

Banking Library Progress: A Study on application of AI and big data analysis for leveraging customer satisfaction in Indian Banking

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Abstract

Talk about the Digital Banking (DB) transition has taken centre stage in industry discussions these days. The way individuals conduct transactions and do business has been altered by digital disruption. Nevertheless, the bankers encountered several issues during the DB changeover process. The primary problems with database transformation are that, instead of emphasising the customer satisfaction, many banks continue to believe that digital transformation is only about processes and technologies.

These days, Big Data Analytics (BDA) and Artificial Intelligence (AI) have emerged and become significant components of the new banking period. The current BDA and AI trends allow banks to be more customer-centric based on data generated. Customisation services are emerging as a key tactic for maximising current customer interaction and drawing in new business from prospective clients.

This study investigates the use of BDA and AI in banking to improve customer satisfaction. Data for this study were gathered through interviews and a review of the literature. To get insight into the use of AI and BDA in India, we spoke with a number of people in the banking sector. The study presents the best practices for using AI and BDA in banking form in India.

The study's recommendations for digital innovation in AI and BDA, as well as the suggested enterprise architecture, allow financial organisations to capitalise on consumer satisfaction.

Key-words:- Digital Banking Transformation , Artificial Intelligence , Big Data Analytics And Customer satisfaction

Introduction

The Internet has become a tool that not only changes how consumers make judgements about what to buy, but also how businesses operate these days. The daily lives of common customers have changed within the previous 20 years. The emergence of portable computing devices like tablets and smartphones, together with technological advancements like GPS, has a big influence on consumer behaviour. Consumers engaged and bonded with their surroundings and friends more. In addition, their use of a wide range of service providers was entirely different from that in the early 1990s.

The shift in consumer behaviour gave rise to digital disruption, a phenomena that modifies the industrial environment and its associated activities. The competitive market of today is reflected in the unstable business climate brought about by global economic integration. The shortened life cycle of products and services is a problem to many business sectors, including banking. The focus on banks to constantly develop by changing their competitive dynamics and strategic environment is brought about by the rapid rise of information technology and electronic communication. In line with the worldwide trend, Indian's banking industry adapts to these changing consumer habits by gradually providing advanced Digital Banking (DB) products and services. The following is how Massachusetts Institute of Technology describes the future of Digital Bank in their document "Digital Banking Manifesto: The End of Banks": The unsatisfactory situation with current banks creates a special chance to start a digital bank from the ground up. Such a bank will use cutting edge technology, such as deep learning, big data, artificial intelligence, distributed ledger systems, and cryptography, to perform its objective. The bank intends to extensively utilise artificial intelligence and big data analytics to enhance client experience, automate the issuing of personal and SME loans, and optimise risk management. The Indian consumer demographics for 2018 were displayed in Figure 1. The development of the Internet has had a profound effect on consumer

behaviour across a wide range of businesses, including India's banking industry. The Central Bureau of Statistics (BPS) said that in 2018, 57,33% of Indians had internet access, and 50,4% of them used it daily. The increase in smartphone users is another trend affecting the Indian consumer population. According to a "We are social" survey, 50 million individuals in India own smartphones. Because of their unique client base, Indian banks are compelled to develop a smartphone-specific mobile strategy. Fig.

When several national banks began offering Internet and mobile banking in the early 2000s, the database revolution in India got underway. The makeup of financial transactions in India has evolved throughout the modern era. The way that transactions are conducted has changed from using branches to using digital banking platforms.

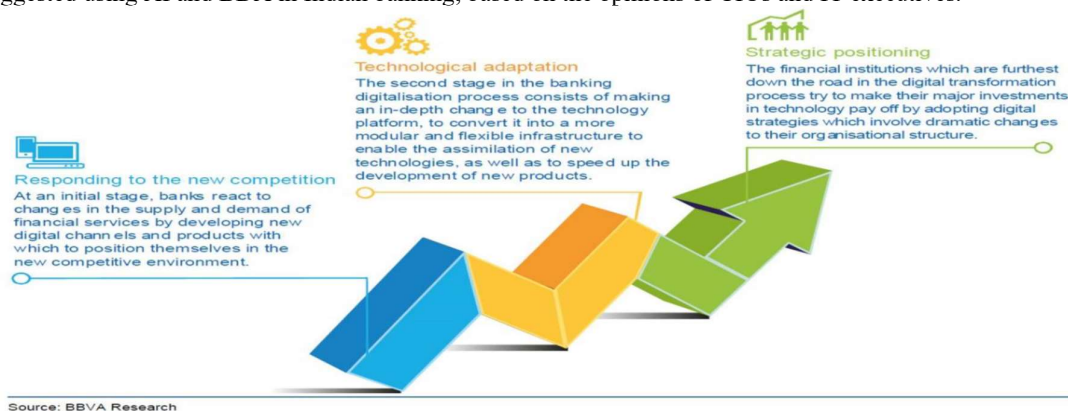
According to a PwC study report from 2018, clients prefer to complete purchases over other channels, such as the internet and mobile devices. Compared to 2015, the transactional environment is no longer dominated by conventional branches. For several banks, the value of transactions made through the branch remains high despite a decline in transaction volume. It should come as no surprise that Indian bank customers will become more of a cashless society in the near future due to the rapid advancement of technology.

