

Review

Integrating Technological and Behavioral Perspectives in the Adoption of China's Digital Currency (e-CNY): A Systematic Literature Review

Ao Shen , Hasniza Mohd Taib  and Logasvathi Murugiah * 

School of Economics, Finance and Banking, Universiti Utara Malaysia, Sintok 06010, Malaysia

* Correspondence: staly526@163.com

Received: 25 December 2025; Revised: 26 January 2026; Accepted: 6 February 2026; Published: 24 February 2026

Abstract: Despite rapid pilot expansion, public uptake of China's central bank digital currency, e-CNY, remains uneven. This study synthesizes evidence on e-CNY adoption and develops an integrative perspective that connects technology acceptance with behavioral and cognitive mechanisms. Following Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) 2020, we searched Scopus, Web of Science, ScienceDirect, SpringerLink, and CNKI for studies published from January 2014 to December 2025. After screening and eligibility assessment, 62 studies were included and coded using thematic synthesis. The evidence converges on three determinant clusters: technological adaptability (performance expectancy, effort expectancy, social influence, facilitating conditions), behavioral and cognitive determinants (institutional trust, perceived risk, financial literacy, awareness), and contextual moderators (merchant acceptance, policy communication, regional infrastructure, and demographics). Across studies, institutional trust and perceived risk show the most consistent and substantial associations with adoption intention, while effective government communication and a dense merchant ecosystem reduce uncertainty and strengthen perceived usefulness. Building on these findings, we propose an integrative framework that links Unified Theory of Acceptance and Use of Technology (UTAUT) constructs to behavioral and cognitive mechanisms and outline a Theory-Context-Characteristics-Methodology (TCCM)-based agenda for future research on CBDC (Central Bank Digital Currency) adoption dynamics. The results offer actionable implications for central banks on privacy design, communication strategies, and inclusion-oriented deployment to support sustainable CBDC diffusion. The review also highlights gaps in post adoption behavior, privacy perception measurement, and cross-regional comparisons, and calls for longitudinal, experimental, and mixed method designs to validate causal mechanisms in real world CBDC use.

Keywords: e-CNY; Central Bank Digital Currency; UTAUT; Behavioral Finance; Adoption Intention; Institutional Trust; Perceived Risk

1. Introduction

1.1. Research Background

The rapid advancement of financial technology has reshaped the global monetary system and redefined how individuals, institutions, and governments interact with money. Among these innovations, the Central Bank Digital Currency (CBDC) has emerged as a significant development in modern finance [1]. A CBDC refers to a digital version of a nation's legal tender, issued and regulated by its central bank. It is designed to improve payment efficiency, enhance transparency, and strengthen financial inclusion [2-4]. Unlike decentralized cryptocurrencies that operate

outside institutional frameworks, CBDCs combine technological innovation with state control, thereby supporting monetary stability and effective regulatory oversight [5,6].

China has been at the forefront of CBDC experimentation through the introduction of the Digital Renminbi (e-CNY), developed under the Digital Currency Electronic Payment (DCEP) initiative by the People's Bank of China (PBoC). The pilot program began in 2020 and has since expanded to major cities such as Shenzhen, Suzhou, Chengdu, and Beijing. The e-CNY functions as legal tender and supports both online and offline transactions. Its hybrid structure integrates value-based and account model features, allowing for traceability while maintaining limited anonymity [7,8]. By mid-2025, more than 200 million digital wallets had been opened, facilitating over three billion transactions [9–11].

The main goal of the e-CNY initiative is to modernize China's financial infrastructure and promote inclusive digital finance. However, despite extensive policy promotion and government endorsement, consumer adoption has been slower than expected. Private platforms such as Alipay and WeChat Pay continue to dominate the digital payments market, accounting for over 90 percent of all transactions [12]. By the end of 2021, approximately 261 million e-CNY transactions had been processed, yet the pace of adoption remained slow relative to the entrenched mobile payment ecosystem dominated by platforms such as WeChat Pay and Alipay, which together account for most transactions in China's digital payment landscape. This indicates that the presence of established third party payment systems continues to present significant competitive pressure for e-CNY adoption, highlighting that technological innovation alone may not ensure widespread acceptance [13,14].

