5.1. Introduction

The Banking in India have cross three eras – pre-nationalization era, post nationalization era and post liberalization era. During the pre-nationalization era till 1996, banks were focused more on basic principles of banking- accepting deposits for the purpose of lending. Customers approached bankers for giving deposits which banker accepted for the purpose of lending and making profits. During the post-nationalization era till 1994, several banks were brought under Government control and directed to towards a major thrust to rural lending and poverty alleviations programs. Employment generation was the focus. Banks were re-oriented them selves to open and manage branches in the remotest corners of the country to meet the region wise, sector wise lending targets. Thousands of employees were recruited. Lakhs of borrowers benefited. Cores of rupees were mobilized as deposits and were also lent with focus on increasing agricultural production. Developing small scale sectors, self employment programs and so on.

The post liberalization era started in the late 1990s and continuing even now fuelled by the emergence of IT sector as major export earner for the country. Computerization is a positive step to bank growth. With the aid of computers, the bank work can be done faster. Not only the present work load can be reduced to a great extent but also the bank can expand its working area with the same manpower. Reserve bank of India and State Bank of India installed computer systems for processing and reconciliation of inter branch transactions, processing statistical data and for research purpose.

“Based on the norms worked out by Rangarajan Committee (II), 7827 branches of the public sector banks were identified for full branch computerization up to March 2000 of which around 4620 were computerized as on March 99. Meanwhile, the networking of the already-computerized branches also assumed urgency and some of the Banks have started inter-connecting their computerized branches using
leased telephone lines or Very small Aperture Terminals (VSATS). This is meant to provide a more comprehensive service to customers and at the same time give banks better centralized control over the branch operations. The Financial Reforms that were initiated in the early 90s and the globalization and liberalization measures brought in a completely new operating environment to the Banks. The arrival of foreign Banks and Financial Institutions, are setting up. Services and products like “Anywhere Banking”, “Tele-banking” “Internet banking” “web banking” E-banking, e-commerce, e-business etc. have become the buzzwords of the day and banks are trying to cope with the competition of offering innovative and attractively packaged technology-based services to their customers”[1] Information Technology has basically been used two different avenues in Banking. One is Communication and Connectivity and other is Business Process Reengineering. Information technology enables sophisticated product development, better market infrastructure, implementation of reliable techniques for control of risks and helps the financial intermediaries to reach geographically distant and diversified markets. “The software packages for Banking Applications in India have their beginnings in the middle of 80s, when the Banks started computerizing the branches in a limited manner. The early 90s saw the plummeting hardware prices and advent of cheap and inexpensive but high powered PCs and servers and banks went in for what was called Total Branch Automation (TBA) packages. The middle and late 90s witnessed the tornado of financial reforms, deregulation, globalization etc coupled with rapid revolution in commercial technologies and evolution of novel concept of ‘convergence’ of computer and communication technologies, like Internet, mobile/cell phones etc”[2]

5.2. Over view of information system

Information system is as old as recorded human history. “The earliest use of information system so far discovered was in a Sumerian temple way back in the third millennium B.C. The Sumerian used clay tablets for recording receipts and issues of grain to individuals out of temple grain store. The data storage requirements were little in those days. Information system had its fast growth in the last few centuries. The Industrial Revolution gave it a great fillip. Thereafter
business started growing and along with growth, business complexity also increased. Modern systems of state administration also required the business of keeping accounts and reporting to various groups interested in business. More commercial laws were enacted to bring control over business and industries. Accounting systems, fast growth of organizations, professionalism, and advances in information technology among others have ensured the fast growth of information systems in the recent past. 

Information system includes the resources, procedures and people who help in gathering, processing, storing and communicating information. There are various types of information systems that are in use. The simplest form of information system is manual using paper and pen. Now-a-days the information system is used widely computerized information system. This type of information system will process the raw-data and provide the useful information. An Information system means, it provides information to different levels of management, which is useful for decision making and planning purpose. Computerized information system is used in every field of life, like Educational Information System, Management Information system in Business organization, Railway reservation system, Hospital information system, banking and insurance system etc. The purpose of the information system, like other system in organization is to process inputs, maintaining files of data about the organization and produce information or other outputs. Information system is an arrangement of people, data, process, network and technology that interact to support and improve both day today operations in business as well as support the problem solving and decision making needs of the management. Therefore the simple meaning of Information System is “an integrated set of components for collecting, storing, processing, and communication information. Business firms, other organizations, are individuals in contemporary society rely on information systems to manage their operations, compete in the marketplace, supply services, and augment personal lives. For instance, modern corporations rely on computerized information systems to process financial accounts and manage human resources; municipal governments rely on information systems to provide basic services to its citizens; and individuals use
information systems to study, shop, bank, and invest”[4]. The main components of information systems are computer hardware and software, databases, telecommunications systems, human resources, and procedures.