The Indian conventional banks that are committing to digital banking are changing in response to the new competition, technical adaption, and strategic positioning. This change enables them to position themselves within the new ecosystem. The digital banking transition is contingent upon the initial conditions of each institution, yet it is apparent that many phases exist based on the bank's maturity level. The process of transforming digital banking is depicted in Figure 2. Bank CIOs in India think that big data and artificial intelligence (AI) will improve banking operations and allow for the creation of more individualised banking goods and services that will appeal to consumers. A key component of the digital banking transformation plan is the use of AI and BDA to gain a competitive advantage.

This paper examines how AI and BDA may be used in banking to improve customer experience, using the banking industry in India as the empirical study case.

The research contributions of the paper in the academic and practice world are as follows:

- supplied relevant papers on the worldwide banking industry's use of BDA and AI.
- presented a study on the use of BDA and AI in the Indian banking industry.
- investigated managers' opinions about how the use of BDA and AI will affect the customer experience.
- examined the difficulties that may arise when using BDA and AI in the banking industry.
- suggested digital innovation and suggested enterprise system design that let financial organisations take advantage of client interactions.
- suggested using AI and BDA in Indian banking, based on the opinions of CIOs and IT executives.



The definition, idea, and some of the current work on applying AI and BDA in the banking industry are briefly discussed in this section.

An explanation of artificial intelligence and its idea AI will have an influence on and be useful to people and companies both now and in the future. Consumer lives are being significantly impacted by AI. Artificial intelligence (AI) is defined by eminent consulting firm Accenture as:

"a computer system with cognitive, motor, sensory, and learning abilities. Put another way, a system that is able to sense its surroundings, evaluate and comprehend the data it gets, act in response to that knowledge, and enhance its own performance by drawing lessons from the past. Additionally, technology may greatly increase the capabilities of both humans and robots by allowing them to interact more naturally with one another, with people, and with data.

The banking industry is currently entering the intelligence era. Artificial intelligence allows banking businesses to radically reimagine how they operate, create innovative products and services, and design intricate client journeys that become customer experiences. The techno bankers are trying to figure out how to generate value in their organisations by integrating AI technology in an efficient manner. Not every technology is a worthwhile investment. The artificial intelligence technologies of today are depicted in Figure 3 and include: Natural language processing (1), Deep learning (2), computer vision (3), intelligence automation (4), and natural language processing (5). Neural Networks (6), Video Analytics (7), Machine Learning (8).

In addition to identifying technologies that can be utilised to help the company, such as techniques and algorithms that can be employed in AI and BDA to solve business challenges, the bank institution should also outline its plan for developing new products and services.

Definition and concept of Big Data Analytics

Without data, AI is limited in its capabilities; financial institutions already deal with an abundance of data. With the help of BDA, AI is able to choose, evaluate, and act upon facts, as well as provide recommendations for making defensible judgements. In recent years, big data analytics has gained popularity. The following is a definition of big data:

"Big data is a term that describes large volumes of high velocity, complex, and variable data that require advanced techniques and technologies to enable the capture, storage, distribution, management, and analysis of the information," according to the TechAmerica Foundation. Big data analytics is defined as "the application of advanced analytics techniques against very large, diverse data sets that include structured, semistructured, and unstructured data, from different sources and in different sizes from terabytes to zettabytes," by IBM, a well-known IT company.

