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LEVERAGING AI AND DATA ANALYTICS FOR ENHANCING FINANCIAL INCLUSION IN DEVELOPING ECONOMIES

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ABSTRACT

Financial inclusion, defined as the access and usage of financial services by all individuals and businesses, is critical for fostering economic development and reducing poverty, particularly in developing economies. However, significant portions of the population in these regions remain underserved or excluded from formal financial systems. Leveraging artificial intelligence (AI) and data analytics presents a promising avenue for addressing the challenges of financial exclusion and advancing financial inclusion in developing economies. This Review explores the role of AI and data analytics in enhancing financial inclusion. Firstly, AI technologies such as machine learning and natural language processing enable the analysis of vast datasets to identify patterns, behaviors, and creditworthiness of individuals and small businesses, thereby facilitating more accurate risk assessment and decision-making by financial institutions. Additionally, AI-powered chatbots and virtual assistants offer

personalized financial guidance and support, improving accessibility to financial services for marginalized populations who may have limited literacy or access to traditional banking channels. Moreover, data analytics plays a crucial role in expanding financial inclusion by providing insights into customer preferences, spending habits, and transaction histories. By harnessing these insights, financial service providers can tailor their products and services to better meet the diverse needs of underserved communities, thereby increasing uptake and usage of formal financial services. Furthermore, data analytics enables the development of alternative credit scoring models that leverage non-traditional data sources such as mobile phone usage and utility payments, allowing individuals with limited credit histories to access credit on favorable terms. However, several challenges must be addressed to fully realize the potential of AI and data analytics in enhancing financial inclusion. These include concerns related to data privacy and security, ensuring the fairness and transparency of AI algorithms, and bridging the digital divide to ensure equitable access to technology-enabled financial services. In conclusion, leveraging AI and data analytics holds significant promise for enhancing financial inclusion in developing economies. By harnessing the power of these technologies, policymakers, financial institutions, and other stakeholders can work towards building more inclusive and resilient financial systems that empower individuals and businesses to participate more fully in the formal economy.

Keywords: AI, Data Analytics, Financial Inclusion, Developing Economies, Leveraging.

INTRODUCTION

In developing economies, achieving financial inclusion is not merely an aspiration but a vital necessity for sustainable economic growth and poverty alleviation. Financial inclusion refers to the accessibility and usability of financial services by all individuals and businesses, irrespective of their socioeconomic status or geographic location. It encompasses essential financial services such as savings, credit, insurance, and payment systems. The significance of financial inclusion lies in its potential to empower individuals, promote entrepreneurship, and foster economic resilience within communities (Adegbite & Machethe, 2020, Chowdhury & Chowdhury, 2023, Pandey, Kiran & Sharma, 2022). However, despite its importance, numerous challenges impede the realization of widespread financial inclusion in developing economies. These challenges range from structural barriers such as limited access to formal banking services and inadequate financial literacy to regulatory constraints and infrastructural deficiencies. Millions of people remain excluded from the formal financial system, relying instead on informal and often unreliable financial mechanisms.

Addressing these challenges requires innovative solutions that can surmount traditional barriers to financial inclusion. One promising avenue is the integration of artificial intelligence (AI) and data analytics into the financial ecosystem of developing economies. AI encompasses a range of technologies, including machine learning and natural language processing, which can analyze vast datasets and derive actionable insights (Gadepally, et. al., 2019, Kasowaki & Adler, 2024, Sarker, 2022). Similarly, data analytics leverages the wealth of data generated by financial transactions to understand consumer behavior and preferences more comprehensively. By leveraging AI and data analytics, financial institutions and policymakers can unlock new opportunities to enhance financial inclusion. These technologies offer the potential to revolutionize the way financial services are delivered, making them more

accessible, affordable, and tailored to the needs of underserved populations. From improving credit scoring models to providing personalized financial guidance through virtual assistants, AI and data analytics hold the promise of overcoming longstanding barriers to financial inclusion (How, et. al., 2020, Qureshi, 2020, Yasir, et. al., 2022).

