving (beneficiary) bank within 15 to 30 minutes from the batch time. Banks are hard pressed to afford credit to beneficiary accounts immediately or else return the transactions within two hours of completion of the batch settlement.

For e.g.: A payment instruction sent to RBI for 12.00 clock settlement batch, may reach the beneficiary bank by 12.30 P.M. If the beneficiary bank has STP (Straight Through process) facility, the amount will be credited immediately. In case, if the beneficiary bank wants to return the transaction for any reason, they should return the same within 2 PM batch on the same day.

In order to encourage small value payments through NEFT, we have fixed nominal charges only. There is no minimum as well as maximum transfer amount limit. There are no charges for inward payments.

3.9.13 ONLINE BANKING:

Online banking (or Internet banking or E-banking) allows customers of a financial institution to conduct financial transactions on a secure website operated by the institution, which can be a retail or virtual bank, credit union or building society.
To access a financial institution's online banking facility, a customer having personal Internet access must register with the institution for the service, and set up some password (under various names) for customer verification. The password for online banking is normally not the same as for telephone banking. Financial institutions now routinely allocate customer numbers (also under various names), whether or not customers intend to access their online banking facility. Customer numbers are normally not the same as account numbers, because a number of accounts can be linked to the one customer number. The customer will link to the customer number any of those accounts which the customer controls, which may be cheque, savings, loan, credit card and other accounts.

To access online banking, the customer would go to the financial institution's website, and enter the online banking facility using the customer number and password. Some financial institutions have set up additional security steps for access, but there is no consistency to the approach adopted. Online banking facilities offered by various financial institutions have many features and capabilities in common.

3.9.13.1 Features of online banking:

- viewing account balances
- viewing recent transactions
- downloading bank statements, for example in PDF format
- viewing images of paid cheques
- ordering cheque books
3.9.14. RTGS

Real time gross settlement systems (RTGS) are funds transfer systems where transfer of money or securities takes place from one bank to another on a "real time" and on "gross" basis. Settlement in "real time" means payment transaction is not subjected to any waiting period. The transactions are settled as soon as they are processed. "Gross settlement" means the transaction is settled on one to one basis without bunching or netting with any other transaction. Once processed, payments are final and irrevocable.

The acronym 'RTGS' stands for Real Time Gross Settlement, which can be defined as the continuous (real-time) settlement of funds transfers individually on an order by order basis (without netting). 'Real Time' means the processing of instructions at the time they are received rather than at some later time.' Gross Settlement' means the settlement of funds transfer instructions occurs individually (on an instruction by instruction basis). Considering that the funds settlement takes place in the books of the Reserve Bank of India, the payments are final and irrevocable.

The RTGS system is primarily meant for large value transactions. The minimum amount to be remitted through RTGS is Rs.2 lakh. There is no upper ceiling for RTGS transactions. Under normal circumstances the beneficiary branches are expected to receive the funds in real time as soon as funds are transferred by the remitting bank. The beneficiary bank has to credit the beneficiary's account within two hours of receiving the funds transfer message.
The RTGS service window for customer’s transactions is available from 9.00 hours to 16.30 hours on week days and from 9.00 hours to 13.30 hours on Saturdays for settlement at the RBI end. However, the timings that the banks follow may vary depending on the customer timings of the bank branches.

3.9.14.1 The Remitting Customer Has To Furnish The Following Information To A Bank For Affecting RTGS Remittance:

1. Amount to be remitted
2. Remitting customer’s account number which is to be debited
3. Name of the beneficiary bank
4. Name of the beneficiary customer
5. Account number of the beneficiary customer
6. Sender to receiver information, if any

3.9.14.2 Existing systems

Below is a listing of countries and their RTGS systems:

- Albania - AECH, RTGS
- Australia - RITS (Reserve Bank Information and Transfer System)
- Bosnia and Herzegovina - RTGS
- Bulgaria - RINGS (Real-time INterbank Gross-settlement System)
- Brazil - STR (Sistema de Transferência de Reservas)
- Canada - LVTS (Large Value Transfer System) (This is actually an RTGS Equivalent system. Final settlement happens in the evening.)
- China - China National Advanced Payment System ("CNAPS") (also called "Super Online Banking System)
- Chile - LBTR/CAS (Spanish: Liquidación Bruta en Tiempo Real)
- Croatia - HSVP (Croatian: Hrvatski sustav velikih plaćanja)
- Czech Republic - CERTIS (Czech Express Real Time Interbank Gross Settlement System)
- Hong Kong - Clearing House Automated Transfer System (CHATS)
- Hungary - VIBER (Hungarian: Valós Idejű Bruttó Elszámolási Rendszer)
- India - RTGS
- Indonesia - System Bank Indonesia Real Time Gross Settlement (BI-RTGS)
- Iran - SATNA (Iranian Automated Settlement System)
- Israel - Zahav (Credit and Transfers in Real Time)
- Japan - BOJ-NET (Bank of Japan Financial Network System)
- Kenya - Kenya Electronic Payment and Settlement System (KEPSS)
- Kuwait - KASSIP (Kuwait's Automated Settlement System for Inter-Participant Payments)
- Macedonia - MIPS (Macedonian Interbank Payment System)
- Malaysia - RENTAS (Real Time Electronic Transfer of Funds and Securities)
- Mexico - SPEI (Spanish: Sistema de Pagos Electrónicos Interbancarios)
- New Zealand - ESAS (Exchange Settlement Account System)
- Nigeria - CIFTS (CBN Inter-Bank Funds Transfer System)
- Pakistan - NIFT
- Peru - LBTR (Spanish: Liquidación Bruta en Tiempo Real)
- Philippines - Phil Pass
- Poland - SORB
- Russia - BESP system (Banking Electronic Speed Payment System)
- Romania - Regis system
- Saudi Arabia - (Saudi Arabian Riyal Interbank Express) SARIE
- Singapore - MEPS+ (MAS Electronic Payment System Plus)
- South Africa - SAMOS (The South African Multiple Option Settlement)
- Switzerland - SIC (Swiss Interbank Clearing)
- Taiwan - CIFS (CBC Interbank Funds Transfer System)
- Thailand - BAHTNET (Bank of Thailand Automated High value Transfer Network)
- Turkey - EFT (Electronic Fund Transfer)
- United Kingdom - CHAPS (Clearing House Automated Payment System)
- United States - Fed wire

3.9.15 SMART CARD:

A smart card is a plastic card about the size of a credit card, with an embedded microchip that can be loaded with data, used for telephone calling, electronic cash payments, and other applications, and then periodically refreshed for additional use.
3.9.16 SMS BANKING:

SMS banking is a technology-enabled service offering from banks to its customers, permitting them to operate selected banking services over their mobile phones using SMS messaging.

3.9.16.1 Advantages:

Allows us to request and receive banking information from our bank on our mobile phone

We can manage bank accounts, check account balances, perform check requests and pay some bills; if we are in a business we can access our account whenever we need to

It is more convenient because we don't have to go to a bank to complete a banking transaction.

It's quite discrete, so we can view it when we are doing everyday jobs and we don't have to set aside time to go to the bank.

3.9.16.2 Disadvantages:

If we don't have the internet on our mobile we can't access what we need on our bank account.
We could get our phone stolen and it will have all of our details on it, so people can gain access to our account as well as our phone.

It causes more people to use their mobile phones and can cause radiation.

3.9.17 TELE BANKING:

Tele banking is a service provided by a financial institution, which allows its customers to perform some banking transactions over the telephone. Most telephone banking services use an automated phone answering system with phone keypad response or voice recognition capability. To ensure security, the customer must first authenticate through a numeric or verbal password or through security questions asked by a live representative. With the obvious exception of cash withdrawals and deposits, it offers virtually all the features of an automated teller machine: account balance information and list of latest transactions, electronic bill payments, funds transfers between a customer's accounts, etc.

Usually, customers can also speak to a live representative located in a call centre or a branch, although this feature is not always available 24 hours/7days. In addition to the self-service transactions listed earlier, some telephone banking representatives can also do what was traditionally available only at a branch: loan applications, investment purchases and redemptions, chequebook orders, debit card replacements, change of address, etc. Banks which operate mostly or exclusively by telephone are known as phone banks. They also help modernize the user by using special technology.
Telebanking is a throwback to the days when people would call into a central number at their bank/financial institution in order to get balance, check status and other account-related information. Most financial organizations offer telebanking services today; however, the public representation is known as telephone-based customer service or just customer service.

