Chapter 1
Introduction
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Title: Role of Technology in Financial Services of Commercial Banks in India

1.1 Introduction:

Since last decade many organizations have done changes in the method of their working due to the implementation of Technology. Organizations are doing massive investments in Information Technology implementation. It appears that Information Technology investments purely aimed at improving productivity and reducing costs, do not lead to value creation for the firm that makes the investment; the benefits are passed on to their customers in the form of consumer surplus. A value building model that is based on Information Technology investments aimed at improving the performance of the organization through strengthening its market power is becoming priority for many organizations. But how far can financial services organizations differentiate from their competition to achieve market power? There is a trade-off between the forces of differentiation and of conformity.

Financial services is an interesting industry in which it is critical to analyze the impact of Information Technology. It is because, it is going through intense change (in particular the retail side of the business). Banks, confronted with declining customer bases due to the increased competition in the industry, have become locked into uneconomic cost structures. In addition, increased competition generates excess capacity, depresses margins and forces many banks to the marginal edge of risk taking and may tempt some towards failure by reducing margins and building riskier portfolios. As a consequence of this, competition is working asymmetrically in the banking industry: because of developments in technology and the general erosion of entry barriers into banking, it is easier for non-bank financial institutions to move into banking than for banks to diversify out of financial services.
Similar trends can be found in the insurance sector. In the life assurance sector there is a shift from low value to higher value products: from life assurance to investment; from annual products to single premium products; from simple products like whole life, to complex products such as utilized products; from rigid products to flexible products; from mass marketing to individualized marketing; from low advice to high advice levels; from obtaining new customers to retaining and extending services to existing customers. In other words, to achieve higher retention rates and to overcome price sensitivity, insurance companies are moving away from a product culture to a service culture. Examples are:

(a) The introduction of the all-embracing protection policy, instead of individual products; and
(b) a major emphasis on improving quality of service by such measures as “documentation-while-you-wait”, speedy reply to queries, better claims handling and telephone advice.

From a technology point of view, the main problem faced by the sector is the need to change from systems that deliver mass-produced, standardized products to highly specialized systems that provide customized insurance products for specific groups.

In the last few years the Finance and Financial service sector has changed significantly. Due to the advent of technology, the numbers of services in Finance and Financial sector have been increasing, changing and are becoming more qualitative. This has also increased the service quality and the efficiency. This has significantly changed the business scenario in the corporate world. The methods of transaction are highly affected due to the same. E.g. online banking, internet baking, online insurance, funds transfer (domestically as well as globally), governance of transactions, electronic governance e.g. income tax monitoring through PAN cards etc. This has also enabled the effective implementation of accounting standards and adherence to the financial norms as per the global scenario. Foreign exchange is one of the areas where these kinds of developments are quite evident. The Banking sector has undergone a major change due to the advent of technology. This can even be
experienced by the common man. E.g. core banking, mobile banking, electronic clearance system, electronic funds transfer, checking and monitoring loan status online etc. Similarly the changes have taken place in the Insurance sector. One can enroll the policies online, check the policy status (i.e. whether it is in force or lapsed), check the loan availability, check the accumulated bonus, check the date of maturity etc.

1.2 Objectives of the study:

1. The aim of this research is to study the existing Financial Services of Commercial Banks and the Impact of technology on these services.
2. To understand the impact of technology on consistency and reliability in the banking operations.
3. To understand and study the impact of technology on employee productivity, security, governance and cost of operations.
4. To study and understand the factors like convenience and efficiency after technology implementation in banks.
5. To study whether technology in financial services of banks contribute to globalization.
6. To identify and study the new products or services introduced by the banks due to technology implementation.

1.3 Scope of the study:
To study the following Financial Services provided by Banks:
Category A (Most frequently used services):
ATM’s, Debit Cards, ATM cum Debit Cards, Credit Cards.
Category B: (On Demand Services):
Internet Banking, Electronic Funds Transfer, Electronic Clearing System, Electronic Bill Payments.
Category C: (Specialized Services)
Phone Banking/Mobile Banking, Core Banking, Wealth Management, Real Time Gross Settlement.
Category D: (Additional Services)
Dematerialization Services, Trading Account, FOREX Services, Multi-city pay at par cheques.

As per the current Scenario, the technology based financial services provided by many banks due to competition are as follows:

1. 24/7 ATM Networks.
2. Transactions from any bank ATM allowed from 1st April 2009.
3. Internet Banking / Mobile Banking.
5. DEMAT Accounting System
6. Portfolio Management
7. Foreign Exchange Services (Similar to Western Union money transfer)
9. Payment Gateways
10. Income Tax Payment Systems (e-Filing of income tax returns)

Some of the Banks are deficient in providing some of the above mentioned services due to which they have faced a problem of reduction in customer base.

Some banks are trying to add services to the existing services in order to fulfill the customer expectations on demand or customize the services as per the requirements of the customers.

Some Important Issues to be analyzed and addressed:

1. Services provided by the Bank currently.
2. Its overall impact on the business (Positive or Negative)
3. Comparison of the services of the bank with its competitors.
5. Cost benefit Analysis of the services provided and the services expected.
8. Scalability.
9. Description of some technology oriented services provided by banks:
10. Electronic Clearing Service (ECS)

1.4 Services Provided by Some Banks

ECS:
ECS is an electronic mode of payment / receipt for transactions that are repetitive and periodic in nature. ECS is used by institutions for making bulk payment of amounts towards distribution of dividend, interest, salary, pension, etc., or for bulk collection of amounts towards telephone / electricity / water dues, cess / tax collections, loan installment repayments, periodic investments in mutual funds, insurance premium etc. Essentially, ECS facilitates bulk transfer of monies from one bank account to many bank accounts or vice versa.

ECS Credit is used by an institution for affording credit to a large number of beneficiaries (for instance, employees, investors etc.) having accounts with bank branches at various locations within the jurisdiction of a ECS Centre by raising a single debit to the bank account of the user institution. ECS Credit enables payment of amounts towards distribution of dividend, interest, salary, pension, etc., of the user institution.

ECS Debit is used by an institution for raising debits to a large number of accounts (for instance, consumers of utility services, borrowers, investors in mutual funds etc.) maintained with bank branches at various locations within the jurisdiction of a ECS Centre.
for single credit to the bank account of the user institution. ECS Debit is useful for payment of telephone / electricity / water bills, cess / tax collections, loan installment repayments, periodic investments in mutual funds, insurance premium etc., that are periodic or repetitive in nature and payable to the user institution by large number of customers etc.

Based on the geographical location of branches covered, there are three broad categories of ECS Schemes – Local ECS, Regional ECS and National ECS.

Local ECS – this is operating at 81 centers / locations across the country. At each of these ECS centers, the branch coverage is restricted to the geographical coverage of the clearing house, generally covering one city and/or satellite towns and suburbs adjoining the city.

Regional ECS – this is operating at 9 centers / locations at various parts of the country. RECS facilitates the coverage all core-banking-enabled branches in a State or group of States and can be used by institutions desirous of reaching beneficiaries within the State / group of States. The system takes advantage of the core banking system in banks. Accordingly, even though the inter-bank settlement takes place centrally at one location in the State, the actual customers under the Scheme may have their accounts at various bank branches across the length and breadth of the State / group of States.

