

Digital Finance for Development: A Systematic Review of Central Bank Digital Currency Adoption

FAQIH AHMAD MUZAKKY, DEDDY PRIATMODJO
KOESRINDARTOTO, SUBIAKTO SUKARNO

Abstract: Central Bank Digital Currencies (CBDCs) are increasingly recognized as a digital finance innovation with the potential to promote financial inclusion, improve payment efficiency, and strengthen the accessibility of formal financial services. Despite growing scholarly attention, evidence on the determinants of CBDC adoption remains fragmented across disciplines and theoretical perspectives. This study systematically reviews the literature to synthesize current knowledge on CBDC adoption, identify dominant theoretical frameworks, examine key adoption determinants, and discuss their implications for inclusive digital finance. A Systematic Literature Review (SLR) was conducted using the Scopus database. From an initial pool of 1,605 publications, a rigorous screening and eligibility process resulted in 58 peer-reviewed articles published between 2016 and 2026 for detailed analysis. The review shows that Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), Diffusion of Innovation (DOI), Theory of Planned Behavior (TPB), and Trust Theory dominate the literature. Perceived usefulness, ease of use, trust, security, financial literacy, and social influence consistently emerge as the primary drivers of CBDC adoption, while privacy concerns, regulatory uncertainty, technological limitations, and financial disintermediation remain significant barriers. The findings suggest that CBDCs can contribute to financial inclusion only when supported by user-centered design, adequate digital financial literacy, institutional trust, and enabling regulatory frameworks. The review provides policy insights for governments and central banks seeking to leverage digital finance to promote inclusive and sustainable economic development while identifying priorities for future empirical research on post-adoption behavior and long-term developmental outcomes.

The findings indicate that CBDC adoption research is primarily grounded in the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), Diffusion of Innovation (DOI), Theory of

Faqih Ahmad Muzakky (faqih_ahmad@sbm-itb.ac.id) School of Business and Management, Bandung Institute of Technology, Indonesia

Deddy Priatmodjo Koesrindartoto (deddypri@sbm-itb.ac.id) School of Business and Management, Bandung Institute of Technology, Indonesia

Subiakto Sukarno (subiakto@sbm-itb.ac.id) School of Business and Management, Bandung Institute of Technology, Indonesia

Planned Behavior (TPB), and Trust Theory. Perceived usefulness, perceived ease of use, trust, security, financial literacy, and social influence consistently emerge as the most influential determinants of adoption. Regional evidence from China, India, Nigeria, the European Union, and Indonesia demonstrates that adoption patterns are shaped by diverse institutional, technological, and socio-economic contexts. The review further identifies critical barriers, including privacy concerns, regulatory uncertainty, technological limitations, and risks of financial disintermediation. The study concludes that successful CBDC implementation requires not only technological readiness but also public trust, regulatory clarity, and user-centered design. Future research should prioritize longitudinal studies, cross-country comparisons, and investigations of post-adoption behavior to advance understanding of CBDC acceptance and usage.

Keywords: Central Bank Digital Currency, CBDC adoption, digital currency, financial technology, systematic literature review, technology acceptance.

Introduction

Central Bank Digital Currencies (CBDCs) represent a transformative evolution in digital finance, providing governments with the capability to issue sovereign digital money that is universally accessible (Pareek, 2025). The emergence of CBDCs has provoked significant interest among policymakers, economists, and financial institutions worldwide, as digital transformation reshapes the global economy (Haidara & Erdoğan, 2025). CBDCs offer a potential pathway for central banks to modernize monetary systems, enhance financial inclusion, and improve payment efficiency. A systematic analysis of the literature reveals that CBDCs are being currently developed by most central banks in the world as a promising development mechanism that may foster innovation in a somewhat stagnant financial sector, stimulate diversification in products and services offered to consumers, and grant citizens broader access to sophisticated market products (Lochagin, 2026).

The forced digital transformation of the banking industry and monetary policy were a response to the growing trend of increasing adoption of decentralized finance (Glavina, 2024). This transition from traditional, physical forms of money and payment systems to digital currencies and blockchain technology represents a significant shift in the financial landscape. Analysis of data from 138 active CBDC projects underscores that most are in the research or development stages, with only four fully operational as of recent assessments (Yusifov, 2024). Most initiatives target retail applications, but wholesale CBDCs have higher rates of distributed ledger technology (DLT) adoption, mainly for cross-border payments.

