

Banking the Unbanked: Central Bank Digital Currencies (CBDCs) as a Digital Bridge to Financial Inclusion

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Abstract

This paper examines the role of CBDCs as a policy tool for promoting financial inclusion by integrating unbanked and underbanked population into the formal financial system. It adopts a qualitative policy oriented analytical approach drawing on a comprehensive review of existing literature, global financial inclusion data set, and comparative analysis of selected CBDC initiatives. A conceptual framework is developed to assess how CBDC design features can reduce structural barriers to financial access and usage. The findings suggest that retail CBDCs can enhance financial inclusion by reducing transaction costs, simplifying access requirements, and enabling secure digital payments supported by central bank credibility. Features such as offline functionality and low-cost digital wallets can help address, access, usage and demographic gaps. However, key challenges persist, including limitations in digital infrastructure, low financial literacy, cybersecurity risk, and potential disruptions to the banking sector. Overall, the study provides policy relevant insights for central banks in designing inclusive CBDC frameworks aligned with national financial inclusion strategies, particularly in emerging economies.

Keywords

Central Bank of Digital Currency (CBDC), Financial Inclusion, Financial Services, Digital Payments, Sri Lanka

1. Introduction

Financial inclusion, in a modern context, has evolved beyond simply having a bank account. Globally, the successful integration of fintech with financial inclusion serves as a key mechanism for accelerating economic growth and meeting

global Sustainable Development Goals (SDGs). However, despite remarkable progress in financial technology and growth in account ownership, 1.3 billion adults¹ globally remain unbanked. The persistence of financial exclusion is now primarily driven by structural friction², even with the rise of digital finance. These modern obstacles include socio-economic inequality, rigid identity and compliance standards, and significant digital literacy and infrastructure capacity gaps (Klapper et al., 2025). Further, branch-based traditional banking systems often fail to reach rural, low-income, or undocumented population.

As the digital economy expands, CBDCs have emerged as a transformative innovation that can integrate the financially excluded into the formal system. This enhancement is critically contingent upon specific design features that directly address structural friction, especially through the provision of offline functionality, low-cost transactions, simplified risk-based KYC, and its state back nature³ to foster trust and address financial anxiety (Auer et al., 2021).

Although research on CBDC has expanded rapidly, much of the existing literature has primarily focused on monetary policy transmission, financial stability implications, and technological design considerations. While financial inclusion is widely recognized as a key motivation for CBDC issuance, especially in emerging and developing economies (Kosse & Mattei, 2023), the literature provides limited systemic analysis of how CBDC design features can address the multiple dimensions of financial inclusion. The link between CBDC design features and structural barriers to financial access, usage, and demographic inclusion remains insufficiently explored. This study develops a conceptual framework to explain how CBDCs may help reduce these barriers and promote inclusive participation in the formal financial system.

2. Literature Review

2.1. The Global Financial Inclusion

Financial inclusion refers to the fact that individuals and businesses have access to and actively use affordable, quality financial products and services that meet their needs and are delivered responsibly.

2.2. Financial Inclusion Theory

The concept of financial inclusion is supported by various theoretical perspectives that explain the role of financial systems and public institutions in expanding ac-

¹Analysis of the unbanked population reveals it is concentrated among highly vulnerable segments: it is predominantly female (55%), comprised mainly of individuals from the poorest 40% of households (52%), characterized by low educational attainment (62% with primary education or less), and exhibits low economic activity (54% out of the workforce). The largest demographic subset is working-age adults, specifically those aged 25 - 54 (46%).

²Structural barriers/frictions to financial inclusion are systematic constraints embedded within economic, institutional, and infrastructural frameworks that hinder access to and utilization of formal financial service by underserved populations.

³Direct Liability of the Central Bank.

cess to formal financial services. Public good theory and public money theory emphasize the role of the state providing inclusive financial infrastructure, while private money theory highlights the contribution of market based financial innovations. Vulnerable group theory and community echelon theory focus on the need to investigate marginalized population into formal financial systems. In addition, financial literacy theory underscores the importance of knowledge and awareness in enabling individuals to effectively use financial services (Ozili, 2020). Overall, these theories underline the importance of coordinated public policy, financial innovation, and user capability in addressing financial exclusion and promoting inclusive participation in the formal system.

