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A STUDY ON IMPACT OF TECHNOLOGY ON THE BANKING SECTOR

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Abstract

Financial services, including banking services, are at the cusp of a revolutionary change driven by technological and digital innovations. A rapidly growing number of financial entities and technology firms are experimenting with related technological and financial solutions as well as new products in the financial services field which either modifies the way financial intermediation takes place or leads to disintermediation. This study attempts to analyze the technological development in the banking sector in the past few years. A systematic review of literature has been done and it found that still a lot of advancement will be there in the banking sector in coming years.

Key words: Technology, growth, financial services, banks

- **Introduction**

The Indian banks are financial service providers and so banking industry is redefined. Technology is modifying the past business procedures and a change in customer behaviour has also come. This has increased the level of competition. The four trends changing the banking industry are: consolidation, globalization of operations, development of new technologies, and universalization of banking (K.V.Kamath, S.S.Kohli, et.al., 2003).The technology is modifying the business ways and opens new avenues for doing the same work in cost –effective ways. The bank at home concept is getting implemented by tele-banking and internet-banking. Technology is taking over the transaction processing load so banks can focus on intensifying marketing ways and re-invent their business form. Traditional branches, with an infrastructure that supported transactions, are transforming into an open-space interface where experts connect personally with their customers, deliver specialized advisory services with respect to retail banking (Ali Yakhlef 2001).

The banking and financial service organizations are now foreseeing a paradigm shift of operations brought about by the fusion of technology into financial services. Technology is using application to achieve desired benefits with lesser efforts. In this usage, technology refers to tools and machines that may be used to solve real-world problems.

Banks and other financial institution are heavy users of computers in maintaining customer's accounts, ledger, updating, electronic fund transfer and processing of huge amount of cheques, credit cards, and the major transactions that takes place daily.

The core of banking is the holding of financial assets–albeit it may have expanded far beyond the days of holding coins for notes of promise. That is where an entire sector was birthed. Banks are simple, for they hold assets for its clients, with a promise that it may be withdrawn should the depositor require the assets in return.

Banks leverage money deposited in their vaults as loans, earning money from the interest gap between loan payments and depositor's interest. While it may not contain all the money in its vaults, it does so on paper—and these papers drive the economy forward, pushing it to grow. The entire sector takes diversified risks by investing widely to prevent unexpected loan defaults from sinking the entire organization–they exchange one gigantic problem for various other insignificant problems. And for such a diverse and enormous sector, technology is a reliable support, and a tool for aggressive expansion as well. Ever since the dawn of the age of information, technology has been growing faster than the knowledge of how to apply them. And out of such technical applications, the banking sector takes an enormous chunk of them, applying almost every secure technology that we have today.

Evolution of Indian Banking

Indian banking has undergone a total transformation over the last decade. Moving seamlessly from a manual, scale-constrained environment to a technological leading position, it has been a miracle. Such a transformation takes place in such a short span of time with such a low cost. Since, independence Indian banks have undergone through various phases which can be categorized as Pre- Reform Period-

- A period of consolidation of banks up to 1966.
- A period of historic expansion in both geographical and functional terms from 1966-1980.
- A period of consolidation of branches from mid 1980-1991.
- A period of strengthening banking industry 1991-1999
- A period of technology introduction 1999-till now

These above changes were policy induced but not driven by market force. The technology in Indian banking industry was induced by the Rangrajan committee Report, way back in the 1980s but during the 1990s, the banking sector witnessed various liberalization measure. One of the major objectives of Indian banking sector reforms was to encourage operational self-sufficiency, flexibility and competition in the system and to increase the banking standards in India to the international best practices.

The second phase of reforms began in 1997 with aim to reorganization measures, human capital development, technological up-gradation, structural development which helped them for achieving universal benchmarks in terms of prudential norms and pre-eminent practices.