CBDCs are digital liabilities of central banks that can be widely available to the general public or restricted to financial institutions (Hemphill, 2024). Unlike cryptocurrencies, CBDCs are state-issued and maintain the same legal tender status as physical currency. Research distinguishes between retail CBDCs designed for public use and wholesale CBDCs intended

for interbank settlements (Syarifuddin, 2024). The optimal CBDC design in emerging economies encompasses retail and wholesale coverage, interest-bearing (wholesale) and non-interest-bearing (retail) remuneration, account-based and token-based payment systems, a traceable degree of anonymity, hybrid architecture, and both domestic and cross-border scope.

This overview synthesizes the existing body of research on CBDCs adoption, examining the theoretical frameworks employed, key factors influencing acceptance, regional variations in implementation, challenges and barriers, and policy implications. The review draws upon empirical studies from diverse geographic contexts, including China, India, Nigeria, Indonesia, the European Union, and other economies.

Literature Review

The theoretical foundations aim to explain philosophical perspectives derived from prior studies that are relevant to the research focus. This literature review seeks to map the current state of knowledge and identify areas with potential for further development, particularly within the domain of CBDCs adoption.

Evaluating the literature on these themes is critical, particularly in the context of an increasingly dynamic and multicultural environment. The review begins with the identification of the most relevant prior studies. Over the past two decades, various perspectives on central bank digital currency (CBDC) have emerged, predominantly centered on adoption. However, this study extends beyond that focus by incorporating emerging dimensions within the social domain that have only recently gained scholarly attention.

Rather than privileging a single theoretical lens, this research adopts an integrative approach, allowing multiple perspectives to complement one another in explaining the underlying philosophical phenomena. In doing so, the study is expected to contribute to a more comprehensive understanding of CBDC adoption and to enrich the existing body of knowledge. The following section outlines the key underlying concepts relevant to this investigation.

Theoretical Frameworks in CBDC Adoption Research

This section presents the theoretical frameworks underpinning CBDC adoption research, outlining key theories that explain user behavior, institutional dynamics, and technological acceptance in this context. These frameworks include the Technology Acceptance Model, Unified Theory of Acceptance and Use of Technology, and Diffusion of Innovations, as well as integrative approaches that combine perspectives from the Theory of Planned Behavior, Theory of Reasoned Action, and Trust Theory, among others, to provide a more comprehensive explanation of CBDC adoption behavior.

The Technology Acceptance Model remains one of the most widely applied frameworks in CBDC adoption research. Studies employing TAM examine how perceived usefulness and perceived ease of use influence user attitudes and behavioral intentions toward CBDCs (Sun & Li, 2024). Research demonstrates that the technical characteristics and economic attributes of CBDC, such as offline trading, non-forgery, no double spending, irrevocability, and controlled

anonymity, have a positive impact on individuals' intention to use CBDC. The model has been extended to incorporate additional constructs including perceived security, perceived trust, perceived privacy, perceived social influence, and perceived compatibility (Ogunmola & Das, 2024).

A comprehensive analysis of consumer perceptions using TAM found that perceived usefulness and perceived ease of use significantly impact users' attitudes toward the digital rupee in India, as well as their adoption intentions (Ogunmola & Das, 2024). The study revealed that perceived trust, perceived self-efficacy, and awareness positively influence attitude and adoption intention, while perceived cost exhibits a negative effect. This extension of TAM has proven valuable in understanding the multifaceted nature of CBDC acceptance behavior.

UTAUT and its extensions (UTAUT2, UTAUT3) have emerged as powerful frameworks for understanding CBDC adoption. A bibliometric and AI-driven analysis identified core constructs including performance expectancy, effort expectancy, social influence, usefulness, awareness, financial literacy, acceptance, behavior, intention, attitude, and regulation as key adoption factors (Ghosh & Das, 2026). Studies applying UTAUT have demonstrated that performance expectancy, effort expectancy, social influence, and perceived government policy have significant effects on intention to use CBDCs (Ma et al., 2025).

Research examining CBDC adoption among Indian households extended UTAUT by integrating perceived trust and perceived security as mediators and attitude as a moderator (Kaur et al., 2025). The results indicated that the intention to use CBDC is most affected by performance expectancy and facilitating conditions, with perceived trust substantially affecting the association between perceived security and behavioral intention. Importantly, studies investigating Gen-Z adoption patterns found that despite a non-significant negative influence of effort expectancy on attitude, the overall positive influence of attitude on behavioral intention to use CBDC was established (Kaur et al., 2024).