2.3. Why Financial Inclusion Matters

Financial inclusion is crucial as it serves as a powerful catalyst for poverty reduction, empowerment, and overall economic growth. By providing low-income households with access to formal financial services, such as savings accounts and credit, it enables them to manage risk more effectively, efficient consumption and invest in productive activities. At the macroeconomic level, greater financial inclusion enhances capital mobilization, strengthens financial intermediate, and fosters entrepreneurship, thereby stimulating economic growth (Sahay et al., 2015).

Reflecting these developmental benefits, financial inclusion is embedded within the SDGs, particularly SDG goal 1—Non-Poverty, SDG goal 5—Gender Equality, SDG goal 8—Decent Work and Economic Growth, and SDG goal 10—Reduced Inequalities. However, when many people are excluded from formal financial services, they cannot save, borrow, or manage risk effectively, which keeps households trapped in poverty and deepens existing economic and social inequalities, ultimately slowing productivity and economic growth.

2.4. The Global Financial Inclusion Gap

Financial inclusion gap, the persistent exclusion of billions of adults from formal financial system, measured by disparity between the population with access and active usage and the population that remains unbanked⁴ and underbanked⁵, imposes significant and far-reaching disadvantages on individuals, economics and overall social development. The primary measure of the financial inclusion gap involves assessing two major dimensions of exclusion alongside various relevant demographic indicators, as mentioned below.

2.5. The Access Gap

The access Gap, which defines the unbanked population, is the proportion of the adult population that remains excluded by not possessing an account at a formal

⁴**Unbanked** (Total Exclusion): These individuals lack any formal financial account, representing the most basic level of exclusion from the financial system.

⁵**Underbanked** (Partial Exclusion): These individuals have an account but rely on expensive, non-traditional services for critical needs.

financial institution. This exclusion is caused by structural friction, evidenced by difficulty in meeting Know Your Customer (KYC) mandates due to lack of formal identification and limited geographical access to established financial infrastructure. As per the Global Findex Database 2021, 27 per cent of the unbanked adults globally state that a lack of required documentation is a key reason for not having an account (Kunt et al., 2021).

2.6. The Usage Gap

The usage gap, which defines the underbanked population, refers to the proportion of individuals who possess a formal account yet frequently rely on expensive, alternative financial services. This persistence reliance mainly occurs because the formal products available are typically deemed unaffordable, irrelevant or too complex for specific needs. Furthermore, a combination of personal financial constraints, lack of trust in the banking system, and logistical and educational challenges causes people to remain underbanked.

2.7. Demographic Disparities

The financial inclusion gap is primarily defined by systematic inequalities, confirming that exclusion is not random but rather concentrated in vulnerable groups. Demographic disparities in financial exclusion are strongly stratified by gender gap income and education. Global Findex data indicate that 64 per cent of unbanked adults possess only a primary education or less. Further, approximately 740 million women, nearly 57 per cent of world's unbanked adults, lack an account and in many economies, women remain systemically more likely than men to be financially excluded (Kunt et al., 2021). This concentration of exclusion among the poor and less educated underlines how demographic inequalities remain major to universal financial inclusion.

2.8. Strategies for Enhancing Financial Inclusion

Based on the most recent data from the Expanding mobile Banking, Digital wallets, and online payment platforms remain the most prominent and effective way to increase financial inclusion. Accordingly, financial inclusion can be expanded through a combination of digital services, tailored products, and supportive policy measures. Further, COVID-19 accelerated digital financial inclusion worldwide, including in Sri Lanka, as lockdowns and cash-handling risks pushed towards mobile payments and online banking (Hansi, 2022). Mobile banking, digital wallets and CBDCs can reach underserved populations at lower cost than traditional branches and provide secure access to financial services. Globally, adults use of digital payments continues to grow with 61 per cent of adults in low- and middle-income economies, transacting digitally, a 27 per cent increase in comparison to 2014 (Klapper et al., 2025). Amid the growth of digital financial inclusion, CBDC in particular provides a safe, government-backed digital medium that can integrate unbanked populations directly into the formal financial ecosystem, facilitat-

ing payments, savings, and access to government transfers (Tan, 2023). Further, as per theoretical context, innovation as CBDC can be viewed as public policy instrument that combines elements of public financial infrastructure and digital innovation to address structural barriers and promote broader financial inclusion.