In this paper, we explore the role of AI and data analytics in advancing financial inclusion in developing economies. We examine the challenges hindering financial inclusion, the potential of AI and data analytics to address these challenges, and the implications for policymakers, financial institutions, and other stakeholders. Through this exploration, we aim to shed light on the transformative power of technology in fostering inclusive economic growth and building resilient financial systems in developing economies.

Understanding Financial Inclusion Challenges in Developing Economies

Financial inclusion, the accessibility and usability of financial services by all individuals and businesses, is crucial for economic development and poverty reduction in developing economies. However, despite its importance, significant challenges hinder the achievement of widespread financial inclusion in these regions. This review delves into three primary challenges: the lack of access to traditional banking services, limited financial literacy and awareness, and inadequate infrastructure and regulatory barriers (Erlando, Riyanto & Masakazu, 2020, Okello Candiya Bongomin & Munene, 2020, Tran & Le, 2021). One of the fundamental obstacles to financial inclusion in developing economies is the lack of access to traditional banking services. According to the World Bank's Global Findex database, approximately 1.7 billion adults worldwide remain unbanked, with the majority residing in developing countries. In many rural and remote areas, financial institutions are scarce or nonexistent, leaving millions of people without access to basic banking services such as savings accounts, credit facilities, and insurance products (Cull, Demirguc-Kunt & Morduch, 2021, Naumenkova, Mishchenko & Dorofeiev, 2019, Tram, Lai & Nguyen, 2023).

The absence of brick-and-mortar bank branches is exacerbated by geographic barriers, particularly in rural regions where transportation infrastructure is underdeveloped. As a result, individuals must travel long distances to access banking services, incurring additional costs and time burdens. Moreover, the high costs associated with maintaining physical bank branches in remote areas often render it economically unviable for financial institutions to expand their outreach. Furthermore, traditional banking services may not be tailored to the needs of marginalized populations, such as low-income individuals, women, and small-scale entrepreneurs. Banks often require extensive documentation and collateral for loan approvals, excluding those without formal employment or property ownership from accessing credit. Additionally, language barriers and cultural biases may deter certain demographic groups from engaging with formal financial institutions.

Another significant challenge to financial inclusion in developing economies is limited financial literacy and awareness among the population. Financial literacy refers to the knowledge and skills necessary to understand financial concepts, make informed decisions, and manage personal finances effectively. In many developing countries, a large portion of the population lacks basic financial literacy, hindering their ability to access and utilize financial services optimally. Limited education and awareness about financial products and services contribute to misconceptions and mistrust towards formal financial institutions. Many individuals, particularly in rural areas, rely on informal financial mechanisms such as rotating

savings and credit associations (ROSCAs) or moneylenders due to a lack of understanding of alternative options. Moreover, misconceptions about interest rates, fees, and repayment terms often deter individuals from engaging with formal banking channels (Klapper & Lusardi, 2020, Morgan & Long, 2020, Ozili, 2021).

Furthermore, cultural norms and societal pressures may perpetuate, financial illiteracy, particularly among women and marginalized communities. Gender disparities in financial literacy exacerbate existing inequalities, limiting women's access to financial resources and opportunities for economic empowerment. Therefore, efforts to promote financial literacy must be tailored to address the specific needs and challenges faced by different demographic groups. Inadequate infrastructure and regulatory barriers pose additional challenges to financial inclusion in developing economies. Limited access to reliable electricity, internet connectivity, and mobile network coverage hinders the adoption of digital financial services, which are increasingly seen as a critical pathway to expanding financial inclusion (Milazzo & Goldstein, 2019, Niyonkuru & Barrett, 2021, Walker, et. al., 2019). Without access to basic infrastructure, individuals in remote areas struggle to conduct financial transactions, access information, or engage with digital banking platforms.,

Moreover, regulatory barriers such as stringent Know Your Customer (KYC) requirements and anti-money laundering (AML) regulations may inadvertently exclude marginalized populations from accessing formal financial services. KYC regulations often mandate extensive documentation and verification procedures, which can be burdensome for individuals without formal identification or proof of address. Additionally, regulatory constraints may inhibit innovation in financial services and deter new entrants from entering the market, limiting the availability of diverse and affordable financial products. Furthermore, the lack of supportive regulatory frameworks for emerging financial technologies, such as mobile banking and digital payments, may impede their adoption and integration into the formal financial ecosystem. Without clear regulatory guidelines and consumer protections, individuals may be hesitant to embrace digital financial services, fearing fraud or exploitation (Anika, 2019, Lee, 2022, Leung, et. al., 2022).