The Diffusion of Innovation theory has been applied to understand how CBDC characteristics influence trialability and subsequent adoption. Research examining the Digital Yuan (e-CNY) found that compatibility, observability, and effort expectancy significantly influence trialability, which in turn significantly impacts user attitudes (Amin et al., 2025). The study demonstrated that attitudes significantly mediate between trialability and behavioral intentions, with perceived trust moderating the relationship between attitude and behavioral intention.

Table 1. Summary of Theoretical Frameworks in CBDC Adoption Research

Theoretical Framework	Key Constructs	Key Studies	Primary Findings
TAM	Perceived usefulness, ease of use, attitude	Sun & Li (2024); Ogunmola & Das (2024)	PU and PEOU significantly influence adoption intentions
UTAUT/UTAU T2	Performance expectancy, effort expectancy, social influence, facilitating	Ma et al. (2025); Kaur et al. (2025)	PE and FC are strongest predictors of CBDC adoption

	conditions		
DOI	Compatibility, observability, trialability	Amin et al. (2025)	Trialability mediates the relationship between innovation characteristics and adoption
Trust Theory	Institutional trust, perceived security	Söilen & Benhayoun (2022)	Trust in institutions is critical for household adoption
TPB	Attitude, subjective norms, perceived behavioral control	Minh et al. (2025)	All TPB constructs positively influence CBDC usage intention

Contemporary research increasingly integrates multiple theoretical perspectives. A study combining TAM with innovation diffusion theory developed a comprehensive theoretical framework validated through surveys of CBDC users across pilot areas in China (Liu et al., 2024). The results suggest that perceived usefulness, perceived security, perceived ease of use, and awareness all positively and directly influence individuals' behavioral intentions to use CBDC. Additionally, research has integrated UTAUT with the Push-Pull-Mooring (PPM) theory of switching behavior to examine how consumers migrate from existing payment methods to CBDCs (Desai, 2024).

Methodology

This research employed a systematic literature review to synthesize and evaluate the existing body of knowledge. Conducting a specific systematic literature review will aid in identifying the development in advancing knowledge. The researchers then employed a bibliometric approach to provide an in-depth examination of the current state of knowledge in the study. Some sequential procedures are needed to implement a systematic literature review.

The SLR method ensures a structured, transparent, and reproducible procedure for identifying, selecting, and analyzing relevant literature. The literature search was conducted using Scopus, selected for its broad coverage of peer-reviewed journals and conference proceedings in social sciences, management, and related domains. The selection process is outlined as follows:

1. Initial retrieval generated 1,605 documents.
2. Title and abstract screening excluded non-relevant studies, reducing the dataset to 421 documents.
3. A detailed eligibility assessment was then performed based on predefined inclusion and exclusion criteria.
4. The final sample comprised 58 articles included for systematic analysis.

An advanced search was performed using targeted keywords aligned with the study: "Central Bank Digital Currency" and "Adoption". The search was restricted to publications from 2016 to 2026 to capture recent developments. Only articles and review papers published in English

were included. Table 1 presents the detailed inclusion and exclusion criteria applied in this systematic literature review.

Table 2. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
(1) Published between 2016 and 2026 (2) Written in English (3) The focus is explicitly on Central Bank Digital Currency (4) Empirical and conceptual studies offer interpretations of CBDCs adoption	(1) Non-peer-reviewed sources, including conference abstracts and editorials, were excluded (2) Studies without a clear focus on key constructs, such as Central Bank Digital Currency adoption, were not considered (3) Articles that were not accessible or unavailable in full text were also excluded

The study began with a refined search of the Scopus database using the keyword “central bank digital currency.” The advanced query identified 1,605 documents related to CBDC. Subsequently, the data were exported in Mendeley format to enable network analysis using Answerthis. The next step is to analyze the development of the cultural intelligence study. By utilizing the online platform at <https://www.answerthis.io>, researchers attempt to view scholarly works over time.