3. Methodology

This study employs a conceptual and comparative policy analysis framework to explore the potential of CBDC as a mechanism for enhancing financial inclusion. The analysis is grounded in an extensive review of the existing body of literature, encompassing peer-reviewed academic studies, policy documents, central bank publications, and reports issued by leading international institutions such as the International Monetary Fund, the Bank of International Settlements, and the World Bank. By synthesizing theoretical insights and policy perspectives from these sources, the study critically evaluates the opportunities, challenges, and policy implications associated with CBDC implementation in the context of financial inclusion.

The comprehensive assessment of CBDC features, implementation strategies, and their implications for financial inclusion is undertaken through a synthesis of the existing literature and policy evidence. To provide deeper insights into the practical application of CBDCs, a comparative analysis of selected country experience is conducted, with particular emphasis on identifying key opportunities, implementation challenges and policy lessons. Country selection is based on the presence of CBDC pilot projects or operational initiatives, and the relevance of their experiences to financial inclusion objectives. The analysis is informed by a wide range of secondary sources, including central bank publications, policy reports, international institutional documents, and publicly available statistical data. Through a systematic comparison of this experience, the study highlights variations in CBDC frameworks, implementation approaches, and their observed or anticipated outcomes for financial inclusion, which refers to the expected improvements in access to, use of, and participation in formal financial services, particularly among underserved and financially excluded population.

By integrating insights from literature and international experience, the study develops a conceptual framework for understanding how CBDCs may contribute to enhancing financial inclusion, particularly in developing and emerging economies.

4. Conceptual Framework

Financial exclusion continues to persist due to structural barriers that limit access to and usage of formal financial services. In this context, CBDC has emerged as a potential public digital infrastructure that could help reduce these barriers and enhance financial inclusion.

The conceptual framework developed in this study posits that specific design features of CBDC can influence financial inclusion outcomes by mitigating structural frictions that constrain access to and usage of formal financial services. Key

CBDC characteristics, such as low-cost digital transactions, simplified onboarding requirements, interoperability with existing payment systems, offline functionality, and central bank backing, have the potential to facilitate participation in digital financial ecosystems among individuals excluded from traditional banking systems. By addressing documentation constraints, reducing transaction costs, enhancing payment accessibility, and strengthening public trust in digital financial services, these features may contribute to broader and more inclusive engagement with the formal financial system.

Within this framework, CBDC design features act as key enabling factors that promote financial inclusion through two primary channels, which are expanding financial access for unbanked individuals and enhancing the usage of formal financial services among underbanked populations. By addressing these access and usage barriers, CBDCs may facilitate border financial inclusion outcomes, including greater participation in digital payments, Improved savings opportunities, and stronger integration of marginalized groups into the formal financial system.

However, the effectiveness of CBDCs in promoting financial inclusion depends on supporting institutional and technological conditions, including digital infrastructure, regulatory frameworks, financial literacy, and cybersecurity capacity, which influence their ability to reduce structural barriers and achieve inclusive financial outcomes.

Accordingly, the conceptual framework (Figure 1) illustrates how CBDC design features, together with structural barriers and enabling conditions, shape financial inclusion outcomes and support broad economic participation and inclusive development.

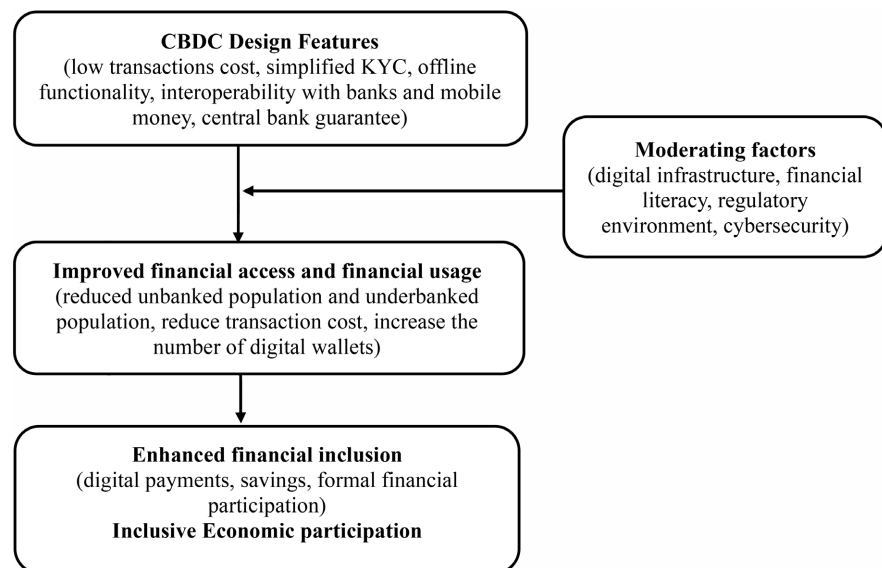


Figure 1. Conceptual framework.

