



AI-Based Central Bank Digital Currencies: Fintech to Financial Inclusion

Aishwarya S.

Ph.D. Scholar, Management Faculty, SRM IST, KTR. Email ID: saishu1998@gmail.com

DOI : <https://doi.org/10.5281/zenodo.17316174>

ARTICLE DETAILS

Research Paper

Accepted: 22-09-2025

Published: 10-10-2025

Keywords:

Digital currencies, financial inclusion, CBDCs, cryptocurrencies, mobile money, digital wallets, Bitcoin, financial empowerment, AML, KYC, digital literacy, fintech policy, global development.

ABSTRACT

The Evolving Global Payment Landscape research book on AI-enabled digital currencies that facilitate financial inclusion provides a critical and interdisciplinary approach to the analysis of digital financial technologies (i.e., cryptocurrencies, blockchain, stablecoins, and digital currencies (CBDCs)). Based on the theories of inclusive finance, development economics, and digital innovation, the work discusses the structural obstacles that stop marginalized groups of people from accessing formal financial services, such as poverty and informality. This paper identifies certain variables that determine the success or failure of digital currencies. It integrates theoretical analysis with control assessment to examine how digital currencies can enhance the financial ecosystem's affordability, accessibility, and participation. The main results are that digital currencies significantly lower the cost of transactions, facilitate mobile-based financial services, and enable programmable financial tools of inclusion, including conditional transfers and microloans, particularly in the global South. The book ends by providing a policy-technology-society model of the requirements to establish inclusive, secure, and scalable digital currency systems.

INTRODUCTION

The history of payment systems demonstrates the persistence of the relevance of security in transactions. Beginning with a barter system, in which goods and services were exchanged directly, the weaknesses of



these systems (i.e., the necessity of having a double coincidence of wants) were the origins of money (Asokan et al., 1997). Initial forms of money, such as precious metals and coins, made transactions more standardized and facilitated trade networks to become larger (Tapscott and Tapscott, 2016; Kuroda, 2020).

During this period, there is a digital revolution in payment systems. The decentralization and the lack of trust in the transaction systems centered on blockchain technology became feasible only with the introduction of cryptocurrencies such as Bitcoin, which was launched in 2009 (Nakamoto, 2008; Werbach, 2018).

At the same time, the central banks of the world are considering digital currencies (CBDCs) to promote the efficiency and inclusivity of payments and retain regulatory control (Auer et al., 2020). The new technology of artificial intelligence (AI) and decentralized finance (DeFi) adds to this change because they automate the processes, increase security, and disrupt established financial intermediaries (Krause, 2024).

The purpose of the research is to analyse the intersection of digital currencies and new technologies, in particular, central bank digital currencies, cryptocurrencies, artificial intelligence, and decentralized finance. The paper examines the possible synergies of these innovations, which include better cross-border payment systems, increased financial inclusion, and increased operational efficiency. Lastly, it will assess the implications of these technologies on the global financial infrastructure in the future, such as the potential for integration or competition of these systems. The trend of combining digital currencies and new technologies will probably transform the financial world internationally. The payment systems can be taken to a new level of efficiency and inclusivity by adding innovations such as CBDCs, cryptocurrencies, AI, and DeFi. But the achievement of these benefits will entail creative regulatory and technological approaches to overcome interoperability, security, and ethics challenges.

CENTRAL BANK DIGITAL CURRENCIES

CBDCs are sovereign currencies that exist in digital form and are controlled and issued by central banks. CBDCs are centralized in contrast to decentralized networks of cryptocurrencies, which gives more control to the governments over monetary systems (Ozili, 2023). CBDCs are widely divided into two, namely, retail and wholesale. CBDCs for the general population are meant to be used by people and businesses conducting direct transactions with the central bank (Morales-Resendiz et al., 2021).



They aim to displace physical money and provide a convenient and safe, and efficient means of exchange. Wholesale CBDCs will be restricted to financial institutions and will mainly be used to carry out interbank relations and settlements, which will make the large-scale financial system more efficient and less prone to counterparty risks. (Opare et al., 2020)

FEATURES OF AI-BASED CBDCS.