5.3. Hardware Architecture:
Information system of the Present era is highly dependent on computer, either small or large size, depending on the requirements of individual organizations. Manager, as users of information generated by computerized information system may not be required to be expert in information technology, but to be more effective to perform some other task also. Computer is high speed data processing device or system. It performs logical, arithmetical and memory functions by manipulation of electronic, magnetic or other impulse. It includes all input, output, processing, storage, programs or communication facilities which are connected to the computer. It needs both hardware and software. Hardware consists of the mechanical and electronic components, which we can see and touch.

5.3.1. Computer Configuration: A Computer system is a configuration several components and this configuration, as a whole, is known as computer. “A modern computer system, irrespective of its size, has four hardware components-central processing unit, storage/memory, input devices and output devices” [5] shown in figure (a).

The central processing unit, the heart of the computer, manipulates the data and controls other parts of the computer system. There are two types of storage system, a) Primary and b) Secondary. Primary storage temporarily stores data and program instructions during processing, secondary storage feeds data and instructions into
central processor and stores data for future use. For this purpose, magnetic disk, optical disk, and magnetic tape are used. Input devices are used to enter data and instructions into the computer system. These devices are in the form of keyboard, mouse, and touch screen and source data automation. Output devices present data in a form that user understands. These devices are in the form of printer, video display terminals (screen), plotter, audio output etc. All the above four components are required for every computer. However, where different computers are linked to each other, sometimes, communication devices are used to control the passing of certain information to and from communication networks. For example computerized data communication and transmission etc.

5.3.2. Types of Computer: Computers are generally classified on the basis of size and data processing capacity. They can be generally divided into two:

a) Small computer: Micro computer or Personal Computer (PC)
b) Large Computers: Work station, Mini Computer, Main Frame Computer, Super Computer

5.3.3. Input Output devices: The I/O devices form the bridge between user and the central processing unit. The user inputs are fed into the CPU through input devices and the results are carried out through the input devices. These devices are: Keyboard, Mouse, Text recognition (Optical Character recognition), voice recognition, Floppy disk, Hard disk, CD ROM, Scanner, Printers, plotter etc.

5.4. Software Platforms:

For using a computer, software is required. Software, in general term, consists of instructions, routines, or procedures that make it possible for an individual to use the computer and several digital devices of all kinds together in coherent system. Without software, computer hardware is of no use. Software is divided into two types:

i) System software and ii) Application software.

i) System software includes operating system and all the utilities that enable the computer to function.

ii) Application software includes programs that do real work for user and the user develops that software for performing his tasks. For example: Word processor, user
made software like railway reservation system, banking information system, library management system etc. Apart from this software there is a need of Data base Management System, File Management system, software for run the computer network etc.

5.5. System Development Life Cycle:

Like human beings, systems too have a similar life cycle. After a system has been in operation for a number of years, it gradually declines and becomes less and less effective because of the changing environment. For some period it is possible to overcome the problems by amendments (changes) and minor modification to the system, but it will not work for a long period of time, and at one point of time the user have to buy or develop a new system to fulfill his requirement. Same thing is applicable in Information system.