Financial institutions may be able to take advantage of additional business prospects and obtain a more comprehensive understanding of their clients and industry thanks to big data. The banking industry may benefit from big data analytics in several ways, including precise consumer insights, riskanalysis as well as fraud identification. These strategies may result in more sophisticated transactions, which may help businesses control risks and offer more individualised services, giving them a competitive edge.[12] Banking institutions will gain from the ability to use both AI and BDA in numerous ways, including the provision of extremely important information that helps organisations create more intelligent systems. This skill will help businesses obtain a significant competitive edge.

Customer Experience Innovations using Digital Banking

In the banking industry as well as other service industries, customer loyalty is seen as essential to survival and success. client happiness and perceptions of service quality have an impact on client loyalty in retail banking.

In the modern banking period, bank institutions must comprehend customer experience and assess the client journey throughout time. This strategy will raise customer happiness and service quality. The growing emphasis on the customer experience stems from the fact that consumers today engage with businesses through a multitude of touchpoints across various media and channels, creating increasingly complicated customer journeys.

Digital banking innovation can be implemented for leveraging customer experience. The main roles of AI and BDA technologies in the development of digital banking innovations are as follows:

- Banking firms may now examine the whole client journey and their experiences across all database channels thanks to technology.
- Technologies may be utilised to examine underperforming database channels and identify use patterns that lead to sales. With this information, banks may devise a plan to maximise every database channel. The tools.

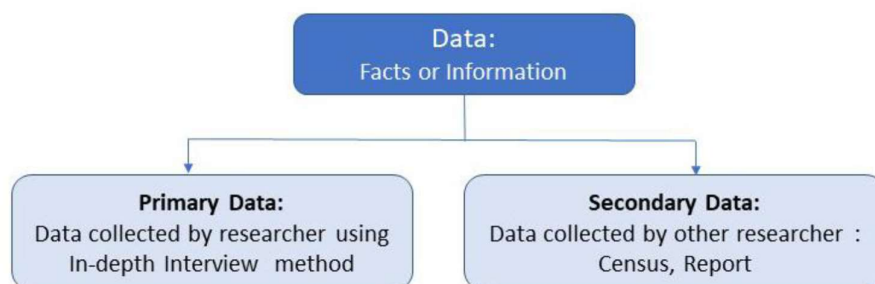
RESEARCH METHODS

Phases I, II, III, IV, and V of the research process included problem description, literature evaluation, data collecting, and qualitative data analytics, as well as outcome and conclusion. Figure 4 outlines the research methodology used in this study. The tools.



Data collection:-

We used primary and secondary data analysis to inform our qualitative research. Figure 4 displays the specific data gathering methods employed in the study.



Primary information gathered through in-depth interviews for study. Eight bank institutions' CIOs and Heads of IT are taking part in the study. Because in-depth interviews allow for a detailed and in-depth exploration of topics, they were chosen as the primary technique of data collecting.

To ensure validity, two participants from different universities examined the first draft of the interview script. Before the major interviews, several of the participants' questions were unclear, so the pilot feedback helped to clarify them.

Table 1. showed questions asked in the interview

Q1a	Have your institution implemented Artificial Intelligence (AI)?
Q1b	If you have implemented AI, what features have been developed?
Q2a	Have your banking institution implemented Big Data Analytics?
Q2b	If you have implemented Big Data Analytics, what features have been developed?
Q3	In your opinion, what challenges will arise when your institutions implement AI and Big data analytics?
Q4	In your opinion, are the implementation of AI and Big Data Analytics can leverage customer experience? What potential application will be prioritized to implement to enhance customer experience. Please describe
Q5	Could you please describe the IT architecture of your Digital Banking that includes the implementation of AI and Big Data Analytics?

We also gather secondary data to bolster the conclusions drawn from our core data. Data gathered by other academics or organisations are referred to as secondary data. To address study problems, we examined secondary data, which included the applications of artificial intelligence (AI) and big data analytics in international banking. The information that Qualitative Data Analysis (QDA) examined.

RESULT & DISCUSSION**Utilising Big Data Analytics and Artificial Intelligence in International Banking**

The development of AI has a big influence on consumers' lives both now and in the future. AI-powered technology is becoming more and more prevalent in daily life. AI is also transforming a commercial sector that affects almost all customers and enterprises, including the banking industry. Table 2 showed how artificial intelligence was being used in several international banks.