- With the ease of licensing norms, new private & foreign banks emerged-equipped with latest technology.
- Deregulation has opened up new opportunities for banks to increase revenues by diversifying into investment banking, insurance, credit cards, mortgage financing, depository services, securitization, etc The role of banking is redefined from a mere financial intermediary to service provider of various financial services under one roof acting like a financial supermarket.
- In the current phase emerging technologies have changed the banking industry from paper and branch based banks to digitized and networked banking services. Unlike before, broadband internet is cheap and it makes the transfer of data easy and fast. Technology has changed the accounting and management system of all banks

The changes after economic liberalization and globalization process, initiated since 1991, have significant impact on the financial institution. Information Technology revolution has entirely changed the way financial business is conducted. It has significantly extended the range of products and increased the estimated demands of the customers. The automation in the banking sector began in nineties. The initiation of automation witnessed rejection and resilience. The bankers and customers never thought of computerized banking, automated teller machines, net-banking, phone-banking, digital payments etc. will become a part of their daily life. Financial sector reforms and banking sector reforms are the part and parcel of economic reforms, which strengthen the economic reforms. IT Act of 2000 gave new dimension to the Indian financial sector. IT has created transformation in banking sector: banking structure, business process, work culture and human resource development. It affected the productivity, profitability and efficiency of the banks to a large extent. Strengthening the financial sector and improving the functioning of financial market have been the core objective of the financial sector reforms.

- **Theory and Reviews of Literature**

The Committee on public Sector banks (1978) suggested a legal use of information technology (IT) for few services of banks for improving the operational efficiency, quality of customer service and to speed it up. It will not only increase efficiency but also lessen the weight of routine and recurring work and give enough time to employees to offer better services to customer.

Beccalli (2006) used data from 737 banks covering the period from 1993 through 2000 to study the impact of increased information technology investment on the profitability performance of banks in France, Germany, Italy, Spain and United Kingdom. The study used balance sheet and income statement data, giving a pooled total of 4414 observations. ROA and ROE have been used as performance variables and hardware cost, software costs and services cost as the investment variables. The study found no significant relationship between total information technology expenditure and improvement in profitability. Carlson (2001) reached the same conclusion after investigating the same issue in the US banking market by regressing a bank's

ROE on a set of controlled variables including an explanatory binary variable for the presence or absence of internet banking. Shirley and Mallick (2008) tested the cost effect and network effect of IT by applying a differentiated model in 68 US banks using 20 years data and concluded that bank profits decline due to adoption and diffusion of IT investment, reflecting negative network effects in this industry.

Mittal and Dhingra (2007) evaluated the impact of computerization on the performance of Indian banks using Data Envelopment Analysis (DEA) and found that the benefits of computerization in boosting productivity and performance of banks is difficult to quantify.

A lot of studies have found positive impact of IT on the performance of banking sector. Shaukat (2009) examined the impact of IT investments on profitability and employee productivity in Pakistani banking sector over a period of 1994-2005. They found that IT has a positive impact on performance of the banking sector. Parsons, Gotlieb and Denny (1993) reached at the same conclusion after studying the impact of IT on banking productivity in Canadian banking industry. Using data from 1974-1988, a trans-log cost model has been estimated. The research found a 17-23 percent increase in productivity with the use of IT.

Cooke(1998) studied some new and fast growing financial innovations linked to IT investment, e.g., assets securitization and derivatives in US banking sector. The study found that IT has enabled the banks to offer new products, expand into nontraditional areas, operate more efficiently and minimize risks. Deyoung, R. (2006), analyzed the impact of investment in information technology (IT) systems on bank's profitability in UK. Using panel data the study supported the view that IT has a positive impact on bank's profitability through several factors such as reducing the labour costs and transactions costs. Claudia et al. (2002), empirically examined Italian banks based on univariate and multivariate

regression models and found a significant relationship between offering of internet banking activities and bank's profitability. Betterymarch (2003) used a panel of 600 Italian banks over the period 1989-2000 and stochastic cost and profit functions have been estimated. The results show that both cost and profit frontier shifts are strongly correlated with IT capital accumulation. Banks adopting information technology capital intensive techniques are also more efficient.

Hung Viet Ngugen (2005) studied Vietnamese commercial banks in terms of their efficiency change, productivity growth and technological change during the period 2001-03. The Study used Data Envelopment Analysis (DEA) and MalmquistIndex with four inputs (labour, capital, technology and deposits) and two outputs (interest income and noninterest income). It shows that total factor productivity increased by 5.7 percent in 2003 relative to 2001. Aghdassi, M. (2008) analyzed the strategic value of e-banking for Iranian banks and revealed that bank manager's performance through e-banking is quite positive and effective. They also concluded that information technology stock contributes to value added growth significantly and use of information network shows positive impacts on TFP.

