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Commerce

USE OF ARTIFICIAL INTELLIGENCE AND BLOCKCHAIN IN BANKING **SECTOR:**

A STUDY OF SCHEDULED COMMERCIAL BANKS IN INDIA

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Artificial Intelligence (AI) is rapidly transforming the global financial services industry. Artificial Intelligence studying ABSTRACT the thought processes of human beings and it deals with representing those processes via machines (like computers, robots, etc.), on the other side The Block-chain Technology is a technology in which digital information is stored in a public shared data-base. This technology got famous mainly after introducing the first cryptocurrency which is the Bitcoin. The study was conducted to know the importance of using Artificial Intelligence and Block Chain especially in the Banks to reduce the dependency on the human element also to understand what can be the possible implications of the use of artificial intelligence and Block Chain.

KEYWORDS: Artificial Intelligence; Blockchain; Fintech; Banking Technology; Intelligence; Customer Service.

"What we're seeing is something unprecedented, which is the arrival of artificial intelligence, which has a big impact ... it creates tremendous uncertainty and impacts different people differently

... and some people could be left out."

-Robert Shiller, 2018 Davos Forum



INTRODUCTION

The term financial technologies or 'Fintech' is used to describe a variety of innovative business models and emerging technologies that have the potential to transform the financial services industry (OICO-IOSCO, 2017) [1]. In this context we look at two technologies: artificial intelligence and blockchain or distributed ledger technology to promote the financial services in India.

The term "Artificial Intelligence" was coined in 1956 by John McCarthy. The Oxford English Dictionary defines AI as "The theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making and translation between languages." [2] and FSB (2017) defines AI as, "The theory and development of computer systems able to perform tasks that have traditionally required human intelligence."[3].

Almost a decade ago Satoshi Nakamoto, the unknown person/group behind Bitcoin, described how the blockchain technology, adistributed peer-to-peer linked-structure, could be used to solve the problem of maintaining the order of transactions and to avoid the double-spending problem (Nakamoto, 2008). [4].

Blockchain, "is a particular type of data structure used in some distributed ledgers which stores and transmits data in packages called 'blocks' that are connected to each other in a digital 'chain'. Blockchains employ cryptographic and algorithmic methods to record and synchronize data across a network in an immutable manner" (World Bank, 2017) [5] and Distributed Ledger Technology (DLT) is also known as blockchain technology refers to a protocol that allows peer-to-peer transfer of assets over the internet. DLT is a novel way of sharing data across multiple data stores (or ledgers) (World Bank,2017)[5].

A **chatbot** is a technology service powered by algorithms that interacts with a customer in a natural (human-like) manner, either by voice or text.

Robotic Process Automation (RPA) uses a number of techniques to mimic routine human activities automatically, repeatedly, faster, and more accurately.

Review Of Literature:

Kaplan (2016), [6]. describes AI as, "The essence of AI, indeed the essence of intelligence, is the ability to make appropriate generalizations in a timely fashion based on limited data. The broader the domain of application, the quicker the conclusions are drawn with minimal information, the more intelligent the behavior."

Malinova and Park (2016), [7]. examine e.g. how the securities trading and market design can be reshaped and enhanced by applying the blockchain technology.

Pinna and Ruttenberg (2016), [8]. claim in their study that smart contracts, which are one of the most ambitious application of the technology so far, can replace several functions that are currently maintained by necessary post-trade institutions.

Trautman (2016), [9]. the blockchain technology has the potential to disrupt and reshape the world of banking, despite of all the challenges it faces.

Chakraborty and Joseph (2017), [10]. each ML system comprises five components: (1) a problem, (2) data source,(3) a model,(4) an optimization algorithm and (5) validation and testing.

Hall and Pesenti (2017), [11]. Identify three areas of finance in the UK where AI has great potential: personalised financial planning; fraud detection and anti-money laundering; and process automation.

Cecchini et al. (2010), [12]. use SVMs for detecting corporate management fraud using financial data. The global financial system is exploring ways of using blockchain-enabled applications for financial assets, such as securities, fiat money, and derivative contracts (Peters and Panayi, 2016 [13].; Fanning and Centers, 2016 [14].; Nijeholt et al., 2017[15].; Paech, 2017[16]).

example, blockchain technology offers a massive change to capital markets and a more efficient way for performing operations like:

securities and derivatives transaction (Van de Velde et al., 2016 [17]; Wu and Liang, 2017 [18]),

digital payments (Papadopoulos et al., 2015 [19]; Beck et al., 2016 [20]; Min et al., 2016 [21]; Yamada et al., 2017 [22]; English and Nezhadian, 2017 [23]; Lundqvist et al., 2017 [24]; Gao et al., 2018 [25]),

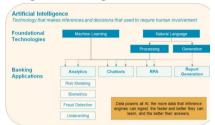
management schemes (Gazali et al., 2017 [26]), general banking services (Cocco et al., 2017 [27]), financial auditing (Dai and Vasarhelyi, 2017 [28]) or cryptocurrency payment and exchange (i.e.,e-wallets) (Cawrey, 2014 [29]; Rizzo, 2014[30]).