In conclusion, understanding the challenges hindering financial inclusion in developing economies is essential for designing effective interventions and policies to address them. The lack of access to traditional banking services, limited financial literacy and awareness, and inadequate infrastructure and regulatory barriers are interconnected issues that require holistic approaches and multi-stakeholder collaboration. By addressing these challenges, policymakers, financial institutions, and other stakeholders can work towards building more inclusive and resilient financial systems that empower individuals and communities to achieve financial security and prosperity.

Role of AI in Enhancing Financial Inclusion

Artificial Intelligence (AI) has emerged as a powerful tool in the quest to enhance financial inclusion, particularly in developing economies where traditional barriers to access persist. This review explores the multifaceted role of AI technologies, including machine learning and natural language processing, in revolutionizing financial services to promote greater inclusion and accessibility. It delves into how AI is utilized for risk assessment and credit scoring, as well as for providing AI-driven customer service and personalized financial guidance (How, et. al., 2020, Mhlanga, 2020, Sampene, et. al., 2022).

AI encompasses a diverse set of technologies that enable machines to perform tasks that typically require human intelligence. Two key AI technologies that are particularly relevant in the context of financial inclusion are machine learning and natural language processing (NLP). Machine learning algorithms enable computers to learn from data and improve their performance over time without being explicitly programmed. These algorithms can analyze vast amounts of financial data to identify patterns, trends, and correlations that may not be apparent to human analysts. In the context of financial inclusion, machine learning can be used for predictive modeling, fraud detection, and risk assessment, among other applications. NLP is a branch of AI that focuses on enabling computers to understand, interpret, and generate human language in a natural way (Dwivedi, et. al., 2021, Hassani, et. al., 2020, Korteling, et. al., 2021). NLP algorithms can analyze textual data from sources such as customer inquiries, social media, and news articles to extract insights and sentiment. In financial services, NLP is used for tasks such as sentiment analysis of market news, chatbots for customer service, and automated document processing.

One of the primary applications of AI in enhancing financial inclusion is in risk assessment and credit scoring. Traditional credit scoring models often rely on limited data sources, such as credit history and income, which may exclude individuals with thin or no credit profiles. AI-powered credit scoring models leverage alternative data sources and machine learning algorithms to assess creditworthiness more accurately and inclusively. Machine learning algorithms can analyze a wide range of data sources, including transaction history, social media activity, and mobile phone usage, to generate predictive models of credit risk. By incorporating non-traditional data points, such as utility payments and behavioral patterns, AI algorithms can provide a more holistic and nuanced assessment of an individual's creditworthiness.

Moreover, AI-driven credit scoring models have the potential to mitigate biases inherent in traditional credit assessment methods. By relying on objective data and algorithms, rather than subjective judgments, AI can help reduce discrimination based on factors such as race, gender, or socioeconomic status. This can facilitate greater access to credit for underserved populations who may have been unfairly excluded from traditional banking services (Langenbacher & Corcoran, 2022, Remolina, 2022, Sadok, Sakka & El Maknouzi, 2022). In addition to credit scoring, AI is also transforming customer service and financial guidance in the context of financial inclusion. AI-powered chatbots and virtual assistants are being deployed by financial institutions to provide round-the-clock support to customers, particularly in regions where access to physical branches is limited. These AI-driven interfaces can assist customers with a wide range of queries, from account balance inquiries to loan applications, in multiple languages and dialects. By leveraging natural language processing capabilities, chatbots can understand and respond to customer inquiries in real-time, providing personalized assistance and guidance. Furthermore, AI algorithms can analyze customer data to offer personalized financial guidance and product recommendations. By understanding an individual's financial goals, preferences, and behavior, AI can tailor financial advice and product offerings to meet their specific needs. This personalized approach not only enhances the customer experience but also fosters greater engagement with financial services among underserved populations.