3.9.17.1 Features of telephone banking

With telephone banking you can carry out a range of transactions and access a number of services.

- **Transfer money** - immediate transfer of funds between your Nat West accounts or transfer money to someone else's account
- **Pay bills** - pay your suppliers, staff or general business expenditure
- **Manage payments** - set up, change and cancel standing orders and Direct Debits
- **Check your balance** - order a statement and check your recent transactions as well
- **Order foreign currency** - to be delivered to your business or collected from a Nat West branch
- **Order a cheque book** - or a pay
3.9.18 VIDEO BANKING:

**Video banking** is a term used for performing banking transactions or professional banking consultations via a remote video connection. Video banking can be performed via purpose built banking transaction machines (similar to an Automated teller machine), or via a videoconference enabled bank branch.

3.9.18.1 Video Banking Services:

Depending on the type of video banking solution deployed there are numerous types of services that can be offered. In conjunction with transaction hardware video banking can include all of the following types of services:

- Customer authentication
- Cash Deposits
- Check Deposits
- Cash Withdrawal
- Coin Withdrawals
- Check Print
- Account Transfers
- Bill Payments
- Account inquiries
- Process New Accounts
These are the various type of banking technologies which are currently operating in the world of banking. But incase of the study area TIRUNELVELI DISTRICT the following modern technologies are available in banks.

3.10 Banking technology available in the study area TIRUNELVELI DISTRICT:

Some of the technologies that are available in the study area Tirunelveli District are,

1. INTERNET BANKING

2. NEFT

3. RTGS

4. MOBILE BANKING

5. ATM

6. TELE BANKING

7. MICR

8. CREDIT AND DEBIT CARDS

The above technologies are available in the study area TIRUNELVELI DISTRICT. So the bank customers of Tirunelveli District adopted these banking technologies. The research focuses their impact on these kind of banking technologies.
and also finds their adoption level, their satisfaction, their problem in using of these kind of banking technologies.

### 3.11 PROFILE OF THE STUDY AREA:

- **TIRUNELVELI** is a district of Tamil Nadu state in southern India. Tirunelveli District was formed on September 1, 1790 by the East India Company (on behalf of the British government). Tirunelveli, the penultimate southern most district of Tamil Nadu, is described as a microcosm of the State, owing to its mosaic and diverse geographical and physical features such as lofty mountains and low plains, rivers and cascades, seacoast and thick inland forest, sandy soils and fertile alluvium, a variety of flora, fauna, and protected wild life. Thenpandiyanadu of the early Pandyas, Mudikonda Cholamandalam of the Imperial Cholas, Tirunelveli Seemai of the Nayaks, Tinnevelly district of the East India Company and the British administration and Tirunelveli district of Independent India was bifurcated on 20th October 1986. The divided districts are called Nellai-Kattabomman district and Chidambaranar (Tuticorin) district. Subsequently the district name was christened as Tirunelveli-Kattabomman district. As per the decision of the Government of Tamil Nadu to call all the districts by the 87 name of the headquarter town, Tirunelveli-Kattabomman district is now Tirunelveli district. Chidambaram district is now called Thoothukudi district.
3.11.1 Puranic Association:

The Tirunelveli Sthalapurana prescribes a tradition for the origin of the name Tirunelveli. The puranic version goes that one Vedasarma, a staunch devotee of Shiva, on his pilgrimage from the North to the South was invited by Lord Shiva in his dream to his abode on the banks of the sacred river Tamiraparani. The delighted devotee came to Sindupondhurai on the banks of the river and stayed there with his family. Once there was a famine which forced Vedasarma to collect paddy by way of begging and continuing his daily prayers. One day he spread out the paddy to dry under the sun before the Lord, and went for his ablutions in Tamiraparani. He prayed to the Lord for rain which he thought could be a remedy for the famine. His prayer was answered and when he was bathing, a thunder storm broke-out and it rained heavily. Vedasarma rushed to the place where he had spread the paddy. He witnessed a miracle. Despite rain around the area, the paddy that he had spread did not get even a single drop of rain and did not get soaked. Since then according to the purana the town is called as “Tiru-nel-veli” (Sacred hedged paddy).