National ECS – this is the centralized version of ECS Credit which was launched in October 2008. The Scheme is operated at Mumbai and facilitates the coverage of all core-banking enabled branches located anywhere in the country. This system too takes advantage of the core banking system in banks. Accordingly, even though the inter-bank settlement takes place centrally at one location at Mumbai, the actual customers under the Scheme may have their accounts at various bank branches across the length and breadth of the country. Banks are free to add any of their core-banking-enabled branches in NECS irrespective of their location.

ECS Credit payments can be initiated by any institution (called ECS Credit User) which needs to make bulk or repetitive payments to a number of beneficiaries. The institutional
User has to first register with an ECS Centre. The User has to also obtain the consent of beneficiaries (i.e., the recipients of salary, pension, dividend, interest etc.) and get their bank account particulars prior to participation in the ECS Credit scheme.

ECS Credit payments can be put through by the ECS User only through his / her bank (known as the Sponsor bank). ECS Credits are afforded to the beneficiary account holders (known as destination account holders) through the beneficiary account holders’ bank (known as the destination bank). The beneficiary account holders are required to give mandates to the user institutions to enable them to afford credit to their bank accounts through the ECS Credit mechanism.

The User intending to effect payments through ECS Credit has to submit details of the beneficiaries (like name, bank / branch / account number of the beneficiary, MICR code of the destination bank branch, etc.), date on which credit is to be afforded to the beneficiaries, etc., in a specified format (called the input file) through its sponsor bank to one of the ECS Centers where it is registered as a User.

The bank managing the ECS Centre then debits the account of the sponsor bank on the scheduled settlement day and credits the accounts of the destination banks, for onward credit to the accounts of the ultimate beneficiaries with the destination bank branches.

MICR Code

MICR is an acronym for Magnetic Ink Character Recognition. The MICR Code is a numeric code that uniquely identifies a bank-branch participating in the ECS Credit scheme. This is a 9 digit code to identify the location of the bank branch; the first 3 characters represent the city, the next 3 the bank and the last 3 the branch. The MICR Code allotted to a bank branch is printed on the MICR band of cheques issued by bank branches. ECS Credit offers many advantages to the beneficiary –
1. The beneficiary need not visit his / her bank for depositing the paper instruments which he would have otherwise received had he not opted for ECS Credit.
2. The beneficiary need not be apprehensive of loss / theft of physical instruments or the likelihood of fraudulent encashment thereof.
3. Cost effective.
4. The beneficiary receives the funds right on the due date.

User institutions enjoy many advantages as well. For instance,
1. Savings on administrative machinery and costs of printing, dispatch and reconciliation of paper instruments that would have been used had beneficiaries not opted for ECS Credit.
2. Avoid chances of loss / theft of instruments in transit, likelihood of fraudulent encashment of paper instruments, etc. and subsequent correspondence / litigation.
3. Efficient payment mode ensuring that the beneficiaries get credit on a designated date.
4. Cost effective.

ECS Debit transaction can be initiated by any institution (called ECS Debit User) which has to receive / collect amounts towards telephone / electricity / water dues, cess / tax collections, loan installment repayments, periodic investments in mutual funds, insurance premium etc. It is a Scheme under which an account holder with a bank branch can authorize an ECS User to recover an amount at a prescribed frequency by raising a debit to his / her bank account.

The User institution has to first register with an ECS Centre. The User institution has to also obtain the authorization (mandate) from its customers for debiting their account along with their bank account particulars prior to participation in the ECS Debit scheme. The mandate has to be duly verified by the beneficiary’s bank. A copy of the mandate should be available on record with the destination bank where the customer has a bank account.

The ECS Debit User intending to collect receivables through ECS Debit has to submit details of the customers (like name, bank / branch / account number of the customer, MICR
code of the destination bank branch, etc.), date on which the customer’s account is to be debited, etc., in a specified format (called the input file) through its sponsor bank to the ECS Centre.

The bank managing the ECS Centre then passes on the debits to the destination banks for onward debit to the customer’s account with the destination bank branch and credits the sponsor bank’s account for onward credit to the User institution. Destination bank branches will treat the electronic instructions received from the ECS Centre on par with the physical cheques and accordingly debit the customer accounts maintained with them. All the unsuccessful debits are returned to the sponsor bank through the ECS Centre (for onward return to the User Institution) within the specified time frame.

The advantages of ECS Debit to customers are many and include:
1. ECS Debit mandates will take care of automatic debit to customer accounts on the due dates without customers having to visit bank branches / collection centers of utility service providers etc.
2. Customers need not keep track of due date for payments.
3. The debits to customer accounts would be monitored by the ECS Users, and the customers alerted accordingly.
4. Cost effective.
5. User institutions enjoy many benefits from the ECS Debit Scheme like,
6. Savings on administrative machinery and costs of collecting the cheques from customers, presenting in clearing, monitoring their realization and reconciliation.
7. Better cash management because of realization / recovery of dues on due dates promptly and efficiently.
8. Avoids chances of loss / theft of instruments in transit, likelihood of fraudulent access to the paper instruments and encashment thereof.
9. Realization of payments on a uniform date instead of fragmented receipts spread over many days.
10. Cost effective.
The banking system has many benefits from ECS Debit such as –

Freedom from paper handling and the resultant disadvantages of handling, receiving and monitoring paper instruments presented in clearing.
1. Ease of processing and return for the destination bank branches. Destination bank branches can debit the customers’ accounts after matching the account number of the customer in their database and due verification of existence of valid mandate and its particulars. With core banking systems in place and straight-through-processing, this process can be completed with minimal manual intervention.
2. Smooth process of reconciliation for the sponsor banks.
3. Cost effective.

RTGS System

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.

Difference between RTGS and NEFT

NEFT is an electronic fund transfer system that operates on a Deferred Net Settlement (DNS) basis which settles transactions in batches. In DNS, the settlement takes place with all transactions received till the particular cut-off time. For example, currently, NEFT operates in hourly batches - there are eleven settlements from 9 am to 7 pm on week days and five settlements from 9 am to 1 pm on Saturdays. Any transaction initiated after a
designated settlement time would have to wait till the next designated settlement time. Contrary to this, in the RTGS transactions are processed continuously throughout the RTGS business hours.

The RTGS system is primarily meant for large value transactions. The minimum amount to be remitted through RTGS is ₹ 2.00 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 remitting bank receives a message from the Reserve Bank that money has been credited to the receiving bank. Based on this the remitting bank can advise the remitting customer that money has been delivered to the receiving bank.

It is expected that the receiving bank will credit the account of the beneficiary instantly. If the money cannot be credited for any reason, the receiving bank would have to return the money to the remitting bank within 2 hours. Once the money is received back by the remitting bank, the original debit entry in the customer's account is reversed.

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.

With a view to rationalize the service charges levied by banks for offering various electronic products, a broad framework has been mandated as under:
a) Inward transactions – Free, no charge to be levied
b) Outward transactions –
₹ 2.00 lakh to ₹ 5 lakh - not exceeding ₹ 25 per transaction.
Above ₹ 5 lakh – not exceeding ₹ 50 per transaction.
The remitting customer has to furnish the following information to a bank for effecting a 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
7. The IFSC Number of the receiving branch
8. (IFSC Code is Indian Financial System Code, which is an eleven character code assigned by RBI to identify every bank branches uniquely, that are participating in NEFT system in India. This code is used by electronic payment system applications such as RTGS, National Electronic Fund Transfer and CFMS(centralized funds management system).