4.1. CBDCs as a Tool for Financial Inclusion

While multiple policy measures and payment innovations, including fast payment

systems and private e-money, are being adopted to enhance financial inclusion, CBDC offers a differentiated and complementary value proposition. As a form of central bank money, CBDC combines digital efficiency with safety, potential legal tender status, interoperability, and features such as offline payments, which many private solutions may not provide. While other initiatives remain essential to address broader inclusion barriers, CBDC can complement existing instruments and, where it offers clear efficiency and inclusion benefits, serve as a valuable addition to the financial inclusion policy toolkit (Lannquist & Tan, 2023).

4.2. Understanding CBDCs

CBDCs are digital forms of a country's sovereign currency, issued and regulated by the Central Bank. In contrast to cryptocurrencies, CBDCs are backed by the government and provide secure payment options to citizens. CBDCs offer several advantages over cash, as they provide a safer, faster, and more convenient way to make payments without the physical risks and handling costs associated with cash. They reduce opportunities for theft and fraud, enable instant digital transactions, support remote and online payments, and offer greater transparency for monitoring financial activity. Importantly, CBDCs also facilitate smoother and faster cross-border transactions, while promoting financial inclusion by giving easy access to digital payments even for those without traditional bank accounts (Hansi, 2023).

CBDC designs generally fall into two categories. Retail CBDCs are accessible to the public for everyday payments, and wholesale CBDCs, which are limited to financial institutions for large value settlements. CBDCs can also be structured as token-based⁶ systems or account based⁷ systems. Further design considerations include the level of privacy, degree of centralization, interoperability with existing payment systems, and whether the CBDC is distributed directly by the Central Bank or through intermediaries (Auer et al., 2021).

The Central Bank of Bahamas, the Central Bank of Nigeria, and the Bank of Jamaica have already launched their own CBDCs: the Sand Dollar in October 2020, the e-Naira in October 2021, and Jam-Dex in April 2022, respectively. Additionally, several other Central Banks have conducted research and pilot programs to assess the feasibility of CBDC adoption. For example, China's digital yuan (e-CNY) has been piloted extensively for retail payments.

4.3. The Role of CBDCs in Expanding Financial Inclusion

Central Banks are considering CBDCs mainly due to the decline in cash usage in advanced economies and the financial inclusion in emerging and developing economies (BIS, 2021). According to the Bank for International Settlements (BIS) survey on CBDC and crypto, about 60 per cent of emerging and low-income countries identify financial inclusion as one of their top three motivations for issuing

⁶Token-based CBDCs involve the transfer of a token between wallets.

⁷Account based CBDCs involve the transfer of a claim on an account.

CBDC (Kosse & Mattei, 2023).

4.4. How CBDCs Can Overcome Inclusion Barriers

CBDCs can significantly enhance financial inclusion in emerging markets and low-income economies by encouraging previously unbanked individuals to enter the formal financial system. When CBDCs offer faster payments, more privacy, or safer savings than traditional deposits, more people participate in digital finance. Even if lending falls, household welfare can rise because CBDCs provide valuable payment benefits and a secure savings option (Tan, 2024).

Retail CBDCs can reduce the access gap by enabling simple, low entry digital access to payment services. Unlike traditional bank accounts, which often require extensive documentation, minimum balances and physical access to the bank branches, CBDC based digital wallets typically involve fewer prerequisites, allowing unbanked individuals to access CBDC and participate in the formal financial ecosystem (Tan, 2023). Further, retail CBDCs can help narrow the usage gap by enabling low-cost, instant, and convenient digital payments, making formal financial services more relevant for everyday transactions. By reducing transaction fees, improving reliability, and providing a safe digital store of value, CBDCs promote regular and active use of financial services. In addition, by offering inclusive and easily accessible digital payment and savings tools that bypass traditional banking constraints, such as limited branch access and high minimum balance requirements, retail CBDCs can broaden participation in the formal financial system among women, rural populations, and low-income individuals, thereby helping to reduce demographic disparities in financial inclusion (Das et al., 2023).

