CHAPTER 9
SUMMERY AND CONCLUSIONS
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9.1 INTRODUCTION

Banks in India have invested heavily on deployment of information technology in the past one decade. IT over the years has become business driver rather than a business enabler. Sustainable development of banks depends heavily on effective use of IT. The Public Sector Banks have been investing in technology in hopes of leapfrogging their rivals in terms of competitive advantages, cost reduction, and coping with an increasing volume of business. Therefore, banking industries have increased technological investment dramatically. Unfortunately technological expenses sometimes has set more offset than improved productivity and gained promising returns. Customers blame decreased productivity on under-trained employees and an increasing use of computers in self-service systems, whereas bank staff makes excuses blaming system errors, customer errors, and incompetence in using Information In response to reforms. Indian banking sector has undergone radical transformation which has altered the organizational structure, ownership pattern, system and procedures of operations, made human resource management more important and infused competition in the banking sector.

In India, while the banking sector continues to play a predominant role, the implementation of Information technologies has further increased the importance of financial sector. Therefore, the government and RBI have taken several initiatives to facilitate the Public Sector banks to compete with Private Sector and foreign Banks. As a regulator and supervisor, the RBI has made considerable progress in facilitating the infusion of new technology with a view to establishing a competitive, efficient and secure system functioning in a changing environment.

However, a gap in the functioning of the private vs the public sector banks was witnessed. This was partly due to the emerging culture in the private corporate sector and due to the technological stronghold held by the private and foreign banks. The Private and Foreign Banks are already equipped with latest state of art technology
and are operating mostly their branches from metros and urban areas whereas the Public Sector Banks are operating even at remotest part of country. These Banks are having hard time to compete with Private and Foreign Banks. The public sector banks have been investing crores of funds in modernization of their operations and offering latest products. However, there have been many constraints and as such many of the products chosen by them have not yielded the desired results.

According to the National Association of Software and Services Companies, (NASSCOM), the IT market for banks, which was $500 million in 2002, is expected to grow by 25 per cent a year for the next few years. Senior bankers predict that over the next 10 years, banks will spend on IT and related fields an eye popping Rs 15,000 crores. Some banks could spend as much as over 10 per cent of their capital. An international bank on an average spends around 9 per cent of its revenues on IT annually. In India, state owned banks spend only half a per cent of their revenues. Though the private banks spend 4-5 per cent, they still have a long way to go.

Further, banks face a dilemma. If they do not invest in a highly popular technology, their image as innovative leaders declines. However, if it does invest, benefits from technologies are still difficult to obtain. Benefits such as image and customer satisfaction are difficult to measure.

The bank has to take risks since the costs are explicitly discerned, but benefits seem to be implicit. Also, having the full benefits from technological investment is related to many factors (e.g. staff and customers). The choice of proper technology and right way to diffuse thus selected technology down the line to end user and customer become utmost important for these banks. Further, successful IT adoption and diffusion requires improved skills and capabilities of staff, integration with the structure of routine operations, meeting customers' requirements, reduced operating expenses, and consistency with organizational policies and procedures.

Deployment of new technology in Public Sector Banks is not an easy task to the management mainly because of the non availability of required qualified professionals, the non competency of the existing staff to make use of IT to cover various activities of the banking. In spite of these problems Public Sector Banks are adopting new technology to get the benefit of speed, efficiency, customized product
development and increased volume of activity. No doubt that the new technology brings process improvements and positive results but it needs proper identification of the benefits and its utilization. Making decisions in the fast changing areas of information technology is a difficult process. Decision-makers, have to deal with multiple alternatives and criteria in an uncertain environment.

Technology adoption and diffusion is still, a controversial issue in India. As such, careful planning which requires appropriate decision-making is vital for the success of technological adoption and diffusion else rejection of technology, especially information technologies, occurs frequently. This had generated a need to study the choice of technology and diffusing it further to the end user by public sector Banks.

The study examined the comparative technologies, on various criteria including customer satisfaction, economy and staff etc in various Public Sector Banks. The study highlights the various IT Products/Projects implemented to improve banking efficiency with the help MCDM and System Dynamics analysis. To achieve the set objectives of the study, a case study was undertaken i.e. State Bank of India apart from studying various public sector banks by arranging them in two categories on the basis of size i.e. number of branches. The study is descriptive and empirical in nature because secondary and primary data is analyzed. The study also analyzed the perceptions of bank customers and employees with respect to IT products. This analysis is based on primary data collected through questionnaire from Customers and IT officials across India apart from general bank employees. The broad aspects of the work done abroad by Arunee Intraparirot have been taken as base line for this study, including research methodologies.

With a view to generate a common opinion about Public Sector banks we had studied the operations and procedures related to technology choice and implementation procedures followed by State Bank of India and its associate banks, Canara Bank, Punjab and Sind Bank, Bank of Baroda and Punjab National bank. Thus covering approximately 70 % Public Sector Banking operation in India. Further, as a dedicated study of actual adoption and diffusion process we have considered State bank of India as a case study.
9.2 OBJECTIVE AND RESEARCH QUESTIONS

The main objective of this research, "A study on the adoption and diffusion of information technologies in the Public Sector Banks in India using multiple-criteria decision making and System Dynamics approaches ", is to develop:

- A holistic modeling framework for information technologies (IT) adoption.
- A holistic modeling framework for information technologies (IT) diffusion.
- A model to detect the inter-relationship among variables, identify problems, and then find requisite and operational policies for State Bank of India.

The model was tested and evaluated to gain more understanding with respect to five research questions.

Q. 1 What is the current status regarding IT usages of the bank?
Q. 2 What is a requisite group model of IT adoption?
Q. 3 What is a requisite group model of IT diffusion?
Q. 4 What are the requisite policies for adoption and diffusion of IT for the bank?
Q. 5 Can information technologies be used as to leverage business strategies to the advantage of the banking industry in India and if so, why and how?

The research, combining two study areas of Multiple Criteria Decision Making (MCDM) and System Dynamics (SD), was conducted using System Development and supplemented by Case Study of State Bank of India. Consequently, multiple-criteria based System Dynamics modelling was proposed as a suitable model to mitigate problems regarding technologies because this approach combines the strong competence of each decision making tool.