1.2. Research Problem

Existing studies on CBDCs have largely focused on macroeconomic and institutional aspects, such as monetary policy implications, financial stability, and payment system efficiency [5,15,16]. Although these studies have deepened the understanding of CBDC design and policy objectives, they have paid relatively little attention to consumer behavior and adoption mechanisms [17,18].

Digital currency adoption involves both technological and behavioral dimensions. Technology adoption theories such as the Unified Theory of Acceptance and Use of Technology (UTAUT), the Technology Acceptance Model (TAM), and the Innovation Diffusion Theory (IDT) explain adoption intention through factors like performance expectancy, ease of use, and social influence [19,20]. However, these frameworks often overlook psychological and cognitive variables that influence user trust and decision making, including perceived risk, financial literacy, and privacy concerns [21–23].

In the specific context of e-CNY, adoption is also shaped by institutional trust and government communication. Users' confidence in the central bank, their understanding of data protection mechanisms, and their awareness of the benefits of digital currency all contribute to behavioral intention [24]. The lack of comprehensive integration between technological adaptability and behavioral cognition in existing research has created a theoretical gap. This study addresses this limitation by combining these two perspectives to provide a holistic understanding of e-CNY adoption.

1.3. Research Objectives

The objective of this study is to conduct a systematic literature review (SLR) to consolidate current knowledge on e-CNY adoption and to identify theoretical, methodological, and contextual gaps in the existing literature. The review seeks to achieve three specific goals:

1. To synthesize empirical and conceptual research on the determinants of e-CNY adoption, including technological, behavioral, and contextual factors.
2. To integrate technology acceptance theories with behavioral and cognitive constructs to develop a comprehensive conceptual framework.
3. To identify key research gaps and propose a structured future research agenda based on the TCCM (Theory–Context–Characteristics–Methodology) framework.

These objectives lead to the following research questions (RQs):

RQ1: What are the main determinants and recurring themes in the existing literature on e-CNY adoption?

RQ2: How can technological, behavioral, and cognitive theories be integrated to explain adoption behavior in the context of CBDCs?

RQ3: What research gaps remain in the current literature, and how can they inform future studies on digital currency adoption?

1.4. Research Questions

This study is guided by the following research questions:

1. What are the dominant theoretical frameworks employed in e-CNY adoption research?
2. How do technological adaptability factors influence user attitudes toward e-CNY?
3. How do behavioral and cognitive factors shape user trust and intention to adopt?
4. What moderating effects do demographic variables and regional contexts have on adoption behavior?
5. What are the key research gaps that future studies on CBDC adoption should address?

1.5. Significance of the Study

This review contributes to the growing body of research on CBDC adoption in three major ways. First, it integrates technological and behavioral perspectives, offering a more comprehensive framework than existing single theory models. Second, it identifies the role of psychological factors such as perceived trust and financial awareness in shaping digital currency use, a dimension often neglected in policy-oriented studies. Third, it provides practical insights for policymakers, particularly the PBoC, on strategies to enhance public confidence, promote financial literacy, and foster broader participation in the e-CNY ecosystem.

Beyond China, the study also contributes to the international discourse on CBDCs, providing implications for other countries developing digital currencies such as the Digital Euro, e Krona, and e Naira. Understanding user adoption behavior in the Chinese context can serve as a valuable reference for global CBDC design and implementation.

1.6. Scope of the Review

This review focuses on empirical and conceptual studies related to e-CNY and, more broadly, CBDC adoption within the Chinese context. The analysis covers literature published between 2014 and 2025, capturing the full evolution of e-CNY from initial conceptualization to the current pilot phase. Only peer-reviewed journal articles, conference papers, and dissertations written in English or Chinese are included. Studies dealing exclusively with technical design, cryptography, or macroeconomic policy are excluded, as they do not directly address behavioral adoption dynamics.

