Leveraging Artificial Intelligence (AI) for Banks in Emerging Markets

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Abstract—**Banks can leverage Artificial Intelligence (AI)-powered solutions to drive operational efficiency, save costs, and improve customer experiences, thereby gaining a competitive advantage in the fast-growing banking industry. Chatbots and virtual assistants using AI can perform various services, like advising on personal finance, assisting in transactions, and offering banking services on mobile apps and messaging platforms. The author sought to explore the role of Artificial Intelligence (AI) in improving customer experience and personalization of services in banks within emerging markets. Findings show that Artificial Intelligence (AI) plays a significant role in financial inclusion in emerging economies, including customer onboarding, authentication, data analytics, risk and portfolio management, fraud detection, investment, and credit appraisal. JPMorgan Chase in the United States of America (USA), Development Bank of Singapore (DBS), Sberbank in Russia, Housing Development Finance Corporation (HDFC), and Industrial Credit and Investment Corporation of India (ICICI) Banks in India have implemented AI banking. However, there are fewer data protection rules and infrastructure for AI, especially in emerging markets. Failure to provide adequate data privacy protection could expose personal information to unauthorized access, abuse, or exploitation, threatening individuals' privacy and personal rights. In conclusion, using artificial intelligence represents a ground-breaking prospect for banks in emerging economies to stimulate the financial system further, improve the efficiency of banking operations, and facilitate better customer experiences. In conclusion, using artificial intelligence represents a ground-breaking prospect for banks in emerging economies to stimulate the financial system further, improve the efficiency of banking operations, and facilitate better customer experiences.**

Keywords—artificial intelligence, customer experience, operational efficiency

I. INTRODUCTION

Artificial Intelligence (AI) refers to computer systems that can perform tasks that typically require human intelligence (Gallego-Gomez & De-Pablos-Heredero, 2020). The functions of AI include learning, reasoning, problem-solving, understanding natural language, and perception. AI aims to create machines that can simulate and replicate human cognitive functions. The importance of AI lies in its ability to revolutionize various aspects of human life. It enhances efficiency, automates tasks, enables data analysis at scale, and contributes to advancements in fields like healthcare, education, finance, and more (Sandu & Gide, 2020; McBride, 2019).

AI has the potential to solve complex problems, make informed decisions, and drive innovation which makes it a significant force in shaping the present and future of technology and society (Biswas & Carson, 2020). The key elements of AI include machine learning, which allows systems to learn from data; natural language processing for understanding and generating human language; computer vision for image and video analysis; and robotics for physical tasks (Gallego-Gomez & De-Pablos-Heredero, 2020). These elements work together to enable AI systems to perform various cognitive tasks.

Banks can leverage AI-powered solutions to drive operational efficiency, save costs, and improve customer experiences, thereby gaining a competitive advantage in the fast-growing banking industry (Roy & Mohan, 2019; Mehta & Kulkarni, 2020; Banna, Alam & Reaz, 2020). Higher stakes in AI adoption also mean unique ethical challenges, especially where developing economies are concerned and where socioeconomic contexts, cultural factors, and regulatory landscapes differ in some things to consider from a moral perspective. AI algorithms developed on biased or incomplete data will likely reinforce or amplify inequalities and prejudices prevalent in emerging markets (Santos & Oliveira, 2020). For example, biased credit scoring algorithms may discriminate against marginalized groups or always-ignored populations. Making AI fair involves detecting and mitigating bias in data collection, algorithm design, and decision-making in all settings, ultimately empowering different segments of society to benefit from technologies equitably (Banna, Alam & Reaz, 2020).

Research question: What is the role of Artificial Intelligence (AI) in improving customer experience and personalization of services in banks within emerging markets?