CBDCs are associated with a wide range of advantages that would have the power to change the global financial infrastructure (Chiu and Davoodalhosseini, 2023). CBDCs have the potential to enhance the financial inclusion of unbanked groups, especially in developing economies, where banking infrastructure is not very accessible (Auer et al., 2021). CBDCs also enhance efficiency in payment, making it real-time and cheaper in operation than the current systems, such as SWIFT or Automated Clearing Houses (ACH). More so, programmable money can facilitate new monetary policy practices due to the presence of CBDCs. CBDCs can be developed by governments to fulfill certain policy agendas, including subsidizing certain goods or rates to negative levels to stimulate expenditure during recessions (Bao et al., 2022). Also, CBDCs would allow central banks to have more visibility and control over currency flows and help them fight illicit financial operations. (Zhang, 2024)

III. Blockchain technology and cryptocurrencies.

Cryptocurrencies are a concept that signifies a paradigm shift in the way financial transactions are made, and with the introduction of decentralized, unregulated systems that require no intermediary, such as a bank or payment processor. Cryptocurrencies are characterized by their utilization of distributed tally technology(DLT), the most evident type of which is blockchain(Nakamoto, 2008). A blockchain is a resistant tally that is secure and has no tampering, and in which deals are stored in sequential blocks, and validated by agreement mechanisms, such as proof of work(PoW) or proof of stake(Pos). Besides documenting deals, blockchain technology supports smart contracts -tone-running contracts encoded into the blockchain. (Buterin, 2013; 7 Zheng et al., 2020)

LITERATURE REVIEW

The results of the research in the present paper denote the comparisons between the counter accusations of the fiscal system on the CBDC and the crypto means, stablecoins, and narrow bank digital plutocrat, and indicate the absence of similarity and differences in counter accusations. This means that CBDC would not bring change to the fiscal system.



(Peterson K. Ozili.,2024). This writer concludes that a bit of thoughtful consideration is required of central banks in the implementation of artificial intelligence in the central bank currency period, because part of creating a sustainable CBDC will involve growing.

CENTRAL BANK DIGITAL CURRENCIES(CBDCS)

CBDC is a type of central bank money in electronic form, which is implicitly widely used by homes and businesses to store value and make payments. It is a digital steward in the central bank in the sense of a plutocrat. This renders CBDCs safer and less random than other digital currencies. (CBDC), meaning some sort of central bank plutocrat, mediated through electronic means and accessible to the mass market, can be viewed as a third variant of the base plutocrat, coming to overnight deposits with the central bank, currently open only to banks, particular non-bank fiscal establishment, and the bills of some approved depositors in the sector, is very much accessible and arguably relatively ineffective, and relies on vintage technology. Other publications draw a difference between the case of non-commercial and general-purpose CBDC, where the former can only be accessed by a specific number of enterprises, but the ultimate is available to all users.

MOTORISTS OF CBDCS.

The necessity to have CBDCs is due to the accelerated digitisation of husbandry, the necessity to have real-time payments and agreements, and more effective financial relations domestically and internationally. The International Monetary Fund(IMF) notes that centralised technology akin to CBDCs can lower charges, grease the smooth movement of money, fiscal addition, and provide safer accessibility to money via digital mediums. Conversely, many central banks are also feeling the growing presence of digital currency and are apprehensive about the indirect effects on the fiscal system. We have associated the following four essential motorists that have driven central banks to consider CBDCs.

1. Furthering the computerisation of husbandry.
2. Automation of existing payment systems.
3. Improving the financial and financial policy.
4. perfecting fiscal addition

KEY DESIGN CONSIDERATIONS AND ADOPTION ENABLED.



They derive in the process three considerations that are of central importance to central banks in CBDC design processes. First, CBDC will be government-guaranteed and have a legal status as a currency. CBDC has to be directly supported by the government so that it can be tokenized. Second, the banking and credit risk of the custodian and financial institution should not be transferred to the use and deposit of CBDC. Otherwise, the possibility of a bank run and utilizing alternative platforms may be present since not every online statutory institution poses an equal risk. Third, both the public and private sectors must collaborate in the design of a new CBDC. In the case of cross-border remittance, strict regulation must allow innovation to take place.

Table 1.0 Key adoption and key enablers.

Factors of Optimal Integrated Ecosystem	Critical Enablers for mass adoption
Integrated and Enabling Infrastructure	Digital Identification Data Privacy Protection Interoperable Value Transfer Gateway Talent, Knowledge, and Skills
Global Cooperative Standard and Compliance	Compliance Easy Comprehensive Data and Oracle Ecosystem Open-source and Trust Distribution Governance
Accessibility, Inclusivity of Storage, and Exchange	Digital Literacy and User Experience Strong Security Frameworks Fast and Stable Network

AI-POWERED CBDCs AND FINANCIAL INCLUSION

AI-driven Central Bank Digital Currencies (CBDCs) have the potential to help combat fiscal exclusion a great deal by providing evidence-based services, improving security, and reducing barriers to entry among the unbanked. Education Chatbots provide AI-enabled services to detect fraud, to build trust, provide personal recommendations on using CBDCs, and assist informal businesses with digital records to alleviate access to credit. Having fiscal services more accessible and secure, and stoner-friendly, AI-integrated CBDCs can eventually lead to the conversion of large numbers of unbanked people into the formal economy, increasing fiscal success and profitability.