4.5. Financial Inclusion Theories and CBDC

Several theoretical perspectives help explain the role of CBDC in promoting financial inclusion (Figure 2). Public money theory and public good theory emphasize the role of the state in providing accessible financial infrastructure. Public good theory views financial inclusion as a societal objective that benefits the entire population, emphasizing the responsibility of governments to ensure universal access to affordable financial services and the necessary financial infrastructure. Complementing this perspective, public money theory stresses that governments can mobilize public resources, such as tax revenues, finance financial inclusion initiatives and subsidize the expansion of formal financial services. In the context of CBDC, these theories underscore the role of the state in providing publicly backed digital payments that can lower access barriers, reduce transaction costs and extend financial services to underserved populations (Ozili, 2020). Further, technology adoption theory is particularly relevant for understanding how digital financial services, including mobile banking, digital wallets, and CBDC can be adopted by individuals who were previously excluded from formal financial systems (Davis, 1989). Accordingly, CBDC can be considered a policy tool through which governments can implement these theoretical principles to enhance broader

and more inclusive access to the formal financial system.

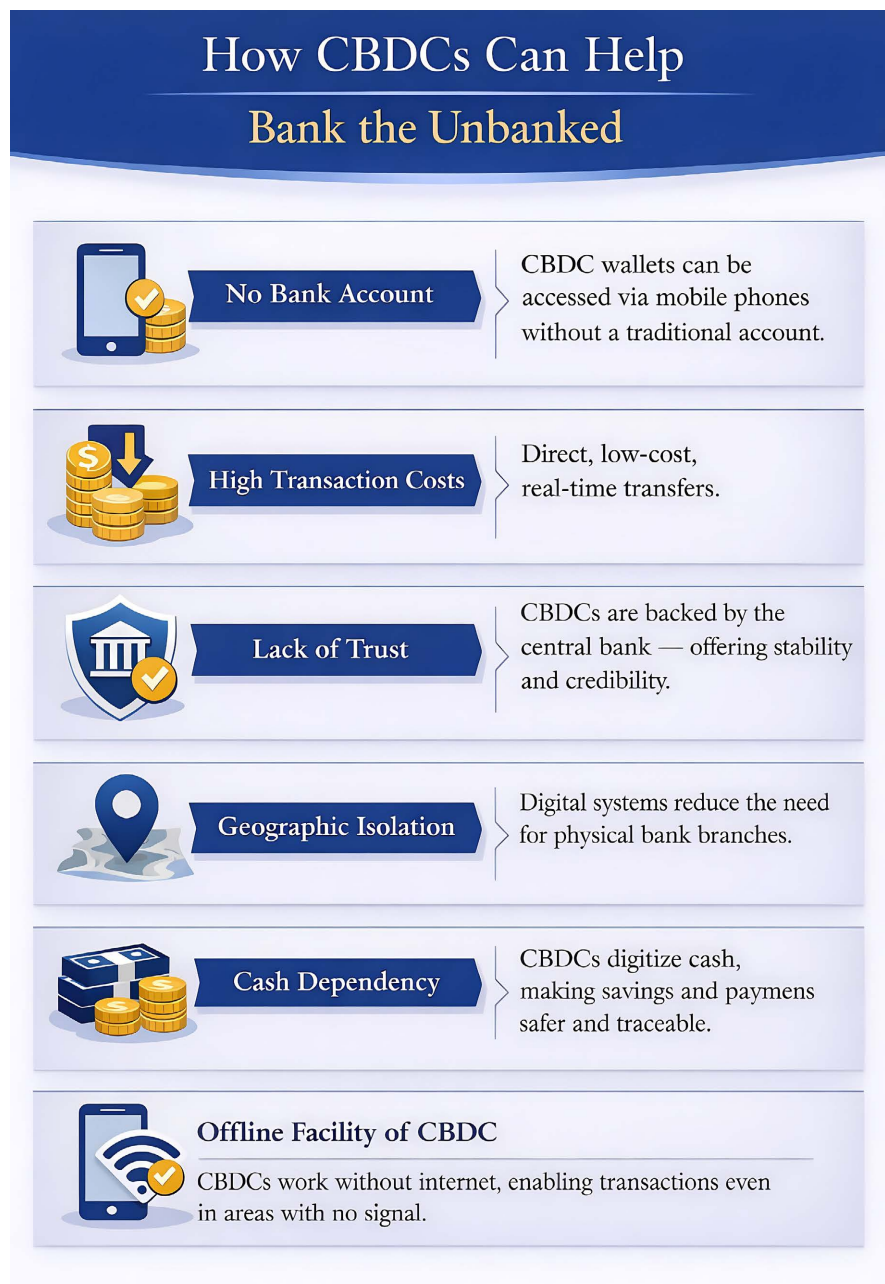


Figure 2. CBDC promotes financial inclusion.

