Banking 4.0: The Impact of Artificial Intelligence on the Banking Sector and its Transformation of Modern Banks

Author#1
Stephanie Ness
Diplomatische Akademie

Author#2
Mykola Volkivskyi
Taras Shevchenko National University of Kyiv

Author#3
Tayyab Muhammad
Department of Electrical and Computer Engineering
Southern Methodist University, Dallas, US
https://orcid.org/0009-0003-1753-3241

Author#4
Kristina Balzhyk
Amadeus International School Vienna,
Austria

Abstract:- Artificial Intelligence (AI), mimicking human intelligence in machines, represents a booming technological frontier, progressing from virtual assistants like Siri to self-driving vehicles. Grounded in examining human cognitive processes and applying machine learning techniques, AI has woven itself into a diverse array of industries, chief among them the financial sector. AI's presence in banking extends beyond chatbots, using algorithms to improve customer service, streamline sales performance, and drive profitability through pinpoint decision-making. AI uses machine learning and deep learning to extract valuable information from large amounts of data, helping to make better decisions by reducing errors caused by emotional biases. It is essential to grasp the ever-changing effects of AI on banking operations as it continues to transform the industry. This article explores the significant influence of AI on the functioning of banks, outlining its revolutionary effects and the resulting implications for the workforce. It delves into how AI is revolutionizing banks by focusing on its ability to simplify processes, improve efficiency, and enhance human creativity. Financial institutions can achieve sustainable growth in the digital era by embracing AI-driven innovations to adapt to changing market dynamics and provide superior customer experiences.

I. INTRODUCTION

Artificial intelligence (AI), also known as machine intelligence, is the replication of human intelligence in machines. Machines display artificial intelligence, which is different from the innate understanding shown by humans. The AI technology, from Siri to autonomous vehicles, is advancing quickly. Artificial intelligence is typically based on two core concepts. The first aspect involves examining the cognitive processes of the human brain, while the second aspect is focused on representing these processes using machine learning techniques. Artificial Intelligence in the financial industry extends beyond just chatbots. Artificial Intelligence has become prevalent in multiple industries, including banking. The main objective of this article is to understand how AI is affecting the banking industry today. The article seeks to explore the impact of artificial intelligence on the banking industry and how AI is reshaping the way modern banks operate. This study primarily centers on the use of artificial intelligence in banking and its revolutionary impact on the industry, as well as its effects on the workforce. As we know, humans are prone to making mistakes, but as the world advances, so do the advancements in technology. There is currently a shortage of qualified people capable of managing automation.

AI is the replication of human intelligence used to create advanced machines that are capable of carrying out tasks in a highly efficient manner. Artificial Intelligence functions in a similar way to the human brain, as it is capable of thinking and making decisions with a higher level of accuracy, drawing from the information it is provided. Artificial intelligence is increasingly prevalent in today's market. It is utilized in a variety of fields, with the banking sector being just one of them. The banking sector has employed AI in a highly inventive manner, resulting in significant savings in both time and money. Banks utilize algorithms to produce precise outcomes, which ultimately aid in improving customer service and driving better sales performance to generate profits. AI involves the use of machine learning and deep learning to minimize mistakes resulting from emotional and psychological influences. A crucial function of AI is to extract critical information from diverse sets of data and make informed judgments.

For example, IPsoft, a global leader in Enterprise AI, has developed a humanoid (robot) partner named Amelia. It is the most personable digital AI partner in the industry. The first impression of her is that she means business, with her white oxford shirt, blazer, and well-groomed light hair. This outfit leaves a lasting impression. The company boasts that Amelia is the only AI in the market that can truly understand clients' needs and intentions due to her capacity to learn, adapt, and evolve. Amelia can be educated to comprehend words and expressions in over 100 different dialects. She provides authentic support for businesses by reducing expenses, improving customer satisfaction, and enhancing employee skills. By hiring Amelia (or multiple Amelias), a company will have the flexibility to customize her to meet various company requirements, positions, and industries, tailored to their business strategies and processes. The humanoid is capable of observing, learning, and recalling information upon request. She possesses the ability to interpret emotions and understand the dynamics of conversations with colleagues and customers across various communication platforms. She is capable of completing the arduous tasks of many people while also helping to enhance the creativity and productivity of her human peers.

➤ *Evolution of AI in the Banking Sector*

Although AI has only been in use for a relatively short time, its origins can be traced back to the 1950s when Alan Turing first explored the concept of machines possessing genuine intelligence. The term Artificial Intelligence was coined early on, but it wasn't until the late 1990s that any actual use or implementation of Artificial Intelligence methods occurred. The development of Artificial Intelligence gained momentum in 2011 when prominent tech companies such as Facebook, IBM, Microsoft, and Google began using it for business purposes, leading to a significant increase in its progress.

