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**Extended Abstract**

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**Artificial Intelligence and the Banking Sector**

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**Abstract**

Adoption of emerging but disruptive Artificial Intelligence (AI) technologies have created opportunities yet posed challenges for the traditional banking industry. Following a framework and case study methodology, this paper discusses how AI technologies when integrated into financial services generate competitive advantage for Indian banks. Based on the secondary published sources, we discuss opportunities created through disintermediation, banking process efficiencies and reduction in transaction costs. Next, we examine literature to discuss selected areas and services like measurement of credit risk, detection of fraud, digitalization of financial services, mobile banking, profiling of customers, and financial inclusion where AI intelligence has been

integrated. Following this, we study examples of adoption of AI applications by selected Indian banks to showcase ethical and general hindrances faced by them. Although Indian banks are increasingly introducing using AI-enabled solutions, shreds of evidence indicate that their adoption of AI techniques as compared to global counterparts, is sluggish of mandated transparency challenging their privacy framework. We conclude to recommend that a standardized and updated regulatory framework on technologies would accelerate implementation of AI in Indian banks.

Keywords: AI (Artificial Intelligence), Banking Industry, India

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## **Artificial Intelligence and the Banking Sector**

### **1. Introduction**

Artificial intelligence (AI) technology has showcased its growing impacts in various facets of the economy. Applications and usage of artificial intelligence are compounding on a daily basis, fulfilling complex and sophisticated requirements. While AI complements agricultural machines and activities like crop and soil monitoring and livestock monitoring in the agricultural sector (Alreshidi, 2019), services like mobile banking, chatbots, and voice assistants are implemented in banking sector (Doherty & Curran, 2019; Owusu et al., 2021). Currently India's position in implementing AI is third after USA and China (ETCIO, 2018) and ranked sixth according to Global vibrancy ranking of 2020 (Saxena, 2021). However, India recorded the highest rate of adoption of different AI powered technologies in 2020 (PWC, 2020) accompanied by AI's potential to add worth approximately \$1trillion in the Indian economy by the year 2035 (Menon et al., 2017). Current mobile phone users (1.18 billion) and internet users (795 million) have a significantly persuading role in enabling the increased adoption of AI solutions (TRAI, 2020).

The digitalization stage in Indian banks has touched new heights during the demonetization period. While the number of ATMs stood stagnant and unchanged at 0.22 million, owing to a high diffusion rate during the demonetization, point of sale (PoS) swiping has reached over 3.7 million (Dastur, 2019). This trend shows that India is witnessing a dramatic surge and establishing arguably as a growing market in terms of digitalization and applications which use AI solutions.

Indian banks have now initialized increasingly adopting different AI applications particularly chatbots, virtual assistants, Robo advisors, mobile wallets and post-payment banks, etc. According to a study, the Indian economy is likely to add worth approximately \$1trillion by the year 2035 only from the AI adoption in the banking sector. (Lakshminarayana. N & R, 2019). In light of the above motivation, this paper tries to shed lights on the opportunities and challenges of Indian banks when adopting AI technologies.

## **2. Research method**

This study has followed a trial and error keyword approach to be better informed about the opportunities and caselets of AI applications in India. To accomplish the goal of addressing the research questions, we have persuaded a combined approach including conceptual and documentary analysis and case study method (Eisenhardt, 1989). Conceptual and documentary analysis involve screening research articles, reports and other authoritative documents. Different databases like web of science, scopus and EBSCO were utilized to find matches for the keywords like ‘AI and Banking’, ‘Opportunities and challenges of AI’, ‘Machine learning and Banking’ and ‘AI in Indian banks’. Subsequently, this study has deployed case study method to understand the scenario of selected Indian banks in the application of AI technologies. This method has been applied by different researchers to study a phenomenon in detail (Khalfan et al., 2006; Olasina, 2015; Tan et al., 2010). Caselets included are HDFC, SBI, ICICI, Bank of Baroda and Axis Bank.

## **3. AI technology application in the banking sector**

**Detecting fraud:** AI technology can identify real-time patterns by assessing different indicators from the observed data and detect suspicious behavior and recommend ways to mitigate risk. Machine learning techniques have been extensively used by banks to detect various credit card frauds. Credit card payments are protected with a monitoring system encompassing a workflow engine that is trained on past data to detect possible frauds (Van Liebergen, 2017). With the adoption of blockchain technology, banks can avoid reconciliation costs and losses arising from documentary frauds as the technology is based on sharing data between parties and providing permission while making transactions (IDRBT, 2017). However, the influx of e-commerce websites has created loopholes for the third party to commit credit card fraud in the traditional system, which can be overcome with the incorporation of blockchain technology cryptographic proof replacing third parties for an online transaction (Crosby et al., 2016).

**Digitalization of financial services:** There are several risks that arise due to the existence of a relationship with third parties, unknown and uncertain costs from the inexperience, and vulnerability of customers in the existing digital finance which can be overcome with the adoption of AI technologies (Bank, 2020). AI enables banks and non-banking financial institutions to extend enhanced products and services like online deposit and withdrawal, transferring money, payment for goods and services, and accessing credit and savings (Van Hove & Dubus, 2019). Chatbots play a significant role while accessing financial services as it is extensively used to interact online with customers without the involvement of working staffs (Saon et al., 2019). Chatbots can automatically deliver conversations with customers incorporating huge datasets and can be accessed through platforms like banking mobile apps, social media, and websites to avail the support and guidance for different financial services like bank transactions, customer services, credit assessment or projection, and financial advice (Caron, 2019).