Agboola (2007) used Likert-type ratings to measure and analyze the degree of utilization of identified technologies and the variations in their adoption rate in Nigerian banks. The study revealed that the adoption of ICT in banks has improved customer services, facilitated accurate records, provided home and office banking services and enhanced faster services. Illyas-Ur Rahman (2007) examined the role of information technology in banks and studied the perception of bank employees towards the implementation of information technology. The study considered different information technology variables like net banking, credit cards, mobile banking, electronic funds transfer, phone banking, card to card funds transfer. The study found a positive relation between implementation of information technology and delivery of services. Ahmad Mashnour (2009) investigated the way in which information technology investment created value in the Jordanian banks. The study measured some variables which determine financial information system performance i.e. (a) IT integrated in IS; (b) software quality; (c) investment in training; (d) customer services; (e) productivity; (f) user satisfaction; and (g) cost benefit analysis. The study concluded that information system provides a competitive advantage to the banking industry and the effectiveness of information systems has a positive impact on Jordan banks. Ombati and Magutu(2010), analyzed the relationship between technology and service quality in the banking industry in Kenya. The research is a cross-sectional survey and the respondents of the study are customers of banks using e-banking services (internet banking, mobile banking and ATM). The findings revealed that e banking has improved the service quality of banks. Madume Stella (2010) analysed the impact of information and communication technology on the productivity of the Nigerian banking sector using CAMEL and the

transcendental logarithmic production function also called Translog. The study found that bank output such as loans and other assets increase significantly due to increase inexpenditure on information and communication technologies.

Leckey, Osei and Harvey (2011) ascertained and documented the extent to which investment in information technology may affect profitability in Ghana banking sector. The study used an enhanced Balanced Scored Card (BSC) approach proposed by Kaplan and Norton (1992) and used the extensive panel data set of 15 banks over a 10 year period (1998-2007). The study found that higher IT level banks have the tendencies of increased profitability.

S. Dhingra (2012) found that the system quality, information quality and service quality are the major factors leading to users' satisfaction. The user satisfaction directly increases the business performance. It is believed that there is a change in the system quality, information quality and service quality due to the use of technology.

Alpar and Kim (1990) studied 759 US banks during 1979-1986 to analyze the impact of IT on economic performance. Applying cost function approach they found that IT was able to reduce operating costs, increase capital expenditures of banks, save personnel costs, reduce demand deposits, and increase time deposits. Ekata, G.E. (2012), examined technological change, its relationship to firm size, and its impact on the efficient scale of output and product mix for large US commercial banks. The results suggest that technological change lowered real costs by about 1 percent per year, increased the cost minimizing scale of outputs, and affected product mix.

To study the efficiency and productivity of banks, many researchers used DEA model. Das et al., (2000) used DEA approach for all the three types of ownership— public, private and foreign. Kamakura &Ratchford, (1996) used DEA with translog cost function to measure efficiency of multiple retail stores.While applying DEA, different IT related input specifications have been noticed.Some studies used computer (hardware) as input measure (Oral and Yolalan,1990; Vassiloglon&Giokas, 1990) whereas some others have taken Number of ATMs (Zenios et al., 1999). Choudhari&Tripathy, (2004) used DEA with a lot of variables like profitability, financial management, growth, productivity, and liquidity. Many other users of this approach were Mukherjee et al. 2002; Kumar &Verma 2003; Sathye 2003; GunjanM.Sanjeev; 2006; Gupta et al., 2008; Rezvanian et al., 2008; Awdeh&Moussawi, 2009; Sunil &Rachita, 2010 etc.

Research Objectives: On the basis of above research questions, this study proceeds with the research objective of analyzing the recent developments in technology in banking industry.

Technology Trends in Indian Banking Sector

Information and Communication Technology (ICT) has changed the functioning of banks worldwide. The foremost breakthrough started with the use of Advanced Ledger Posting Machines (ALPM) in 1980s. The enormous automation at branch level reduced errors which resulted in customers receiving error free services. In late 1980s Total Bank Automation (TBA) was introduced both for the front-end and back-end operations within the same branch followed by the establishment of mechanized cheque processing systems which used the Magnetic Ink Character Recognition (MICR) technology. Financial sector reforms and the emergence of internet facilitated banks in opting for centralized database for all their branches which resulted in low cost networks. New private sector banks and foreign banks employed ATMs, phone banking and internet banking pretty early followed enthusiastically by the public sector banks.