Notably, a set of the world's biggest banks, including Barclays and Goldman Sachs have joined forces with R3 (R3,2015) to establish an operating blockchain-based framework for the financial market (Crosby et al., 2016 [31]).

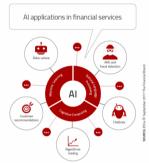
Objective Of The Study

- 1) To study the areas and the application where the Artificial Intelligence is being used by the banks.
- 2) To study the areas and the application where the Block Chain is being used by the banks.
- 3) To study about the applications of AI in use in the leading commercial banks in India: HDFC Bank, ICICI Bank, Axis Bank, State Bank of India, Canara Bank and City Union Bank.

Artificial Intelligence in Banking



Source: Celent analysis. Arrows represent influence of source on target



BankChain was announced on 8 February 2017 by SBI, India's largest bank. It's a 30+ member consortium led by SBI, the country's largest lender, and includes banks, NBFCs and the National Payments Corporation of India (NPCI), an organization set up by Indian banks to support retail payments. Simply put, BankChain is a community of banks for exploring, building and implementing blockchain solutions. BankChain is supported by Pune -based startup Primechain Technologies to create these solutions. Currently, it has 37 members and 8 live projects. [32].

Applications of AI in Commercial Banks in India: HDFC Bank, ICICI Bank, Axis Bank, State Bank of India, Canara Bank and City Union Bank:

HDFC Bank

India's first AI-based banking chatbot, Eva, built for HDFC Bank by Senseforth AI Research has successfully addressed over 2.7 million customer queries in a span of six months, HDFC Bank's EVA becomes India's largest banking Chatbot.[33].

HDFC bank has developed an AI- based chatbot called Eva' (Electronic Virtual Assistance), built by Bengaluru based Sense forth that has addressed over 2.7 million customer queries, interacted with over 530,000 unique users, and held 1.2 million conversations. With an accuracy level of over 85% and uptime of 99.9%. The device can provide answers in less than 0.4 seconds and has in the first few days of its launch answered more than 100,000 queries from thousands of customers from 17 countries. The bank is also experimenting with in-store robotic applications called IRA (Intelligent Robotic Assistant).[33-35].

ICICI Bank

ICICI bank has deployed a software robotics (a kind of software generally focused on automating office work) in over 200 business processes a cross various functions of the company. Calling it the robotic software the bank claims it to be the first in the country and

among very few in the world to deploy this technology, that emulates human actions to automate and perform repetitive, high volume and time consuming business tasks.[35]

ICICI Bank has also launched a AI-based chatbot, named iPal(chatbot) which has interacted with 3.1 million customers, has answered about 6 million queries, with a 90 percent accuracy rate. The bank is also considering the process of integrating iPal with existing voice assistants such as Cortana, Siri and Assistant. [36-37]

Axis Bank

Axis Bank recently launched an AI and NLP (Natural Language Processing) enabled app for conversational banking, to help consumers with financial and non-financial transactions, answer FAQs and get in touch with the bank for loans. [35] [38].

State Bank of India (SBI)

SBI India's largest public-sector bank has embarked on using AI by launching a national hackathon called "Code For Bank" for developers, startups and students to come up with innovative ideas and solutions for banking sector that focusing on technologies such as predictive analytics, fintech/block chain, digital payments, IoT, AI, machine learning, BOTS and robotic process automation. SBI has also launched SIA, an AI-powered chat assistant that addresses customer enquiries instantly and helps them with everyday banking tasks just like a bank representative. [35].

SBI is currently using an AI-based solution developed by Chapdex, the winning team from its first hackathon. The solution essentially scans cameras installed in the branch and captures the facial expressions of the customers and immediately reports whether the customer is happy or sad... this is real-time or near real-time feedback! [39].

Canara Bank

Canara Bank installed Mitra and Candi robots at some of its offices. Mitra, a humanoid robot developed by Bengaluru-based Invento Robotics and named after the Vedic god of friendship, could well be the poster child for cooperation in artificial intelligence (AI) between India and China. Japan's SoftBank Robotics too is in the mix with humanoid robot Candi. Mitra and Candi have found home in the Karnataka capital. Mitra greets customers in Kannada and helps them navigate the bank's head office on JC Road, while Candi offers answers in English to 215 preset questions at the financial institution's circle office on MG Road. [40].

City Union Bank

City Union Bank Lakshmi operates on Artificial Intelligence platform and it Provides information regarding day to day banking transactions, including interest rates. City Union Bank Lakshmi is Capable of responding to voice based interactions City Union Bank customers across the country can receive information from City Union Bank Lakshmi,[41].

"Taking cue from the robot, we introduced a ChatBot (similar to online chatting service) on our site. As more than 83 per cent of our operations take place via the online mode, we sensed the need for a Chatbot to respond to FAQs. More than 1,000 people are using this service. We intend to personalise the Chatbot to enable customers to ask account-specific information. It will be rolled out soon," N Kamakodi,CEO. [42].