A multiple criteria decision-making process (MCDM) was, therefore employed for selecting the most preferable technology during the technological adoption phase because it was capable of evaluating the best alternative from various conflicting criteria. Subsequently, System Dynamics was employed during the
diffusion phase to handle dynamic aspects and interrelated variables of the selected technology. System development was employed because the model development of technology adoption and diffusion fits well with the concept and follows the steps of system development research of concept-development-impact. Initially, concepts regarding the ways to adopt and diffuse information technologies effectively were accumulated from literature reviews to identify research questions. Then a generic conceptual framework was constructed to detect answers to those questions, guide the design of computer simulations, and conduct systematic observation using a case study. The conceptual framework was elaborated to design and develop the models of technologies adoption and diffusion using Multiple Criteria decision-making and System Dynamics methodologies.

A case study was used to investigate organizational and managerial processes of an organization to gain more holistic and meaningful characteristics of real world events. The State Bank of India was chosen as a case study since the bank along with its associate banks has the largest market share and had invested heavily in information technologies. State Bank of India was employed as a case study in order to get general feeling for what is involved in a research domain, tailor the generic variable to a specific case. It is possible to use software for simulations to refine theories, test system behaviors and perform sensitivity analysis for strategic policies. Since computer simulations provide visualized results of model analyses within relatively short time they are useful for enhancing insight about system behaviors and ways of improving them.

The models were designed to detect the inter-relationships between variables of technology adoption and diffusion, identify problems, test requisite and operational policies for the bank and provide the answers to the research questions.

9.3 ANALYSIS

Many of the IT initiatives of banks started in the late 1990s or early 2000 with an emphasis on the adoption of core banking solutions (CBS), automation of branches and centralization of operations in the CBS. Over the last decade, most of the banks completed the transformation to technology-driven organizations. Moving from a manual, scale-constrained environment to a global presence with automated
systems and processes, it is difficult to envisage the adverse scenario the sector was in the era before the reforms, when a simple deposit or withdrawal of cash would require a day. ATMs, mobile banking and online bill payments facilities to vendors and utility service providers have almost obviated the need for customers to visit a branch. Branches are also transforming from operating as transaction processing points into relationship management hubs. The change has been very productive for banks bringing in an increase in productivity and operational efficiency to be more competitive. Better risk management due to centralization of information and real time availability of critical data for decision making.

First, on the conceptual side, the study shows how two well-known modeling approaches, MCDM and SD, could be combined effectively. Initially, MCDM was suitably employed for static approaches by selecting the most preferable choice among various alternatives. SD was subsequently employed for detail analyses of the selected choice by capturing inter-relational and dynamic effects among variables in order to detect behavioral patterns of the problems of concern.

Second, on the application side, the study shows how MCDM and SD could be used to develop a requisite group model of IT adoption and diffusion for a major bank in India, for policy analysis and forward planning.

Third, the models were developed as a decision support tool. With user friendly devices, decision-makers may improve their decision-making processes by running sensitivity analyses, applying the models based on their available information, intuition, and experience, testing for high impact policies, visualizing their decision outcomes, and modifying the models to other relevant issues or scenarios.

The banking today is re-defined and re-engineered with the use of Information Technology and it is sure that the future of banking will offer more sophisticated services to the customers with the continuous product and process innovations. Thus, there is a paradigm shift form the seller’s market to buyer’s market in the industry and finally it effected at the bankers level to change their approach from “conventional banking to convenience banking” and “mass banking to class banking”. The shift has also increased the degree of accessibility of a common man to bank for his variety of
needs and requirements. The IT invasion in banking industry has changed the banking concept “from much” to “how fast”. The earlier banking was concentrated on interest rates and present banking is based on quality/value added services which extends bank’s virtual premises to anywhere.

The research consisted of five stages; identifying problems, constructing a conceptual framework, developing system architecture, testing and validation, and conducting policy experiments. Data was collected from various sources including observations, interviews, questionnaires, and documents.

We have considered State Bank of India as a case study and its associate Bank’s follow the same strategy, the rest of public sector banks can be divided into two categories large and small (those having less than Rs. 50,000 Crores of deposits) to ensure a level playing field. This division can be done on the number of branches also as the performance was observed to be liner with number of branches.

9.3.1 Technology Usage in the Large Banks - Adopting newer technologies for application implementation, enhancements or improvements, which result in a satisfactory response to customer needs, has become the driving force for the IT team within large banks. For which Banks should have adequately sized teams in terms of manpower with appropriate skill sets and capabilities to cater to current and future IT initiatives. The large commercial banks such as State Bank of India, Punjab National Bank, employ various kinds of technologies due to sufficient resources in terms of monetary funds and skilled workers. It can be summarized for large size bank that they have clear visions to use technology for competitive advantage.

Large Banks in India started to take full advantage of IT in the early nineties. In the last 15 years or so there have been systematic improvement and up-gradation of IT infrastructure for modernizing business operations. It is the high-spced real time processing, high volume processing and analytical capabilities that have helped in operational efficiency. Subsequently, it was observed that some of the Public Sector Banks surged ahead in implementing technology even in the face of constraints and could compete effectively with their private and foreign peers. They aim at being a technological leader and deploy technologies to gain competitive advantages in terms of market share and profit. For example, State Bank of India and 7 of its associate
banks combined together, could network app 15,000 Branches and happens to be the largest public sector bank. State Bank has visions of applying modern technology to support decision-making for management and applying technology to facilitate customers' requirements in order to maximize customer satisfaction. To attain this aim, the bank emphasizes human resources, technology, and operational efficiency. Large Banks are increasingly developing technology based applications for better customer service and to cut operation cost. No queue, no holidays, any time/anywhere banking operation. Pay electricity bill, telephone bill, credit card bill, and insurance premium. Check account status, transfer of funds etc. Technology is viewed as an important integral part of the bank and is continuously developed to maintain the bank's position as a leader in banking technology. The State Bank has long adopted policies to invest in technology to respond to customers' requirements and still places strong emphasis on technological developments to be a leader in finance and banking technology. The bank has invested huge amount to network its app 15,000 branches spread across India. The high altitude branches operational in Leh, Ladakh, Lahaul, Spiti, kinnaur and remote areas of Kashmir have been put on national network using satellite based media. The State bank had way back in early 80’s established an apex institute SBIICM (State Bank Institute of Information, Communication and Management) to facilitate the IT development and orientations needs of the bank.