In the early 20th century, parts of Tirunelveli district was separated into Ramanathapuram and Virudhunagar districts. In 1986, Tirunelveli district was further
split into two districts for administrative purposes: Chidambaram (present-day Thoothukudi) and Nellai-Kattabomman (later Tirunelveli-Kattabomman and present-day Tirunelveli) districts.

3.11.2 ORIGIN OF THE DISTRICT:

On acquisition from the Nawab of Arcot in 1801, the British named it as Tinnevelly district though their headquarters was first located in Palayamkottai the adjacent town, where they had their military headquarters during their operations against the Palayakars. Two reasons may be attributed for naming it after Tirunelveli. One is because, it was and is the chief town of the district and the other is that it was already called Tirunelveli Seemai under the Nayaks and Nawabs. Both Tirunelveli and Palayamkottai grew as the twin towns of the district.

3.11.3 GEOGRAPHY AND CLIMATE

Tirunelveli has a unique climate, and has rainfall in all seasons (953.1 mm in 2005-2006). The district benefits from both the northeast and southwest monsoons. Most precipitation came from the northeast monsoon (548.7 mm) followed by the southwest monsoon (147.8 mm) and summer rains (184.2 mm). The district is irrigated
by several rivers originating in the Western Ghats such as the Pachaiyar River, which flows into the Tambaraparani River. The Tambaraparani and Manimuthar Rivers have many dams, with reservoirs providing water for irrigation and power generation. The Tamiraparani River provides consistent irrigation to a large agricultural area. The Chittar River also originates in this district. The Courtallam, Manimuthar and Agasthiyar waterfalls are the three major falls in the district.

3.11.4 DEMOGRAPHICS:

Tirunelveli district is populated with 27,23,988 people which includes 13,33,939 males and 13,90,049 females. Details of the population data are given in

<table>
<thead>
<tr>
<th>Total Persons</th>
<th>2723988</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1333939</td>
</tr>
<tr>
<td>Female</td>
<td>1390049</td>
</tr>
<tr>
<td>Growth % (1991-2001)</td>
<td>11.97</td>
</tr>
<tr>
<td>Rural</td>
<td>1415742</td>
</tr>
</tbody>
</table>

TABLE 3.1
POPULATION OF TIRUNELVELI DISTRICT
3.11.5 INFRASTRUCTURE:

The district is well-connected by a network of roads and railways. Tirunelveli city serves as the main junction. It has no airports; the nearest airports are at Tuticorin (60km), Madurai (150 km) and Thiruvananthapuram (240km). The district has a total of 27 Railway stations. Canals, wells, tanks and reservoirs are the sources of irrigation in the district. Electricity is provided by the Tamilnadu Electricity Board (TNEB). The Koodankulam Nuclear Power Plant project is being undertaken (with Russian aid) at the village of Koodankulam.

3.11.6 DISTRICT ADMINISTRATION:

The district administration is headed by the District Collector with his office at the district collectorate. The responsibilities of the District Collector include maintenance of law and order, coordinating various development and welfare activities in the district. A detail of other administrative setup in Tirunelveli District is given in Table 3.2.
TABLE 3.2

ADMINISTRATIVE SETUP OF TIRUNELVELI DISTRICT IN 2001

<table>
<thead>
<tr>
<th>Number of Villages 628</th>
<th>628</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Village Panchayats 425</td>
<td>425</td>
</tr>
<tr>
<td>Number of Town Panchayats 38</td>
<td>38</td>
</tr>
<tr>
<td>Number of Municipalities 5</td>
<td>5</td>
</tr>
<tr>
<td>Number of Municipal Corporation 1</td>
<td>1</td>
</tr>
<tr>
<td>Number of Taluks 11</td>
<td>11</td>
</tr>
<tr>
<td>Panchayat Unions 19</td>
<td>19</td>
</tr>
</tbody>
</table>

Source: Census report of TIRUNELVELI DISTRICT 2001
3.11.7 REVENUE DIVISION OF TIRUNELVELI DISTRICT:

There are 3 revenue division in Tirunelveli. 11 taluks and 19 development blocks in Tirunelveli District. The below chart clearly explains about the division of Tirunelveli.