![System Development Life Cycle](Figure-b: System development life cycle)
(Source: Elements of System Analysis- Marvin Gore & John Stubbe)

5.6. MIS for Banks:

One of the major features of computerization in banking is designing and development of “Management Information System”. It is very convenient and user friendly. “The importance of effective MIS for control operations and of maintaining customer and business/industry data base for strategic planning has also surfaced; while Banks are looking at Data warehousing, Data mining, Business
Restructuring etc. as most essential things to have as early as possible, they are taking urgent steps to computerized the operations in their administrative and controlling machinery, so as to evolve an effective MIS. In this phase, the new communication revolution sweeping the nation and the world has come in extremely handy, as the communication infrastructure has improved significantly and the Internet technologies are available to network branches at a relatively low and affordable cost with a high degree of reliability. The present level of MIS covers, basically, information needed for control, performance monitoring, decision making etc. and encompasses most activities in administrative offices like processing of statutory returns under Reserve Bank of India Act, monthly/quarterly performance reports from branches, credit information/BSR, inter-branch transactions, personnel inventory, provident fund accounting, profit and loss accounts, cash and investment management, stationery stock accounting, and branch house keeping etc.” [5]

5.6.1. Accounting Information System for Banks: Information technology, globalization, and related developments have made business increasingly dependent on high-quality information for decision making. Business decision makers need the relevant and reliable information, which should be available at the right time and at reasonable cost. In earlier days, customers obtained the information through manually data processing. It takes lot of time and with the possibility of error. Today is the age of Information Technology. Data is processed by computer system and generate the useful information. There is an information generating software which provides information to the user at required time. For Example, Accounting Information System, is computer based software or system with process the raw data and generate the information for the user or for the bank. Being an information system, accounting information must have a target (objectives) system. This system will perform banking accounting operations as well as non-accounting operations such as Human resources information system, Production planning and scheduling system, Strategic planning system and so on. The target system for an accounting system has to do with the aspects of business operations that have to do with accountability for assets/liabilities of the enterprise,
the determination of the results of operations that ultimately leads to the computation of comprehensive income, and the financial reporting aspects of business operations.

5.6.2. AIS and related disciplines: Accounting Information System (AIS) may be considered a discipline as well as a collection of system. AIS study the structuring and operation of planning and control processes. Its main objectives are:

a) Providing information for decision making and accountability to internal and external user
b) Providing the right conditions for sound decision making
c) Ensuring that no assets illegitimately exit the organization.

AIS relates to several more elementary disciplines of which Accounting and Administrative Organization (AAO), Internal Control (IC), Managerial Information Provision (MIP), and Information Systems (IS) are main ones shown in figure (c).

(Figure-c: Accounting Information System and related disciplines)

Sources: Information System for Banks, INDIAN INSTITUTE OF BANKING & FINANCE, Taxman Publication (P.) Ltd (2005))

(a) Accounting and Administrative Organization: The system of organizational measures with respect to data processing aimed information provision for management entity functionality and accounting purposes.

(b) Managerial Information Provision: The system gathering, recording and processing of data aimed at the provision of information for management decisions.

(c) Internal Control: Control of judgments and activities of others in so far as control is conducted for the management of the organization by or on behalf of that management.

(d) Information system: An information system is an asset of interrelated components working together to collect, retrieve, process, store and disseminate
information for the purpose of facilitating planning, control, coordination, and decision making in businesses and other organizations.

5.7 Architecture of bank branch computerization,

5.7.1. General approaches: One of the important aspects of branch automation is to determine the size and type of the computer required at the branch. The computer size or the configuration is specified in terms of memory, disk space, number of terminals, printers etc. All capacity planning is directed towards optimizing throughout during peak loads and maximizing its use during other periods. The hardware architecture will define the parameters to be used in determining the size (capacity). “In banks computerization used hardware architecture consist of:

a) Mini -computers at each branch and multiple terminals
b) LAN at the branch with work station and

c) ALPMs at the branch”[6]

5.7.1. Database design: The database design can be classified as follows:

i) Common databases and

ii) Individual functional area databases

i) Common Data bases: This type of database contain particular information which is frequently required for both transaction posting as well as other services like query, Management Information System (MIS) reports, etc. This is derived from all the functional areas where the information is common in nature for the areas such as transaction, cheques issue, stop payment, standing instructions, balances attachments, etc.

ii) Individual Functional Area Data bases: This data base has detailed information about each functional area. They have information which is not required frequently and also it contain master information about the functional area. If the transaction is not validated at common database then the transaction may be required to go through the functional areas for validation.
5.7.2. The Model of Mini-computer with Multi-Terminal System: “In the mini-computer with multiple terminals at branch where a customer will be served at any terminal with any type of transactions and other services. The module uses single window concepts, i.e. all modules or functional areas can be operated through one window. The configuration required for this model is: N number of terminals depending upon the work-load distribution (i.e., number of terminates at counters, back-office, authorization, development, etc.) connected to a main host computer. The intelligent terminals connected may have a hard disk for off-loading the data at the end of the day for back-up purposes”[7]

![Diagram of Multi-Terminal System](source: IT, MIS & Productivity – S.M. Padwal)

The operator can access all functional areas of the branch from any terminals. Any type of service can be obtained by the customer from any terminal. This eliminates the formation of queues at the counters.