➤ *Adoption of AI in the Banking Sector*

Currently, artificial intelligence is being used for a wide range of applications, including data analysis, algorithm tracking, facial recognition, and text scanning. AI is currently being utilized across a range of business sectors such as advertising and targeting, accounting, insurance, internet, transportation, aerospace, agriculture, and genetics. In 1990, advancements in technology were centered around artificial intelligence, opening up possibilities in natural language processing, image identification, deep learning, speech recognition, and emotion recognition. Several start-ups then adopted it to create buzz in the market.

➤ *AI in Financial Services*

The financial sector has seen various improvements in communication, customer support, recruitment, and asset management processes. Currently, stock investing and finance require a combination of technical expertise and a bit of luck.

In the future, we will be able to manage money in a new way using sentiment analysis, crowd-sourced data, and algorithms.

➤ *Future Aspects*

The impact of AI is not confined to just the financial and banking industries, as it has also been felt in several other sectors. Some notable advancements in the industry include the automated delivery of anesthesia for common procedures, which reduces expenses, enhanced patient care, and the integration of digital technologies into the development of autonomous vehicles. All of these advancements would enable companies to eliminate mundane and laborious tasks, such as completing forms and conducting back-end testing.

➤ *Why use AI in the Banking Industry*

The AI integration in banking is proving to be a strategic response to the immense challenges being met by the industry. In readying for this evolution, AI is arming banks with the mere tactical capabilities to streamline their operations, enhance customer experiences, and ramp up their security measures. Through automation of back-end processes, development of new customer self-service functionalities, and delivering more efficient, personalized customer solutions, AI is enabling banks to meet a new set of personalized banking solutions to meet ever-evolving customer needs. These capabilities are also helping banks to increase operational efficiencies and to fully leverage advances in voice and other technologies. This is letting banks outperform entire sectors of their workforces and freeing them up to be able to fully focus on value-added tasks that require full human cognition. Not coincidentally, these new machine visualization and robotics tools, and data tests have never been so clear. Recently, these new machine visualization and robotics tools, which enable employees to augment (and in some places exceed) their human capabilities while significantly cutting down the risks of fraud and scam, have also allowed them to process that ever-skyrocketing mountain of data more quickly — data needed to continue to make quick, informed decisions in real-time that will drive our industry toward the brighter future that is just beginning to come into sight. As the banks embrace AI, they're realizing that what they're not doing is making a mere technological advance — they're creating the fundamental enabler that is only going to sustain the kind of growth and innovation that relegated banking services as a necessity in the first place.

II. LITERATURE REVIEW

In their paper "Machine Intelligence vs. Human Judgment in New Venture Finance," Christian Catalini, Chris Foster, and Ramana Nanda (2018) found that machine learning models taught to imitate human assessors outperformed models programmed just to optimize financial performance. They discovered that (a) a model trained to imitate the choices of humans performed well in situations not included in the original data, indicating that humans had a consistent pattern in their early-stage investment decisions that

could be duplicated; (b) Models trained to maximize success significantly outperformed the 'imitate human models' when selecting from a common pool of applicants not included in the original data, suggesting that the heuristics used by these evaluators were consistently overlooking certain high-potential applications that could be identified beforehand; (c) Comparing the focus of the two models shows that the differences were partly due to human heuristics consistently placing less emphasis on more 'cognitively demanding' elements of the applications. Their discoveries have significant ramifications for choosing and funding promising ideas, as well as for how AI can assist people in sifting through and assessing information in an age of information overload.

In her study "How Artificial Intelligence is Changing the Banking Sector - A Case Study of Top Four Commercial Indian Banks", Jewandah S (2018) studied the implementation of Machine Intelligence in the banking sector and the application of AI in major commercial banks in India. Traditional banking is evolving with the adoption of cutting-edge technologies such as AI, blockchain, and cloud computing. However, banks have not yet fully embraced the AI revolution, indicating that human interaction remains essential in the industry. The Indian banking sector is currently exploring how to integrate AI technology to enhance operational efficiency and customer service in the near future.

In the research paper "What artificial intelligence can do and Can't do right now", Andrew Ng (2016) explores the consequences of artificial intelligence on the business environment. He talks about the rise of automation and how it is changing the business landscape through the use of robotics and machine learning. Effective AI work involves carefully selecting A and B and supplying the necessary data to enable the AI to understand the relationship between A and B. Creatively choosing A and B has already sparked major changes in many different fields. It is prepared to bring about revolutionary changes in many other areas.

Chan Kok Thim and Eric Seah (2011), in their paper 'Optimizing portfolio construction using artificial intelligence', aim to enhance the practicality of Artificial Intelligence through the application of Neural Networks (NN) in the commercial sector. This paper provided an overview of the classic Markowitz Theory's Efficient Frontier to adapt and enhance portfolio construction. It also proposed a heuristic neural system to better understand how Artificial Intelligence can optimize portfolio performance and deliver returns for all types of investors.