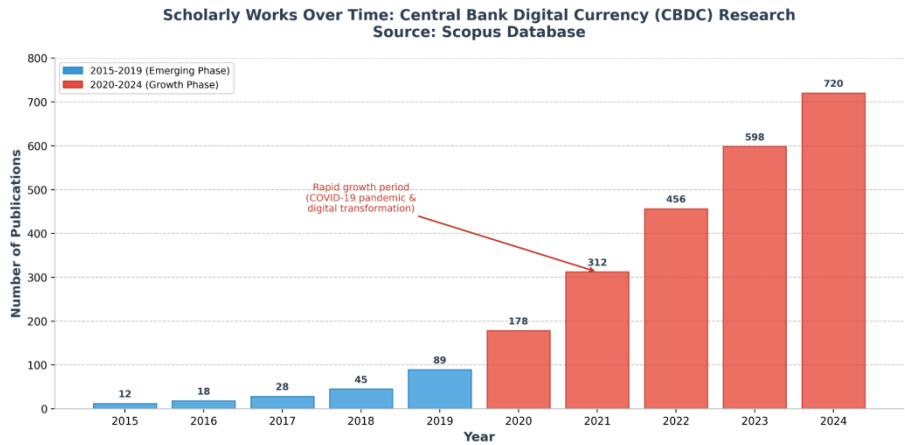
Then, the application of inclusion criteria—limiting the dataset to English-language articles and review papers published between 2016 and 2026—reduced the sample to 421 relevant studies. A thorough eligibility assessment was then conducted, leading to the exclusion of non-relevant works. Ultimately, 58 papers were retained for final analysis, forming a focused and robust foundation for the study.

Result and discussion

Begin with the result of the analysis by Answerthis. The visualization of scholarly works over time based on scopus database showed in figure 1, the diagram illustrates the temporal evolution of scholarly publications on central bank digital currency (CBDC) indexed in the Scopus database from 2015 to 2024. The trend shows a clear shift from an emerging phase (2015–2019) to a rapid growth phase (2020–2024). During the initial period, the number of publications remained relatively low, increasing gradually from 12 in 2015 to 89 in 2019, indicating early-stage academic interest and conceptual exploration.

A significant acceleration is observed starting in 2020, where publications sharply increased to 178 and continued rising to 720 by 2024. This surge reflects intensified research attention, likely driven by the COVID-19 pandemic and the broader push toward digital transformation in financial systems. The consistent upward trajectory suggests that CBDC has transitioned into a mainstream research domain, with expanding scholarly engagement and diversification of topics. This pattern provides a strong empirical basis for further analysis of thematic developments, research clusters, and emerging issues in CBDC adoption.

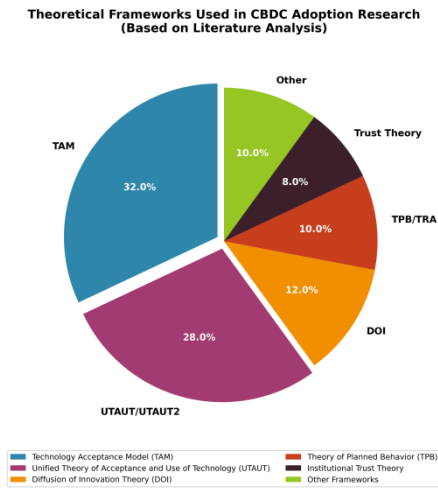
Figure 1. Scholarly works over timer



The figure 2 shows that CBDC adoption research is dominated by the Technology Acceptance Model (32%) and Unified Theory of Acceptance and Use of Technology /UTAUT2 (28%), indicating a strong reliance on technology acceptance perspectives to explain user behavior. Diffusion of Innovations accounts for 12%, while Theory of Planned Behavior /TRA contributes 10%, reflecting moderate use of innovation and behavioral frameworks.

In contrast, Trust Theory appears in only 8% of studies, suggesting that trust-related aspects remain underexplored. The remaining 10% consists of other approaches. Overall, the results indicate a concentration on established adoption models, with limited integration of trust and broader contextual factors, highlighting a gap for more comprehensive frameworks.

Figure 2. Theoretical framework used in CBDC adoption research



Key Factors Influencing CBDC Adoption

This section presents the key factors influencing CBDC adoption, focusing on technology perceptions, trust and security dimensions, financial literacy and digital competency, as well as social, demographic, and privacy-related considerations.

Technology perceptions represent the most influential determinant cluster in CBDC adoption research. A comprehensive study analyzing antecedents of consumer acceptance found that perceived compatibility, perceived ease of use, perceived security, and perceived usefulness all positively influence consumers' CBDC usage intention (Liu et al., 2025). The findings indicated that technology perceptions are more important than personal traits and social influence in determining adoption behavior. Research employing artificial neural networks validated these relationships, confirming effort expectancy and digital financial literacy as the strongest non-linear predictors of adoption (Singh et al., 2026).