NEFT
National Electronic Funds Transfer (NEFT) is a nation-wide payment system facilitating one-to-one funds transfer. Under this Scheme, individuals, firms and corporates 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. For being part of the NEFT funds transfer network, a bank branch has to be NEFT-enabled. Individuals, firms or corporates 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 ₹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.
Individuals, firms or corporates maintaining accounts with a bank branch can receive funds through the NEFT system. It is, therefore, necessary for the beneficiary to have an account with the NEFT enabled destination bank branch in the country.

The NEFT system also facilitates one-way cross-border transfer of funds from India to Nepal. This is known as the Indo-Nepal Remittance Facility Scheme. A remitter can transfer funds from any of the NEFT-enabled branches in to Nepal, irrespective of whether the beneficiary in Nepal maintains an account with a bank branch in Nepal or not. The beneficiary would receive funds in Nepalese Rupees.

There is no limit – either minimum or maximum – on the amount of funds that could be transferred using NEFT. However, maximum amount per transaction is limited to ₹50,000/- for cash-based remittances and remittances to Nepal.

There is no restriction of centers or of any geographical area within the country. The NEFT system takes advantage of the core banking system in banks. Accordingly, the settlement of funds between originating and receiving banks takes places centrally at Mumbai, whereas the branches participating in NEFT can be located anywhere across the length and breadth of the country.

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 Saturdays.

NEFT Operation:

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 center (also called the NEFT Service Centre).

Step-3: The pooling center 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.

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 ₹ 1 lakh – not exceeding ₹ 5 (+ Service Tax)
- For transactions above ₹ 1 lakh and up to ₹ 2 lakhs – not exceeding ₹ 15 (+ Service Tax)
- For transactions above ₹ 2 lakhs – not exceeding ₹ 25 (+ Service Tax)

c) Charges applicable for transferring funds from India to Nepal using the NEFT system (under the Indo-Nepal Remittance Facility Scheme) is available on the website of RBI.

Internet Banking:

The Internet banking is changing the banking industry and is having the major effects on banking relationships. Internet banking involves use of Internet for delivery of banking products & services. It falls into four main categories, from Level 1 - minimum functionality sites that offer only access to deposit account data - to Level 4 sites - highly sophisticated offerings enabling integrated sales of additional products and access to other financial services- such as investment and insurance. In other words a successful Internet banking solution offers:
1. Checking with no monthly fee, free bill payment and rebates on ATM surcharges
2. Easy online applications for all accounts, including personal loans and mortgages
3. 24 hour account access
4. Quality customer service with personal attention

Advantages previously held by large financial institutions have shrunk considerably. The Internet has leveled the playing field and afforded open access to customers in the global marketplace. Internet banking is a cost-effective delivery channel for financial institutions. Consumers are embracing the many benefits of Internet banking. Access to one's accounts at any time and from any location via the World Wide Web is a convenience unknown a short time ago. Thus, a bank's Internet presence transforms from 'brouchreware' status to 'Internet banking' status once the bank goes through a technology integration effort to enable the customer to access information about his or her specific account relationship. The six primary drivers of Internet banking includes, in order of primacy are:
1. Improve customer access
2. Facilitate the offering of more service
3. Increase customer loyalty
4. Attract new customers
5. Provide services offered by competitors
6. Reduce customer attrition

The banking industry in India is facing unprecedented competition from non-traditional banking institutions, which now offer banking and financial services over the Internet. The deregulation of the banking industry coupled with the emergence of new technologies, are enabling new competitors to enter the financial services market quickly and efficiently.

Mobile Banking:

Definition : Mobile banking (also known as M-Banking, mbanking, SMS Banking etc.) is a term used for performing balance checks, account transactions, payments etc. via a mobile device such as a mobile phone or Personal Digital Assistant (PDA). ...

In today world Mobile Banking is a popular term. Mobile Banking means a financial transaction conducted by logging on to a bank’s website using a cell phone, such as viewing account balances, making transfers between accounts, or paying bills. It is a term used for performing balance checks, account transactions, payments etc. via a mobile device such as a mobile phone. In recent time Mobile banking is most often performed via SMS or the Mobile Internet but can also use special programs called clients downloaded to the mobile device.

Mobile Banking concept:
In general term we can categorized the mobile banking below -
1. Mobile Accounting
2. Mobile Brokerage

3. Mobile Financial Information Services

Most services in the categories designated Accounting and Brokerage are transaction-based. The non-transaction-based services of an informational nature are however essential for conducting transactions – for instance, balance inquiries might be needed before committing a money remittance.

Overall impact of Banking Technology on the business:
Technology adoption has changed the face of banking in India. What started as a mere Automation of some routine work processes in banks in the mid 80’s has moved on to become business process re-engineering which has resulted in making banking services branchless, anytime and anywhere; facilitated new product development and, enabled near real time service delivery. Technology has helped banks to reach the doorsteps of the customer by overcoming the limitations on geographical/ physical reach in branch banking and easing the resource and volume constraints posed by the brick and mortar model. All the stakeholders have benefitted from the expansion of delivery channels, product innovation and efficiency enhancement which have been facilitated by technology adoption. Banks, however, need to guard against losing personal touch with their customers in such technology driven environment as this would result in their losing valuable information needed for their business. Overall, technology that began its journey in Indian banking as an enabler, has now become a business driver, and is poised to be an inseparable part of banking business process. This journey has come to the present stage by virtue of the push given by the Reserve Bank and the whole hearted co-operation by Industry participants.

Reserve bank and banking technology:
Reserve Bank of India started this push with the Rangarajan Committee Report I & II on Computerization in Banks, followed by Saraf and Vasudevan 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.

RBI has released an IT vision document 2011–17, which identifies the key focus areas for banks in India. The document indicates the significance to be accorded to the enhanced use of IT in areas like MIS, regulatory reporting, financial inclusion along with the need for appropriate risk mitigation measures and business continuity management. It envisages banks to work towards utilizing technology for cost reduction of small value transactions, improved customer services and effective flow of information within the banks and to the regulator. The document emphasizes the need to move towards integrated IT environment for tapping the synergistic benefits of holistic system implementation.

Setting up of IDRBT – contribution in banking technology & research

Setting up of the Institute for Development and Research in Banking Technology (IDRBT), Hyderabad in the mid-nineties, as a research and technology center for the banking sector was a major step to facilitate and support the “technological revolution” in banking. It was set up in the year 1994 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 also acts as a Certifying Authority (CA) for issuance of digital certificates for players in the banking and financial sector. Structured Financial Messaging System (SFMS), a secure and common domestic financial messaging solution for intra-bank and interbank applications, developed on the lines of SWIFT was the brainchild of 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.
Reaching for the skies – banking technology excellence awards

Institution of the excellence awards is a step in the direction of encouraging effective adoption of technology by banks. Instituted in the year 2001, with the primary objective of encouraging and recognizing excellence in implementation of Technology for better customer service, operational efficiency and expansion of banking services to the hitherto uncovered sections of society, the category of awards has been changing with the change in the technology deployment focus from time to time. This year, banks have been divided into two categories – large and small, to enhance the spirit of “sporting competition” amongst banks by ensuring a level playing field.

Alignment of technology and business objectives – critical issues

Having given the background of the role of technology in banking development and the role essayed by Reserve Bank and IDRBT, a few focus areas in the business-technology alignment which could become critical in pursuit of technological excellence.