In conclusion, the role of AI in enhancing financial inclusion is multifaceted and transformative. From revolutionizing credit scoring to providing AI-driven customer service and personalized financial guidance, AI technologies hold the potential to expand access to

financial services and empower individuals and communities to achieve greater financial security and prosperity. However, it is essential to ensure that AI solutions are developed and deployed in an ethical and responsible manner, with appropriate safeguards in place to protect consumer privacy and mitigate potential biases. By harnessing the power of AI, policymakers, financial institutions, and other stakeholders can work towards building more inclusive and resilient financial systems that benefit everyone.

Harnessing Data Analytics for Financial Inclusion

In today's data-driven world, harnessing the power of data analytics is essential for promoting financial inclusion, particularly in developing economies where traditional barriers to access persist. This review explores the importance of data analytics in understanding customer behavior and preferences, developing tailored financial products and services, and creating alternative credit scoring models using non-traditional data sources. Data analytics plays a crucial role in understanding customer behavior and preferences, enabling financial institutions to gain valuable insights into the needs and preferences of their target audience. By analyzing data from various sources, such as transaction histories, demographic information, and social media activity, financial institutions can identify patterns, trends, and correlations that provide deeper insights into customer behavior (Nwokolo, et. al., 2023, Roberts & Lunsford, 2023, Shukla, et. al., 2023).

Understanding customer behavior allows financial institutions to anticipate their needs and preferences, thereby enabling them to offer more relevant and personalized financial products and services. For example, data analytics can help identify segments of the population that are underserved or have specific financial needs, such as small business owners or low-income households. Armed with this information, financial institutions can tailor their offerings to better meet the needs of these segments, thereby increasing their engagement and satisfaction. Moreover, data analytics can also help financial institutions identify potential risks and opportunities in the market. By analyzing market trends and consumer behavior, financial institutions can make more informed decisions about product development, marketing strategies, and risk management. One of the key benefits of data analytics in financial inclusion is the ability to develop tailored financial products and services based on insights gleaned from data analysis. Traditional financial products and services are often designed with a one-size-fits-all approach, which may not adequately meet the diverse needs of underserved populations. Data analytics allows financial institutions to segment their customer base and identify specific needs and preferences within each segment. For example, data analysis may reveal that a significant portion of the population prefers mobile banking solutions due to limited access to physical branches. Armed with this information, financial institutions can develop mobile banking apps that are user-friendly, secure, and accessible to individuals with limited technical skills. Furthermore, data analytics can also help financial institutions optimize their product offerings by identifying areas for improvement or innovation. For example, data analysis may reveal that a particular demographic group is underserved by existing financial products, prompting financial institutions to develop new products that cater specifically to their needs (Ivanchenko, et. al., 2019, Raiter, 2021, Shirazi & Mohammadi, 2019).

Traditional credit scoring models often rely on limited data sources, such as credit history and income, which may exclude individuals with thin or no credit profiles. Data analytics enables financial institutions to develop alternative credit scoring models that leverage non-traditional

data sources to assess creditworthiness more accurately and inclusively. By analyzing a wide range of data sources, such as transaction history, utility payments, and social media activity, financial institutions can build predictive models of credit risk that take into account a broader range of factors (Aggarwal, 2021, Djeundje, et. al., 2021, Rodriguez, 2020). For example, data analysis may reveal that an individual's payment history for utility bills is a reliable predictor of their creditworthiness, even if they have limited or no credit history. Moreover, alternative credit scoring models can help mitigate biases inherent in traditional credit assessment methods. By relying on objective data and algorithms, rather than subjective judgments, these models can help reduce discrimination based on factors such as race, gender, or socioeconomic status.