**AI-enabled Mobile Banking:** As we witness, banks do not function round the clock on any day, however banking services need to be accessed at the requirement, at any time. This can be fulfilled through the adoption of mobile banking by the customers (Trabelsi-Zoghalmi et al., 2020). However, mobile banking services might not be able to provide the complex services required by clients, which paves the way for AI-enabled mobile banking to fulfill the needs of customized and personalized banking services (Suhartanto et al., 2021). This mobile banking enhances the ability of customers related to financial planning as it diagnoses the financial attitude and behavior of customers over time and recommends personalized services as to how efficiently they can deploy their money and wealth (Lui & Lamb, 2018; Riikinen et al., 2018). AI incorporated mobile banking to tighten the aspects related to security without the expense of quality and experience of services (Payne et al., 2018).

**Profiling customer's behavior:** Customer profiling is done to recognize the identity of customers which is determined based on the traits and attributes (Dawood et al., 2019) capitalizing on data mining, which is the extraction of relevant, implicit, and previously not known or deriving similar pattern from a large data set (Han et al., 2011). Banks can resolve many challenges like customer retention, detecting frauds (Mhlanga, 2020), credit risk analysis (Bahrammirzaee, 2010), and classification of customers with the help of customer profiling. Machine learning can be deployed to obtain insights and patterns from a large dataset (Wu et al., 2008), which additionally aid to strengthen the connection with current customers, predicting the future customer behavior by

looking at the pattern and similarities based on which future strategy and planning on credit products can be devised (Dawood et al., 2019). This has drastically changed the approach of banks giving higher preference to customer experience and personalization of products and services.

#### 4. Cases of AI products and services in the banking sector in India

HDFC bank's chatbot EVA collect information from different sources in less than 0.4 seconds and offer customers instantaneous responses on their queries related to products and services with 85 percent accuracy and it learns and grows smarter as the customer interaction increases (Baruah, 2020). The bank has recently introduced Intelligent Robotics Assistant (IRA) to direct customers in a branch to the right counter which also helps the bank to understand and serve customers in a better way as they expect improved services from time to time (Salunkhe, 2019). SBI, apart from its personal assistant chatbot SIA, has applied AI techniques into various banking services, which include 'Shikhar Project', Pre-approved personal loan, Personal gold loan, Agri gold loan, and Recommendation engines (IDRBT, 2020). ICICI is the first bank to introduce robotic software intended to automate the process of a bank in India. In addition to the automation in more than 200 banking processes, the Bank has also developed "Zero Credit Touch" (ZCT) strategies by which credit facilities are provided without the requirement of credit intervention and additional information from customers with the help of state of the art methodologies (IDRBT, 2020). BoB integrated AI application in the field of trade documents, developed an engine, which can learn the mandated rules and regulations and examine the trade document to unscramble large clauses and discrepancies, enabling the bank to be accurate and reduce the working time (Bhushan, 2018). BoB has adopted AI techniques to support and prioritize the efforts of the collection department and for which multiple predictive collection models are developed to pinpoint risky cases (IDRBT, 2020). Axis Bank has developed an AI & NLP enabled app known as 'Conversational Banking' to enrich the customer experience by facilitating all kinds of transactions including nonfinancial, giving timely responses to FAQs, and connect customers with the bank for loans and other related products. The bank has also developed an interactive voice response (IVR) system, named AXAA to recognize the true nature of customer's queries effectively without any involvement of human interference, with an additional feature of handling multiple languages like English, Hindi and Hinglish (Kumar, 2021).

## **5. Challenges in the AI application**

AI techniques rely heavily on a large amount of data sets which is further trained to process for algorithms. More often this information is leaked and tracked through unauthorized access which results in questioning the privacy of users (Kochhar et al., 2019). During the year 2016 to 2018, India is the second-highest victim of cyber-attacks, Data Security Council of India reports (IDRBT, 2020). It is very crucial to understand the legal and ethical aspects coherently and handle them effectively to win the trust of customers for the respective AI technologies. (Königstorfer & Thalmann, 2020). A data needs to represent the population it addresses as the ability of AI techniques to predict is majorly dependent on the extent of quality the data possess. The documentation process of the information system does contain merely the algorithm and interfaces rather than the trained dataset, which solely decides the behavior of the algorithm (Butler & O'Brien, 2018). Training and deriving algorithm based on biased data will lead banks to commit similar mistakes when decisions were taken by humans previously and this will automatically result in undetected discrimination (Barocas & Selbst, 2016). As automation increases in the operational and lower-level employment which include repetitive tasks, a number of people who holds such roles have lost their job (Dwivedi et al., 2021). World Bank reported that India may lose 69 percent of jobs due to the automation process enabled by AI intelligence (WorldBank, 2016). Additionally, automation also challenges white-collar and cognitive jobs which require creative skill sets (Brynjolfsson, 2014; Vieira & Sehgal, 2017).

## **6. Conclusion**

Indian banks are spearheading to a parallel shift in terms of AI technologies as a result of globalization and emerging new technologies. Increasing demand for online banking and financial information offerings created opportunities for AI implementation in India's retail banking. However, Indian banks are in nascent stage as compared to global counterparts in the implementation of AI technologies. AI applications in most of the Indian banks are confined to mobile payment services, personal assistants including chatbots and virtual assistance, and automation of process. There is an essential and fundamental need for a robust data protection and privacy policy. RBI has to take a commanding role in framing regulations on emerging technologies, data privacy and ensuring the business interests of the banks (Balakrishna, 2020).

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