Punjab National Bank makes a commitment to invest in information technology and staff training in order to be ready for changes in the work system and to strengthen the bank’s competitiveness. PNB perceives that service differentiation and the ability to provide efficient high quality service are critical factors for retaining a competitive advantage and ensure future success.

Therefore, a huge investment has been made in Information technology emphasizing a "re-engineer" program. The technological investment of each bank is well planned and managed. Technological investment is prepared to make ready for future growth in areas such as technological infrastructure, computer centers, network systems and re-engineering programs. PNB has developed technologies to provide more service channels, upgrade communication network, improve a number of
internal operations for better efficiency, improve information in the data warehouse system and upgrade the web technology system.

State Bank of India puts emphasis on "re-engineering" bank operations to improve customer services and operational efficiency with the roll out of Business Process Rollouts. The Bank has established special Centers/cells for work specific activities namely CCPC (Centralized Clearing Processing Cell), CCPC (Centralized Pension Processing Cell), LCPC (Liabilities Centralized Processing Cell) and many more. With this program, the bank is able to reduce customer-waiting time with less staff, shorten the loan approval process, and improve efficiency of the payment process and collections. The development of technology of the large banks has been developed together with investment in human resources because advantages from technology depend on the utilization of human beings. Therefore, training and educational programs are highlighted. The State Bank for instance, apart from ongoing training programs at its 52 State Bank Learning Centers across India, started developing the "PARIVARTAN" concept in 2008-09.

The large banks attempt to pioneer promising and advanced technology in order to be an innovative leader searching for new business opportunities. Currently, most of banks have started electronic commerce due to a huge market potential (Banking technology reforms-2007).

In large public sector banks, there is a strong emphasis on aligning the IT strategy of the bank with its business goals. The senior management of the bank supports and maintains a culture where business verticals are ready to shift and accept changes brought in by new IT systems and processes, which impacts the operational and technological environment of the bank. Some of the measures that banks have implemented are:

- The IT strategy of the bank or an IT vision document is typically approved by the board.
- The IT committee of the board constitutes the senior management of the bank at the board level to ensure and review IT strategic goals on a periodic basis.
- The committee is also responsible for the approval of the IT budgets and prioritization of projects within the scope of IT.
• This group acts as a bridge between the IT and business teams and ensures that business objectives are planned and implemented to drive the bank’s vision over the long haul.

Large nationalized banks have also implemented a layer of the Project Steering Committee for critical strategic initiatives or large projects where senior executives record the progress at pre-defined intervals — monthly or quarterly. In public sector banks, it has also been observed that various verticals are created to support business groups at various levels to implement IT initiatives.

A strategic planning process group co-ordinates the alignment of business objectives with IT objectives which serves as a roadmap to the future implementation of IT within the bank. It has also been noted that some of the large public sectors banks have made significant investment in attracting, retaining and nurturing their IT staff members. The teams have been varied in terms of the size and complexity of its structure according to the requirements of the bank, number of initiatives and level of outsourcing that has been implemented in the bank.

Since the growth of financial services in India has been significant in the past few years, most large banks have ensured that their current IT set up is not only capable of handling the current level of customers and their associated volumes, but are also well equipped to ensure a similar level of service for the future growth and services in line with their business goals. Most large banks have reported that they have separate streams or verticals to manage their IT in some form or the other, such as technology solutions, infrastructure management, systems management and IT information security, among others. The primary responsibility of these groups is to manage their individual areas in terms of delivery, ensure compliance to the IT policies of the bank and drive the innovation or business programs that the IT committee of the bank proposes.

The leading large banks of the country have ensured state-of-the-art data center facilities for their DC and DRC, maintaining a 2/3 security compliance level and ISO 27001 certification. Banks have also ensured zero data loss with the implementation of the near site, considering the RPO (recovery point objective) and RTO (recovery time objective) for critical applications.
These data centres have been housed in different seismic zones to ensure data security in Force Majeure situations such as earthquakes, floods and fire. The replication of data between the data centres has been done using redundant network links from different service providers.

The security environment of the data centre has been ensured at the physical level and operational level by the installation of firewalls, network-based intrusion prevention system (NIPS) and host based intrusion prevention system (HIPS) as well as the installation of anti-spam and anti-virus solutions from industry leaders. The large banks have not only implemented technologies which are customer oriented but technologies which have strengthen their system i.e implementation of Active Directory System, same way many technologies have been implemented from MIS point of view.

9.3.2 Technology Usage in the small Banks - The Indian banking industry which is on the way of consolidation due to opening to foreign banks have created a feeling of insecurity among small sized banks. Small banks are preparing for an era of intensified competition after the RBI permits new banks backed by deep-pocketed business groups to open for business. These Banks are realizing the importance of having strategic IT roadmaps. While businesses have realized the importance of IT and the need for investments thereof; the question that arises now for these banks is that can they restructure their business to increase the level of flexibility and adaptability to market conditions? Where and how can they cut costs? How much to invest in technologies and which technologies? Business leaders expect business restructuring to play an increased role in their company’s activities over the coming years and for many organizations, the IT function is clearly targeted as a priority. It was observed that some of the small/medium size banks have the business technology layer, which acts and co-ordinates the initiative between the business and technology group within their bank’s environment and solutions from industry leaders.

These banks today recognize information technology (IT) as a key strategic function to enable an institution’s business vision, as the boards of these banks believe that the appropriate use of IT can substantially improve the efficiency and competitiveness of the business. To achieve the management’s objective, we have
observed that the technical department of these banks works closely with business operations to create effective mechanisms and processes. These processes include the implementation of the IT governance, risk and compliance (GRC) framework based on best industry practices.

The bank’s IT strategy committee or steering committee provides direction to the bank’s IT department and has laid down a roadmap to further drive the IT strategy at a senior management level. Banks also ensure that the information security audit of the critical systems and applications are done by qualified external auditors appointed by the bank’s IT team.

We have also noted that an individual at the GM or DGM level in small banks is assigned to monitor the progress of critical initiatives and report to the steering committee on a monthly basis. While technology-focused possibilities of IT may be unlimited due to their application and adoption in India, there is a need to exercise a conscious approach for the business process re-engineering of existing practices and procedures to capitalize effectively on IT. Training and upgrading skills play a critical role in the absorption of new technologies.