In conclusion, data analytics is a powerful tool for promoting financial inclusion by providing valuable insights into customer behavior and preferences, enabling the development of tailored financial products and services, and creating alternative credit scoring models using non-traditional data sources. By harnessing the power of data analytics, financial institutions can better meet the diverse needs of underserved populations and empower individuals and communities to achieve greater financial security and prosperity. However, it is essential to ensure that data analytics is used responsibly and ethically, with appropriate safeguards in place to protect consumer privacy and mitigate potential biases.

Addressing Challenges and Considerations

As developing economies strive to leverage artificial intelligence (AI) and data analytics to enhance financial inclusion, they must navigate a range of challenges and considerations. Ensuring data privacy and security, fostering fairness and transparency in AI algorithms, and bridging the digital divide to ensure equitable access to technology are among the most critical issues that policymakers, financial institutions, and other stakeholders must address. This review explores these challenges and considerations in detail and discusses potential strategies for overcoming them. One of the foremost challenges in leveraging AI and data analytics for enhancing financial inclusion is ensuring the privacy and security of personal and financial data (Kshetri, 2021, Mhlanga, 2020, Mhlanga, 2021). In the digital age, vast amounts of data are generated and collected by financial institutions, governments, and other entities, raising concerns about the potential misuse or unauthorized access to sensitive information.

Developing economies, in particular, may lack robust regulatory frameworks and enforcement mechanisms to safeguard data privacy effectively. Moreover, the proliferation of mobile banking and digital payment systems has increased the risk of data breaches and cyberattacks, threatening the confidentiality and integrity of financial data. To address these challenges, policymakers must enact comprehensive data protection laws and regulations that establish clear guidelines for the collection, storage, and use of personal data. Financial institutions must implement robust cybersecurity measures, such as encryption, multi-factor authentication, and intrusion detection systems, to safeguard against data breaches and cyber threats (Bennett & Raab, 2020, Mitchell & Mishra, 2019, Rustad & Koenig, 2019).

Furthermore, fostering a culture of transparency and accountability is essential for building trust among consumers and stakeholders. Financial institutions should be transparent about their data practices and provide clear explanations of how customer data is collected, used, and shared. Additionally, consumers must be empowered with greater control over their data through mechanisms such as consent management tools and data portability rights. Another

critical consideration in leveraging AI for financial inclusion is ensuring the fairness and transparency of AI algorithms. AI systems are susceptible to bias, both in the data used to train them and the algorithms themselves, which can result in discriminatory outcomes and perpetuate existing inequalities.

In developing economies, where historical data may be limited or biased, AI algorithms may inadvertently reinforce social, economic, or cultural biases. For example, if credit scoring models are trained on data that disproportionately represents certain demographic groups, such as urban residents or individuals with formal employment, they may systematically disadvantage marginalized populations, such as rural or informal workers (Schwartz, et. al., 2022, Yu, 2020, Zajko, 2021). To address bias and promote fairness in AI algorithms, stakeholders must prioritize diversity and inclusion in data collection, model development, and testing processes. This requires ensuring that datasets are representative of the population being served and free from discriminatory biases. Moreover, financial institutions must implement measures to monitor and mitigate bias in AI algorithms, such as algorithmic audits, bias detection tools, and fairness impact assessments. Transparency is also crucial, with financial institutions being transparent about the factors and criteria used in AI decision-making processes.

Additionally, fostering collaboration between AI developers, domain experts, and affected communities can help identify and address potential biases in AI algorithms. By incorporating diverse perspectives and feedback, stakeholders can work together to develop AI systems that are fair, transparent, and equitable. Bridging the digital divide is essential for ensuring equitable access to technology-enabled financial services in developing economies. While advancements in technology have the potential to expand access to financial services, significant disparities in access to digital infrastructure and resources persist, particularly in rural and underserved areas.

Limited access to reliable internet connectivity, smartphones, and digital literacy skills poses significant barriers to accessing digital financial services for millions of individuals in developing economies (Pazarbasioglu, et. al., 2020, Rana, Luthra & Rao, 2020, Thaddeus, Ngong & Manasseh, 2020). Moreover, cultural and linguistic barriers may further exacerbate disparities in access to technology, particularly for marginalized populations. To bridge the digital divide, policymakers must prioritize investments in digital infrastructure, including expanding broadband connectivity and improving network reliability in remote and underserved areas. Additionally, efforts to promote digital literacy and skills development are crucial for empowering individuals to navigate digital financial services effectively.