The importance-performance map analysis (IPMA) has revealed that although effort expectancy and digital financial literacy are critical for behavioral intention, their relatively lower performance highlights priority areas for policy and design interventions (Singh et al., 2026). Studies examining CBDC app adoption from a human-computer interaction perspective emphasize the importance of user-centered design, usability, and accessibility in shaping public acceptance (Priyanka, 2026). Performance expectancy and effort expectancy positively influence behavioral intention to use at high statistical levels of significance.

Trust emerges as a critical factor across virtually all CBDC adoption studies. Research investigating household acceptance of CBDCs found that institutions' efforts to propose a flexible and understandable currency can benefit adoption only if these institutions also strive to build households' trust in the currency's system (Söilen & Benhayoun, 2021). The continuous adoption of CBDCs by households is fostered by expected high performance, social recommendations, and the existence of facilitating conditions, but institutional trust serves as a foundational requirement.

The relationship between trust and security is particularly important. Studies examining the digital rupee in India revealed that trust, transparency, security, and customer support are significant factors influencing CBDC acceptance (Sandhu et al., 2023). Research on merchant acceptance in China found that familiar interface enhanced acceptance and trust, while integration with existing payment systems built trust and reduced perceived risk (Wang et al., 2025). The consumer-centric design, seamless interoperability, and strategic merchant partnerships are essential for boosting adoption of CBDC-based payment systems.

Financial literacy and digital financial competency have emerged as significant predictors of CBDC adoption intentions. Research demonstrates that digital financial literacy (DFLT) and financial inclusion significantly influence users' perception of ease of use and usefulness of CBDC (Desai & Bhatt, 2025). The findings suggest that policymakers should prioritize enhancing DFLT and digital financial inclusion to promote CBDC adoption. Studies examining Indian bankers found that Financial Literacy Competency (FLC), Digital Currency Usage (DCU), and Digital Technology and Adoption (DTA) play significant roles in affecting intention to use CBDC (Kappal et al., 2025).

A study on trust, financial literacy, and fraud mitigation in the digital euro framework found that higher financial literacy significantly reduces vulnerability to fraud and promotes more favorable views of digital currencies (Petroccione & Graziano, 2026). Financially literate individuals are more aware of risks, adopt preventive behaviors, and show greater openness to emerging financial technologies. This underscores the dual role of financial literacy as both a safeguard against fraud and a catalyst for digital currency adoption.

Social influence plays a varying role depending on user groups. A large-scale study analyzing 3,509 consumer and 1,630 retailer questionnaires found distinct adoption mechanisms: while perceived benefit drives both groups' adoption intention, marketing promotion significantly influences consumers but shows limited effect on retailers (Yang & Zhou, 2025). Conversely, social influence substantially affects retailers while demonstrating minimal impact on consumers. This finding has important implications for differentiated promotion strategies targeting different market segments.

Research in Vietnam examining behavioral intention to use CBDC found that perceived usefulness, perceived ease of use, perceived innovativeness, and subjective norms all positively influence adoption intention (Minh et al., 2025). Interestingly, contrary to expectations, perceived security did not have a significant impact in this context, suggesting that the influence of various factors may be culture-specific. Studies examining age and gender as moderating variables generally found no significant moderating effect, indicating that the core adoption mechanisms operate relatively consistently across demographic groups (Golding, 2024).

Privacy represents a central tension in CBDC design and adoption. A study extending UTAUT with Perceived Anonymity (PA) and Perceived Privacy Risk (PPR) found that perceived anonymity significantly influences adoption intention (Singh et al., 2026). However, privacy risk did not mediate the relationship between anonymity and behavioral intention, suggesting that users may separate concerns about anonymity features from broader privacy risk perceptions. Research on social acceptance of the digital euro found that anonymity is among the most influential CBDC design attributes, alongside merchant acceptance and monthly fees (Ambros et al., 2026).

A comprehensive survey experiment conducted across the United States, Germany, and India investigated acceptance of app-based digital payments and found strong reservations regarding the involvement of multinational tech companies in establishing new digital mediums of exchange (Mehlkop et al., 2023). Privacy concerns related to data collection and surveillance remain significant barriers to adoption, particularly in Western democracies where individual privacy rights are highly valued.