Leveraging technology for financial inclusion – the journey so far, introspection and way ahead:

Banking, as all of us know, 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. It is not just people in the rural areas; many of the lower income categories of the urban population are also excluded from the banking fold. This is largely because of the way the supply of such services is organized. Our existing banking business model has done laudable work in some of the areas, but has not been able to adequately address these specific challenges. For instance, transaction costs of financial services to the poor are much larger in comparison to their revenue generation potential in the short term. From the demand side too, there is financial illiteracy and the consequent fear of approaching formal institutions. With this huge chunk of our populace being deprived of basic economic facilitators, or alternatively seen, with this huge resource base remaining untapped, it would not be feasible to achieve our growth potential.
Technology has the potential to influence financial inclusion in a big way and help resolve many of the above problems. The use of technology in extending banking outreach is an area of contemporary focus in India. Thanks to the versatility of information technology, innovation is giving us the hope that new business models like Banking Correspondents (BCs), innovative payment devices, Unique Identification number allocation etc. will enable us to achieve financial inclusion, while addressing some of the cost and beneficiary identification issues. Ultimately, the objective is to lower the operating costs through technological innovations whereby, financial inclusion becomes a profitable business. This will result in a huge upside to the bank in the form of stable deposits. Financial inclusion would be a catalyst to growth and would also contribute indirectly to financial stability.

Use of IT for improving internal effectiveness – significance and benefits

Focus of technology in Indian banking, so far, has, mainly, been on transaction processing, data storage, service delivery, and rightly so. These were the priorities to make banking better, convenient and more accessible. Now, that banking has reached a stage where many of such services are running on tech enabled processes, banks look forward to improving other areas which were not in focus and have huge scope for improvement, such as internal management and back end processes. Currently, while data storage and retrieval are on computerized systems, the administrative processes are largely manual, warranting huge resource deployment. This adds to costs, impacts efficiency and reduces effectiveness of internal controls. Further, in the existing models followed in many work areas in banks, data flows and reporting for MIS as well as external filings require manual interventions and multiple database access/ sourcing. This not only affects the timeliness of data submission but also the quality thereof. Errors in submitted data and, sometimes, subjective interpretations of data submission requirements lead to wrong decisions and, may be, serious consequences. RBI has taken the initiative in the form of automated data flow project, through which an attempt is being made to ensure that all banks start furnishing reports to RBI by means of straight through/ automated processes which do not require
manual intervention. This will ensure that reporting is error free, direct from business data and timely.

1.5 Challenges in IT usage – costs and risks
Wide spread technology deployment in the banking business has brought to the fore some new issues and challenges. These can be broadly divided into two categories – Costs and Risks.

Costs – in terms of increasing expenditure on IT deployment and, Risks – resulting from – reliance on IT systems without necessary safeguards. Cost aspects can be addressed by synergizing IT deployment objectives with the broader, strategic business objectives to ensure adequate operational and management controls over purchase as well as maintenance of appropriate technology solutions. Oversight and Governance mechanisms have to be strengthened to ensure that costs involved in IT management are properly evaluated and controlled, technology deployment decisions are based on holistic and considered evaluation, the solutions / process changes have customer in focus and that banking organizations do not end up investing in technology which hampers customer interests. The second aspect relating to IT risks is a very critical issue. With the increased use of IT, there are attendant risks posed to the banks as well as their customers in terms of monetary loss, data theft, breach of privacy and banks need to be extremely cognizant of such risks.

Another significant aspect of banking business is regulatory and supervisory compliance. With the growth and globalization of markets in general and in the aftermath of recent crisis in particular, number of such compliance requirements is increasing. It requires enormous amount of continuous data capturing for analysis, risk measurement and provisioning, as also validation of models and processes deployed for such assessments. All this has to be essentially carried out using technology based applications. However, these requirements will entail some costs and banks will have to see as to how appropriate technology usage can help them reduce the costs of compliance process, at least in terms of operational efficiency. At the same time, IT risk itself shall form a large part of the
operational risk and shall require focused attention. Within the boundaries of permissible action, some banks may find innovative solutions to shore up asset or liability management efficiency to counterbalance some of the costs. But, again, Governance mechanism shall have to be alert and appropriate to ensure that cost considerations do not lead to “shortcuts” in compliance. IDRBT has collated and published some useful information on their website regarding IT Governance, which is appreciable.
1.6 IT Vision of Reserve Bank India - 2011-17\(^1\)

The last few years have witnessed an explosion of Information Technology (IT) based initiatives which have brought about a sea change in the banking sector of the country. The Reserve Bank has been at the forefront of IT initiatives with broad directions outlined by its IT Vision Documents. The latest in this series is the Information Technology Vision Document, 2011-2017 which aims at providing a road map towards a transformation which is knowledge based and which has Information as its focal point.

The Vision Document discusses the stance of the Reserve Bank in positioning itself as a knowledge organization and the steps to be taken for harnessing human resource potential. In this journey, other facilitators would be the migration to enterprise architecture for IT systems and appropriate business processing re-engineering. Factors resulting in the accomplishment of the objective of a knowledge based organization include the need for data to conform to internationally accepted standards and usage of business intelligence from data warehouse. This will form the basis for development of optimal Management Information Systems (MIS) with effective Decision Support Systems (DSS).

The Vision Document sets the priorities for commercial banks for moving forward from the core banking solutions to enhanced use of IT in areas like MIS, regulatory reporting, overall risk management, financial inclusion and customer relationship management. It also dwells on the possible operational risks arising out of adopting technology in the banking sector which could affect financial stability and emphasizes the need for internal controls, risk mitigation systems and business continuity plans.

Further, the Vision Document gives a bird’s eye view of the factors resulting in improved IT Governance, with specific strategies centered on effective project management, evolution of well-defined information policies as well as information security frameworks,

\(^1\) Reserve Bank of India.
juxtaposed with better vendor management and outsourcing practices. Impetus would be provided to reviewing of IT processes aimed at holistic processing leading to better alignment between business objectives and IT.

Finally, the Vision Document focuses on adopting environmental friendly green IT.

IT Vision of Reserve Bank India - 2011-17

“Enabling IT as a Strategic Resource for
Enhancing Enterprise Knowledge
Improving Customer Service
Strengthening Governance
Increasing Overall Efficiency and
Ensuring Environment Friendly Systems”

1. Enhancing Enterprise Knowledge

Knowledge emanates from information, which itself is based on data. The meaningful transformation of data to knowledge through information can be possible only when data is methodically collected, stored, processed, shared, disseminated and used. Enterprise knowledge can be enhanced by using relevant data and information effectively and applying knowledge either in the same context or in a new context (where new knowledge is created). It is for this reason that the need for enhancement of enterprise knowledge is gaining importance. Executing a knowledge-based strategy is not just about managing knowledge but about imparting knowledge to those who aspire for it.

The Reserve Bank has been an organization which has always been in the fore front as far as organizational learning and knowledge based decision making is concerned. It recognizes that while individuals possess part of what is known about a given domain, a body of knowledge is possessed by the organization. This knowledge is based on a multitude of information, which emanates from a variety of sources. IT plays an important
role in enhancing enterprise knowledge through improved channels and contents - two important ingredients of knowledge organization, another being culture.