Financial institutions can also play a role in bridging the digital divide by developing user-friendly and accessible digital platforms that cater to the needs of diverse populations. This may include providing multilingual interfaces, simplified user interfaces, and educational resources to support users with limited digital literacy skills. Furthermore, fostering partnerships between governments, financial institutions, technology providers, and civil society organizations can facilitate collaborative efforts to address barriers to digital inclusion. By leveraging collective expertise and resources, stakeholders can develop holistic solutions that promote equitable access to technology-enabled financial services and enhance financial inclusion for all (Afjal, 2023, Baart, et. al., 2019, Torres, Jofre & Lizardi, 2020).

In conclusion, addressing the challenges and considerations of leveraging AI and data analytics for enhancing financial inclusion in developing economies requires a concerted effort from policymakers, financial institutions, and other stakeholders. By prioritizing data privacy and security, fostering fairness and transparency in AI algorithms, and bridging the digital divide to ensure equitable access to technology, stakeholders can unlock the transformative potential of AI and data analytics to empower individuals and communities to achieve greater financial security and prosperity.

Case Studies and Success Stories

In recent years, numerous initiatives leveraging artificial intelligence (AI) and data analytics have emerged to enhance financial inclusion in developing economies. These initiatives encompass a wide range of applications, from credit scoring to customer service, aimed at expanding access to financial services for underserved populations. This review explores examples of AI and data analytics initiatives for financial inclusion, assesses their impact on improving access to financial services, and identifies lessons learned and best practices for implementation (Mogaji & Nguyen, 2022, Qureshi, Rea & Johnson, 2021, Strusani & Hounghonon, 2019).

M-PESA, launched by Safaricom in Kenya in 2007, is one of the most successful mobile money platforms globally. Leveraging AI and data analytics, M-PESA enables users to transfer money, pay bills, and access other financial services using their mobile phones. By analyzing transaction data and customer behavior, M-PESA has been able to develop tailored financial products and services that meet the needs of its users, including microloans and savings accounts. JUMO, a fintech company based in Africa and Asia, uses AI and machine learning algorithms to provide financial services to underserved populations. By analyzing alternative data sources, such as mobile phone usage and social media activity, JUMO develops credit scoring models that assess the creditworthiness of individuals with limited or no formal credit history. This enables JUMO to offer microloans and other financial products to individuals who may have been excluded from traditional banking services.

Tala, a mobile lending platform operating in East Africa and Southeast Asia, utilizes AI and data analytics to provide instant loans to underserved populations. By analyzing smartphone data, including call and text history, Tala assesses the creditworthiness of users and determines their eligibility for loans. This data-driven approach enables Tala to reach individuals who may not have access to formal banking services and provide them with much-needed financial support. The impact of AI and data analytics initiatives for financial inclusion in developing economies has been significant, leading to greater access to financial services and improved financial outcomes for underserved populations. These initiatives have enabled millions of individuals to access credit, savings, and other financial products that were previously out of reach.

For example, M-PESA has revolutionized the way people in Kenya and other African countries access financial services, with over 45 million active users and billions of dollars in transactions processed annually. The platform has facilitated greater financial inclusion by providing a convenient and accessible way for individuals to send and receive money, pay bills, and access other financial services. Similarly, JUMO and Tala have made significant strides in expanding access to credit for underserved populations in Africa and Asia. By leveraging AI and alternative data sources, these platforms have been able to reach individuals who may have

been excluded from traditional banking services and provide them with access to much-needed financial resources. As a result, borrowers have been able to invest in education, healthcare, and small businesses, leading to improved livelihoods and economic empowerment.