1.7. Structure of the Paper

The remainder of this paper is organized into four main sections that together provide a coherent analysis of e-CNY adoption. Section 2 describes the methodological framework used for the systematic literature review, outlining the database selection, keyword strategy, and screening procedure that ensured methodological transparency and replicability. Section 3 develops the theoretical foundation of the study by reviewing the Unified Theory of Acceptance and Use of Technology (UTAUT) and extending it through behavioral and cognitive perspectives relevant to central bank digital currencies. Section 4 synthesizes the findings of the reviewed studies and identifies recurring themes, empirical patterns, and contextual variations in e-CNY adoption. Finally, Section 5 presents the discussion and conclusion, emphasizing theoretical implications, policy relevance, and directions for future research. Collectively, these sections provide an integrated and multidimensional understanding of the technological, behavioral, and institutional determinants shaping the adoption of China's digital currency.

2. Methodology

A systematic literature review (SLR) was conducted to consolidate empirical and conceptual findings on the adoption of China's digital currency, the e-CNY. The review followed the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) guidelines to ensure transparency, replicability, and methodological rigor [25,26]. All search, screening, and synthesis procedures were carefully structured to capture the full scope of research on e-

CNY adoption. To further enhance the reliability of the screening process, two independent reviewers examined each record using the same inclusion criteria. When differences occurred, they were discussed until a consensus was reached. This step helped to reduce potential bias and ensured that the review procedure was transparent and replicable according to established systematic review standards.

2.1. Search Strategy and Data Sources

The review drew on multiple academic databases to achieve comprehensive coverage of interdisciplinary work. Sources included Scopus, Web of Science (WoS), ScienceDirect, SpringerLink, and CNKI, ensuring access to both international and Chinese studies. Using multiple databases reduced potential publication bias and allowed for the inclusion of research from economics, behavioral science, and information systems.

Search terms were developed through an iterative process to ensure precision and inclusiveness. The final string was:

“Central Bank Digital Currency” OR “CBDC” OR “Digital Yuan” OR “e-CNY” OR “Digital RMB”) AND (“adoption” OR “acceptance” OR “intention” OR “trust” OR “behavior” OR “awareness”).

The time frame covered January 2014 to December 2025, reflecting the development of the e-CNY from initial conceptualization to advanced pilot stages. Article titles, abstracts, and keywords were screened for relevance. Additional publications were retrieved through reference snowballing, in which citations from key studies were reviewed to locate otherwise uncaptured materials. The search strategy employed a combination of Boolean operators and specific keywords related to e-CNY and technology adoption models. **Table 1** summarizes the main search terms and their combinations.

Table 1. Search for Keywords and Boolean Combinations.

Conceptual Category	Keywords Used	Boolean Combination Example
Digital Currency Terms	“e-CNY”, “digital yuan”, “digital renminbi”, “China CBDC”, “central bank digital currency”	(“e-CNY” OR “digital yuan” OR “digital renminbi” OR “CBDC China”)
Adoption & Behavior	“adoption”, “acceptance”, “intention to use”, “user behavior”, “attitude”, “trust”	(“adoption” OR “acceptance” OR “behavioral intention”)
Theoretical Models	“UTAUT”, “TAM”, “behavioral finance”, “perceived risk”, “financial literacy”, “awareness”	(“UTAUT” OR “behavioral finance” OR “perceived risk”)

2.2. Inclusion and Exclusion Criteria

To ensure the methodological rigor and relevance of the reviewed literature, strict inclusion and exclusion criteria were applied throughout the selection process. Studies were considered eligible for inclusion if they were published between 2014 and 2025 and focused on the adoption of the e-CNY or, more broadly, the adoption of central bank digital currencies within the Chinese context. Eligible works applied recognized theoretical frameworks such as the Unified Theory of Acceptance and Use of Technology (UTAUT), the Technology Acceptance Model (TAM), the Innovation Diffusion Theory (IDT), or behavioral finance constructs. Only empirical or conceptual studies that examined behavioral variables related to user adoption, such as intention, trust, perceived risk, or financial awareness, were retained. Furthermore, to ensure academic credibility, only peer reviewed journal articles, conference proceedings, and doctoral dissertations written in either English or Chinese were included in the final dataset.