![Diagram of Module Functions Details](source: IT, MIS & Productivity – S.M. Padwal)

5.7.2. Mini Computer System with a Multi-Terminal – Software Architecture: The development of software depends upon the approach selected. Accordingly the software may be favourable or unfavourable to the customers. Customer services are divided in to mainly two types- transactions and other services. Transaction
type services are validated and posted to common data base with authentication by
the offices/ manager as per the requirements. If more details are required for
posting the transactions then the control will go to individual functional area’s
database, and it refers to additional information required and then the transaction
will be posted. For any other type of customer service i.e., query, updation,
changing details, then it will be routed directly to the individual functional area’s
databases and operation will be carried out. “In this design internal processing
functions (main functions) have been identified, and such high-level functions are
decomposed into sub-functions like issuing a cheque book, stop payments, loans,
advance bills, term loan agricultural loan, bill purchases, bill receivable, etc. the
data storage is based on these sub-functions.” [8]

5.7.3. LAN Model: The LAN models are designed on the basis of two approaches:
1) Each LAN having a number of dedicated terminals for each depending upon the
work- load. Those terminals will be networked at back-office to the host system.
ii) The second approach has separate LAN for a particular module depending upon
the dominating or crowded modules and remaining modules can have a separate
LAN or individual ALPMs. “LAN for some modules and LAN nodes or ALPMs
for the remaining will be networked with the host computer, i.e., we will be using a
LAN in a LAN.” [9]

Therefore in both the approaches a customer will be served at dedicated terminals
for particular modules and one window concept need not be used. Each operator
will have access to only that module for which his terminal is dedicated. But the
officer/manager can have access to all modules from his terminal.
5.7.4. LAN Model/ Approach - Software Architecture: “Architecture details for LAN model/ approach is also the same as multi-terminal approach. The difference is that access restrictions to each functional module are incorporated. As the architecture is same as the multi-terminals mode, there is flexibility for allocating and reallocating of terminals for different modules as per the work-load requirements.” ALPMs are simply the stand-alone PCs. Because of restrictive practices of the staff union regarding technology related matters, banks use ALPMs. The cost effectiveness of this approach is limited due to permissible number of accounts, and also the type applications that are taken up for mechanization. But this approach is slowly converting itself into LAN approach.

5.8. Banking Software
The Software Packages for Banking Applications in India had their beginnings in the middle of 80s, when the Banks, spurred on by RBI and the Rangarjan Committee Report, started computing the branches in a limited manner. The approach was to empanel a few hardware vendors who will also develop the software as per bank’s specifications and also help to install at the branches. This was a multi-vendor approach to foster competition and to assess the relative vendor capabilities. These packages were written usually in fox-pro or c language and were Dos-based-and rarely Unix-based. The early 90s witnessed a reduction in the hardware prices due to which high powered PCs and Servers were available in the affordable price. This led to what is called the Total Branch Automation (TBA) package. The solutions offered by the vendors were architecturally different. Some has centralized solutions and some vendors offered distributed processing models. The platforms used ranged from simple UNIX-C to powerful RDBMS like Oracle etc. The middle and late 90s there was rapid revolution in communication technologies and evolution of novel concept of ‘Convergence’ of computer and communication technology, like Internet, mobile/cell phones etc. The arrival of foreign and private banks with their superior technology-based services pushed Indian Banks also to follow suit by going in for the latest technologies so as to meet the threat of competition and retain customer base. This also brought in
revolutionary products and services to which, the Indian Software Industry has significantly contributed.

