



“A Study On The Application, Role, And Challenges Of Information Technology (IT) In Banking Sector”

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Abstract

Over the past few decades, banking sector has been dramatically transformed by the development and advancement of Information Technology (IT). The paper discusses the impact of IT sector on operational efficiency, financial security, customer experience, innovation, etc. of the banking sector. It also examines various aspects of inter-connection between banking industry and network industry. The study explores the challenges associated with IT in banking and future potential of emerging technologies, such as artificial intelligence (AI), cloud computing, blockchain, etc. The findings of the study show that there has been profound potential of IT sector to influence the banking sector to introduce quick and effective services for its customers.

Key Words

Information Technology, Banking Sector, Network Industry, Financial Security, Customer Experience, Artificial Intelligence, Blockchain, Cloud Computing.

1. Introduction

Information Technology has played a vital role in the advancement of the banking sector by improving efficiency, providing better customer service and security in transactions. It has brought significant changes in banking operations by introducing online banking, mobile applications, digital wallets, and many other such services. The transition of banking services from brick-and-mortar to digitalization is only because of the advancement of IT sector. It has a major role in reducing human error as well as streamlining back-office operations.

1.1 Objectives

1. To study about the evolution of information technology (IT) in banking sector.
2. To understand how information technology is applied in the operations of modern banking system.
3. To analyze the role of information technology in the development of banking sector.
4. To evaluate the interconnection between banking industry and network industry.
5. To discuss technology trends in banking industry.
6. To analyze the benefits and challenges in adopting IT in the banking sector.
7. To provide some feasible solutions to overcome the challenges.

1.2 Novelty

There have been numerous studies that have examined the impact of Information Technology (IT) on the banking sector. However, this research brings a different perspective as it offers a comprehensive and balanced analysis that emphasizes the real-world challenges of IT integration in banking environments. The study explores about the dynamic challenges such as cyber security, rising costs of applying technology, regulatory compliance, customer adaptability, etc. The paper also incorporates the use and impact of sophisticated technology like AI, blockchain, fintech collaboration, etc. highlighting their emerging roles in reshaping modern banking practices.

1.3 Problem Statement

Information Technology (IT) has become an indispensable component in the banking sector for enhancing efficiency, maintaining competitiveness, improving customer service, etc. Innovations such as online banking, mobile apps, digital payment systems, real time fund transfers, etc. has revolutionized the banking sector to face the challenges of modern-day banking system such as cyber security threats, high implementation costs, regulatory concerns, digital divides among customers, etc. Even though there is widespread adoption of information technology across the banking sector, there remains a significant gap in understanding how IT is applied effectively across various banking services, what barriers banking institutions face in optimizing the use of IT, what role it truly plays in shaping banking operations. In this research paper the researcher has aimed to explore the multidimensional application of IT in banking, and analyze the challenges that hinder full potential of the banking sector.

1.4 Research Methodology

The research is descriptive and analytical and the researcher has used secondary data from various reports, government sources, journals, websites, etc.

1.5 Review of Literature

The available literature on the role of IT sector in banking system reveals that while IT has unquestionably transformed banking operations, it is believed that its full potential is yet to be realized due to continuous modernization of IT sector and persistent challenges faced by the banking sector. The researcher has believed that continuous innovation, better risk management strategies, and inclusive technology policies are very much essential for leveraging IT effectively in the banking sector.

2. Evolution of IT in Banking Sector

The notable technological revolution in the banking industry is seen with the introduction of Automated Teller Machines (ATMs) during 1980s and 1990s as these machines allowed customers to get the basic banking services without physical visit to the banks. Moreover, the emergence of internet services in the 1990s paved the way for online banking. With operation of mobile banking in 2000s, the banking industry has reached to another level of height in the ladder of development of the banking industry. However, with the advent of smartphones, the mobile banking gained more popularity after 2010s. Furthermore, the rise of various digital wallets - PhonePe, Google Pay, Venmo, Apple Pay, MobiKwik, Amazon Pay, etc. have also revolutionized the transactions methods. Crypto currencies, such as Bitcoin and Ethereum and Blockchain Technology have emerged as remarkable innovations in the banking industry.