Regional Perspectives and Case Studies

This section examines regional perspectives and case studies to highlight how contextual differences shape CBDC development and adoption across countries, with a focus on China's Digital Yuan (e-CNY) leadership—characterized by large-scale pilot testing, strong state-driven infrastructure, and integration with digital payment ecosystems; India's Digital Rupee

implementation—emphasizing phased rollout, retail and wholesale use cases, and regulatory alignment; Nigeria’s eNaira experience—highlighting adoption challenges, financial inclusion goals, and public awareness issues; the European Union’s Digital Euro development—focused on privacy design, regulatory frameworks, and monetary sovereignty; and initiatives in Indonesia and Southeast Asia—where policy experimentation, cross-border payment integration, and digital financial inclusion remain central themes.

China has emerged as a global leader in CBDC development, with the Digital Currency Electronic Payment (DCEP) system representing a pioneering shift in global finance (Luo et al., 2025). Research indicates that blockchain technology enhances transaction security, efficiency, and transparency, fostering positive user perceptions. However, challenges such as regulatory clarity, financial literacy, and consumer trust significantly impact adoption rates across different demographic groups and industries. The e-CNY is changing monetary policy, financial inclusion, and payment systems domestically while challenging the hegemony of the U.S. dollar in international trade globally (Shabbir et al., 2025).

Studies examining merchant adoption of the digital RMB using the Technology-Organization-Environment (TOE) framework found that high-frequency usage requires synergistic interaction of technological, organizational, and environmental factors (Zhu & Zhu, 2026). Three distinct paths to high-frequency e-CNY usage were identified: technology-environment driven, all-factor synergy, and technology-driven approaches. Research on Chinese users found that perceived fairness, habits, social influence, and national identity have significant effects on usage, with national identity serving as a significant moderator (Wu et al., 2022).

India has initiated a phased rollout of its Digital Rupee, with research revealing high awareness (85%) but limited direct pilot usage (28%) among respondents (Singh, 2025). Citizens strongly supported using CBDC for faster and more targeted fiscal transfers and endorsed key features such as offline capability and programmability. However, concerns about potential bank disintermediation and systemic stability risks were prominent. Strategic policy design balancing innovation with inclusion and privacy is essential to ensure the Digital Rupee complements India's existing monetary tools without destabilizing its banking ecosystem.

Research applying Interpretive Structural Modeling (ISM) to CBDC adoption in India found that facilitating conditions and performance expectancy are the most influential constructs, forming the foundational layer in the adoption hierarchy (Dixit et al., 2025). In contrast, hedonic motivation and behavioral intention act as dependent variables influenced by preceding constructs. The findings underscore the importance of infrastructure readiness, user convenience, and institutional support in shaping public intent to adopt CBDC.

Nigeria became the first African nation to launch a CBDC, providing valuable real-world adoption data. Studies examining retailer adoption of the eNaira found that perceived ease of use, perceived usefulness, and trust significantly influence adoption intentions (Ahmed et al., 2025). Emotionality was identified as a significant mediator between trust, financial concerns, and adoption intentions, highlighting the importance of emotional factors in acceptance, especially when digital activities are involved. However, financial concerns were not

significant direct predictors of adoption, suggesting that emotional responses to technology may be more influential than purely economic calculations.

Research on Nigerian retailers confirmed that perceived ease of use, usefulness, and trustworthiness positively influence e-Naira adoption, while financial concerns have a negligible direct effect (Ahmed et al., 2025). Emotionality significantly mediates the relationship between these factors and intentions, providing actionable insights for policymakers on addressing the challenges and opportunities of integrating CBDCs in the retail sector.

The European Central Bank's digital euro project represents a strategic initiative combining technological innovation with the strengthening of financial sovereignty (Духневич, 2025). The digital euro complements rather than replaces cash, preserving attributes such as privacy and offline availability. Research emphasizes that success depends on a clear regulatory and legal framework, changes in banking system structure aligned with institutional interests, high standards of cybersecurity and privacy, effective public engagement, and an inclusive approach to populations with limited digital access.

Comparative analysis of the digital yuan and digital euro reveals diverging paths in CBDC development (Paulovici, 2025). While the e-CNY prioritizes state control, financial sovereignty, and cross-border expansion, the proposed Digital Euro emphasizes privacy, financial stability, and regulatory compliance. The findings highlight the need for harmonized global regulatory standards, balanced tradeoffs between privacy and oversight, and recognition of the strategic role CBDCs can have for more efficient monetary policy, financial stability, and inclusion.