CHART-3.8

REVENUE DIVISION OF TIRUNELVELI DISTRICT

OVERVIEW OF THE INDUSTRIAL SCENARIO

- Limestone is the major mineral available in Rastha, Thalaiyothu, Sankarnagar & Padmaneri.
- Limestone available here contains calcium oxide (CaO) from 34.57% to 55.49 %, Magnesium oxides (MgO) from 0.31% to 7.24 %.
3.11.8 BANKS IN TIRUNELVELI DISTRICT:

There are 18 banks situated in TIRUNELVELI DISTRICT. Totally 205 branches are located in the study area. The following table clearly shows about the details of banks situated in Tirunelveli.

**TABLE 3.3**

**LOCATED BANKS IN TIRUNELVELI DISTRICT**

<table>
<thead>
<tr>
<th>Bank</th>
<th>Branches</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDIAN OVERSEAS BANK</td>
<td>57</td>
</tr>
<tr>
<td>CANARA BANK</td>
<td>27</td>
</tr>
<tr>
<td>STATE BANK OF INDIA</td>
<td>23</td>
</tr>
<tr>
<td>INDIAN BANK</td>
<td>20</td>
</tr>
<tr>
<td>TAMILNAD MERCANTILE BANK</td>
<td>17</td>
</tr>
<tr>
<td>CENTRAL BANK OF INDIA</td>
<td>12</td>
</tr>
<tr>
<td>ICICI BANK LTD</td>
<td>10</td>
</tr>
<tr>
<td>STATE BANK OF TRAVANCORE</td>
<td>5</td>
</tr>
<tr>
<td>KARUR VYSYA BANK</td>
<td>4</td>
</tr>
<tr>
<td>UNION BANK OF INDIA</td>
<td>4</td>
</tr>
<tr>
<td>BANK NAME</td>
<td>BRANCHES</td>
</tr>
<tr>
<td>------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>PUNJAB NATIONAL BANK</td>
<td>4</td>
</tr>
<tr>
<td>BANK OF INDIA</td>
<td>4</td>
</tr>
<tr>
<td>AXIS BANK</td>
<td>4</td>
</tr>
<tr>
<td>BANK OF BARODA</td>
<td>4</td>
</tr>
<tr>
<td>SYNDICATE BANK</td>
<td>3</td>
</tr>
<tr>
<td>FEDERAL BANK</td>
<td>3</td>
</tr>
<tr>
<td>CORPORATION BANK</td>
<td>3</td>
</tr>
<tr>
<td>HDFC BANK LTD</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: www.google.com

3.11.9 BANKS TAKEN TO THE RESEARCH:

The research takes the below 5 banks of customers for getting data by adopting convenience sampling method. The following table 3.4 clearly explains about the detail of the banks.
The evolution of modern banking started from the use of Automatic teller machines, Internet banking, Telephone banking, Mobile banking, National electronic fund transfer and Real time gross settlement. So the customers have to identify and understand these types of technologies. Because technology will bring fundamental shift in the functioning of banks. It would not only help them bring improvements in their internal functioning but also enable them to provide better customer service. Technology will break all boundaries and encourage cross border banking business. So this research focuses
The customers’ impact on these kinds of technologies like ATM, Internet Banking, Tele Banking, Mobile Banking, RTGS, and NEFT. The study analyzes the customer’s adoption of these banking technologies, the impact of these technologies among them, their problem in using and their satisfaction level with these technologies in the five banks (SBI, CANARABANK, IOB, TMB, and AXIS) located in the study area Tirunelveli District.

3.10 CHAPTER SUMMARY:

In this chapter the evolution of technology in Indian Banking Sector was briefly explained. It explained about the Indian Banking from the traditional period to modern period. Various kind of modern banking technologies and available technologies in the study area were elaborately discussed. It also stated about the profile study of the study area Tirunelveli District.