These banks such as Bank of India, Indian Bank, Canara Bank, Syndicate Bank, Union Bank, and Allahabad Bank etc are more careful in adopting new technology. They tend to adopt proven technology or follow technologies that are successfully implemented by the large banks because of limitations in resources and skilled personnel. Technology is mainly adapted to aid work processes.

However, as an exception, even being a small bank Bank of Baroda has earned fame of being a technical bank and known as “India international Bank” having operations in 25 countries. Bank has been successful in implementing latest technology initiatives which are clearly focused on the customer. The Business Transformation Program, encompassing technology, is being implemented by the Bank with a view to providing the customer, convenience banking on 24 X 7 basis, at major centers in India and abroad, through deployment of Core Banking Solution with integrated delivery channels like ATM, Internet, Phone, Mobile, Kiosk, Call Centre. The major factors influencing technology initiatives in these banks are heightened competition, increasing number of banks are looking at IT deployment as part of a
comprehensive IT strategy, offering of allied products such as insurance and investment products will drive the growth for total automation.

As compared to other banks Bank of Baroda’s technology deployment is not restricted to only core banking solution. It also covers other applications like Enterprise wide General Ledger, Risk Management, Anti-Money laundering, Cheque Truncation, Credit Cards, Mutual Funds, On-line Trading, Data Warehousing, Customer Relationship Management, SWIFT, RTGS, NEFT, Internet Payment gateway, Global Treasury, Human Resources Management System, Employee Pay Roll, Cash Management, Mobile Banking, SMS delivery, Retail Depository, Phone Banking, Risk Management, Knowledge Management etc. which are well integrated and provide a seamless experience to customers of all segments and lines of business. These applications also provide critical MIS through Data warehouse for timely business decision. Bank is one of the few Public Sector Banks having our Internet Payment gateway offering E-commerce services. With 100% CBS and various initiatives, Bank has enabled its customer with the state of the art technology; duly complemented with the human interface.

The Bank of India has recently awarded 10 years IT infrastructure outsourcing contract valued $ 150 million to HP services. The Bank of India agrees that technology can be used as to achieve competitive advantages, as the bank went from the loss making to profit making bank. In case of Canara Bank technology development is has been observed to be indispensable, to retain this position and to gain sustainable growth. Therefore, the bank has spent substantial resources on technological development emphasizing a quality branch program and a business process improvement or redesign (BPR) program. These two programs help the bank improve the quality of the branch offices with regard to servicing customers more efficiently, improving decision-making and strategic planning using information from the branches, and expanding the numbers of branches without increasing the number of staff.

Use of technology in small banks is one of the key focus areas of banks. The banks in India are using Information Technology (IT) not only to improve their own internal processes but also to increase facilities and services to their customers.
Efficient use of technology has facilitated accurate and timely management of the increased transaction volume of banks of that comes with larger customer base. By designing and offering simple, safe and secure technology, banks reach at doorstep of customer with delight customer satisfaction several banks use IT to automate their key business and operations and help reduce operational costs. Revenues are largely increased with the introduction of more channels such as ATMs, internet banking or mobile banking to bring more customers or to retain existing customers by offering convenience to banks on a 24x7 basis. Banks have also placed a strong emphasis on IT to improve customer service, security, efficiency and competitiveness of the business. Some of the initiatives to reduce costs or increase revenues that the banks have implemented include consolidation of data centres and servers, virtualization, network bandwidth management tool, installation of solid state hard disks or implementation of advanced data replication tools.

The proactive monitoring of the infrastructure and applications has also helped these banks reduce costs and improve customer service. Infrastructure monitoring helps to reduce the potential downtime and cost of servicing. The implementation of dashboards for various applications helps the senior management to monitor the status of applications on a real-time basis.

Being a small bank, Central bank of India is more cautious in adopting new technology because of limitations in resources. The bank adopts fundamental technologies that are necessary to facilitate work processes and increase customer satisfaction advanced technologies will be adopted in accordance with the bank's vision and objectives or following the success stories of pioneer banks.

On the positive side being a small bank allows the bank to gain benefits from economies of scales from investments and to be able to control technological development projects. Dena Bank introduced Smart Card at selected branches and also drives in ATM at Mumbai as an initiative to adopt IT but on a small scale.

In general, small banks likes Punjab & Sind Bank, Dena Bank, IDBI Corporation Bank, Vijay Bank etc are operative in a particular region thus they have to invest in departmental technologies rather than integrated systems. These banks gradually develop only the very successful technology and employ only affordable
technology in order to facilitate work processes and support personnel development (IDRBT Journal 2008).

The Punjab and Sind Bank agree that technological investment is an important part of achieving competitive advantages. IDBI indicates that information technology plays an important role because of the high competitive nature of the banking business. Therefore, the bank perceives the importance of human capital and technological development as a prerequisite for the delivery of quality products and services to satisfy customers. Corporation Bank has developed technology together with re-engineering for three years in order to achieve the vision of becoming the best financial institution for every need, with a record of innovation and a reputation for professionalism. The technology development helps the bank to increase branches from 90 to 110 branches. Vijay Bank emphasizes technology, both hardware and software, and personnel development in order to create efficiency in management and enhance customer satisfaction that may lead to retaining the growth rate of the bank. At the same time the small bank always has advantage of easy diffusion of adopted IT due to limited no of branches. Thus they can have better planning in terms of utilization of particular technology. Banks like Corporation banks, Vijay bank etc are doing extremely well due to this reason only. Selective operations i.e. limited no of branches and suitable technologies adopted to cater to specific requirements of selective customers.

The small banks invest in fundamental technologies (e.g. ATMs, tele-banking, ATM, network systems, account system), and technologies that they can afford and help them fulfill their objectives. Corporation Bank places an emphasis on information management systems such as Financial Management Information system and Customer Information Systems. Indian Bank invests in well-provca successful technologies. The Corporation Bank invests heavily on the development of the retail bank system by transforming branch offices to be a fully integrated system to support every bank system and function. Indian Bank launched Smart cards in conjunction with student cards in order to encourage students to use technology in their daily lives.
The results from the study revealed that information technologies (IT) can be used to achieve competitive advantages for the banking industry in India because technologies help them gain or maintain competitive advantages in terms of market share and survival in an intensely competitive environment. Each bank develops and adopts technology individually depending on its vision, objectives, business size, and availability of resources.

