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Integration of artificial intelligence in digital financial inclusion: A conceptual study

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Abstract
The recent era is witnessing a massive change in the domain of financial inclusion. Digital financial services are consistently spreading the wings and trying to engulf the existing empire of financial inclusion through traditional services. Decades of researches have advocated the positive impact of financial inclusion through traditional services on
economic growth. Hence it is pertinent to examine the impact of digital financial inclusion thoroughly and continuously in this context. The purpose of this work is to study the impact of digital finance on financial inclusion and the effect of Artificial Intelligence (AI) on digital financial inclusion. The study observed the use of various Artificial Intelligence tools and applications by the Fintech companies in order to make digital financial inclusion a success. The present study found that Artificial Intelligence has a strong influence on digital financial inclusion. The investigation found that Artificial Intelligence is transforming the financial inclusion through the extensive use of algorithms to automate risk detection, management and measurement. Providing prompt and efficient customer support and helpdesk through chatbots, ensuring advanced consumer protection through fraud detection and cyber security, overcoming the problem of information asymmetry; are few among the various benefits of applying Artificial Intelligence tools in digital financial inclusion. Thus, the study recommends that the various strategies and initiatives adopted by government and non-government institutions and agencies towards financial inclusion must use the platform of digital finance. Government may also take initiatives to implement and apply various Artificial Intelligence tools in all financial institutions in order to bring maximum number of people of this country into an organized financial system.

Keywords: Artificial intelligence, digital finance, financial inclusion, innovative financial technology

1. Introduction
The recent era is witnessing a massive change in the domain of financial inclusion. Digital financial services are consistently spreading the wings and trying to engulf the existing empire of financial inclusion through traditional services. Decades of researches have advocated the positive impact of financial inclusion through traditional services on
economic growth. Hence it is pertinent to examine the impact of digital financial inclusion thoroughly and continuously in this context.

2. Objective of the study
The purpose of this work is to study the impact of digital finance on financial inclusion and to investigate the effect of Artificial Intelligence (AI) on digital financial inclusion.

3. Literature Review
Plenty of researches have tried to investigate the impact of digital finance on financial inclusion in recent times. In the era of digitalization digital finance and integration of Artificial Intelligence (AI) on digital financial inclusion are extremely pertinent areas of research. Some of the glimpses are stated in this study.
As mentioned by Hassani *et al*. (2020) [15], artificial intelligence was introduced in the year 1956 at a computing conference.
Vittaldas Leeladhar (2005) mentioned that "financial inclusion is the delivery of banking services at an affordable cost to the vast sections of disadvantaged and low-income groups. Unrestrained access to public goods and services is the sine qua non of an open and efficient society.

As banking services are in the nature of public good, it is essential that availability of banking and payment services to the entire population without discrimination is the prime objective of the public policy."

According to the research of Alka Singh (2017), technology was found as a major enabler in the process of providing banking services to the needs of a larger section of society.

Chhavi Kiran (2018) found that with regard to branch penetration financial inclusion is increasing in India consistently. The study concluded that in rural areas and segments, more efforts are required towards the improvement of quality of financial services. The study also found that the rapid growth and changes in technology have helped to take care of this issue.

Durai and G. (2019) researched in this domain and examined the impact of digital finance on financial inclusion. With the help of statistical tool One Way ANNOVA the study tried to attain the objective of the work. The tools of digital finance that are examined in the work are debit card, credit card, internet banking, mobile banking and mobile wallets. Positive impact of Convenience, Usability, Accurate timing, Low service charge, and easy interbank account facility was found the financial inclusion.

(Ozili, 2020) [13] evaluated various alternatives of Digital Finance to check whether it promotes FI and is it suitable for poor people as it is being advertised by majority of authorities and providers. The study was conceptual in nature as it was based on various publications from reputed and authentic sources. Concluding remarks of the study highlighted that the DF exposes poor and marginalized people to financial risk against only one benefit offered i.e. better financial decision making by information it provides. The researcher suggested that DF for poor should come with lower or no risk option and that can be done with separate arrangement only. Thus, Govt. and service providers should think in this direction.

(Nandru, Madhavaiah, & Velayutham, 2021) conducted a study to explore the actual status of Digital FI in India with the help of World Bank's Global Findex Database. The study measured the usage and accessibility of DFS against demographic variables. It revealed that socio-economic factors of the respondents had significant impact on accessibility of financial services and usage of the same. Which means that low income and lack of education in population are the barriers to adoption and usage of digital financial services. Digital financial services can be helpful in improving FI of financially excluded individuals having education and belonging to lower middleclass and above group.

(Sahu, Nayak, & Swain, 2021) conducted a study to measure the impact and effectiveness of DFS on FI in India, the study was done considering the tools such as 53 Agency, Internet and Mobile Banking services. Regression model was deployed in analysis. The study found that there was no significant impact of DF on FI. It was noted that the promotion of adoption of DFS is just a competitive strategy of banks and not FI measure. The study suggested that banks should focus on providing better quality services at branches to improve FI.