II. INFLUENCE OF ARTIFICIAL INTELLIGENCE (AI) ON BANKING SERVICES IN EMERGING ECONOMIES

A. Prioritizing the Customization of AI Solutions to Designing AI Applications for Banks

Applications that suit developing economies' Fintech for financial inclusion require explicitly understanding the

challenges underbanked or underserved populations face (Sinha *et al.*, 2023; Gomber *et al.*, 2018). Myriad emerging economies need more than conventional credit scoring mechanisms to measure the credit reliability of individuals with bare credit reports or informal financial flow (Chen & Zhang, 2021). To better assess the creditworthiness of this underserved population AI-powered credit scoring models have the potential to use alternative sets of data like mobile phone usage data, utility bill payments, and social media (Chakraborty & Joseph, 2021). AI algorithms can identify patterns and behaviors associated with credit risk in these groups and allow financial institutions to extend credit to those otherwise out of reach (Chen & Zhang, 2021).

B. Mobile and Digital Technology in Financial Inclusion

In developing economies where mobile penetration is usually higher than traditional banking infrastructure, mobile and digital banking is one of the most viable ways to promote financial inclusion (Agarwal, 2019; Ali & Ahmed, 2021). Chatbots and virtual assistants using AI can perform various services, like advising on personal finance, assisting in transactions, and offering banking services on mobile apps and messaging platforms (Kim, 2019; Sandu & Gide, 2020; Bhattacharya & Sinha, 2022; Trivedi, 2019). Leverage Value Graph Learning (VGL) AI-driven digital banking solutions to reach the unbanked living in outlying regions, allowing them convenient and inexpensive access to bank services.

Banks must collaborate with Fintech startups, governments, and NGOs to drive financial inclusion through AI innovation (Gomber *et al.*, 2018). Working with partners from across the financial services ecosystem, banks can tap into additional know-how and resources and reach out to build and implement AI solutions that are fit for purpose in addressing the unique needs and barriers to availability that underserved populations face. Ecosystem collaboration can also help share knowledge, capacity building, and policy advocacy initiatives for fostering inclusive growth and development (Li, *et al.*, 2020).

Banks can leverage technology with customized AI applications for developing economies, foster collaboration across sectors to ensure every individual can access financial services, and ultimately create inclusive growth and world development (Li *et al.*, 2020). For instance, using AI in risk management during rapid market changes can give banks a more profound perception of, review, and decrease risks.

C. Creation of AI-focused Incubators, Accelerators, and Innovation Hubs to Support Startups and Entrepreneurs in the Emerging Market

The innovation hubs offer mentorship, financial resources, and access to a network of resources for early-stage AI startups to develop and market their ideas for AI advancements. Incubators and accelerators are another way to promote collaboration in AI innovation and entrepreneurship between startups, corporates, investors, and government agencies (Li *et al.*, 2020). The most effective AI strategy is the establishment of industry consortia, collaboration, and networks with shared societal challenges and opportunities for AI use and innovation (Li, *et al.*, 2020). The community-oriented network can bring together banks, technology companies, financial technology (Fintech) startups, regulatory bodies, and others in the same sphere to share insights, best practices, and resources.

Other benefits of community-oriented networks include working towards common objectives like establishing AI standards, constructing data-sharing agreements, enacting data protection and cybersecurity laws, and advocating for specific regulations (Arner, Barberis & Buckley, 2017). There are fewer data protection rules and infrastructure for AI, especially in emerging markets. Failure to provide adequate data privacy protection could expose personal information to unauthorized access, abuse, or exploitation, threatening individuals' privacy and personal rights (Khan *et al.*, 2020). Robust data protection laws, encryption protocols, and data governance frameworks are critical to protecting privacy and promoting trust in AI applications (Bose & Bastid 2019).

D. The Role of AI in Data Analysis, Risk, and Portfolio Management

AI-powered predictive analytics models can analyze historical market data, macroeconomic indicators, and relevant factors to predict market trends and identify potential risk factors (Indriasari, Gadi & Matsui, 2019; Marr, 2020). Machine learning algorithms can help banks predict volatility, price changes, and other risk events more accurately and in advance to manage risk and realign investment strategies.