Indonesia is developing its own CBDC called digital rupiah, with research finding that performance expectancy, effort expectancy, habit, personal innovativeness, and awareness are significant factors affecting behavioral intention (Bere et al., 2024). Facilitating conditions, habit, personal innovativeness, and behavioral intention are factors that significantly affect use behavior. Studies using modified TAM found that perceived effectiveness, perceived trust, perceived risk, and perceived ease of use significantly influence attitudes toward CBDC, though perceived ease of use had a negative effect on intention to use in certain contexts (Kurniawan et al., 2024).

Challenges and Barriers to CBDC Adoption

A critical examination of CBDC adoption reveals a set of interconnected challenges, spanning technological and infrastructure limitations, privacy and surveillance concerns, financial stability and disintermediation risks, regulatory and legal complexities, as well as the persistent intention–implementation gap.

CBDC implementation faces significant technological challenges including scalability, interoperability, and offline functionality (Sethaput & Innet, 2025). Research examining blockchain applications in CBDCs analyzed key aspects including scalability, security, privacy, interoperability, environmental sustainability, and regulatory considerations. The need for

robust technological infrastructure represents a critical prerequisite for successful implementation, particularly in emerging economies where digital infrastructure may be less developed.

Studies on barriers to CBDC adoption using Interpretive Structure Modeling identified that organizational commitment is the most crucial component, followed by data security, virtual service quality, user-friendliness, and perceived value (Kumar, 2025). The research suggested that cost-effective transactions, user-friendly technologies, and transaction and information security all contribute to increased trust in CBDC applications. For emerging economies, the most optimal CBDC design encompasses hybrid architecture and domestic and cross-border scope (Syarifuddin, 2024).

Privacy concerns represent one of the most significant barriers to CBDC adoption, particularly regarding potential government surveillance. Research discusses how central banks calibrating design criteria for CBDC must strike a balance between data protection and the individual's right to privacy on the one hand, and the prevention of financial crime on the other (Ballaschk et al., 2021). Independent central banks are positioned to serve as honest brokers in protecting user privacy, but gaining public trust and acceptance remains a key challenge.

Studies on disciplining CBDCs highlight the privacy implications and risks that issuing sovereigns may misuse CBDCs to serve their agendas (C et al., 2022). The research proposes disciplinary mechanisms that may credibly enforce privacy protection laws against issuing central banks and governmental authorities, including the extraterritorial character of modern privacy laws that allows foreign privacy protection regulators to discipline the CBDCs of other sovereigns.

The potential for bank disintermediation represents a significant concern for commercial banking systems. Research examining the Bahamian Sand Dollar illustrates how the central bank could become a deposit monopolist, leading to high funding risks, disintermediation risks, and solvency risks for the commercial banking sector (Wenker, 2022). The study argues that restrictions and caps will be necessary specifications of regulatory frameworks for CBDCs if disintermediation in the banking sector is to be prevented.

Research on emerging markets found that while CBDCs can enhance efficiency and financial accessibility, their impact varies depending on banking infrastructure, regulatory framework, and financial stability measures (Jailani et al., 2025). In some cases, CBDCs have exacerbated liquidity risks for commercial banks, while in others, they have promoted digital innovation and alternative revenue streams. Policy recommendations include implementing limits on CBDC holdings, integrating CBDCs with existing banking services, and fostering regulatory frameworks that support a balanced financial ecosystem.

Legal challenges in CBDC adoption include establishing appropriate regulatory frameworks for issuance, data security, privacy, and anti-money laundering compliance (Bharad & Sharma, 2024). Research emphasizes the importance of implementing CBDC cautiously with incremental development, thorough testing, and review. The legal paradigm shift from physical

cash to digital code demands an updated understanding of legal tender, payments, and state-backed money in the digital age (Amjad, 2026).

A study examining competing paradigms in CBDC law highlights that legislative intervention has focused predominantly on enabling issuance through legal tender designation and accompanying regulatory frameworks (Zatti, 2025). However, cases such as the U.S. Anti-CBDC Surveillance State Act represent a fundamental paradigm shift toward prohibition rather than enablement, reflecting tensions between sovereignty as state capacity versus sovereignty as constitutional restraint.

Research has identified a critical gap between adoption intention and actual implementation behavior. A study on CBDC adoption in Vietnam found that Global Brand Presence (GBP) acts as a significant negative moderator, weakening the link between a consumer's adoption intention and their subsequent implementation behavior (Pham & Tran, 2025). This finding suggests that monetary authorities must manage communication around international partnerships to mitigate socio-political risks and sovereignty concerns, and that targeted, phased rollouts may be more effective than universal launches.