1.1 Channels, Contents and Culture

As a knowledge organization, the Reserve Bank has embarked on its pivotal role of disseminating the knowledge possessed by it in a meaningful manner through various channels. The first channel is the public website. The second channel is the Reserve Bank's data warehouse which stores the data relating to various sectors of the economy, equipped with powerful search tools and business analytics facilitating ease of use. This also provides the non-confidential data for the benefit of the general public, which includes researchers, analysts, banks and others in the form of Data Base on Indian Economy (DBIE). The third channel is the Enterprise Knowledge Portal (EKP) for knowledge diffusion within the Reserve Bank. The portal houses the internal circulars, references, and useful developments pertaining to various functional areas. The Reserve Bank believes in bringing class rooms closer to employees through virtual learning sessions in various fields. Accordingly, it will make continuous efforts continue to increase the scope of the existing channels and introduce new channels for collective learning and effective collaboration. IT would provide the means to the Reserve Bank to strengthen its initiative of being a storehouse of primary (producer of information) and secondary (other sources) information.

In order to ensure that information is available to authorized persons/entities in a manner useful to them, it would be ideal if the culture of information sharing in the Reserve Bank shifts from a “need to know” to a “responsibility to provide”. This will mandate establishment of a trust environment with access and security built into the data and the environment.

1.2 Data Quality and Data Standards

The Reserve Bank assigns great importance to both quality and timeliness of data and its processing into useful information for MIS and decision making purposes. For achieving
this objective, it is pertinent that uniform data reporting standards are put in place. Use of uniform reporting standards for data collection process will effectively reduce the reporting burden, ease validation, and improve overall efficiency. To ensure smooth flow of quality data in a timely manner to the users, it is essential that:

1. Uniform data reporting standards are developed
2. Data flow is automated from the source systems of banks to their MIS server
3. Data is submitted to the Reserve Bank in an automated manner without any manual intervention.

1.3 Effective MIS for Decision Support System (DSS)

Information as a major ingredient of effective MIS for DSS may be viewed as a commodity and as such, can have economic value, the level of which depends on its accuracy, its potential and intended use. Information, therefore, has to be treated as a very important resource which should be managed well. Acquiring information is a constant process and needs continuous updation.

World over Central banks have been assigning great importance to ‘information competency’. Towards this, the Reserve Bank of India has set up the Data Warehouse which has the potential to meet the MIS and DSS requirements – both within the Bank and outside. To further enhance the usefulness of the Data Warehouse for internal decision and policy making and external dissemination, the Reserve Bank adopts the following steps:

i. The process of collection of data from the source systems to be totally automated with the help of appropriate Extract, Transform and Load (ETL) tools. Over a period of time, it should be possible to move towards near real time aggregate information.

ii. By using Business Intelligence (BI) tools, the internal users at various levels to be provided interfaces for extracting key information and doing further analysis on the information.
iii. For tracking trends and identifying outliers, appropriate dashboards to be built and made available on desktops.

With large volumes of data available in the data warehouse, there also arises a responsibility on the Reserve Bank to provide access to information to the general public that includes banks, researchers, analysts and others. The contents and interface of the public face of the data warehouse i.e. DBIE, may be reviewed and reworked on a periodical basis.

2. IT as a Strategic Resource

Technology is moving at a very fast pace and adoption cycles are short. Therefore, it is becoming difficult to keep pace with the rate of advancement. Quick adoption of developments in the field of IT is a challenge and a key component is the role which human capital will play in this regard. The steps to be taken in this direction are given below:

2.1 Creation of Dedicated Pool of Human Resources

There is an urgent need to train people across several levels to bridge the gap between the technological skill-sets required and skilled manpower available. There is also a need to ensure continuity for human capital by creating a dedicated pool of trained IT professionals with suitable aptitude. Towards this, a roster of dedicated resources in the following areas may be prepared:

1. Infrastructure management
2. IT project management
3. Process engineering
4. Data / information management
5. Data warehousing and data mining
6. Business continuity
7. Information security management
8. Business Intelligence and analytics
The following steps are required for creation and maintenance of such a dedicated pool of resources:

1. Identifying potential employees with relevant IT competencies
2. Providing appropriate training on a continuous basis
3. Monitoring performance and re-orienting to specific tasks
4. Preparing career paths and succession plans
5. Sharing the common pool across the Reserve Bank

In addition to putting such a system for its internal use, the Reserve Bank can encourage a service or umbrella organization such as IBA, for preparing and maintaining a roster of IT talent for the banking sector as a whole.

2.2 Evolution of Centre of Excellence (CoE)

To overcome the issues related to rapid technology obsolescence as also scarcity of technical skill sets, it is desirable to develop a Centre of Excellence (CoE) which would become a strategic resource for the banking sector. In this regard, IDRBT is assuming a greater role in evolving as a Centre of Excellence and to function as a laboratory for all research and development activity in the banking sector and for achieving, inter-alia, the following objectives:

1. Impact analysis of IT deployment vis-à-vis operations and processes
2. Benchmarking IT solutions
3. Disaster management and contingency planning design
4. Specific business problems where IT deployment is considered
5. Be a research hub and learning center for all banking-centric solutions
6. Be a nodal center for design and development of standards for IT applications, services, governance and products relevant to banking industry
7. Support innovation in developing IT ecosystems
3. Integrated IT Environment

Implementation of IT based systems has quite often followed an Icelandic approach, whereby individual systems have been implemented to take care of a particular requirement or a felt need. The trend to migrate towards holistic systems is of recent origin. Such a move has distinct advantages from efficiency and management perspectives as well. It is, thus, of paramount importance to migrate towards the implementation of holistic systems by ensuring that the synergistic effects of integration are tapped for use in the IT environment as delineated below.

3.1 Enterprise Architecture

The buzz word in the current IT environment is enterprise architecture which refers to achieving flexibility in designing systems and integrating legacy systems. It refers to an enterprise-wide, integrated set of components that incorporate strategic business thinking, and the technical infrastructure that promotes information sharing across the organization. In order to derive more benefits from the existing systems, Reserve Bank is moving towards deploying enterprise architecture to drive business adaptability, improve focus on organizational goals, reduce complexity of existing IT systems, improve agility of new IT systems and ensure a closer alignment between IT deliverables and business requirements. Adoption of new systems is done keeping in view the enterprise wide paradigm to ensure consistent enterprise wide architecture.

It is necessary to keep track of technology changes and to develop response processes. The process for infrastructure management should also support innovation and include maintenance of IT ecosystems. Adoption of new cutting edge technologies should remain a primary focus while acting as an enabler to business objectives. New technologies and concepts may be explored to ascertain if they add substantial business benefits.
3.2 Business Process Re-engineering (BPR)

BPR is integral to leverage manpower and technology for increasing efficiency. By adopting a systematic approach to designing, prioritizing, managing, controlling and monitoring business processes, competitive performance standards and operational excellence can be achieved. BPR should go hand-in-hand with adoption of technological solutions. It should herald the implementation of radical changes in business process to achieve breakthrough results. Technology is to be used for improving the existing processes and procedures, speeding up the service delivery and improving the control mechanism. New business processes are to be built using Information Technology.

In the Reserve Bank, it is necessary to entrust a multi-disciplinary group with the responsibility of process re-engineering. The group would be responsible for optimizing processes and allocating resources before taking up any new development. It would also ensure that the goal of any process reengineering effort is not driven by competitive internal pressures but by the improvement of quality and service levels. It can bring the necessary connect required between technology, information and business processes.

4. IT in Financial Sector

The Reserve Bank has successfully navigated the financial sector to safe shores based on information availability and judgment. Technology infrastructure played a key role in enabling timely availability and access to vital information in the fast evolving macro space. The Reserve Bank has also guided the banking system (mostly PSU banks) in adoption of technology. In the first phase, banks computerized their labor intensive back office operations to reduce costs and improve housekeeping. In the second phase, banks focused on enhancing customer convenience to gain competitive advantage. In the third phase, which is presently in progress, banks have implemented Core Banking Solutions (CBS) combining both front office and back office. This phase marked a paradigm shift in more senses than one and branch customers are now bank customers as they can access
their accounts from any branch for defined purposes. CBS offered new opportunities for information management, for better customer service and improved risk management.