5. Country Experiences with CBDCs

Several countries have begun experimenting with or implementing CBDCs, providing valuable insights into how alternative design choices can advance key policy objectives, including financial inclusion, payment efficiency, and the resilience of payment systems. The following country cases illustrate how CBDC initiatives are being designed to ease financial inclusion constraints by broadening access to digital payment services, lowering dependence on cash, and providing accessible dig-

ital wallets for populations underserved by traditional banking infrastructure (**Table 1**).

Table 1. Country experiences with CBDCs.

Country	Target toward Financial Inclusion
<p>Bahamas - Sand Dollar Launched in October 2020</p>	<p>To promote more inclusive access to regulated payments and other financial services for unbanked and underbanked communities and socio-economic group within the country. By December 2023, Sand Dollar adoption had increased notably, with personal wallets rising by 20 per cent to nearly 119,000 and currency in circulation growing by over 60 per cent to about USD 1.7 million (CBOB, 2024).</p>
<p>Nigeria - eNaira launched in October 2021</p>	<p>e-Naira was introduced to expand financial inclusion, improve the efficiency of remittance flows, and reduce the size of the informal economy. Overall, Nigeria's e-Naira has shown steady growth, with wallet adoption reaching about 12 percent of the population, over 2.2 million transactions recorded, and CBDC circulation rising sharply from 2.55 billion Naira in December 2022 to 12.53 billion Naira by November 2024 (CBN, 2023).</p>
<p>China - e-CNY Pilot program was first introduced in 2019</p>	<p>The e-CNY is designed to promote equal access to digital payment services and advance financial inclusion. By the end of September 2025, China's digital RMB ecosystem had taken shape, with cumulative transactions reaching 14.2 trillion yuan (Xinhua, 2025).</p>
<p>India - Digital Rupee Retail pilot launched in December 2022</p>	<p>Aims to enhance accessibility, financial inclusion, and convenience for individuals/businesses. The amount of digital rupees in circulation rose sharply to approximately 10.17 billion rupees in 2025, up from about 164 million rupees in 2023 (Gupta, 2025).</p>

When assessing country experiences with CBDC implementation, it is important to distinguish between indicators of adoption and indicators of financial inclusion. Measures such as wallet registrations, transaction volumes and the amount of CBDC in circulation provide evidence of user uptake and extent of system utilization. However, these indicators do not necessarily demonstrate a reduction in financial exclusion or an improvement in financial inclusion. More direct evidence of inclusion is reflected in increased access to formal financial services among previously unbanked and underserved populations, greater usage of financial services, and reduced demographic and geographic disparities in financial participation. Therefore, while adoption metrics are useful for evaluating the acceptance and usage of CBDCs, they should be interpreted alongside inclusion specific indicators to assess their effectiveness in advancing financial inclusion objectives.

6. CBDC Readiness for Financial Inclusion in Sri Lanka

The establishment of CBDC requires a clear legal mandate empowering the central bank to issue digital money, a sound and stable monetary and financial system, and adequate public financial capacity to support development, operational maintenance, and cybersecurity. Further, basic digital payment infrastructure, including RTGS systems, retail payment platforms, and widespread mobile connectivity and electricity is essential, along with risk-management frameworks covering AML/CFT, data protection, and operational resilience (Lannquist & Tan, 2023).

In the Sri Lankan context, the country currently exhibits a robust and stable monetary and financial system, following effective policy formulation and implementation undertaken to mitigate the adverse repercussions of the recent financial and economic downturn. Among retail payment instruments, the value of transactions processed through the RTGS system (high-value payment system) amounted to 1358.1 per cent of GDP, reflecting the system's critical role in high-value payments. Meanwhile, the Common Electronic Fund Transfer Switch (CEFTS) recorded the highest per capita transaction value among retail payment methods, accounting for 58 per cent of GDP in 2024, indicating strong adoption and usage of electronic retail payments⁸.