Generally, the banks try to cope with technologies or services that other banks have such as ATMs, Tele-banking, Internet services, Web/homepage based Services, and Data centers and may use technology as a competitive weapon. However, at present, many banks are attempting to strengthen their customer base in order to protect themselves from foreign banks business likely to be open under the GATT agreement. The Reserve Bank of India has established a pioneer institute as an autonomous body named IDRBT (Institute for research and Development in Banking Technology) for Indian banks to exchange/pool technological information, promote continuous co-operation for technological policies, assistance, and research, increase efficiency in work Performance, and to share the pooled technologies which otherwise may not be feasible for small size banks due to financial constraints.

9.4 REQUISITE GROUP MODEL OF IT ADOPTION

To evaluate and select best technology on the basis of selective criteria MCDM technique was employed. The entire exercise was divided in to three stages: structuring a problem; eliciting relevant information and parameters and evaluation.

As a part of banks policy frame work, the objectives guiding to IT invasion in the bank were explored. Subsequently, various technological initiatives by Bank were studied and finally five customer driven projects/products namely Plastic Money (ATM Cards/Credit-Debit Cards/Smart Cards), Anywhere Banking/Core Banking (Core Data Center), Cheque Truncation System/Electronic Fund Transfer Products (EFTs), Internet banking and Mobile Banking, were considered for further evaluation under certain specific criteria.

As a whole seven high level criteria each consisting of several low level criteria was evaluated. Among these seven high level criteria two could not be considered and details of same have been referred in the limitation of this thesis.
As such the remaining five high level criteria, earlier used by Arunee Intraparirot in her study, namely Perceived advantage, Technological features, Internal environment, External environment and customer expectation were considered for further evaluating the technological alternatives.

Each high level criterion was sub-divided into low-level criteria, including specific issues detailed from the main criteria. During the second stage, respondents were asked to weigh the level of importance of each criterion and then score all the alternatives against the specified criteria. The last stage evaluated the alternatives and conducted sensitivity analysis using the V.I.S.A. software. Results from the MCDM analysis revealed that the preferred technology was Internet Banking followed by Anywhere/Core Banking.

The result obtained from analytical analysis were found to be different from the results derived from intuitive judgments of the same respondents, whereby Anywhere/core banking followed by Plastic money to most favourite products. The divergent outcomes may have resulted from differing ways of using available information, differences in conscious awareness between intuitive and rational decision-making, using the same criteria to evaluate different technologies, different perceptions between surface and deep structures, and particularly time delays. As in the latest mandate Mobile Banking was found to be most favourite technology.

We conclude that the proposed model of IT adoption helps decision-makers to increase their level of understanding and solving of problems, compares the rational results with their intuition, detects possible relevant reasons behind objective results, and allows them to improve their decision-making by adjusting weighting and scoring, and conducting sensitivity analyses.

9.5. REQUISITE GROUP MODEL OF IT DIFFUSION

While MCDM was used for technology adoption MCDM could not be used for diffusion of same technology because MCDM was not capable of clarifying the inter-relationships between criteria and variables, and reflecting dynamic effects. As such a more analytical and technical method of System Dynamics was used for technology and model was developed using S D methodology.
The MCDM analysis identified two predominant technologies of the bank: Internet Banking and Anywhere/Core Banking. Therefore, three models were discussed in detail “the generic conceptual model of information technologies”; the model of Anywhere/Core Banking; and the model of Internet banking.

9.5.1 A Generic Model of Diffusion of Information Technologies - A generic model of diffusion of information technologies (IT) was developed based on the qualitative and quantitative System Dynamics approach using a feedback loop technique accommodating the four system boundaries of the technology group of the bank (i.e. SBI), vendors, customers and staff. The detail of which is explained in Chapter 6. The qualitative conceptual model was quantified using the ithink software by adding each feedback loop to the simulation until the whole system was complete. The results from the IT diffusion model revealed the following issues

- Adequate Training is required to make any technology diffusion a successful product to yield proposed economic gains.
- Negative perception about previous technology experience hinders the rate of technology diffusion and as such proposed economic gains.
- Although technology is successfully diffused, economic returns from investment are constrained by the market potential.
- The investment has to be justified considering all opportunity costs. This happiness to be one of the high level criteria which could not be explored in this study. Since all products may not be required or no more economical to be used at all branches. Simply heavy investment does not ensure multiple return on investment.
- Economic gains from new technology are obtained only after the bank has spent substantial resources on technology investment.

IT diffusion model enabled bank officials to understand the present state as well as constraints of technology diffusion in order to apply the model to particular technologies. The main findings can be used for development of strategic policies to enhance the level of diffused technology, minimize constraints and improve the system behaviors.
The model of IT diffusion was proposed for application to any particular technologies. The model analysis revealed that training, a backlog of problems, and market potential, impacted on technology diffusion and subsequently on economic gains. Therefore, it is vital for the bank itself to provide training. Apart from direct training, encouraging self-learning via on the job training may help bank staff to adapt themselves to learn and use technology. Generally, the bank is able to compel staff to use technology. However, if technology serves bank customers directly, it must be tested to be error free before launching to the public market. Otherwise problems from technology and delay time for resolving problems may create negative word-of-mouth feedback that leads to a decrease in technology diffusion.

The bank must provide promotional advertising to speed up technology use, because each technology has a limited economic life. As technology if completely absorbs a potential market before its obsolescence, the bank will be benefited from that technology. However, once the technology has already absorbed the potential market, its economic gains are limited.

9.5.2 A Model of Diffusion of Anywhere/Core Banking - Anywhere/Core Banking is a concept of running whole bank from Central/distributed server/s. The customer can operate his/her account from any branch. The Database is a central analytical database that has been extracted, standardized and integrated from various operational and management databases of the organization to enhance competitiveness and decision support. The State Bank of India has invested extensively In Core Banking thus creating Core Data Center at Belapur, Navi-Mumbai. The project apart from many other purposes has been serving the purpose of obtaining accurate timely data to support decision-making and management.