However, one of the shortcomings that has been observed is disconnect between the Transformation (I) and Technology (T). Owing to this, banks have not been able to reap the benefits of the technology revolution in terms of cost reduction of small value transactions, improved customer services and effective flow of information within the banks and to the regulator. Although banks have deployed technology for transaction processing, the same has not been explored extensively for analytical processing.

Extensive use of technology has brought about upgrades in general banking environment for all stakeholders. The Reserve Bank has played a role of a catalyst in this path and has been providing guidelines with due focus on security, safety, assurance and business continuity. In this background, the role of IT in banking sector needs to be revisited with focus on the following:

1. Introducing technologies that balance 3 Cs – Cost, Control and Customer Service
2. Implementing data warehouse and business intelligence that meets all internal MIS requirements as well as the information needs of the regulator
3. Adoption of technology-based strategies for financial inclusion
4. Usage of analytics for improvement of Customer Relationship Management (CRM), risk management and fraud detection / prevention

IT based solutions entail operational risks, for which banks have to put in place appropriate control mechanisms and mitigation techniques. As solutions become more technology dependent, business continuity plans and DR drills assume greater importance. With financial stability as an important target, the Reserve Bank assigns importance to mitigate IT related risks in the banking sector.
5. IT Governance

IT Governance refers to the framework for decision rights and accountability to encourage desirable behavior in the use of IT. Adoption of well-structured IT Governance models would assist in enabling better alignment between IT and business, create efficiencies, enhance conformity to internationally accepted best practices and improve overall IT performance as also enable better control and security. IT Governance objectives may be translated effectively and efficiently into improved performance. IT Governance structure/framework are to be put in place as they play an important role in monitoring IT and banking business.

5.1 Business Continuity Management (BCM)

BCM is an organization-wide function comprising of a complete set of processes that identify potential threats which impact business processes in an organization. It provides a framework for building resilience for an effective response which safeguards the interests of key stakeholders, reputation, brand and value creating activities. BCM ensures continuity in operation to meet legal, regulatory and contractual obligations. It is inclusive of disaster recovery, business recovery, crisis management, incident management, emergency management, contingency planning as well as alternate planning.

A department/division may be entrusted with the responsibility of BCM which would include conducting a Business Impact Analysis (BIA: process of analyzing the effect of interruptions to business operations or processes on all business functions), and preparing Business Continuity Plan (BCP: process of developing prior arrangements and procedures that enable an organization to respond to an event in such a manner that critical business functions can continue within planned levels of disruption). The department / division itself may have the necessary domain knowledge of various functional areas or may interact with the people in the concerned areas in the preparation of BCP.
The BCP document for all processes may be prepared and it should be readily available to all concerned. The document requires careful planning and verification of contingency plans as these can be effective only if backup systems are thorough, up-to-date, well-communicated and well-rehearsed. BCP encompasses *inter-alia* business, technological, human and regulatory aspects. The focus may be on prioritizing systems and processes in terms of their importance for keeping business operating smoothly and safely.

To factor in changes in the processes / systems and also analyze the effectiveness of the system, a periodic audit of BCM may be done by internal / external agencies.

5.2 Information Policy

An effective Information Policy classifies the available information based on sensitivity. It also outlines the owners of the information and the potential end use to which such information is subjected. It is therefore, essential that a clear, specific and comprehensive Information Policy is framed and adhered to. Access to timely, relevant information is critical for developmental effectiveness.

The fundamental importance of transparency in any bank’s mission, as well as its commitment to foster ownership, build dialogue, and strengthen public oversight of development initiatives are a major rationale for formulating an Information Policy.

The guiding principles of access to information may set the path to formulate an Information Policy. Framing and implementation of Information Policy based on the standards for data collection, compilation, storage, retrieval and dissemination of information needs to be taken up. The Information Policy so framed may be reviewed and updated periodically.

5.3 Information Security Policy

Information Security Policy is a documented business rule for protecting information and the systems which store and process this information. Within an organization, the written
policy document provides a high-level description of the various controls the organization will use to protect information. The strength of any system is no greater than its weakest link. Information should be based on the principles of integrity, reliability, and validity. Protecting confidential information is a business and legal requirement.

The existing IS policy would have to be reviewed and updated at periodical intervals. The IS Policy may detail principles for protecting information from unauthorized access, use, disclosure, disruption, modification or destruction. The information security policy should, inter alia, relate to policies such as firewall, email, network security, and password. The policy should also address issues relating to prevention of cyber-attacks by deploying appropriate technologies such as two-factor authentication.

While following the above, legal aspects relating to the provisions of the Acts such as Payments and Settlement Act, 2007 and IT Act, 2000 may be strictly adhered to.

5.4 Audit of IT Processes and Infrastructure

In view of the critical importance of information security, there is a need to exercise constant vigilance for the safety of the IT systems. Well-defined, structured and documented security policies, standards and guidelines are significant for smooth and efficient operations. At the same time, there is also a need to audit IT systems and processes to ensure confidentiality, integrity, authenticity and timely availability of information. To ensure the above, various types of audits viz., organizational IT audit (management control over IT), technical IT audit (infrastructure, data centers, data communication), application IT audit (business/financial/operational), development/implementation, IT audit (specification/requirements, design, development, and post-implementation phases), and compliance IT audit may be conducted at periodic intervals keeping in view the requirements of the organization. Audits may be conducted by both internal/external agencies adhering to national/international standards.
5.5 Project Management

Managing IT resources, either for achieving the desired objectives or creating new resources for business or functional objectives, has become complex. Therefore, there is an overarching need for professionally managed projects. This may include Identification of business requirements, procedures and IT resources in terms of people, infrastructure, and technology. Projects are conceptualized, developed and implemented following internal prescriptions. In order to streamline the process of project management, standardized project management policies and methodologies need to be adopted.

5.6 Outsourcing/Vendor Management

IT outsourcing is a growing phenomenon in developing economies. The outsourcing of application development and related activities is increasing steadily. The challenges of outsourcing range from selection of ideal outsourcing partner to dynamic issues of knowledge transfer, security risks, legal concerns, vendor dependency, etc. This concern has heightened in recent years and these issues may be dealt with in synchronization with general governance principles.

Before initiating the process of outsourcing any service/application, it is necessary to examine whether the outsourced function meets the business needs and strategic objectives. Identification of the nature of the activities undertaken by the vendor and the inherent risks of the activity are also important. It is recommended that due diligence in selection, contracting, supervision and monitoring of the vendor is adopted. Diligence in vendor selection requires a reasonable inquiry into the ability and suitability of the vendor to meet the requirements for the proposed service. Well defined and enforceable Service Level Agreements (SLAs) with the vendor will establish the performance standard and service quality expected under the agreement. As part of meeting principles of governance, it may be ensured that there is a documented, accepted procedure which governs service expectations and obligations.
6. Augment Green Credentials

Leveraging on the benefits of lower-power, more energy-efficient devices and architecture can lead to tangible savings in energy costs and help to lend build 'green' credentials to IT. Shifting to more efficient products and practices can allow for more equipment to fit within an energy footprint, or to fit into a previously filled center. IT can enable many green initiatives. Converting to online and mobile banking helps the environment. To manage carbon footprints and achieve the objective of becoming environmental friendly, it is important to implement Workflow Management Systems (WMS) using the concept of 'less paper office'.