Table: 2 Scope of Selected Banks

Bank	Bank Functional Area
Bank of America	Chatbot & AI-enabled tool that provides financial guidance for the bank's clients through voice and text messages
JPMorgan Chase	Mobile apps (finn) for creating customer interactions easier and attracting new clients, especially millennials
Wells Fargo	Mobile apps (greenhouse) for creating customer interactions easier and attracting new clients, especially millennials
City Bank	Fraud Detection
JPMorgan	Process Automation

Table:3 Implementation of Big Data Analytics in many global banks

Bank	Objective
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HDFC Bank OCBC Bank Bank of China	Provide more relevant content. the right content at the right channel.
GE Capitals	Recognize multi-channel behaviors that lead to sales. GE Capital has optimized its customer's experience across online and offline channels, increasing both customer satisfaction and marketing efficiency.
HSBC	Guide customers to low cost channels
PKO Bank Polski	Measure marketing effectiveness across channels using a multi-channel campaign management platform
Laurentian Bank of Canada	Perform marketing campaigns across its various channels

The Application of Artificial Intelligence and Big Data Analytics in India

Big Data and AI applications are still in their infancy in India. We observed and spoke with influential individuals in the Indian banking industry, and we discovered that several banks have been using artificial intelligence (AI) since 2018 to personalise client care using chatbots. Natural language processing was used in the development of the chatbot (NLP).

Fraud detection is one of the other AI functions that Mandiri and CIMB Niaga have developed. AI has also been included into area process automation by CIMB Niaga.

Table 4. Implementation of Artificial Intelligence in India

Features	Bank
Chatbot	HDFC BANK
Fraud Detection	ICICI BANK
CRM	INDIAN BANK

Table 5. Implementation of Big Data Analytics in India

Features	Bank
Fraud detection and prevention	INDIAN BANK
Customer segmentation	ICICI BANK
Risk management	HDFC BANK
Past data analytics and future prediction	HDFC BANK
Provide more relevant content, the right content at the right channel	ICICI BANK
Recognize multi-channels behaviors that lead the sales	INDIAN BANK
Guide customers to low cost channels	
Measure marketing effectiveness across channels campaign management platforms	

Challenges & Opportunities

Bank institutions in India are still in the early stages of using BDA and AI. To integrate the technologies into everyday services, they are still in the "explore and experiment" stage. The banks are still researching the benefits and problems presented by the development of BDA and AI. They are now investigating applications that meet the needs of their Indian clientele. The management of the bank should guarantee that the bank will profit from the adoption of this most recent technology and that the investment in technology will undoubtedly pay off.

The following are the implementation issues of AI and Big Data in the Indian banking sector, based on in-depth interviews and qualitative data analytics:

- Infrastructure limitation

Modern banking infrastructure is a must for financial firms.

- For banks to benefit from the use of AI and BDA technologies, data quality must be guaranteed. Banks risk undermining the same user experience they are attempting to improve by using inaccurate data.
- antiquated technology with poor integration potential
- Limitations imposed by regulations
- Teams and business processes that are rigid
- Absence of a competent team
- Adopting BDA and AI may come at a great cost.

According to in-depth interviews, CIOs and IT executives in the banking industry think that leveraging customer experience via the application of AI and Big Data Analytics may be achieved. The following are possible uses of big data and AI that will be given priority in order to improve customer experience:

- a) User communication and customisation. The clients anticipated more individualised care. They want their banking partner to comprehend their preferences and financial objectives, and to handle their money safely. It will set itself apart from fintech startups as well as conventional banks with this individualised approach.
- b) Optimisation of the use of products and services. Banking companies may provide their clients an alluring value proposition by optimising their products and services.
- c) Relationship Management with Customers AI and big data may be used to understand the expectations, patterns, and behaviour of customers. Additionally, the Banks must execute cross
- d) loans with prior approval provided through channels Preapproved loan options are available through the following channels: chatbots and mobile apps
- e) Fraud detection to find unusual transaction activity.
- f) quicker service query answer based on service usage trend.