The major banks in India have introduced Artificial Intelligence (AI) in their activities. For example, HDFC bank has effectively leveraged AI to enhance its customer service offerings, through its AI-driven Chatbot, EVA (Electronic Virtual Assistant). It is capable of answering millions of customers' queries instantly across multiple channels. SBI has developed YONO (You Only Need One) app to serve as a comprehensive digital ecosystem to meet diverse customer needs.

2.1 Application of Information Technology (IT) in Banking

The use of IT in the banking sector has revolutionized the way financial institutions operate. Since sophisticated information and communication technologies are used in the banking operation, it has transformed traditional banking methods and enhanced operating efficiency. Information Technology helps the banking sector in providing the following crucial services:

- a. **Internet Banking:** It is a facility offered by banks that allows customers to use banking services over the internet. Customers need not visit their bank's branch office to avail each and every small service. IT enables customers to access their accounts, transfer funds, pay bills, and perform various transactions through secure online banking portals and mobile apps. This convenience has led to a significant shift towards digital banking. As per a report published by S&P Global Market Intelligence, in 2019, India recorded over 11 billion UPI transactions through online platforms like BHIM, Google Pay, PhonePe, Paytm, BharatPe, etc. and the total amount of transactions was recorded to be \$ 373 billion for the year 2020.

- b. Automated Teller Machines (ATMs):** ATMs are a prime example of IT in banking. They provide round-the-clock access to basic banking services such as cash withdrawals, deposits, and account inquiries. It has replaced the customers' queue in the banking sector.
- c. Video Teller Machine (VTM):** VTM is an electronic banking outlet that allows customers to receive immediate assistance, complete basic transactions or request banking services with the help of live video conferencing consultation with a remote bank teller.
- d. Mobile Banking:** Mobile banking apps have become increasingly popular with the expansion of smart mobile phones in the nook and corner of the world. Customers can manage their finances, make payments, and even apply for loans using their mobile devices. Mobile banking provides quick service to its customers.
- e. Electronic Funds Transfer (EFT) Systems (NEFT, RTGS, IMPS, UPI):** IT facilitates the seamless transfer of funds between accounts, both within the same bank and across different financial institutions. For example, the NEFT system is available on 24x7x365 basis. It is estimated that in the year 2020, a total of 368 billion transactions worldwide were done using the combined transactions of Visa, Master-Card, etc.
- f. Security Measures:** Banks rely on IT systems to implement robust security measures to protect customer data and prevent fraud. This includes encryption, multi-factor authentication, biometrics, and real-time monitoring for suspicious activity.
- g. Customer Relationship Management (CRM) Software:** The CRM module is helpful for banks in order to manage their relationships with customers by storing customer data, tracking and managing interactions, providing personalized services and generating reports. CRM software powered by IT enables banks to better understand and cater to the needs of their customers.
- h. Core Banking Systems:** IT plays a crucial role in managing core banking functions such as account management, loan processing, risk management and transaction processing. It is in fact the central nervous system of a bank as it is vital for maintaining compliance with regulations and providing a seamless customer experience (CX). The IT enabled core banking systems can be either on the premises or it may be cloud-based.
- i. Risk Management:** IT systems are used for sophisticated risk assessment and management, including credit risk, market risk, and operational risk. This helps banks in identifying, monitoring and mitigating the potential threats and implementing strategies to mitigate them.

It is clear that the integration of IT into the banking sector has resulted in increased operational efficiency, expanded service offerings, improved customer satisfaction, and enhanced security.

3. Banking Sector and Network Industries

The network industry refers to sectors involved in the production, distribution and management of networking technologies. This includes telecommunications, internet service providers (ISPs), network hardware manufacturers (such as routers, switches, etc.) and software companies that create and maintain network management and cyber security solutions.