Several lessons can be drawn from the success of AI and data analytics initiatives for financial inclusion in developing economies: Leveraging alternative data sources, such as mobile phone usage and social media activity, can provide valuable insights into the financial behavior and creditworthiness of underserved populations (Gathu, 2020, Lu, Zhang & Li, 2019, Lu & Zhang, 2023). Designing user-friendly and accessible platforms is essential for reaching individuals with limited digital literacy skills and ensuring that they can navigate financial services effectively. Collaboration between governments, financial institutions, fintech companies, and other stakeholders is crucial for driving innovation and scaling initiatives for financial inclusion. Establishing robust data protection measures and ensuring compliance with regulatory requirements are essential for building trust among consumers and protecting their privacy. Investing in financial literacy and education programs can empower individuals to make informed financial decisions and maximize the benefits of accessing financial services. In conclusion, AI and data analytics have emerged as powerful tools for enhancing financial inclusion in developing economies. Initiatives such as M-PESA, JUMO, and Tala have demonstrated the transformative potential of leveraging AI and alternative data sources to expand access to financial services and improve financial outcomes for underserved populations. By embracing best practices and lessons learned from these initiatives, policymakers, financial institutions, and other stakeholders can accelerate efforts to promote greater financial inclusion and empower individuals and communities to achieve greater financial security and prosperity.

Future Directions and Recommendations

As the world continues to grapple with the challenges of financial exclusion, leveraging artificial intelligence (AI) and data analytics holds immense potential for promoting greater financial inclusion in developing economies. However, to realize this potential fully, it is essential to identify future directions and recommendations for advancing the use of AI and data analytics in enhancing financial inclusion. This review explores potential areas for further research and innovation, policy recommendations to promote the adoption of AI and data analytics, and collaboration opportunities among stakeholders to advance financial inclusion efforts in developing economies (Boukherouaa, et. al., 2021, Chadha, et. al., 2023, Sector & Itu, 2019).

Further research is needed to improve the quality and accessibility of data in developing economies. This includes efforts to standardize data collection methods, enhance data sharing mechanisms between public and private sectors, and address data privacy concerns to unlock the full potential of AI and data analytics for financial inclusion. Future research could focus on exploring innovative AI-driven financial products and services tailored to the needs of underserved populations. This may include AI-powered savings and investment platforms, microinsurance products, and personalized financial education tools to promote greater financial resilience and empowerment.

As AI technologies continue to evolve, policymakers must develop regulatory frameworks that facilitate innovation while protecting consumers and ensuring fairness and transparency. Future research could focus on exploring ways to integrate AI into existing regulatory

frameworks and develop guidelines for responsible AI adoption in financial services. Further research is needed to address bias and ethical considerations in AI algorithms used for financial inclusion. This includes developing methodologies for detecting and mitigating bias in AI models, establishing standards for ethical AI deployment, and promoting diversity and inclusion in AI development teams.

Policymakers should establish a supportive regulatory environment that encourages innovation while safeguarding consumer rights and privacy (Akther, 2023, Fefer, 2020, Lee, 2019). This includes developing clear guidelines for AI adoption, data protection laws, and regulatory sandboxes to facilitate experimentation with AI technologies in financial services. Governments should prioritize investments in digital infrastructure, including broadband connectivity, mobile networks, and digital literacy programs, to bridge the digital divide and promote equitable access to technology-enabled financial services. Policymakers should encourage data sharing and collaboration among stakeholders, including financial institutions, fintech companies, government agencies, and civil society organizations, to unlock the full potential of AI and data analytics for financial inclusion. Governments and international organizations should invest in capacity building and training programs to build the skills and expertise needed to harness AI and data analytics for financial inclusion. This includes training data scientists, AI developers, and policymakers on the ethical and responsible use of AI in financial services.

Collaboration between governments, financial institutions, fintech companies, and civil society organizations is essential for driving innovation and scaling initiatives for financial inclusion. Public-private partnerships can facilitate knowledge sharing, resource mobilization, and coordinated action to address systemic barriers to financial inclusion. International organizations and development agencies can play a pivotal role in facilitating multilateral cooperation and coordination efforts to advance financial inclusion globally. This includes sharing best practices, funding research and innovation initiatives, and advocating for policy reforms that promote inclusive and sustainable development (Anakpo, Xhate & Mishi, 2023, Danladi, et. al., 2023, Danladi, Modibbo & Prasad, 2023).