The model of diffusion of Anywhere/Core Banking was initially developed based on a qualitative System Dynamics approach to identify the present state, detect constraints and illustrate holistic perspectives of Anywhere/Core Banking. The details of model have been explained in chapter 7. Incidentally, Anywhere/core banking project is one of those technologies which has relevance for bank as well as for the customer. While customer has benefit of enjoying anywhere banking, Bank on the other hand has entire MIS in hand. A quantitative System Dynamics approach was
employed to quantify the values of dominant variables and to visualize the impacts of
interaction between feedback loops and variables.

This model provided insights into diffusing the Anywhere/Core Banking to the
bank staff via training, and revealed important variables affecting the rate of
technology diffusion such as: training delays; percentage of resolution of problems,
percentage of technology abandonment; and the backlog of problems. The bank may
receive more benefits in the long run if it spends part of its economic gains in
technology investment because continuous improvement may extend the economic
life of the technology. A regular resource upgradation is required in terms of
hardware and network media connecting various branches/offices with Core data
Centre running Anywhere/Core banking facility.

The information from data collection reveals that many bank officials
particularly at the retiring age that happens to be a traditional banker, lack
understanding about the Core Data Center and how to use it. These participants did
dnot agree that the Core Banking (Core Data Center) is a good project but at the same
time they did not openly reveal their negative perceptions because the project was a
Corporate Centre initiative.

The model of the Core Banking detected the following problems: The bank
need to design a charter to clarify the usage of thus generated Database for MIS
reporting and arranging necessary trainings for staff; the bank must increase positive
features of technology and try to make it user friendly; the bank must provide training
support by arranging exclusive help desk at local level; the bank must decrease
perceived complexity; and finally the bank must strengthen the technical team
including the hardware support and system support to generate confidence among
users.

9.5.3 A Model of Diffusion of Internet Banking - Banks in India, first
introduced a project called Remote Login Project, whereby Corporate were given
limited access to Banks system through some networking media i.e. dial-in or radio,
to carry out their account related operations themselves. This facility was extended to
customers by loading certain applications on a particular PC at Customer premises
and this PC was made to communicate with Branch Server. Subsequently, with the
advent n penetration of Internet facility this particular PC became any computer and media became internet. Internet Banking all of sudden became a very popular tool for viewing balances followed by transfer of money. Reflecting the growing popularity of Internet banking, the total number of user registrations for Internet banking in India at present stands at over 2 million, according to an IDC report. As many as 7% of account holders in the country are using the Internet for banking transactions, while branch banking has fallen by a full 15 percentage points, according to a report by global management consultancy McKinsey & Company.

"Use of the Internet for banking has seen a massive rise in the 2010-11 survey, taking the overall number of bank consumers who use the Net to close 7% of the total bank account holders -- a seven-fold jump since 2007 -- even as for the first time in the past 13 years, branch banking has come down by a full 15 percentage points during the same period." McKinsey & Company India partner and head of its retail banking services Renny Thomas said. The prime driver for offering services online is to offer 24x7 availability and convenience to its customers. Beyond that, cost reduction is another.

In this study, information elicited from prospective users indicated clearly that this technology has the potential to expand in the future. There are high numbers of current non-users and high propensity for them to become users if the bank decreases costs of usage, ensures the reliability and security of the system, improves infrastructure and increases promotional advertising.

The model of diffusion of Internet banking depends on variables, their relationships and feedback loops under three sub-system boundaries of the SBI, staff and customers. The details of model have been explained in chapter 8.

The model then was simulated using an incremental technique to verify consistency among the data. The simulation results revealed patterns of diffused Internet banking which follow the s-curve, with differing slopes. If the bank provides training, the slope of diffused technology is more inelastic because technology is diffused more rapidly.

However, if the backlog of problems is taken into account, the slope of the diffused technology curve is elastic because the technology is only gradually diffused and the bank takes a longer time to absorb its market potential.
Further, from literature and from prospective customers we understand that Internet banking most favourits technology provided customer is convinced on certain issues like security and reliability of system etc. This can be further promoted by adding incentive to Internet Banking and arranging promotional advertisements etc.

The important policies that the banks should take into consideration to add more customers to Internet Banking are: adding incentives to internet banking; increasing positive features of technology; making the portal more user friendly and multi-lingual; adding relative advantages or features to this facility; and increasing promotional advertising.

In conclusion, the three models of technology diffusion were developed using user-friendly tools to assist decision-makers who may be inadequately prepared in technological knowledge. By these means, decision-makers may bring their business knowledge to bear in testing different scenarios, assumptions, perceptions and policies, and in turn observe the final outcomes. That would help them to decrease wasted time, effort and resources. It would also help support their decision-making processes, and promote their learning and understanding.

The case study of State Bank of India was further extended to explore the answers of the questions mentioned in Objectives of the research.

9.6 THE REQUISTE POLICIES FOR ADOPTION AND DIFFUSION OF IT FOR THE BANK

Normally the IT policy for any bank in Indian banking industry is a part of Bank’s overall annual plan projected to be achieved. Accordingly, the best fit policy with identified criteria is chosen. However, the best selection does not always guarantee the successful implementation or diffusion or ensure a good return on investment since this depends upon so many other factors studied in this research.

This policy analysis for technology diffusion aims at observing impacts of strategic policies and finding the leveraged ones. Various strategic policies, proposed by bank were considered to explore the most leveraged ones that would help the bank increase the rate of diffusion of selected technology and accelerate economic returns.
In case of Anywhere/Core Banking technology, we conclude that the success of this project depend upon the comfort of end user i.e. desk officer and the quality of database so that it can be used effectively for MIS purpose. Therefore, we can say that leveraged policies are those that increase the knowledge of users apart from generating willingness to use the technology. The policies like arranging mock training in real environment, creating positive perceptions about technology, increasing perceived relative advantages, increasing features of technology, and support from IT officials have been observed as leveraged policies.

However, for Internet banking technology a major difference in the list of policies is the quality of customer base, promotional activities by Bank since this project requires customer’s equal involvement. The high impact policies of Internet banking are making the technology easy to use, increasing positive features of technology, support by IT officials, and increasing perceived relative advantages. This is because prospective customers still perceive that both technologies are not sufficiently reliable, not easy to use, and have no real benefits. The leveraged policies for the two technologies may differ considering the basic application and operation of these technologies.