New technologies of network industries such as advanced computer operating systems, local and wide area networks (LAN, WAN), and the internet, are becoming significant strategic areas for banking and financial institutions. The banking industry and the network industry, while distinct in their core operations and services, share a symbiotic relationship, especially in the contemporary digital era. The intersection of the banking and network industries is most evident in the digitization of financial services. Following are some of the aspects that show how banking industry and network industry are interconnected:

- a. **Digital Banking:** The shift of traditional banking services to online banking platforms relies on robust network infrastructures to offer 24×7 access to banking services, from mobile banking apps to online transaction processing. A strong network support system is very essential to provide continuous and faster services.
- b. **Cyber security:** With the increase in online banking operations, the importance of cyber security has been escalating. Banks often collaborate with network industry specialists to protect sensitive financial data against cyber threats. It is very essential in order to retain and enhance customers' faith on them.
- c. **Fintech Innovation:** In modern banking age, the fintech startups has been growing. The rise of fintech startups, leveraging networking technologies to offer innovative financial services such as crypto currency services, blockchains, peer-to-peer payments, etc. represents a direct blend of banking and network expertise.
- d. **Compliance and Regulation:** Banking and network industry, both are heavily regulated, and they must navigate a complex web of regulations aimed at ensuring data protection, privacy, and financial stability. This often requires integrated efforts to meet compliance standards like GDPR for data protection and Basel III for banking.
- e. **Operational Efficiency:** Banks utilize advanced network technologies, including cloud computing and big data analytics, to improve operational efficiency, enhance customer experience, and make informed risk management decisions.

Although the banking industry and network industry operate with distinct objectives, their co-existence and co-evolution are integral to the digital age, driving innovation, ensuring security, and enhancing service delivery in both sectors.

4. Technology Trends in Banking Industry

Key technology trends that are reshaping banking industry include:

- a. **AI and ML:** AIML [Artificial Intelligence and Machine Learning] has the potential to revolutionize the entire banking industry by enhancing decision-making processes, risk assessment and detecting fraud. Use of AIML has significantly reduced the operational costs as it can automate complex processes easily. Hence there is significant improvement in accuracy. It is expected that the global market for **generative AI** in banking and finance will grow at a compound annual

growth rate (CAGR) of 33% from 2024 to 2034, from a value of around \$1,260.16 million in 2024 to \$21,824.46 million by 2034 (<https://www.avenga.com/magazine/banking-technology-trends/>).

- b. Blockchain Technology:** Development of blockchain technology has streamlined the cross-border payments which was once a cumbersome and expensive process. Blockchain technology has revolutionized the way banks handle present day transactions. It helps in reducing fraud significantly, enhancing transparency and improving compliance processes. Furthermore, there is increasing operational efficiency as it eliminates intermediaries in payment processing resulting cheaper and faster cross-border transactions.
- c. Cloud Computing:** Cloud computing has emerged as one of the game changing technology developments for the banking sector. It has provided banks with cost-effective computing resources as there is no need for extensive in-house infrastructure. Cloud computing facilitates banks to enhance innovation, collaboration, and data storage across different departments and locations. As it offers flexible resources, there is economies of scale in banking services.
- d. Robotic Process Automation (RPA):** RPA technology is widely adopted by banks now a days to automate rule-based and repetitive tasks. Use of this technology helps banks to improve operational efficiency by automating data entry, account reconciliation, and customer onboarding as it reduces the need for manual intervention.