Collaboration with local communities and grassroots organizations is critical for ensuring that AI and data analytics initiatives for financial inclusion are contextually relevant and responsive to the needs of underserved populations. Engaging with community leaders, conducting participatory research, and co-designing solutions with end-users can help build trust and foster sustainable impact. Stakeholders should prioritize knowledge sharing and capacity building initiatives to empower individuals and organizations with the skills and expertise needed to leverage AI and data analytics for financial inclusion. This includes organizing workshops, conferences, and training programs to exchange insights, share lessons learned, and build networks of collaboration (Amoako & Asuamah Yeboah, 2023, Boustani, Sayegh & Boustany, 2022, Chan, et. al., 2021).

In conclusion, leveraging AI and data analytics for enhancing financial inclusion in developing economies requires a concerted effort from policymakers, financial institutions, fintech companies, and other stakeholders. By focusing on future research and innovation, implementing policy recommendations to promote AI adoption, and fostering collaboration among stakeholders, we can unlock the transformative potential of AI and data analytics to empower individuals and communities to achieve greater financial security and prosperity.

CONCLUSION

In the quest for inclusive economic growth and poverty reduction, leveraging artificial intelligence (AI) and data analytics stands out as a transformative strategy for enhancing financial inclusion in developing economies. Throughout this exploration, we've emphasized the pivotal role of AI and data analytics in breaking down barriers to financial access and empowering underserved populations. As we draw to a close, it is crucial to recapitulate the significance of leveraging AI and data analytics, summarize the key insights and implications gleaned from our discussion, and issue a call to action for continued efforts to build inclusive financial systems in developing economies.

Financial inclusion is not just a matter of convenience; it is a fundamental driver of economic development and social equity. Yet, traditional barriers such as limited access to banking services, low financial literacy, and regulatory constraints have impeded progress in achieving widespread financial inclusion. In this context, AI and data analytics emerge as powerful tools that can revolutionize the landscape of financial services delivery, offering tailored solutions, and expanding access to previously excluded populations.

By harnessing AI technologies such as machine learning and natural language processing, financial institutions can gain deeper insights into customer needs, develop personalized financial products and services, and create innovative credit scoring models. These advancements have the potential to transform the financial landscape, enabling individuals and communities to access essential financial services, build assets, and improve their overall well-being.

Our exploration of AI and data analytics initiatives for financial inclusion in developing economies has yielded several key insights and implications. Firstly, there is a clear demonstration of the transformative impact of AI and data analytics in expanding access to financial services and promoting economic empowerment. Success stories such as M-PESA, JUMO, and Tala underscore the potential of AI and data analytics to drive inclusive growth and alleviate poverty. Secondly, while AI and data analytics offer significant opportunities for financial inclusion, they also present challenges and considerations that must be addressed. Ensuring data privacy, fairness, and transparency, as well as mitigating biases in AI algorithms, are critical imperatives to safeguard consumer rights and promote equitable access to financial services.

As we look to the future, there is a pressing need for continued efforts to build inclusive financial systems in developing economies. This requires a collective commitment from governments, financial institutions, fintech companies, and civil society organizations to harness the transformative potential of AI and data analytics responsibly and ethically. We must prioritize investments in digital infrastructure, regulatory reforms, and capacity building initiatives to ensure that AI and data analytics are deployed in a manner that promotes financial inclusion and empowers marginalized communities. Moreover, fostering collaboration, knowledge sharing, and partnerships will be essential for driving innovation, scaling initiatives, and accelerating progress towards building inclusive financial systems that leave no one behind. In conclusion, leveraging AI and data analytics for enhancing financial inclusion in developing economies offers a pathway to create a more equitable and prosperous future for all. By embracing the opportunities presented by AI and data analytics while addressing the associated challenges and considerations, we can build inclusive financial systems that

empower individuals and communities to thrive in the digital age. Let us seize this moment and redouble our efforts to build a more inclusive and sustainable world for generations to come.

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