Investor and market sentiment monitoring tools are based on news articles, social media, or other sources; they are driven principally by AI and deliver live mood and sentiment of the market. Banks that analyze sentiment data with Natural Language Processing (NLP) can uncover new trends, detect shifts in sentiment, and discover market sentiment outliers suggesting latent risks of portfolios (Bhattacharya & Sinha, 2022; Kim, 2019, Sandu & Gide, 2020). An increase in volatility and sentiment analysis may provide essential inputs in risk management, portfolio rebalancing, and asset allocation adjustments in such volatile markets.

E. The Role of AI and Fraud Detection

Kou *et al.* (2021) found that inbuilt AI fraud detection features can provide security in financial transactions that offer security measures to safely exchange confidential information without any third-party interference and ensure the replication of the information on different secured databases. AI-based fraud detection systems can analyze historical transaction data instantly to trace the card schemes of identity theft, account takeover, and unauthorized transactions (Nguyen, 2022; Banna, Alam & Reaz, 2020). Banks can use machine learning algorithms to detect these patterns as they arise, enabling them to detect fraud early, preserve the integrity of the economic system, and safeguard their customers from fraud (Nguyen, 2022; Kou *et al.*, 2021).

AI-based educational platforms can use data from AI-based fraud detection systems to deliver a personalized financial literacy curriculum and simulate learning experiences that suit different audiences. This is where real learning happens. These platforms use AI algorithms to analyze users' behavior and preferences, send them personalized content and recommendations, and test their financial literacy through quizzes targeted at underserved populations (Nguyen & Tran, 2021; Nguyen, 2022).

III. THE ROLE OF ARTIFICIAL INTELLIGENCE (AI) IN BANKS

A. AI in Portfolio Management

AI-powered portfolio optimization techniques help banks optimize their investment portfolios to achieve the desired risk-return profiles in the volatile market. Banna, Alam, and Reaz, 2020 found that banks can utilize optimization algorithms, machine learning models, and risk analytics tools to help them identify the best asset allocation decisions, hedge against downside risks, and diversify their portfolios between distinct asset classes, sectors, and geographies. By optimizing portfolios, investors can reduce the impact of market volatility on investment portfolios and improve long-term performance (Banna, Alam, & Reaz, 2020).

B. AI in Risk Management

AI-powered stress testing models enable the simulation of market scenarios and the calculation of how adverse events can affect a bank's portfolios and balance sheets. By performing thousands of simulations using historical data and AI algorithms, banks can estimate the losses they would potentially have to bear, examine the capital that would be required, and assess how much liquidity would be needed under different scenarios of market crashes, economic recessions, or geopolitical events (Marr, 2020). Banks use stress testing to locate weaknesses in critical functions and thematic scenarios, to improve risk controls, and, therefore, to be less affected by macroeconomic volatility (Marr, 2020).

AI-powered algorithmic trading systems can automate trading decisions and execute trades in volatile markets based on a predefined set of rules and risk parameters. Algorithmic trading systems use machine learning algorithms, Natural Language Processing (NLP) methods, and real-time market data feeds to identify trading opportunities, manage risks, and execute trades at the best prices and timings (Bhattacharya & Sinha, 2022; Kim, 2019; Sandu & Gide, 2020). Algorithmic trading can allow financial institutions to profit from short-term market imbalances, reduce trading expenses, and increase liquidity in unstable markets.

Dynamic risk management strategies that adjust to the changing market conditions as and when required in real-time can also be developed by financial institutions using AI. Consequently, using AI-driven risk management, your risk exposures, hedging positions, and risk limits can be dynamically adjusted based on proprietary algorithms (Chen & Zhang, 2021). This can help manage potential losses, create opportunities in turbulent times, and stay profitable, thus allowing you to scale up your operations quickly. In the face of this added external noise, dynamic risk management strategies typically adopted by financial institutions ease the process of navigating through uncertainties in the market and tailoring to optimum risk-adjusted return experience across scenarios.