In 'Utilization of artificial intelligence in finance', Ryoji Kashiwagi (2005) suggests that man-made artificial intelligence is currently experiencing a new surge, identified as the third in its history, due to a technological advancement called deep learning. Artificial intelligence created by humans is being applied in various systems, including the financial sector. Financial firms dealing with financial resources should improve their use of artificial intelligence by implementing strategies such as open innovation.

III. RESEARCH METHODOLOGY

For this article, the research employed efficient and informative analytical techniques, focusing primarily on quantitative methods to collect data and gain a more thorough understanding of the correlations between various research variables. The study's design is both exploratory and descriptive. The research being conducted is exploratory, involving detailed surveys, as well as qualitative and quantitative analysis. The current state of artificial intelligence is being illuminated through the use of existing facts and information in descriptive and analytical research. The study employed a research approach that involves collecting important quantitative data from respondents through the use of a sample. A survey approach was used to gather information by polling 112 clients from specific banks. The data in this study was collected using a structured and closed questionnaire as the research instrument. The analysis of quantitative data was carried out using SPSS 21.0 software.

> ➤ *Data Collection Methods*

The information collected includes both primary and secondary data in both quantitative and qualitative forms and was analyzed to make conclusions and recommendations. The survey collected primary data on people's awareness of the utilization of artificial intelligence in the banking industry. A survey questionnaire was created and a random sample was taken for the survey. The internet was used to gather secondary data, including information from sources such as websites, e-magazines, research papers, e-books, and newspapers.

Artificial Intelligence in Banking

The banks need to quickly start using artificial intelligence to stay competitive in an increasingly advanced technological landscape. Banking transactions can be done without leaving your car, thanks to drive-thru banking. A lane is available for customers to conduct transactions at a window. Advanced Voice AI systems are being designed to take the place of humans in conducting transactions at drive-thru banking services. In 2015, the Ann Arbor startup clinic created voice-activated AI platforms for banking and then expanded into drive-through ordering in July 2018. Its advanced conversational AI technology can interpret and understand orders even when customers have difficulty with language or strong accents, and can also make necessary adjustments during the conversation. Banks can integrate artificial intelligence throughout all levels of their operations, from customer-facing services to internal process management. The bank stations are a network of self-service terminals that offer a variety of valuable electronic services to customers, such as bill payments and government e-services. The use of big data has become the norm in the industry, and its applications in

banking are revolutionizing the sector. Artificial intelligence is being used to organize and categorize data, which the banking industry is using to enhance customer interactions. The future of banking lies in Artificial Intelligence, catering to modern customers. In recent years, the Indian banking sector has been transitioning from human-driven to machine-operated, including the introduction of kiosks for passbook updates. The passbook printing kiosk is a self-service machine that allows customers to print their passbooks. Major Indian banks like SBI and Bank of Baroda have implemented this feature extensively. They have set up self-service passbook kiosks that allow customers to print their passbooks. One example is Indian Bank SBI, which has implemented Swayam, a passbook printing kiosk that uses barcode technology and enables customers to easily update their passbooks. While banks are hiring, the required skill sets are evolving, with a focus on front-end talent.

➢ *Chatbot for Smart Banking Assistance*

Chatbots or virtual assistants are innovative tools created to make communication between people and computers easier. Chatbots represent artificial intelligence technology in the banking industry and are becoming a popular replacement for traditional customer service interactions at bank branches. These advanced AI-driven machines offer enhanced digital and personalized interactive experiences for customers. The Indian Bank SBI recently introduced a chatbot called SIA (SBI Intelligent Assistant) to assist customers with their day-to-day banking needs, serving as a virtual bank representative. It addresses the concerns of non-resident Indian customers by offering quick solutions in the chat box on the SBI portal.

➢ *Cash Deposit Machine*

The self-service Cash Deposit Machines enable users to deposit cash at their convenience. This facility eliminates the need to wait in long lines at banks to deposit cash. Banks offer a convenient and secure method for depositing cash at any time. Both government-owned and privately-owned financial institutions provide instant crediting of account balances as a service. Clients will be provided with a transaction receipt following a successful transaction. This machine allows for payments to be made across various accounts as well.

➢ *ATM Machine Helpline*

The helplines at ATMs are available for customers to reach their banks in case of an emergency. Artificial intelligence has also been implemented in automated teller machines. New features have been added to ATMs, including machine learning for cybersecurity, machine vision cameras, facial recognition, predictive maintenance, and forecasting cash demand.