Computerization

The process of computerization marked the beginning of all technological initiatives in the banking industry. Computerization of bank branches had started with installation of simple computers to automate the functioning of branches, especially at high traffic branches. Thereafter, Total Branch Automation was in use, which did not involve bank level branch networking, and did not mean much to the customer.

Networking of branches are now undertaken to ensure better customer service. Core Banking Solutions (CBS) is the networking of the branches of a bank, so as to enable the customers to operate their accounts from any bank branch, regardless of which branch he opened the account with. The networking of branches under CBS enables centralized data management and aids in the implementation of internet and mobile banking. Besides, CBS helps in bringing the complete operations of banks under a single technological platform.

CBS implementation in the Indian banking industry is still underway. The vast geographical spread of the branches in the country is the primary reason for the inability of banks to attain complete CBS implementation.
Satellite Banking

Satellite banking is also an upcoming technological innovation in the Indian banking industry, which is expected to help in solving the problem of weak terrestrial communication links in many parts of the country. The use of satellites for establishing connectivity between branches will help banks to reach rural and hilly areas in a better way, and offer better facilities, particularly in relation to electronic funds transfers. However, this involves very high costs to the banks. Hence, under the proposal made by RBI, it would be bearing a part of the leased rentals for satellite connectivity, if the banks use it for connecting the north eastern states and the under banked districts.

Development of Distribution Channels

The major and upcoming channels of distribution in the banking industry, besides branches are ATMs, internet banking, mobile and telephone banking and card based delivery systems.

Automatic Teller Machines

ATMs were introduced to the Indian banking industry in the early 1990s initiated by foreign banks. Most foreign banks and some private sector players suffered from a serious handicap at that time- lack of a strong branch network. ATM technology was used as a means to partially overcome this handicap by reaching out to the customers at a lower initial and transaction costs and offering hassle free services. Since then, innovations in ATM technology have come a long way and customer receptiveness has also increased manifold. Public sector banks have also now entered the race for expansion of ATM networks. Development of ATM networks is not only leveraged for lowering the transaction costs, but also as an effective marketing channel resource.
Introduction of Biometrics

Banks across the country have started the process of setting up ATMs enabled with biometric technology to tap the potential of rural markets. A large proportion of the population in such centers does not adopt technology as fast as the urban centers due to the large scale illiteracy. Development of biometric technology has made the use of self-service channels like ATMs viable with respect to the illiterate population. Though expensive to install, the scope of biometrics is expanding rapidly. It provides for better security system, by linking credentials verification to recognition of the face, fingerprints, eyes or voice. Some large banks of the country have taken their first steps towards large scale introduction of biometric ATMs, especially for rural banking. At the industry level, however, this technology is yet to be adopted; the high costs involved largely accounting for the delay in adoption.

Multilingual ATMs

Installation of multilingual ATMs has also entered pilot implementation stage for many large banks in the country. This technological innovation is also aimed at the rural banking business believed to have large untapped potential. The language diversity of India has proved to be a major impediment to the active adoption of new technology, restrained by the lack of knowledge of English.

Multifunctional ATMs

Multifunctional ATMs are yet to be introduced by most banks in India, but have already been recognized as a very effective means to access other banking services. Multifunctional ATMs are equipped to perform other functions, besides dispensing cash and providing account information. Mobile recharges, ticketing, bill payment, and advertising are relatively new areas that are being explored via multifunctional ATMs, which have the potential to become revenue generators for the banks by effecting sales,
besides acting as delivery channels. Most of the service additions to the ATM route require specific approval from the regulator.

ATM Network Switches

ATM switches are used to connect the ATMs to the accounting platforms of the respective banks. In order to connect the ATM networks of different banks, apex level switches are required that connect the various switches of individual banks. Through this technology, ATM cards of one bank can be used at the ATMs of other banks, facilitating better customer convenience. Under the current mechanism, banks owning the ATM charge a fee for allowing the customers of some other bank to access its ATM.

Among the various ATM network switches are CashTree, BANCS, Cashnet Mitr and National Financial Switch. Most ATM switches are also linked to Visa or MasterCard gateways. In order to reduce the cost of operation for banks, IDRBT, which administers the National Financial Switch, has waived the switching fee with effect from December 3, 2007.

Internet Banking

Internet banking in India began taking roots only from the early 2000s. Internet banking services are offered in three levels. The first level is of a bank’s informational website, wherein only queries are handled; the second level includes Simple Transactional Websites, which enables customers to give instructions, online applications and balance enquiries. Under Simple Transactional Websites, no fund based transactions are allowed to be conducted. Internet banking in India has reached level three, offering Fully Transactional Websites, which allow for fund transfers and various value added services.

Internet banking poses high operational, security and legal risks. This has restrained the development of internet banking in India. The guidelines governing internet banking operations in India covers a number of technological, security related and legal issues to be addressed in relation to internet banking. According to the earlier guidelines, all
internet banking services had to be denominated in local currency, but now, even foreign exchange services, for the permitted underlying transactions, can be offered through internet banking.

Internet banking can be offered only by banks licensed and supervised in India, having a physical presence in India. Overseas branches of Indian banks are allowed to undertake internet banking only after satisfying the host supervisor in addition to the home supervisor.

**Phone Banking and Mobile Banking**

Phone and mobile banking are a fairly recent phenomenon for the Indian banking industry. There exist operative guidelines and restrictions on the type and quantum of transactions that can be undertaken via this route. Phone banking channels function through an Interactive Voice Response System (IVRS) or telebanking executives of the banks. The transactions are limited to balance enquiries, transaction enquiries, stop payment instructions on cheques and funds transfers of small amounts (per transaction limit of ₹2500, overall cap of ₹5000 per day per customer). According to the draft guidelines on mobile banking, only banks which are licensed and supervised in India and have a physical presence in India are allowed to offer mobile banking services. Besides, only rupee based services can be offered. Mobile banking services are to be restricted to bank account and credit card account holders which are KYC and AMC compliant.

With the rapidly growing mobile penetration in the country, mobile banking has the potential to become a mass banking channel, with very minimum investment required by the banks. However, more security issues need to be addressed before banking can be conducted more freely via this channel.

**Card Based Delivery Systems**

Among the card based delivery mechanisms for various banking services, are credit cards, debit cards, smart cards etc. These have been immensely successful in India since their
launch. Penetration of these card based systems have increased manifold over the past decade. Aided by expanding ATM networks and Point of Sale (POS) terminals, banks have been able to increase the transition of customers towards these channels, thereby reducing their costs too.

Payment and Settlement Systems

The innovations in technology and communication infrastructure in recent years have impacted banks in a large way through the development of payment and settlement systems, which are central to the major portion of the businesses of banks.

In order to strengthen the institutional framework for the payment and settlement systems in the country, the RBI constituted, in 2005, a Board for Regulation and Supervision of Payment and Settlement Systems (BPSS) as a Committee of its Central Board. The BPSS now lays down policies relating to the regulation and supervision of all types of payment and settlement systems, sets standards for existing and future systems, approves criteria for authorization of payment and settlement systems, and determines criteria for membership to these systems, including continuation, termination and rejection of membership. Thereafter, the government and the RBI felt the need for a legal framework dedicated to the efficient functioning of the payment and settlement systems. The Payment and Settlement Systems Act was passed in December 2007, which empowered the RBI to regulate and supervise the payment and settlement systems and provided a legal basis for multilateral netting and settlement.