Using AI technologies to manage risk in volatile market conditions can mean that financial institutions can better identify, assess, and respond to risks intelligently, thereby building a stronger, more capital-preserving, and more return-maximizing operating platform in choppy markets. Kim (2019) expounded that AI-driven chatbots and virtual assistants can deliver in-depth customized services to customers 24/7, from inquiries to facilitating operations, whether addressing issues or having issues during the banking process. Using Natural Language Processing (NLP) and machine learning algorithms, chatbots understand customer queries and preferences, provide relevant information and assistance, and optimize consumer satisfaction (Bhattacharya & Sinha, 2022; Kim, 2019; Sandu & Gide, 2020).

C. AI in Data Analytics

AI-powered predictive analytics models analyze customer data, transaction histories, and behavioral patterns to understand and predict customer needs (Konigstrfer &Thalmann, 2020; Choudhury *et al.*, 2020; Marr, 2020). Using machine learning algorithms, financial institutions can recognize cross-selling and upselling opportunities, offer bespoke product suggestions, and tailor marketing campaigns based on each customer to trigger engagement and loyalty. AI allows fraud detection systems to analyze transaction data in real-time, thereby identifying and preventing fraud, including identity theft, account takeover, and unauthorized transactions (Nguyen, 2022; Banna, Alam & Reaz, 2020). With machine learning-based algorithms, anomaly detection methods, and behavioral analytics, financial institutions can detect the patterns and anomalies that signal fraudulent activity, ensuring accounts remain safe and maintaining trust in the banking system (Kou *et al.*, 2021).

D. AI in Investment and Credit Appraisal

AI-driven automation technologies can process and underwrite loans more precisely, reducing manual errors and processing times and cutting administrative costs (Chen & Zhang, 2021). Machine learning algorithms and predictive analytics models have proved useful in analyzing whether the borrower is creditworthy, analyzing documents, and making a lending decision, helping financial institutions get loan approvals quickly and easily, reducing loan processing time, and decreasing the risk (Nguyen & Tran, 2021; Chen & Zhang, 2021; Marr, 2020). AI-powered robo-advisors can offer automated investment advisory services, assisting customers in rebalancing their investment portfolios to achieve their financial goals, risk preferences, and time horizons (Belanche, Casalo, & Flavian, 2019). Using machine learning algorithms and portfolio optimization techniques, robo-advisors suggest appropriate diversified investment strategies, help customers rebalance their portfolios, and

monitor market trends in real-time to make smarter investment decisions and achieve financial goals (Belanche, Casalo, & Flavian, 2019).

E. AI in Customer Onboarding

AI-driven digital onboarding is a powerful solution that can significantly ease the account opening and Know-Your-Customer (KYC) process (Trnka *et al.*, 2022). By fulfilling KYC digitally, customers can open an account without visiting the bank branch. Banks can use biometric user identification, optical data recognition (OCR) technology, and document verification algorithms to accelerate onboarding and reduce the paperwork involved in this procedure, which helps them provide a better user experience at a relatively low level of legal risk (Namirial, 2023).

F. AI in Customer Authentication

Using biometric authentication methods, AI-powered voice and image recognition technologies can help secure this technology. Using deep learning algorithms, voice recognition systems automatically identify and authenticate the client by voice details or data on the voice, picture recognition systems by biometric studies of the customer, and photographs with fingerprint recognition, for instance. Biometric authentication can offer a seamless, quick, secure user experience, enabling less reliance on traditional passwords and PINs (Trnka *et al.*, 2022; Namirial, 2023).

Deploying mechanisms for regulation and compliance can help maintain AI technologies' ethical and legal standards (Arner, Barberis & Buckley, 2017). Governments can also legislate how AI systems, in many cases, are developed, deployed, and used, requiring things like data privacy, algorithm transparency, Accountability, and consumer protections (Khan *et al.*, 2020). Regulatory agencies that oversee the deployment of AI ought to also have the power to enforce that compliance and punish bad actors who fail to comply.