AI Applications within Banking Sector. [43].

Fraud Detection: Anomaly detection can be used to increase the accuracy of credit card fraud detection and anti-money laundering.

Customer Support and Helpdesk: Humanoid Chatbot interfaces can be used to increase efficiency and reduce cost for customer interactions.

Risk Management: Tailored products can be offered to clients by looking at historical data, doing risk analysis, and eliminating human errors from hand-crafted models.

Security: Suspicious behaviour, logs analysis, and spurious emails can be tracked down to prevent and possibly predict security breaches.

Digitization and automation in back-office processing: Capturing

documents data using OCR and then using machine learning/AI to generate insights from the text data can greatly cut down back-office processing times.

Wealth management for masses: Personalized portfolios can be managed by Bot Advisors for clients by taking into account lifestyle, appetite for risk, expected returns on investment, etc.

ATMs: Image/face recognition using real-time camera images and advanced AI techniques such as deep learning can be used at ATMs to detect and prevent frauds/crimes.

Uses of Blockchain/DLT in Finance:

Some of the use cases of blockchain in India include (Iyer and Kumar, 2018). [44]:

- MonetaGo (in trade)
- ICICI, Yes and Axis Bank (in Proofs of Concept)
- NSE collaboration with banks such as ICICI, ÎDFC, on KYC POC
- Unocoin and Coinsecure (Bitcoin exchanges and wallet)
- EzyRemit (remittance solutions)
- SignZy (document storage, signing, and validation)

How can blockchain help in financial inclusion?

- (i) Opening an account- Individuals can open an account or deposit cash through their phones.
- (ii) Usability of an account— Transfer of funds using blockchain takes 10 minutes which is faster compared to such transfers through conventional means in developing countries
- (iii) Costs to the financial institutions- Payments via blockchain do not need to go through the national payments system and hence there is no need of physical branches.
- (iv) Currency risk- Individuals and SMEs have the option of adding funds in the fiat currency. This shift the volatility risk to the financial intermediary (FI). FIs are using bitcoin as vehicle currency the dollar is the dominant vehicle currency and used in 88% of trades. Using boitcoin as vehicle currency and blockchain's platforms means that the recipient and the sender are not exposed to the volatility of the virtual currency.



Mindmap abstraction of the different types of blockchain applications.

Source: F. Casino et al., Telematics and Informatics 36 (2018) 55-81. [45].

Areas of Artificial Intelligence can be used in banking sector

- Personalized Financial Services
- Smart Wallets
- Voice Assisted Banking
- Customer support
- Underwriting
- Blockchain hastening payments
- Digitalization instead of branch lines
- Reduce Costs
- Mitigate Risk
- Increase Revenue

USE OF ARTIFICIAL INTELLIGENCE [46]

Chatbots and virtual assistants. These enable users to settle common doubts and, in some cases, to secure product recommendations or perform certain transactions (e.g. order transfers, open accounts). Communication channels with customers thus become automated, which means that they are available 24/7 and, in addition, that data on interactions with users are collated automatically.

Control of anti-money laundering (AML) and fraud prevention.

The ability to analyse a greater volume of data and to combine those data with new sources of information enables anomalies or patterns to be detected that would otherwise have gone unnoticed, [47].

Credit scoring. The increased analytical capacity can improve credit assessment and make loan origination faster.

Regulatory compliance. The greater analytical capacity that artificial intelligence tools provide eases compliance with certain regulatory requirements (e.g. risk management, reporting obligations) and also monitoring of regulatory changes.

How can AI help in financial inclusion? [48]

- (i) AI to build credit history: to collect information on various indicators which can then be used to create credit history of customers. The information collected could be on Aadhar linked data, GPS data, handset details, insurance etc.
- (ii) AI as a relationship manager: HDFC has already introduced a chatbot for this purpose.AI trained Robots can become their financial
- (iii) AI assisted lifestyle based banking: Another way in which AI can be used is to assist in the financial literacy endeavours. There are a number of government schemes like Gram Sadak Yojna, Swachh Bharat Abhiyan, and Mahatma Gandhi National Rural Employment Guarantee Act (MNREGA) etc. where the incentives go through the Pradhan Mantri Jan Dhan accounts. Banks can use feeds of all such incentive payments data from the Unique Identification Authority of India (UIDAI) database into the AI engine and come up with the best possible products the customer can be offered.

Findings/Conclusions

Artificial Intelligence is the future of banking as it brings the power of advanced data analytics to combat fraudulent transactions and improve compliance and the Bitcoin's creation in 2009 was also a revolutionary idea in the financial world. It is considered as the digital cash of the new age. It is secure, non-centralized and can provide the world with "honest", non-inflatable money. In this Study we examine how AI and blockchain technologies can contribute to Indian Banking Sector. While the potential of blockchain technology it is to be found that AI application is leading the Banking Sector and also helping to fulfill the customer demand faster and easier. It is also being used to meet regulatory compliance, detect fraud, and assess individual creditworthiness.



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