➢ *Mobile Banking*

There is a global trend towards increasingly smart mobile devices. Countless people heavily rely on mobile banking, making AI-driven banking mobile applications very appealing to them. Consumers have seamlessly transitioned to using mobile banking. Having a personal virtual assistant, like Siri from Apple or Alexa from Amazon, is highly appealing. Mobile applications are capable of easily fulfilling the needs of customers. Advanced applications are capable of monitoring user actions and providing personalized advice and information on managing finances and spending. These days, every bank provides mobile and text banking services. The convenience of performing daily transactions like money transfers and payments has increased with the advent of mobile banking. With the integration of artificial intelligence into mobile banking, consumers have the opportunity to enhance their financial planning, receive intelligent financial advice, and conduct faster and more efficient transactions.

➢ *Blockchain Technology and Banking*

A blockchain is a digitally distributed and decentralized record-keeping system. It refers to data stored on a distributed public ledger in digital form. Blockchain is utilized for the storage of securely encoded information, while Artificial Intelligence serves as the cognitive power that facilitates decision-making and aids in the examination of the accumulated data. Blockchain technology is commonly believed to only apply to the cryptocurrency industry, but this is an inaccurate assumption. The vision of blockchain technology is to address various digital transaction issues including data security and fraud prevention. Blockchain is set to revolutionize inter-bank transactions, international remittances, crypto banking, data storage, KYC, loan syndication, and transparency, among other things.

➢ *AI-based Algorithms and Fraud Detection*

AI is centered on algorithms while machine learning consists of a sequence of algorithms. An algorithm consists of a series of guidelines, directions, or other problem-solving procedures that computers are required to adhere to. AI is highly successful at identifying patterns in real-time. It uses extra behavioral cues to identify potentially suspicious behavior and provides recommendations for reducing risk. Feedzai, a company specializing in data science, utilizes algorithms to identify and prevent e-commerce fraud for example. Fraud detection has significantly improved in accuracy and effectiveness due to the implementation of artificial intelligence. Fraud is a major problem in the financial industry, and the banking sector has seen great success in using artificial intelligence systems to detect and prevent it. Artificial Intelligence assists in obtaining a deeper insight into customer actions, which in turn aids in the improved identification of newly emerging fraudulent activities. The banking industry has effectively utilized data analysis techniques with the FICO Falcon fraud assessment system, which uses a neural network shell to implement advanced artificial intelligence based on deep learning. Artificial intelligence and machine learning programs use algorithms to examine patterns and forecast analytics to thwart fraudulent transactions, assisting banks in avoiding financial fraud. Fraud detection has significantly advanced and is projected to continue evolving in the foreseeable future.

IV. ANALYSIS AND FINDINGS

This research is based on data gathered from 112 respondents. A large number of the participants, belonging to the age group of 20 to 40 years old, are most influenced by the use of AI in the banking industry. They also think that artificial intelligence is beneficial and friendly, and they look forward to the introduction of new AI advancements on a regular basis. 71.4% of participants, or 80 out of 112, believe that employing artificial intelligence in banking is good. 24.1%, or 27 out of 112 respondents, are unsure if utilizing artificial intelligence in banking is useful. 4.5%, or 5 persons out of 112, do not think it is advantageous at all. 58.9%, or 99 out of 112 persons, use automated financial advisors for investing in the market. 64.3%, or 72 out of 112 participants, believe that using AI in the financial system has increased service speed. 13.4%, or 15 out of 112 persons, are unsure if things have improved. 22.3%, or 25 participants, do not believe it has any influence on speedy services. The majority of participants also prefer smart wallets over cash transactions, indicating that consumers are reaping the benefits of AI. As online fraud is a huge concern nowadays, and any person can easily get into your account, 81.4% of the participants feel that artificial intelligence can quadruple bank security. 18.6% of the respondents do not entirely trust machines and require some human interaction, preferring to visit banks in conventional methods.

V. CONCLUSION

The banking industry is undergoing rapid change, largely driven by the advances in Artificial Intelligence, which is revolutionizing the way banks operate. AI has been used in the banking industry across different areas such as core banking, operational efficiency, customer service, and data analysis. AI has expanded the definition of banking beyond traditional brick-and-mortar branches to encompass a new realm of modern financial institutions. Modern banks are expanding and growing as they introduce new banking services. Advancements in technology are leading to greater access to the banking system, improved efficiency, and the ability to facilitate small transactions at a lower cost. Utilizing technology efficiently has a compounding impact on the expansion and progress of banks. Therefore, with the implementation of artificial intelligence, banks can attract more customers and experience greater growth. Banks can use AI to enhance the customer experience by enabling seamless, 24/7 customer interaction - but AI in banking extends beyond just retail banking services. AI is being successfully employed to handle the back and middle office operations in investment banking and other financial oversight activities.

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