For example, training may not be that important for Internet banking since it’s more customer perception dependent. Trained staff hardly matters to the diffusion of this technology, rather promotion of this technology along with increasing positive perception about reliability and security of this technology has more influence in converting prospective customers to the list of users of this technology.

The three models of technology diffusion were developed using simple technical tool which can assists decision makers. However, these tools could not be tested for validity because of researcher being employee of State Bank of India and a part of IT structure at Local Head Office Chandigarh.

9.7 USING INFORMATION TECHNOLOGIES AS LEVERAGE BUSINESS STRATEGIES TO THE ADVANTAGE OF THE BANKING INDUSTRY IN INDIA

Technology has brought about a complete paradigm shift in the functioning of banks and delivery of banking services. Gone are the days when every banking
transaction required a visit to the bank branch. Today, most of the transactions can be
done from the comforts of one’s home and customers need not visit the bank branch
for anything. Technology is no longer an enabler, but a business driver. The growth of
the internet, mobiles and communication technology has added a different dimension
to banking. The information technology (IT) available today is being leveraged in
customer acquisitions, driving automation and process efficiency, delivering ease and
efficiency to customers.

Over the last decade, the size of the banking industry has grown by 7.5 times. The
business per employee has increased from INR27.6 million in 2005–06 to
INR62.7 million in 2009–10, while the profit per employee increased from INR0.12
million in 2005–06 to INR0.39 million in 2009–10. Indian banks are also no longer
constrained by geography as they have worldwide operations. IT has been
instrumental in the global expansion of banks. It is a huge challenge for banks to
maintain and keep the vast network operational. IT has helped banks put in place
alternate delivery channels such as internet and phone.

The answer for this research question was analyzed from data collected from
two main sources: interviews and documents. People who have technological
background from State Bank of India, largest bank in India and four medium-sized
Public Sector banks were interviewed including Punjab National Bank, Bank of
Broda, Punjab and Sind Bank and Canara Bank all together representing almost 70 %
of public sector banking. Documentations and IT journals from RBI and Banknet,
annual reports of these banks, IDRBT Journals and information from the Internet was
used and Content analysis was employed for data treatment.

The information revealed that these banks are able to use information and
technologies as a lever for competitive advantage. Technologies can be used to create
competitive advantages both internally and externally. The banks internally employ
technologies to facilitate work processes, improve work performances and assist
better decision-making. At the same time, technologies differentiate products, create
value added, and facilitate services that will attract external customers.

Mobile banking and ATMs have become the prime delivery channels. The
consolidation and centralization of information is also providing banks with
accelerated decisions.
Information technologies (IT) are widely used for three main purposes 1) to service customers with convenient services and differentiated products or services; 2) to accelerate work processes and improve work performance beyond human capability; and 3) to aid decision-making and strategic planning by top management. It is believed that if organizations attain these aims technology may help them to compete with competitors, retain and increase market share, sales and profits.

Use of technology in expanding banking is one of the key focus areas of banks. The banks in India are using Information Technology (IT) not only to improve their own internal processes but also to increase facilities and services to their customers. Efficient use of technology has facilitated accurate and timely management of the increased transaction volume of banks of that comes with larger customer base. By designing and offering simple, safe and secure technology, banks reach at doorstep of customer with delight customer satisfaction.

Indian banking today is witnessing drastic changes. Technology has a definitive role in facilitating transactions in the banking sector and the impact of technology implementation has resulted in the introduction of new products and services by various banks in India. For the last ten years, technology has been the driving force in the banking industry. As foreign and private banks poured huge sums of money to counter the branch advantage of public sector banks, they discovered that technology gives them a large competitive advantage. Some are investing in it to drive the business growth, while others are having no option but to invest, to stay in business. Everyone today is convinced that the technology is going to hold the key to future of banking. The achievements in the banking today would not have make possible without IT revolution. In this backdrop, the paper attempts to trace the latest trends and the role of IT in the banking services, its implications, issues and challenges.

The extensive use of IT has helped banks deliver banking services and products more conveniently and effectively. The rapid access to critical information and the ability to act quickly and effectively has lent a critical edge to banks. It is difficult to quantify the exact impact of IT adoption on productivity and efficiency; however, broad parameters such as cost and profit per employee can be used as proxy
to assess the impact that IT has had. Consistent management and decision support systems provide banks a competitive edge to forge ahead. The optimum utilization of IT infrastructure is fast becoming a priority as banks focus on better implementation and the measurement of efficiency parameters such as return on investment (ROI).

The present status of banking industry in India is a mix of Public Sector, Private Sector and foreign Banks and going by the work done so far we can say that adoption of IT is must being a competitive Industry. Unfortunately, the detailed analytical answers for this research question could not be identified because of banking industry is not that open to share detailed information for publications on certain policy matters. However, information was collected via interviews, documents, and results have been presented earlier in section. This research question still needs more information to produce in-depth answers. The detailed answers could be identified using a survey research.

The banking sector is projected to grow at a strong pace over the next decade and will need to strongly leverage the IT infrastructure to acquire and service the customer base and risk management. The basic technology adoption is almost complete and banks are now looking at improving the efficiency and effectiveness of the IT Infrastructure created. Newer areas of technology initiatives are enterprise risk management, business intelligence, improving internal effectiveness and managing IT risks.

Undoubtedly, banks have made great technological advances in storing information. However, the full power to use that information to be more productive and make better decisions still goes unrealized. By continuing to emphasize only technology and the peripheral business processes it affects, banks have seriously neglected their personal and enterprise-wide intelligence.

9.8 OBSERVATION ABOUT SYSTEMS USED

We have used the software earlier used by Arunee mainly because we have followed the broad frame work. Apart from that being in system we have used many in house software and program/applications in “foxpro” to assist and maintaining the database. The proposed model of technology adoption based on MCDM analysis demonstrated an easy procedure to select the best alternatives from various conflicting
criteria. Using the MCDM tool supported with software applications such as V.I.S.A. may help bank staff evaluate technological alternatives more efficiently and effectively as compared to the traditional method. Further, MCDM tools are easy to learn and are commercially available in market and can be applied on supplied database otherwise also it’s not a very expensive application.