Affordability and accessibility of AI technology in emerging economies are critical success factors to consider when determining how banks can use these technological transformations further for social and economic development. High-performance computing systems and specialized hardware like Graphics Processing Units (GPUs) are costly. Therefore, efforts must be made to develop affordable hardware solutions that meet the needs of developing economies such as developing low-cost AI chips and providing affordable cloud-based services.

G. AI in Regulatory, Ethical, Transparency, and Privacy Compliance

AI technologies are being developed, deployed, and used with the potential to contribute to ethical, transparent, and accountable behavior. We must establish regulatory frameworks to ensure that these AIs are deployed responsibly. Regulatory frameworks and policy recommendations for responsible AI deployment include adhering to well-defined ethical guidelines and principles for developing and deploying AI acoustical guidelines and principles (Zhu *et al.*, 2022). Consequently, governments, industry associations, and international bodies may work together to create and distribute ethical guidance to establish transparent models to guide the practices of AI developers and organizations.

Banks must constantly invest in data quality assurance, data cleaning, and management practices to effectively train AI algorithms and ensure their training data are appropriate, robust, and representative of the target population. Creating well-defined data governance policies and procedures could tackle privacy, security, and compliance challenges (Khan *et al.*, 2020; Arner, Barberis & Buckley, 2017; Bose & Bastid 2019). Bias in algorithms can result in unfair outcomes, particularly about and against marginalized and underserved groups and communities. Banks should oversee bias and Fairness issues throughout the AI development lifecycle, from collecting data to designing algorithms and evaluating the model. By employing bias detection methodologies, fairness-aware algorithms, and diversity metrics, it is possible to uncover and eliminate biases in AI systems to incorporate desirable functionality, leading to fairness and inclusivity in banking operations.

IV. HOW BANKS CAN OVERCOME INFRASTRUCTURE BARRIERS THROUGH AI ADOPTION IN EMERGING MARKETS

A. High Cost of Centralized Data Storage Infrastructure

Adopting technologies that enable computation and data storage near the point of use can dramatically cut reliance on large, centralized data centers and relieve organizations of the pressure of bandwidth-intensive, high-speed internet connections. On the other hand, by deploying AI models and applications to the network edge, banks can process data at the local level (e.g., within a branch office or ATM) and provide real-time insights and services to customers. Consequently, AI adoption can reduce latency and enhance performance and resilience in environments with little internet connectivity or poor or unreliable infrastructure (Ali & Ahmed, 2021; Vaganova *et al.*, 2019).

Hybrid IT architectures, which leverage a combination of on-premises infrastructure with cloud-based and edge computing solutions can enable banks to be more agile and resilient (Korobov, 2020). Banks can use their IT investments and transition to cloud services and edge computing platforms over time. With these two hybrid architectures, banks can better utilize their resources, lower costs, and tailor their technology to their business requirements and developments (McBride, 2019). Hence, using scalable and cost-effective computing resources through cloud computing services can help overcome infrastructure limitations (Ali & Ahmed, 2021; Korobov, 2020). Cloud-based AI services can allow banks to tap AI capabilities without significant upfront investment in hardware and infrastructure. Furthermore, cloud providers also provide big data storage, processing, and analytics services, making it easier for banks to deploy AI solutions.

Collaboration with the government, telecommunication companies (Telcos), and technology companies can help circumvent limitations around infrastructure banks face (Li *et al.*, 2020; Ali & Ahmed, 2021; Vaganova *et al.*, 2019). Governments can encourage investments in digital infrastructure projects like broadband deployment and shared data center construction to improve connectivity and computing power in underserved areas. Private sector partners can bring expertise, resources, and investment to help in faster infrastructure development and AI adoption, especially in banking.

B. Lack of Requisite Technical Skills to Use AI

Not all banks and local communities must have the requisite technical capacity and expertise to derive AI benefits effectively. To overcome such barriers, banks must invest in training programs, workshops, and skill development initiatives that empower their employees with the required knowledge and skills (Reddy & Prasad, 2022). With the successful implementation of these strategies, banks particularly in developing economies can overcome infrastructure barriers to create a conducive ecosystem for AI adoption, revolutionizing the banking sector and beyond (Ali & Ahmed, 2021; Korobov, 2020). Furthermore, partnering with academic institutions and industry associations to create awareness around Science, Technology, Engineering, and Mathematics (STEM) education, and AI literacy can fuel the talent needed to accelerate AI innovation and adoption in emerging markets.