5.8.1. Categories of packages: “The banking software present by available in India can be classified into six types:
i) Stand-alone branch-level package
ii) Multi-branch solutions
iii) Foreign Packages
iv) Packages for specialized niche areas
v) Service Branch / high-volume transactions processing packages
vi) IT Services” [11]

i) **Stand-alone branch-level package:** These are usually in FoxPro, C language or Dbase and are capable of handling specific functions at branches; these are sometimes networked on a LAN to simulate a TBA (Total Branch Automation) environment. At the same time the high-end packages with a central server (which can be a Pentium PC or NT or a MINI or even a Main Frame, supported by multiple dumb or intelligent) terminals are also used. Some of them use sophisticated RDBM like ORACLE as back-end and provide user-friendly front-end with windows GUI (graphical user interface).

ii) **Multi-branch solutions:** These solutions are used to network a cluster of branches in a city; the account maintenance can be central or can be distributed, networking being achieved through Wide Area Network (WAN) or terrestrial lines / high speed lines/ satellite networks – and now even wireless.

iii) **Foreign Packages:** The Foreign banking software solution which are commonly used are Bank Master, Kappiti, and Sanchez etc. These need to be suitable modified to make Indian requirements- but their strength in their proven capabilities in developing and offering modern/ global banking products/ services that India is just ushering in.

iv) **Packages for specialized niche areas:** Like Assets Liability Management (ALM), Treasury Management, Trading / Dealing Room activities, Custodial Services / Depository Participant etc. These are high-end packages with sophisticated analytical and decision tools.
v) **Service Branch / high-volume transactions processing packages:** These solutions include clearing, drafts issue/payments/reconciliation (Remittances), Bills (payments/collection/purchases), Dividend warrant processing, inter-branch reconciliation etc. Mostly the service provides themselves implement these packages.

vi) **IT Services:** These are the sundry services provided by the software dealers. They include services like disaster recovery, virus protection, security handling / networking multiple legacy system between them selves of to new platforms or to new delivery channels like ATMs etc.

### 5.9. Core Banking System

The one of the biggest achievement in this period is development and implantation of **“Core Banking Solution (System)”**. In the Core banking, all the data base of a particular bank is centralized and a bank can access any information and customer can get the services of that bank in any of its branch. It is a combination of Management Information system and small network banking system. Core banking is a general term used to describe the services provided by a group of networked bank branches. Bank customers may access their funds and other simple transactions from any of the member branch offices.

#### 5.9.1. Definition of core banking:

Core Banking is normally defined as “the business conducted by a banking institution with its retail and small business customers. Many banks treat the retail customers as their core banking customers, and have a separate line of business to manage small businesses. Larger businesses are managed via the Corporate banking division of the institution. Core banking basically is depositing and lending of money”\[^{12}\] Normally core banking functions include deposit accounts, loans, mortgages and payments. Banks today know better than anyone the opportunities and the risks they face in an ever-changing competitive environment. The Old Management Information system is turned to words Core banking System (solution). The banks were traditionally grouped into one of the several business areas such as commercial, wholesale or Retail Banking to indicate the thrust they are giving to customer acquisition strategies, the “core” of their banking operations continue to be Deposits, Loans, Money Transfers and
MIS. The aim of any core banking solution will have to meet these core-banking requirements. The role of technology is to make available core banking solutions that can be deployed centrally to take advantages of both the central administration and distribution operations. The core banking solution fulfills the requirements of wholesale banking by providing robust and industry strength Trade Finance and forex modules. And For Retail banking, such a solution should address various types consumer lending from housing loans to commodity loans etc. The core-banking operations will be done through all branches, wholesale banking will be confined to selected branches and much of the retail banking will be done in metros. Hence the core banking solution should be not only cost effective in meeting this varied requirement but also efficient and consistent when accessed centrally. The new private sector banks have brought in new shift in banking operations by meshing core banking with subsidiary banking which generally cover Investment banking, Insurance, Mutual funds and so on and have set expectations that core banking solution should address these requirement as well. They want to do “Universal Banking” through a small network of brick and mortar branches and large network of ATMs and expect that the technology should address this effectively. The emergence of Internet technology has reduced the cost of information delivery substantially and is also readily “available” for commercial exploitation to reduce the cost of online banking operations.