However, System Dynamics (SD) is more difficult to learn and use compared with MCDM. It is more useful in terms of being more applicable in solving various problems, particularly from engineering field. System Dynamics as a decision-making tool for problem solving helps the bank perceive holistic and dynamic aspects of a problem rather than a static snapshot. Decision-makers are able to accommodate more variables, interrelationships among variables, and time delays in problem solving.

9.9 STUDY LIMITATIONS

The limitations and short comings of this research are restricted to the following issues and areas:

i). In this study we have considered the basic technologies being adopted by banks which required banks to re-engineer processes, network branches and introduce alternate delivery channels such as Internet banking, Phone banking/Mobile banking, Anywhere/Core Banking (Core Data Centre), Customer Relationship Management, Integrated Treasury Management, Cheque Truncation System and Active Directory Services etc.

However, due to unavoidable circumstances this research has taken some long time meanwhile newer areas of technology initiatives have come up, some of them are enterprise risk management, business intelligence, improving internal effectiveness and managing IT risk.

ii). The researcher happens to be employ of State Bank of India as a specialist officer (ITS department). Because of this few tests could not be performed or documented. Further, two high level criteria namely “Qualification of deciding Authority” and “Universal utility of adopted technology” also could not be explored while using MCDM methodology. The research has been carried out using the criteria used criteria.
iii). On the same ground policy formation and validation test could not be considered as such this part of research is to be carried out by some outsider researcher.

iv). In the entire methodology time constraints have not been used. The research itself has stressed too long due to unavoidable circumstances. The fresh mandate for choosing best technology the results were found to be different and Mobile Banking was found to be the most preferred technology.

v). The bank officials could not reveal all information due to constraints of confidentiality of the organization. Second, some data could not be recorded or classified because of their specific properties, such as scatter, non-categorization, and non-quantification as such discrepancies in data.

vi). The bank being an business entity may find tools like system dynamics, which requires good engineering skills, too difficult and time consuming for responsible officials to spare time required to understand the process.

vii). The issue of technology adoption and diffusion was initiated as a problem by the researcher, which may not be considered as serious vis-à-vis others challenges faced by bank.

viii). As submitted earlier many tools were developed locally for manning and summarising the database generated out of interview and questionnaire responses. The applications were developed using “Foxpro” and no standard statistical tool was used, which may not be suitable for generalising the model.

As such while designing model for banks we must ensure accurate information considering all possible concerned aspects, synchronization between agencies involved in designing the model and various authorities concerned in management.

However, these models are basic guidelines for generating awareness and understanding about various factors associated and influencing the technology adoption and diffusion in banks.

9.10 FUTURE RESEARCH

While technology-focused possibilities of IT may be unlimited due to their application and adoption in India, there is a need to exercise a conscious approach for the business process re-engineering of existing practices and procedures to capitalize
effectively on IT particularly in banking industry. Training and upgrading skills play a
critical role in the absorption of new technologies. The knowledge gained from
conducting the research relating to MCDM and System Dynamics areas can be further
developed and expanded to deal with many prospects. The generic model of IT
adoption and diffusion can be applied to any particular technology in any
organization. The interesting technologies that are getting popular are worthwhile to
investigate are Mobile Banking, Green Channels, Plastic Money, and electronic
commerce.

These models should be tested against some of the projects which were
implemented by various Banks, but remained stuck between implementation and
practical roll out including Focal Point Project by State Bank of India. Same way
others Banks have made declaration about various projects but have adopted a "wait
and see" policy because of uncertainty of the success of technology diffusion. Such
banks particularly small Bank’s follow the large banks while adopting various
technological projects.

Tracing the detailed characteristics of each technology may reveal different
patterns of technology diffusion and different policies to increase the rate of
technology diffusion, and economic gains. Further research in regard to technology
diffusion is a fascinating prospect.

Further, Group Support System could not be explored due to non-availability
of GSS facilities; and differing natures of an organizational culture. This study
remained confined to MCDM and System Dynamics methodology. GSS is a valuable
tool for data acquisition of group decision-making. MCDM is the best selection tool
to priorities choices, and System Dynamics is suitable for detail and policy analyses.
Exploring GSS for similar study will be another interesting project.

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used as proxy to assess the impact that IT has had. Consistent management and
decision support systems provide banks a competitive edge to forge ahead. The
optimum utilization of IT infrastructure is fast becoming a priority as banks focus on
better implementation and the measurement of efficiency parameters such as return on investment (ROI).

These models should be tested for a long period that would indicate the real impacts of MCDM and System Dynamics applications, whether they contribute to the success of decision-making in an organisation or not. Otherwise, it seems the MCDM and System Dynamics process can be an experiment where model analysts undertake their tasks but there is no real intention for practical implementation.

A comparison using System Dynamics applications in different cultures is thus of great interest. It will be interesting to study the comparison between work performances of Public sector banks with Private sector banks. This shall help us to analyse various efficiency parameters including performance of human resources.

Changing customer preferences, mobile and internet penetration, rising cards, growth in disposable income and spend, as well as new technology initiatives have bolstered the payments landscape in India. It is evident that electronic payments will become increasingly popular as a delivery mechanism. However, there will always be customer segments, which will prefer to transact through a cheque or go to a branch to withdraw money. As such, banks will need to decide on the product strategy and create a mapping of their payment portfolio with their customer segments. Banks will need to increase their efforts in migrating customers from paper-based payments to electronic payments if they want to reap their benefits of cost advantages. However, this will require a fundamental change in consumer behavior, which can happen only if the banks and the regulator offer a secure, robust and efficient network, in addition to incentives in terms of convenience and benefits to customers. A study of Information Technology product invasion and change/bending of customer behaviour would be another interesting topic.

As technology ingrains itself in all aspects of a bank’s functioning, the challenge lies in exploiting the potential for profiting from investments made in technology. A lot needs to be done on the technological front to keep in pace with the global economies, as is evident from the survey by RBI results. Technology systems of Indian banks have been rated more advanced than Brazil and Russia but below par with China, Japan, Hong Kong, Singapore, UK and USA. We find no change on introspection of our past surveys which also highlighted the need for Indian banks to pace up in adoption of advanced technology.