Further, Sri Lanka possesses a well-established digital and financial infrastructure conducive to CBDC implementation. Electrification coverage reached 99.3 per cent as of 2016, while internet penetration stood at 105.6 per cent. Total telephone penetration, including cellular connections, amounted to 141.2 per cent, with fixed-line penetration at 9.7 per cent, reflecting strong communication network readiness. In addition, the country demonstrates a healthy financial infrastructure, with a bank branch density of 17 and a combined ATM, CRM, and CDM density of 33 per 100,000 persons. This is further supported by the establishment of the Data Protection Act and a strengthened AML/CFT framework in Sri Lanka, enhancing trust, security, and regulatory preparedness for CBDC adoption⁹.

Accordingly, Sri Lanka has a strong digital payment infrastructure and supportive financial inclusion policies, providing a solid basis for CBDC exploration. However, Sri Lanka is still at an early stage, and progress toward pilot testing, legal preparedness, and system integration is essential for CBDC adoption.

7. CBDC Adoption: Key Challenges and Way Forward

CBDC adoption is associated with several challenges. One key issue is the digital divide, as individuals without access to smartphones, internet connectivity, or reliable electricity may remain excluded. Cybersecurity and data privacy concerns also arise, requiring a careful balance between protecting users and ensuring effective regulatory oversight. In addition, low levels of financial literacy and limited public trust in digital financial products can hinder widespread adoption. There

⁸CBSL Payment Bulletin - second quarter 2025.

⁹Annual economic Review 2024 - Key social indicators.

is also a risk of bank disintermediation if deposits shift from commercial banks to CBDC holdings. Finally, the implementation of CBDC involves significant costs related to technology development, infrastructure investment, and public education (Alora et al., 2024).

To mitigate these challenges, central banks can introduce offline payment functionality and low tech wallets, strengthen cybersecurity and privacy frameworks, implement financial literacy and public awareness campaigns, adopt tiered wallets and holding limits to manage disintermediation risks, and rely on public private partnerships to reduce costs and leverage existing payment infrastructure (Tan, 2023).

The way forward for CBDC adoption lies in integrating CBDCs into national financial inclusion strategies, ensuring interoperability with existing payment systems, and fostering collaboration with key stakeholders. A phased, pilot-based approach combined with strong consumer protection, data privacy, and financial literacy efforts will be essential to achieve inclusive and sustainable implementation.

8. Conclusion

Financial inclusion remains a fundamental pillar of sustainable and inclusive economic development. Despite significant advancement in digital financial services, a substantial segment of the global population continues to face barriers to accessing and effectively utilizing formal financial system. Structural constraints, including stringent documentation requirements, high transaction costs, geographic disparities in financial infrastructure, and limited financial literacy, persistently restrict the participation of vulnerable groups, particularly low-income households, rural communities, and women.

This study examines the potential role of CBDC as a digital bridge for advancing financial inclusion. Through the development of a conceptual framework, the study illustrates how specific CBDC design features, such as offline functionality, simplified identification mechanism, interoperability with existing payment systems, and reduced transaction costs, can help mitigate structural barriers that constrain financial access and usage. The framework further underscores that the effectiveness of CBDCs in promoting financial inclusion is contingent upon enabling conditions, including the availability of digital infrastructure, supportive regulatory frameworks, adequate financial literacy, and public trust in digital financial systems.

The findings indicate that CBDCs can serve as a form of public digital financial infrastructure, enabling governments and central banks to broaden access to secure and low-cost digital payment systems. However, CBDC should be regarded as a complementary policy instrument rather than a sole solution to financial exclusion. Their success in prompting inclusive financial participation will depend on careful design, supportive institutional frameworks, and coordinated policies that address technological, regulatory, and social adoption challenges.

From a policy perspective, central banks and policymakers should prioritize the development of inclusive CBDC designs, invest in robust digital infrastructure, strengthen regulatory and cybersecurity frameworks, and promote financial literacy to facilitate broad based adoption. Further research may extend the conceptual framework proposed in this study by undertaking empirical analysis of CBDC pilot initiatives and assessing their impact on financial inclusion indicators across diverse economic contexts. Such efforts can provide valuable insights into the potential of CBDC to advance inclusive financial systems and support broader economic empowerment in both emerging and developing economies.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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