5.9.2. Banking Technology Models of Core Banking: The trends world-over are towards adoption of core banking system as the new IT system. “There are basically four models:

<table>
<thead>
<tr>
<th>Model Stage</th>
<th>Model-I</th>
<th>Model-II</th>
<th>Model-III</th>
<th>Model-IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Take Sys and PROs as given</td>
<td>Take CBS as given</td>
<td>Try to map existing Sys and PROs</td>
<td>Identify critical Sys and PROs</td>
</tr>
<tr>
<td>II</td>
<td>Develop SW package</td>
<td>Implement CBS</td>
<td>Customize CBS</td>
<td>Do BPR and Customize</td>
</tr>
<tr>
<td>III</td>
<td>Implement SW package</td>
<td>Develop Sys and PROs based CBS</td>
<td>Implement CBS</td>
<td>Implement CBS and BPR</td>
</tr>
<tr>
<td>IV</td>
<td>No MIS/DSS inefficient, ad-hoc, outdated IT stand alone solution</td>
<td>Effective IT solution, but useful for start-off banks</td>
<td>Good solution but with limited benefits</td>
<td>Most efficient Solution Justifying ROI in IT</td>
</tr>
</tbody>
</table>

(Table -1 Banking Technology Models)
(Source: Transformation of Indian Banks with Information Technology – Prof. S.M. Padwal & Dr.V.T. Godse)
Model-I: Take the given legacy systems and procedures of banking and try to map them on IT products and services without attempting to undertake business process re-engineering for whatever the reasons such as prevailing Industrial Relations, or for associated cost or for want of time. The effect of such model has been witnessed by most of then existing banks in Indian banking in 1990s.

Model-II: In this model the management takes core banking solution (CBS) and starts a bank with systems and procedures as dictated by the CBS. The era of starting new technology driven private banks in India is a good illustration of this model. Limitation of this model is, it is good for a new start-off bank where there is no legacy or any system in existence prior to starting of the bank.

Model-III: In this model, the management selects a CBS and tries to map existing systems and procedures on the CBS. The result would be similar but little better than in the first model.

Model-IV: This model makes a departure in basic approach from first three models. In this case CBS is chosen and the systems and procedures are classified as critical (must have), semi-critical (should have), and non-critical (nice to have). For critical systems and procedures the customization is undertaken by the solution provider in consultation with user acceptance test (UAT) in place, the Business Process re-engineering exercise is also initiated for others. 

5.9.3. Core Banking System-selecton process: In the present scenario, in India, both public and old private sector banks face intense competition and are struggling for customer retention. They have legacy problems of outdated corporate MIS, outnumbered staff, outstretched branch spread, outstanding dues; outclass products and out-of-line customer service. Many of the smaller banks with branch network less than 300 have become target for acquisition by the new private sector banks who want to expand their branch network to meet the social obligations as well as mobilize low cost deposits. In this backdrop, there is urgency on the part of the banks to embrace technology quickly not only to thwart competition but also to stall (their) acquisition itself. Therefore, the availability of centralized core banking solution and the tele communication infrastructure making the post merger system
integration quick and easy for these banks that the getting a little bit adventurous for acquisition by the day.

5.9.4. **Steps of selection process:** The following steps to acquire an online core banking solution and deploy it effectively:

a) **Analysis:** The first step is to analyse the present competition of the banking sector and also to determine the requirements of the customer. This is the key parameters for selection of core banking solution.

b) **Perspective plan:** Draw the perspective plan to bring online core banking in the main branches, which contribute to 75% to 80% of banks business.

c) **Network plan:** Draw the optimistic plan to provide core banking, to other remaining branches through proper network.

d) **Basic solution:** Develop the laundry list of requirements for selection of a suitable core banking solution that will have to meet the basic business functionality and network requirements show in fig.(g).

![Core banking solution](image-url)

(Source: INDIAN INSTITUTE OF BANKING & FINANCE, "Information System for Banks, Taxmann Publication (P.) Ltd)
e) **Back-office MIS:** In head office of the banks, the operations are focused on administration and supervision as well as policy making. But, data and information from the branches will have to flow in time to make these operations effective and efficient. Core banking solutions, installed centrally and administered distributed fashion, will have to have these functions supported. The major users of these functions will be top management of the bank and the operating staff in Head Office (HO) who support them.

f) **Flexibility:** The solution should be flexible to meet new requirements such as multi-currency, Internet banking, integrated Treasury management, integrated Forex management, any where banking etc.

g) **Government Banking:** banks in India also handle accounts and financial transactions on behalf Central Government Departments, State Government departments, Public sector undertaking providing utility services. The core banking solution should be flexible to fulfill these requirements.