5. Role of IT in Modern Banking

- a. Enhancing operational efficiency:** Banks offer personalized services and resolve customer queries quickly by AI-based Chabot and CRM systems. Mobile apps are user friendly and banking has become more accessible now enhancing operational efficiency of the banking sector. Moreover, there has been significant reduction of human error and operational costs. Digital wallets, contactless payments, robo-advisers, etc. are sophisticated services provided by banks by using IT to enhance operational efficiency and competitiveness of the banks.
- b. Supporting real-time transaction processing:** IT has enabled the real time transaction processing as customers can do fund transfers through various services like IMPS, UPI, NEFT, RTGS, etc. Business agility as well as customer satisfaction both are enhanced.
- c. Providing 24/7 Banking Services:** The use of IT has enabled customers to access their accounts, do recharge, transfer funds, pay any kind of bills anytime, anywhere throughout the day. It has enhanced the convenience of the customers. Moreover, banking availability is enhanced by the presence of ATMs and self-service kiosks.
- d. Enabling digital onboarding and KYC:** Account opening has become seamless and fast as the banking sector do digital customer onboarding through e-KYC, document uploads, video verification, etc.
- e. Improving data analytics and decision-making:** Use of IT in banking sector has helped banks to store, analyze and process huge volume of customers' data. There is benefit in terms of fraud detection and risk management.

6. Challenges in Adopting IT in the Banking Sector

Although development in information technology has tremendous positive influence on the efficiency enhancement of the banking sector, there are various challenges while adopting them in the banking sector. Prominent among them are discussed below:

- a. **Cyber security Threats:** Ranging from data breaches and insider threats to malware and phishing, cyber security threats pose significant risks to individuals and organizations. As a result of increasing reliance on IT sector, there has been a growing threat of cyber-attacks on the banking sector. Cyber-attacks can cause significant damage to the financial institution, leading to financial losses as well as reputational damage. **Statista's Market Insights** have anticipated that the global cost of cybercrime is escalating from \$9.22 trillion in 2024 to a staggering \$13.82 trillion by 2028. Antivirus Software, Strong Passwords, Firewalls, Data Encryption, Network Security Measures, etc. are some of the important solutions for such problem. In order to protect sensitive customer data and secure financial transactions, banks must invest heavily in cyber security measures.
- b. **Regulatory and Compliance Challenges:** As financial sector is one of the most regulated industries worldwide, banking sector must ensure their IT systems comply with a range of regulations both at local and international level concerning financial transactions, data protection, and customer privacy. As the banking industry is subject to strict as well as ever-changing regulations, it becomes difficult for banks to keep up with the latest requirements. It may be a complex as well as time-consuming process for the banks while adapting to such regulations and ensuring that IT systems are compliant.
- c. **Huge Initial Investment:** For implementing advanced technologies of IT sector in the banks in order to get significant long-term benefits, the banking sector requires huge initial investment which may be very high for some banks. Software development, infrastructure upgrades, employee training, cyber security, etc. are some of the sectors where banks need heavy initial investment. For example, to develop a mobile app a bank needs \$5,000 to \$300,000 or more depending on the features provided by the app.
- d. **Technological Obsolescence:** Technology has been changing at a rapid pace over the years. To cope up with such technological change, banks must constantly update their systems to avoid becoming obsolete. It may not be easy for the banks to face such situation and maintain up-to-date technology.

Apart from above mentioned challenges, there are challenges of data privacy, upgrading legacy system, competition, higher customer expectation, as well as the need for continuous innovation.

7. Findings and Conclusion with Policy Implications

There is no doubt that there has been massive transformation in the banking sector in recent decades because of the advancement in information technology. Evolution of information technology has become a cornerstone of the banking sector as there has been unbelievable enhancement in the banking operations

- improved operational efficiency, enhanced customer experiences, and strengthened security measures. Information technology has profoundly impacted the entire banking system. There have been significant innovations right from mobile banking to digital wallets, Robotic Process Automation (RPA) to AI powered financial products.

However, despite such benefits, the adoption of IT in banking is not without its challenges. Banks must overcome the problems of cyber security risks, regulatory compliance, integration with legacy systems, the high cost of implementation, etc. in order to fully harness the potential of IT. In order to meet the growing demands of customers, banking sector must adapt to stay competitive. Banking sector must follow the path of information technology as it will remain a key enabler of efficiency, security and customer satisfaction in the banking industry. Banks that can embrace such technological innovations without compromising its growth will succeed in future.

Thus, banks need to invest more in cyber security. There must be various training programs for employees as well as customers. Digital infrastructure expansion in rural areas is a must for the better penetration of banking services.

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