4. Discussion and Findings

With reference to the literature survey it may be mentioned that digital finance plays an important role in financial inclusion in this era of digitalization. Wide acceptance of digital payment among the merchants and their consumers may be regarded as a prominent factor in this regard. Integration of Artificial Intelligence in the endeavour of successful implementation digital financial inclusion may be regarded as another milestone achieved in this journey. Reducing the barriers to entry in the Fintech industry and reducing the licensing requirements for entry into the digital finance ecosystem for Fintech firms may help in making digital financial inclusion a success. Developing the trust in digital financial services among people, enhancement in security of digital financial services and affordable service offerings in this platform may help the financial sector to bring in maximum number of people in the financial network. Digital financial inclusion offers a wide range of benefits. Providing access to all kinds of formal financial services like payments, transfers, savings, credit, insurance, securities, etc; Encouraging digital payments, transfers, savings, credit, insurance and investments; Encouraging government-to-person digital payments; Lower cost of digital transactions for customers and providers of digital financial services are some of them. Instruments for digital financial inclusion e-money accounts, debit cards, credit cards, mobile money, internet banking, retail point of Sale (PoS) terminals and agent networks.

The Influence of Artificial Intelligence has been observed in facilitating Digital Financial Inclusion in the existing researches. It has been found that Fintech companies are rapidly opting for application of Artificial Intelligence applications to manage and detect risk, for risk measurement, for fraud detection, for enhancing consumer protection and many more. Furthermore, it has also being used in domains like market impact analysis, chatbots, credit scoring, capital optimization, trade signalling, and 'reg tech' applications.

Artificial Intelligence is helping the financial sector to progressively gain customers' trust and confidence through enhancing Cyber Security and Fraud Detection. The security aspect of digital finance is a big concern and Artificial Intelligence is having the capability to provide high level security in online finance. This dimension makes it possible for the people at the bottom of the pyramid concerning financial inclusion to be able to participate in the formal financial sector (Reim *et al*. 2020). Further, fintech companies are using AI applications to advance consumer protection and user experience, manage risk, detect fraud in many countries. Various national stock exchanges in many countries are contemplating the use machine learning to identify market patterns to improve monitoring and prevent manipulation of its high-frequency trading (HFT) markets (Journal of Digital Banking 2019). In reality, AI-enabled cybersecurity systems are increasingly being used to guard against and prevent possible security breaches. In addition, AI is influencing wealth management through robot advisors that provide automated financial planning services like tax planning advice, insurance advice, health, investment advice and many other crucial services (Journal of Digital Banking 2019). Efficient customer service is the foundation offinancial sector and Artificial Intelligence may also be integrated in Customer Support System and Helpdesk through Chatbots. Banks are offering an electronic virtual assistant (EVA). Moreover, with AI, financial institutions can provide personalized banking where chatbots and AI assistants, use AI to come up with personalized financial advice and natural language

processing to provide instant, self-help customer service. Besides, AI is used as a relationship manager, banks are introducing chatbots for this purpose. This allows vulnerable households in rural areas to access financial advice and help which they cannot enjoy when dealing with human beings. The HDFC bank of India has already introduced a chatbot for relationship manager purposes. Additionally, Artificial Intelligence may address the problem of Information Asymmetry. Digital financial inclusion through AI can have access to various online shopping platforms and various online social networks which produces a large amount of information on individuals which will help to do away with the problem of information asymmetry between financial institutions and individuals (Wang and He 2020). Moreover, Artificial Intelligence is transforming financial inclusion through the widespread use of algorithms to automate risk detection management and measurement (Muneeza *et al*. 2018) [10]. The use of AI is making it possible for the previously excluded groups to be able to access financial services using various digital tools such as cell phones or instruments like payment cards that can be used to connect with digital devices like point of sale terminals.

5. Conclusion and Recommendations

The research was premised on investigating the impact of AI on digital financial inclusion. Digital financial inclusion is becoming central in the debate on how to ensure that people who are at the lower levels of the pyramid become financially active. On the other hand, fintech companies are taking advantage of the availability of AI to apply its applications to ensure that the goal of digital financial inclusion is realized that is to include groups of low-income earners, the poor, women, youths, small businesses in the mainstream financial market. The study discovered that AI has a strong influence on digital financial inclusion in areas related to risk detection, measurement and management, addressing the problem of information asymmetry, availing customer support and helpdesk through chatbots and fraud detection and cyber security. On the aspect of risk, AI is transforming financial inclusion through the widespread use of algorithms to automate risk detection management and measurement. This enables vulnerable groups of women, youths and small businesses such as smallholder farmers, who were excluded from the formal financial market in the traditional banking sector driven by issues around risk, to access banking services. Considering issues related to information asymmetry, digital financial inclusion through AI can have access to various online shopping platforms and social networks which produces a large amount of information on individuals; this will help to do away with the problem of information asymmetry between financial institutions and individuals, thus increasing the financial inclusion. These are some of the areas where AI is influencing digital financial inclusion among many other issues discussed. It is also important to note that though many people have a lot of misgivings about AI in the industry 4.0, it is, however, important to notice that AI is providing substantial assistance in the digital financial inclusion sphere. Therefore, this study recommends that financial institutions and non-financial institutions adopt and scale up the use of AI as it presents benefits in the quest to ensure that people who were previously unable to participate in the formal financial market can do so with ease.

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