AI-based CBDCS and financial inclusion are the two aspects that need to be improved.

• **PERSONALIZED SERVICES AND INSTRUCTION.**



The bot-driven services on AI may provide acclimatized guidance on the usage of CBDCs, propose offers, and respond to stoner inquiries, streamlining the relinquishment procedure among the less digitally and fiscally savvy.

- **ADVANCED SECURITY AND TRUST**

It may provide AIs to assist and detect the fraudulent conditioning, and CBDC systems will be safer and format stoner trust, which is central to promoting relinquishment.

- **FACILIATING FORMALIZATION**

To unbanked people and informal companies, the digital records created by CBDCs, it's build a fiscal history, perfect access to credit, and formal financial products.

- **CUSTOMIZED FINANCIAL TOOLS**

AI can facilitate the creation of justified fiscal products and services based on the history of selling CBDC to a stoner, which can be integrated into the fiscal system further.

ADVANTAGES TO NON-INDUSTRIAL PEOPLE AND THE AUSTERITY.

- **More Access to Financial Services.**

CBDCs can expand payment services to low-income and remote populations who are poorly served by commercial banks, including offline payments and being accessible on a colourful tackle.

- **Fewer expenses on Informal Businesses.**

CBDCs can enable informal sector businesses and workers to move to the formal sector by providing a cheap method of receiving digital payments.

- **More Economic Stability and Growth.**

CBDCs can result in a larger duty base and a terrain in which businesses are more deposited to invest and grow by banking large unbanked populations and reducing informality.

DIFFICULTIES AND ISSUES.

- **digital and fiscal knowledge:** A abecedarian hedge of digital product relinquishment, such as CBDCs, is a gap in digital and fiscal knowledge, which should be filled.



- **access to structure:** A prerequisite to CBDC relinquishment, at least by vulnerable groups, is access to digital networks, electricity, and relevant tackle bias.
- **Policy and design:** When implementing and formalizing CBDCs, policymakers should take into account a variety of factors, and they should not be seen as an isolated outcome but as a component of a larger fiscal addition strategy.

5. CONCEPTUAL MODEL

This paper presented a conceptual model, A Multi-Level Empowerment Model of Digital Currencies and Financial Inclusion is based on the three main dimensions: Enablers, Mediators, and Outcomes. Enablers include both technological (such as mobile phone penetration and digital identity solutions) and policy and regulation (such as data protection legislation and frameworks facilitating fintech innovation and blockchain, AI-based lending, and smart contracts developments). These fundamental aspects promote development but must be influenced by socio-behavioural factors. The intermediaries are digital literacy, trust in financial and governmental institutions (Adeniran et al., 2022), and deeply rooted gender and social norms (Tripathi and Rajeev, 2023; Umeaduma, 2023).

CONCLUSION

This article has discussed the role and the challenges of artificial intelligence, or AI, in a central bank digital currency project and proposes some of the considerations that central banks can keep in mind when using artificial intelligence in their central bank digital currency project. Artificial intelligence to control and provide central bank digital currency is essential to central banks that wish to have a successful end-to-end central bank digital currency project in a changing AI-finance environment.

REFERENCES

1. <https://www.deloitte.com/ug/en/Industries/financial-services/perspectives/cbdc-central-bank-digital-currency.html>
2. Ozili, P. K. (2024). Artificial Intelligence and Central Bank Digital Currency. In *Global Developments in Central Bank Digital Currency* (pp. 117-125). IGI Global <https://doi.org/10.4018/979-8-3693-5588-6.ch008>
3. Dionysopoulos, L., Marra, M., & Urquhart, A. (2024). Central bank digital currencies: A critical review. *International Review of Financial Analysis*, 91, 103031.



4. Ozili, P. K. (2023). CBDC, Fintech, and cryptocurrency for financial inclusion and financial stability. *Digital Policy, Regulation and Governance*, 25(1), 40-57.
5. Allen, S., Čapkun, S., Eyal, I., Fanti, G., Ford, B. A., Grimmelmann, J., ... & Zhang, F. (2020). *Design choices for central bank digital currency: Policy and technical considerations* (No. w27634). National Bureau of Economic Research.
6. Auer, R., Cornelli, G., & Frost, J. (2020). Rise of the central bank digital currencies: drivers, approaches, and technologies.
7. Bindseil, U. (2019). Central bank digital currency: Financial system implications and control. *International Journal of Political Economy*, 48(4), 303-335.
8. Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). *The Global Findex Database 2017: Measuring financial inclusion and the fintech revolution*. World Bank Publications.