Technology adoption helped banks in crafting their own web pages which customers can access through the web browsers from their homes/workplaces. It was in June 1999 that an IT revolution actually appeared in the Indian financial institutions specially banking sector when the world of IT seemed too wide open with introduction of Indian Financial Net. This Indian Financial Net included a wide area satellite based network, which used Very Small Aperture Terminals Technology. The Reserve Bank of India jointly set it up with the Institute for Development and Research in Banking Technology. The Indian Financial Network initially comprised only the public sector banks but was later on opened up for participation by other categories of members including foreign banks as well. It was the payment system, which was the first segment of banking system, benefited a lot from the introduction of the new technology. This segment being the lifeline of a bank was later on fully mechanized with the introduction of Automated Teller Machines (ATM). This facility was further enhanced by the internet facility, which was an also significantly influenced delivery channel of the banks. Internet has emerged as an important medium for delivery of banking products and services. Detailed guideline of RBI for Internet Banking as prepared the necessary ground for growth of Internet Banking in India.

In addition to this the IT Act, 2000 has provided more enhancement by giving a legal recognition to creation, transmission and retention of an electronic data. The IT Act, 2000 also provide for this electronic data to be treated as a valid proof in a court of law in most of the cases, except those cases, which continue to be governed by the provisions of the Negotiable Instrument Act, 1881. RBI has also stressed the implementation of centralized funds management system, which facilitates a centralized viewing of balance positions of the account holders across different accounts maintained at various locations of Reserve Bank of India. This process was divided in two parts. The first part made the centralized funds enquiry system available to the customers and the second part arranged for a centralized funds transfer system by the end of 2003. In order to enhance the information security on network, Government of India has approved the Institute for Development and Research in Banking Technology as a Certification Authority for digital signatures. Electronic funds transfer is being enhanced in terms of security by means of implementation of digital signatures using the facilities offered by the certification authority. Further recognizing the need for technology based payment products a pilot project for multi-application smart cards in combination with a few banks, under the guidance of the Ministry of Communications and Information Technology, Government of India, has been initiated. All this technological advancement has changed the face of Indian Banking System. As explained above a number of technologically advanced measures are provided to every single customer of present day banks. But of a close analysis is made then one thing will come up that the present day banking is made available to the customer at the finger tips by the most valuable contribution of information technology is the Automatic Teller Machine Card of ATM. It will not be wrong if it is asserted that the biggest agent of change of the face of the banking system today is ATM. Internally, the first ATM was installed on June, 1974 by Barclay Bank, London. In India, the ATM service was introduced in 1987. There are about 16, 00,000 ATMs throughout the world. This ATM card could be used at the ATMs of other banks also.

Public Sector Bank at a glance with respect to technology adoption

The information and communication technology (ICT) is the backbone of banking industry. ICT is the use of communication technologies including internet, wireless networks etc. ICT is

enabling the banks to improve their productivity and services offered to clients, enhance business practices and decision-making that supports their competitive positions in the emerging economies.

Till the 1990s, the financial sector was focused on lending to the industrial sector. Over the last decade the favourable demographics and low penetration of financial services offered immense opportunities for the Indian banking sector in catering to the financial services needs of individuals and households.

The Goiporia committee set up by RBI in 1990 to study customer services in PSBs, has made suggestions to improve customer services. The PSBs are still reluctant to adopt some of the suggestions, while private banks are making every effort to delight their customers. The sector has undergone a transformation over the last two decades, with the adoption of technology, development of new products and creation of alternate banking channels to serve customers. Banks began to adopt a universal banking structure wherein all types of financial services were offered by banks. Banks now offer a range of products like project finance, working capital loans, mergers and acquisitions advisory and financing, trade finance and foreign exchange and derivatives, mortgages, vehicle loans, credit cards and retail savings products.