h) **E- channels:** The core banking solution support the network branches and also support the multi delivery channels Like ATM, Debit/Credit cards, telephone banking etc.

i) **Response Time:** It should be an industrial strength product capable of handling present and future transaction volumes in networked environment with acceptable response time.

j) **Ease of use:** It should be user friendly. That every one should be able to easily operate and understand.

k) **Security:** Banks are custodian of public funds and hence a core banking solution should be secured enough to insure against financial loss caused by frauds, mis-appropriation and embezzlement. It should have highest-level access controls to safeguard against intrusions and should be well-defined and time-tested and must have the control procedures.

5.9.5. **Core Banking Systems- Products and Vendors:** There are many vendors and different products are available for core banking solution in India
### Core Banking Systems- Products and Vendors

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Vendor Name</th>
<th>Leading Banking Customer</th>
<th>Largest Transaction volumes/Branches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finacle 6.x</td>
<td>Infosys Technologies Ltd.</td>
<td>• ICICI Bank</td>
<td>Millions of Transactions; Several Hundreds of branches; Thousands of ATMs;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• UTI Bank</td>
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<td></td>
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<td>• IDBI Bank</td>
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<td>• ABN Amro Bank</td>
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<td></td>
<td>• Punjab National Bank</td>
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<td>• Union Bank of India</td>
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<td></td>
<td></td>
<td>• Tamilnadu Mercantile Bank</td>
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<td></td>
<td></td>
<td>• Karnataka Bank</td>
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<tr>
<td>Flexcube</td>
<td>I-Flex solutions Ltd.</td>
<td>• Syndicate Bank</td>
<td>Lakha of Transactions; Hundred of Branches; Several Hundred ATMs;</td>
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<tr>
<td></td>
<td></td>
<td>• Bharath Overseas bank</td>
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<td>• Karur Vysya Bank</td>
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<td>• HDFC Bank</td>
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<tr>
<td>Sanchez</td>
<td>IBM</td>
<td>• Vysysa Bank</td>
<td>More than 100 branches</td>
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<td>Equation</td>
<td>ACT Kindle</td>
<td>• IndusInd Bank</td>
<td>More than 100 branches</td>
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<td></td>
<td>• Centurion Bank</td>
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<tr>
<td>FNS</td>
<td>TCS</td>
<td>• SBI</td>
<td>Under implementation</td>
</tr>
<tr>
<td>TC/4</td>
<td>TCS/CMC</td>
<td>• United Western Bank</td>
<td>Under implementation</td>
</tr>
<tr>
<td>Newton</td>
<td>ICICI Info Tech</td>
<td>• Lakshmi Vilas Bank</td>
<td>Under implementation</td>
</tr>
<tr>
<td>Quartz</td>
<td>TCS</td>
<td>• City Union Bank</td>
<td>Under implementation</td>
</tr>
</tbody>
</table>

(Source: INDIAN INSTITUTE OF BANKING & FINANCE, "Information System for Banks", Taxmann Publication (P.) Ltd.)

5.9.6. Core banking system-security & control: There are several dimensions to security and control aspects in a core banking solution environment implemented in wide area network. The main two many dimensions are:

i) **Solution Dimension**: Covering the application, operating system controlling the application, network (both physical as well as software) and the database, which keep the data and information.

ii) Topology: The topology in which the solution is implemented covering the data center, the network connecting the branches and the brick and mortar branches form where the system is accessed and e-channel such as ATMs. Show in figure (b)." [14]
Therefore, the objective of security and control are presented as below:
The objective of Security is to i) Prevent unauthorized users from using system ii) Allow authorized users to use the system iii) Safeguard assets from intentional as well as accidental damages hardware, software and data .On the other hand the objectives of control are to ensure that, authorized users use the application and adapt for the intent and purpose for which they are designed and made available by the business. When banks go for selection of core banking solution, they have to also concurrently consider installing a security and control system to administer the security and control policy and procedures. For example: i) appoint a chief security officer (CSO) - He should be an authorized person for to take care the security. ii) Appoint Risk Analysis Team – to analyze the risks and develop counter measures for implementation iii) Develop Safeguard manuals – Administrative safeguard, physical safeguard and technical safeguard.
References


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