Policy Implications and Future Directions

Research provides evidence-based design principles for CBDC implementation. A two-phase theoretical framework identifies prerequisite conditions including clear policy objectives, a robust legislative framework, broad stakeholder engagement, and sound technological capabilities (Pham & Tran, 2024). The second phase addresses market feasibility through end-user acceptance, serving as a valuable guide for central banks in formulating policies and plans, aiding commercial banks in implementing CBDC-related technical solutions, and fostering awareness among end users.

Studies emphasize that CBDC design choices shape social acceptance and must be evaluated not only for technical soundness but also for public resonance (Ambros et al., 2026). Social acceptance highly depends on design choices, which can be as high as 71.6% under favorable conditions but falling to only 21.5% when least favorable conditions are implemented. This underscores the importance of user-centric design approaches.

CBDCs offer significant potential for enhancing financial inclusion, particularly in underserved populations. Research demonstrates that CBDCs can reduce barriers for unbanked populations through tiered KYC requirements, offline functionality, and programmable payments (Pareek, 2025). However, achieving inclusion goals requires addressing digital literacy gaps and ensuring accessibility for populations with limited digital access. Studies indicate that over 13 million adults in the EU still lack access to formal financial services, highlighting the potential scope for CBDC-driven inclusion initiatives.

Research on India's CBDC implementation highlights the role of government schemes such as Jan Dhan Yojana, MGNREGS, and Direct Benefit Transfer in promoting adoption (Vijayalakshmi, 2025). The integration of CBDC with existing welfare infrastructure offers

pathways for expanding financial inclusion while leveraging established trust relationships between citizens and government programs.

Cross-border CBDC applications require international cooperation and standardization. Research emphasizes the importance of regulatory harmonization and bilateral coordination on CBDC interoperability for simplifying trade compliance (Singh et al., 2025). Studies examining cross-border payment system models highlight the importance of collaboration among central banks and international regulatory bodies to ensure seamless and secure transactions (Marin, 2025).

The role of international economic organizations in global economic governance is increasingly important as digital currencies reshape payment systems (Tao, 2025). Research indicates that international economic organizations should enhance global policy coordination, establish robust regulatory frameworks, and provide technical guidance to mitigate risks associated with CBDC implementation.

The literature identifies several priority areas for future research. Systematic reviews call for longitudinal and experimental designs to validate causal mechanisms in real-world CBDC use, comparative assessments across regions, and investigation of post-adoption behavior (Shen et al., 2026). Research gaps exist in privacy perception measurement, cross-regional comparisons, and understanding of long-term adoption dynamics.

Studies highlight the need for more empirical investigation of merchant adoption patterns, given the distinct mechanisms operating between consumer and retailer segments (Yang & Zhou, 2025). Additionally, research should explore the integration of CBDCs with emerging technologies including post-quantum cryptography for enhanced security, zero-knowledge proofs for preserving privacy, and AI-driven compliance automation (Sethaput & Innet, 2025).

Conclusion

This literature review reveals that CBDC adoption is influenced by a complex interplay of technological, psychological, social, institutional, and contextual factors. The dominant theoretical frameworks—TAM, UTAUT, DOI, and Trust Theory—provide complementary lenses for understanding adoption behavior, with integrated approaches offering the most comprehensive explanatory power. Perceived usefulness, perceived ease of use, trust, and security emerge consistently as primary adoption determinants across diverse geographic and cultural contexts.

The global landscape of CBDC development demonstrates varied approaches reflecting national priorities and institutional contexts. China's e-CNY represents the most advanced large-scale implementation, while the European Union's digital euro project exemplifies a privacy-focused, cautious approach. Emerging economies including India, Nigeria, and Indonesia offer valuable insights into challenges and opportunities specific to developing contexts, particularly regarding financial inclusion objectives.

Critical challenges including privacy concerns, disintermediation risks, and regulatory uncertainty must be carefully addressed through evidence-based policy design. The research consistently emphasizes that successful CBDC implementation requires not only technical feasibility but also institutional legitimacy, public trust, and alignment with user expectations. As central banks worldwide continue to explore and implement CBDCs, the body of empirical research will continue to expand, providing increasingly nuanced guidance for policy and practice.

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