Technological innovation played a pivotal role in this expansion, as banking services such as cash management, foreign exchange and trade finance underwent a major change imparting greater efficiency to both banks and corporate houses. Channels of banking also saw a paradigm shift through the decade with increasing use of channels other than the branch. Technology has been an important differentiator in enabling the emergence of these alternate channels of banking. While bank branches continue to be key sales and service points, alternate channels such as ATMs, point-of-sale terminals, internet banking and mobile banking continue to grow their share of transactions. India now boasts of more than 80,000 ATMs and 4 this number is growing further. Internet banking has also picked up in urban and metropolitan centers, while mobile banking is emerging as a channel for low-ticket high volume transactions. Banks have now developed the technological capability to handle large volumes at a low cost.

To achieve the above goal through ICT, RBI established following communication and payment related technologies:

Public Sector Bank at a glance

	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
No. of banks	27	27	27	28	28	28	28	27	27	26	26	26
No. of offices	47596	47923	48242	47170	48638	3688	55103	57850	61630	65217	69498	75779
No. of employees	756625	757251	752627	723856	725434	55621	715408	731524	739646	755102	771388	801659
Business per employee	4991.72	5758.35	6673.87	9142.16	10902.11	926	59.42	73.44	86.43	101.67	115.12	127.47
Profit per employee	30.84	47.99	71.08	65.8	68.57	5	0.37	0.47	0.53	0.59	0.64	0.63
Capital and Reserve & Surplus	57457	65585	79245	97825	112735	10002	1747854	2083419	2410014	2903020	3555765	4086022
Deposits	968628	1079161	1229463	1386383	1582645	147221	24538677	31127471	36920194	43724487	50020134	5.7E+07
Investments	454504	545670	626174	666665	617003	49133	7998413	10126658	12155981	13360764	15040765	1.8E+07
Advances	480123	548444	633037	827015	1078977	108178	17974008	22592117	27010187	33044329	38783125	4.5E+07
Interest Income	100712	107235	109548	116801	134402	12219	2130746	2730882	3059826	3661345	4847401	5548765
Other income	16527	21238	28036	23483	21449	1891	327971	424662	488932	479649	503578	567812
Interest expended	69154	69854	65766	66617	78464	7543	1489021	1934467	2119401	2311530	3285391	3879290
Operating expenses	26421	28895	32534	35429	40368	3362	466627	555037	660749	829652	902145	1018122
												2.57

- **Computerized Branches:** The Reserve Bank of India initiated to have the modernization of traditional bank branches using ICT. It developed **Indian Financial Network (INFINET) in 1999:** It is a satellite base technology which uses VSAT (Very Small Aperture Terminal). It further helped to develop **Core Banking Solution** (CBS) in 2003 which is an arrangement (network) of branches to enable clients to get services of **banks** from any branch of the **Bank** on CBS network, irrespective of the branch where account is maintained. Though, the number of commercial banks over the years is decreasing due to merger and acquisition, but growth rate of bank branches (0.015 per cent) exhibits an exponential growth. Compared to last decade, the present decade has shown higher growth rate of bank branch (0.023 per cent) because of the policy adopted by the banks to expand it with a view to achieve financial inclusion.

- The number of employees is declining over the period of time due to more emphasis given on technology based fast and modern services instead of manual services. During the present decade the growth rate of employees is declining because of advent of technology and communication network and adoption of self service technology (SST) by the banks through ATMs and internet/online banking, as well as changing banking habits of customers over the years.
- Deposit growth rate in both the decades are showing an exponential growth. Currently the deposits are growing faster due to transparency gained through use of technology over the years.
- Credit growth rate in the last and present decades are showing an exponential growth.
- Growth rate of investment in both the decades are showing an exponential growth because the LPG policy measures forced banking to invest more in the government projects for expansion activity and infrastructure development in the country.
- Deposit, credit and investment constitute the total business of the banking sector. Here also the growth is exponential in nature. It means that the total business of banks over the years is growing exponentially due to the policy measures adopted by the central banks (RBI) and the government. Deposit, credit and investment are exhibiting the overall business growth of banks over the decades.

Conclusion

Like it or not, there is more in the store of banking. Technology is set to play a major role in changing how financial services will work across the sector, making it easier for customers and more profitable for the providers of such services. The technological footprint is huge on various business models of banks and other such financial institutions, and will continue to apply to all processes and other back-end operations. Technology has made its mark, and nothing can erase its impact now.

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