Proposed Enterprise Architecture

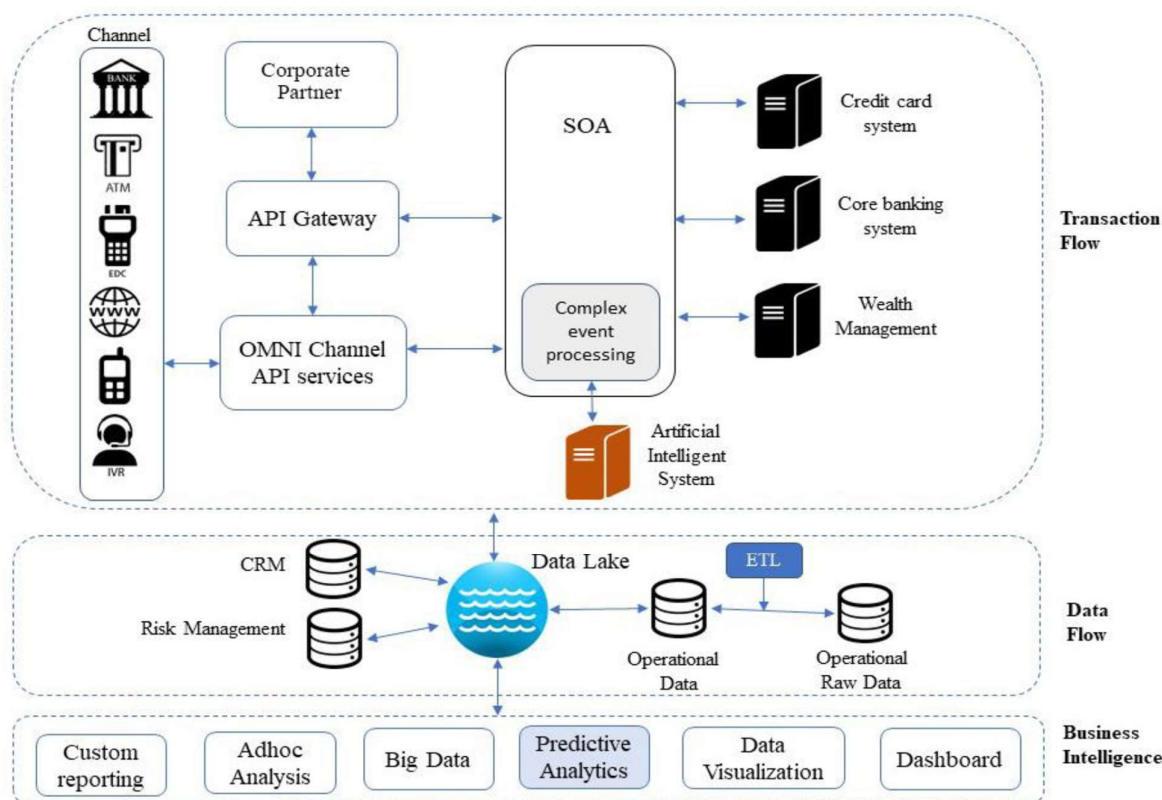
Digital transformation is crucial to the experience of the client. All banks face the challenge of becoming a Digital Bank that extends beyond the client experience as customers want new services centred around 21st-century technologies promoting and cross-promoting The requirement for an enterprise database architecture is multifaceted.

- Bank institutions must have plans in place for developing a standard enterprise system architecture that will allow two technologies—artificial intelligence (AI) and big data analytics (BDA)—to function effectively in systems and improve the efficiency of banking operations.
- The most difficult task of all is developing the bank's core systems to become a totally digital bank.

As seen in Fig. 6, we suggested a Digital Banking Enterprise Architecture that can enhance the client experience.

CONCLUSION

- The banking industry is presently implementing AI and BDA in a number of nations, including India. The banking industry in India has to make better use of technology to enhance its offerings in terms of goods, services, and operations. Banks must update their conventional technical strategy and begin focusing on the digital banking revolution in order to reap the benefits of technology.
- The way that each bank reacts to the use of technology will rely on a number of factors, including: (i) the bank's present standing; (ii) its future goals; (iii) client focus; (iv) organisational capabilities; (v) brand promise; (vi) the regulatory environment; and (vii) capital restrictions. Banks ought to think about the features and technologies they want to use. Each bank must create a plan to overcome these obstacles and seize the chance.
- The enterprise architecture for digital banks that this study provides, which enables AI and BDA technologies, is a contribution to the literature on information technology. The study's findings give CIOs and IT executives insight into how AI and BDA are used in the banking industry to improve customer experience. The findings highlight a number of aspects that can be put into practice and point out issues that should be taken into account in order to develop a more complete and all-encompassing understanding of the use of BDA and AI both locally and globally in the Indian banking sector.
- It will be helpful for bankers to understand the customer's perspective if future research agenda includes more banks as participants and focuses on the customer experience. Lastly, bankers may match the Digital Bank strategy with client expectations.



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