Important technological innovations in payment and settlement systems introduced by the RBI in recent years are discussed here.

Paper Based Clearing Systems

Among the most important improvement in paper based clearing systems was the introduction of MICR technology in the mid-1980s. Though improvements continued to
be made in MICR enabled instruments, the major transition is expected now, with the implementation of the Cheque Truncation System for the processing of cheques.

Cheque Truncation System (CTS)

Truncation is the process of stopping the movement of the physical cheque which is to be truncated at some point en-route to the drawee branch and an electronic image of the cheque would be sent to the drawee branch along with the relevant information like the MICR fields, date of presentation, presenting banks etc. Thus, the CTS reduces the probability of frauds, reconciliation problems, logistics problems and the cost of collection.

The cheque truncation system was launched on a pilot basis in the National Capital Region of New Delhi on February 1, 2008, with the participation of 10 banks. The main advantage of the cheque truncation system is that it obviates the physical presentation of the cheque to the clearing house. Instead, the electronic image of the cheque would be required to be sent to the clearing house. This would provide a more cost-effective mode of settlement than manual and MICR clearing, enabling realization of cheques on the same day. Amendments have already been made in the NI Act to give legal recognition to the electronic image of the truncated cheque, providing for a sound legal framework for the introduction of CTS.

Currently the effort is on increasing the processing efficiency with respect to paper based transactions, and as far as possible, to reduce the burden on paper based clearing. Through the introduction of advanced electronic funds transfer mechanisms, the RBI has been successful in diverting a large portion of paper based transactions to the electronic route.

Electronic Clearing Service

The Electronic Clearing Service (ECS) introduced by the RBI in 1995, is akin to the Automated Clearing House system that is operational in certain other countries like the US. ECS has two variants- ECS debit clearing and ECS credit clearing service. ECS credit
clearing operates on the principle of ‘single debit multiple credits’ and is used for transactions like payment of salary, dividend, pension, interest etc. ECS debit clearing service operates on the principle of ‘single credit multiple debits’ and is used by utility service providers for collection of electricity bills, telephone bills and other charges and also by banks for collections of principal and interest repayments. Settlement under ECS is undertaken on T+1 basis. Any ECS user can undertake the transactions by registering themselves with an approved clearing house.

Operating from 74 different locations, ECS handles an average of 20 million transactions per month. It enables easy payments and collections for repetitive and bulk transactions. ECS takes off a lot of burden of paper work from the banks, enabling smooth flow of transactions. The volume of electronic transactions has increased at an annual average growth rate of 32.1% during FY05-FY09. The use of ECS (credit) and ECS (debit), in particular, has witnessed substantial growth in the last few years.

The RBI has recently launched the National Electronic Clearing Service (NECS), in September 2008, which is an improvement over the ECS currently operational. Under NECS, all transactions shall be processed at a centralized location called the National Clearing Cell, located in Mumbai, as against the ECS, where processing is currently done at 74 different locations. ECS system has a decentralized functioning, and requires users to prepare separate set of ECS data center-wise. Users are required to tie-up with local sponsor banks for presenting ECS file to each ECS Centre. As on September 2008, 25000 branches of 50 banks participate in the NECS. Leveraging on the core banking system, NECS is expected to bring more efficiency into the system.

Electronic Funds Transfer Systems

The launch of the electronic funds transfer mechanisms began with the Electronic Funds Transfer (EFT) System. The EFT System was operationalized in 1995 covering 15 centers where the Reserve Bank managed the clearing houses.
Special EFT (SEFT) scheme, a variant of the EFT system, was introduced with effect from April 1, 2003, in order to increase the coverage of the scheme and to provide for quicker funds transfers. SEFT was made available across branches of banks that were computerized and connected via a network enabling transfer of electronic messages to the receiving branch in a straight through manner (STP processing). In the case of EFT, all branches of banks in the 15 locations were part of the scheme, whether they are networked or not.

A new variant of the EFT called the National EFT (NEFT) was decided to implemented (November 2005) so as to broad base the facilities of EFT. This was a nationwide retail electronic funds transfer mechanism between the networked branches of banks. NEFT provided for integration with the Structured Financial Messaging Solution (SFMS) of the Indian Financial Network (INFINET). The NEFT uses SFMS for EFT message creation and transmission from the branch to the bank’s gateway and to the NEFT Centre, thereby considerably enhancing the security in the transfer of funds. While RTGS is a real time gross settlement funds transfer product, NEFT is a deferred net settlement funds transfer product. As the NEFT system stabilized over time, the number of settlements in NEFT was increased from the initial two to six. NEFT now provides six settlement cycles a day and enables funds transfer to the beneficiaries account on T+0 basis, bringing it closer to real time settlement.

The commencement of NEFT led to discontinuation of SEFT, and EFT is now available only for government payments. With the SFMS facility, branches can participate in both the RTGS and the NEFT System. It is envisioned that all the RTGS enabled bank branches would be NEFT-enabled too, so that the customer would have a choice between RTGS or NEFT, based on time urgency, value of the transaction and different charges applicable on the two systems. Using the NEFT infrastructure, a one-way remittance facility from India to Nepal has also been implemented by the RBI since 15th May 2008.

In order to increase the coverage of NEFT to a wider section of bank customers in semi-urban and rural areas, an enhancement of the NEFT called the NEFT-X [National EFT
(Extended)] is also proposed for phase wise implementation. This would facilitate non-networked branches of banks to transfer funds electronically by accessing NEFT-enabled branches for transfer of funds. NEFT (Extended) would work on a T+1 basis and would ensure wide rural coverage of the electronic funds transfer system.

RTGS

The other payment and settlement systems deployed were mostly aimed at small value repetitive transactions, largely for the retail transactions. The introduction of RTGS in 2004 was instrumental in the development of infrastructure for Systemically Important Payment Systems (SIPS).

The payment system in India largely followed a deferred net settlement regime, which meant that the net amount was settled between banks on a deferred basis. This posed significant settlement risks. RTGS was launched by RBI, which enabled a real time settlement on a gross basis. To ensure that RTGS system is used only for large value transactions and retail transactions take an alternate channel of electronic funds transfer, a minimum threshold of one lakh rupees was prescribed for customer transactions under RTGS on January 1, 2007.

RTGS minimizes systemic risks too, in addition to settlement risks, as paper based funds settlement through the Interbank clearing are replaced by the electronic, credit transfer based RTGS system. High systemic risks are posed by high value interbank transfers, so, it is considered desirable that all major interbank transfers among commercial banks having accounts with RBI be routed only through the RTGS system. The RTGS system had a membership of 107 participants (96 banks, 8 primary dealers, the Reserve Bank and the Deposit Insurance, Credit Guarantee Corporation and Clearing Corporation of India Ltd.) as at end-August 2009. The reach and utilization of the RTGS has witnessed a sustained increase since its introduction in 2004. The bank/branch network coverage of the RTGS system increased to 58,720 branches at more than 10,000 centers facilitating the increased usage of this mode of funds transfer.
Technology Vendors

Many Indian banks handled technological issues in house till the late 1990s. Thereafter, the complications of the business necessitated the engagement of specialized vendors to handle complex issues. Due to the complexities involved, most banks now prefer to engage IT vendors to introduce specialized software’s to help in their risk management systems, retail and corporate banking, card management systems, complete back office support including data management systems.