V. FINDINGS AND DISCUSSIONS

Banks can leverage technology with customized AI applications for developing economies, foster collaboration across sectors to ensure every individual can access financial services, and ultimately create inclusive growth and world development. Banks can leverage AI-powered solutions to drive operational efficiency, save costs, and improve customer experiences, thereby gaining a competitive advantage in the fast-growing banking industry.

Banks must adhere to AI principles and guidelines, designed from an ethical perspective such as transparency, accountability, and individual privacy rights including providing clear, easily understandable explanations of algorithmic decision-making processes, and potentially allowing for accountability mechanisms for monitoring and addressing risks and harms. In banking, privacy, transparency, and Accountability cover the whole panorama of AI technological deployment, from managing privacy, providing transparency in decision-making, and ensuring Accountability for decisions.

By working with stakeholders, such as customers, regulators, and civil society organizations, banks can better understand complex issues like buying and managing data and develop an intuition about ethics and trust in AI technologies to stay compliant and mitigate legal and regulatory risks. Hence, banks can expand new growth opportunities, efficiency gains, and competitive advantages in the AI era. Governments and banks should

remove barriers to access including affordability, and enhance digital literacy to widen financial inclusion. Removing barriers involves getting more people access to cheaper internet, creating training programs and educational assets for everyone to learn AI and digital technologies, and working with disadvantaged and underserved populations to make it easier and safer for them to get jobs in the digital economy.

Ethical AI design and deployment are essential because they help reduce risk and guarantee that AI technologies benefit everyone. It requires addressing data collection biases, algorithmic bias in decision-making, transparency and Accountability in AI systems, privacy rights for individuals, and protections from discrimination and unfair treatment. Banks must constantly invest in data quality assurance, data cleaning, and management practices to effectively train AI algorithms and ensure their training data are appropriate, robust, and representative of the target population. Creating well-defined data governance policies and procedures could tackle privacy, security, and compliance challenges. Banks must collaborate with Fintech startups, governments, and NGOs to drive financial inclusion through AI innovation.

Deploying mechanisms for regulation and compliance can help maintain AI technologies' ethical and legal standards. Governments can also legislate how AI systems, in many cases, are developed, deployed, and used, requiring things like data privacy, algorithm transparency, accountability, and consumer protections. Regulatory agencies that oversee the deployment of AI ought to also have the power to enforce that compliance and punish bad actors who fail to comply. As a prelude to AI adoption, introductory workshops, and practical training sessions for the bank's staff on the fundamental concepts of AI and applications are imperative. The workshops should focus on machine learning, NLP, Data Analytics, and AI ethics. During seminars and training sessions, employees should work through hands-on exercises and case studies to understand how AI technologies can be implemented in banking processes and customer services to augment financial inclusion through improved access and affordability.

VI. CONCLUSION

In conclusion, using artificial intelligence represents a ground-breaking prospect for banks in emerging economies to stimulate the financial system further, improve the efficiency of banking operations, and facilitate better customer experiences. AI technologies have helped banks to alleviate the above issues, including inadequate infrastructure, difficult regulatory regimes, and limited resources. On the other hand, a thought-out integration is a prerequisite and involves devising intelligent strategies that prioritize the local market, data protection or trust, and the workforce. AI is evolving; thus the potential of banking services in the emerging economies of Africa, Latin America, and Southeast Asia is large. However, careful planning, collaboration with the regulatory bodies, and talent development will be the

factors driving the optimum use of the technology. In the end, AI will be the tool that will drive a more inclusive and robust banking sector thus enabling new growth avenues to ensure sustainable economic growth.

CONFLICT OF INTEREST

The author declares no conflict of interest.

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