Publications were excluded if their primary focus was limited to cryptographic mechanisms, technical system designs, or regulatory frameworks without addressing user perception or behavioral dimensions. Opinion papers, editorials, and commentaries lacking methodological detail were also removed. Duplicate records and incomplete studies were excluded during the final review stage. These criteria collectively ensured that the synthesized literature reflected both conceptual depth and methodological transparency, providing a robust foundation for the subsequent analysis.

2.3. Screening and Selection Process

Following the PRISMA protocol, the screening process unfolded in four stages: identification, screening, eligibility, and inclusion.

Trust in the central bank and confidence in regulatory integrity help reduce perceived uncertainty, while concerns about data surveillance or misuse of financial information increase hesitation. This relationship between

trust and perceived risk reflects a psychological balance rather than a direct causal link. Empirical findings in financial technology adoption show that users who perceive institutions as transparent and accountable are more likely to tolerate minor risks associated with innovation. Integrating these behavioral and institutional perspectives expands the explanatory reach of the UTAUT framework, emphasizing that digital currency adoption involves both rational evaluation and emotional assurance.

During the identification stage, 1132 records were retrieved across databases. After duplicate removal, 387 records remained for title and abstract screening. At this stage, 200 records were excluded, leaving 187 articles for full text assessment. During eligibility assessment, 125 studies were excluded due to conceptual or methodological limitations. Ultimately, 62 publications met the inclusion criteria and were analyzed in detail.

Another essential dimension influencing technology adoption is the perception of institutional credibility and cognitive framing. Users' willingness to adopt e-CNY depends not only on their understanding of the system but also on how they interpret government intentions and regulatory transparency. Behavioral economics suggests that individuals tend to overestimate potential losses when faced with unfamiliar financial instruments, a phenomenon consistent with prospect theory. Such risk averse tendencies are amplified when users lack reliable information about data security or policy continuity. Integrating these cognitive and institutional variables into existing adoption models helps explain why even technologically literate users may delay participation until a sense of stability and fairness is established.

Each study was coded for year, theoretical model, data type, and key determinants. Coding reliability was validated through independent cross checks by two reviewers. Discrepancies were resolved by discussion until consensus was achieved, ensuring objectivity and replicability.

2.4. Data Analysis and Synthesis

Because the selected studies employed diverse research methods and datasets, thematic synthesis was chosen as the analytical approach rather than meta analysis. Thematic synthesis integrates both qualitative and quantitative findings by grouping evidence into conceptual categories [27].

The analysis proceeded in three stages. First, studies were categorized according to their theoretical base, including UTAUT, TAM, and hybrid behavioral frameworks. Second, adoption determinants were compared across studies to identify convergent and divergent evidence. Third, recurring variables were synthesized into three major thematic clusters: technological adaptability, behavioral and cognitive conditions, and contextual moderators. These themes formed the conceptual foundation for the framework presented in Section 3.

2.5. Methodological Framework

In addition to these behavioral variables, user decisions are shaped by their assessment of institutional credibility and perceived fairness of policy implementation. Trust in the central bank and confidence in regulatory integrity help reduce perceived uncertainty, while concerns about data surveillance or misuse of financial information increase hesitation. This relationship between trust and perceived risk reflects a psychological balance rather than a direct causal link. Empirical findings in financial technology adoption show that users who perceive institutions as transparent and accountable are more likely to tolerate minor risks associated with innovation. Integrating these behavioral and institutional perspectives expands the explanatory reach of the UTAUT framework, emphasizing that digital currency adoption involves both rational evaluation and emotional assurance.

The overall research procedure is summarized in the methodological framework shown below (**Figure 1**). It outlines the stages from data identification to thematic synthesis and highlights how theoretical integration was achieved.

2.6. Ethical Considerations and Limitations

As this study relied entirely on secondary data, ethical approval was not required. All sources were accurately cited to preserve academic integrity and to avoid plagiarism. The main limitation lies in potential publication bias, since only peer reviewed literature was included. Another constraint is the concentration of studies on Chinese samples, which may limit generalization. To mitigate these issues, the search incorporated both English and Chinese databases and applied rigorous cross validation during coding.

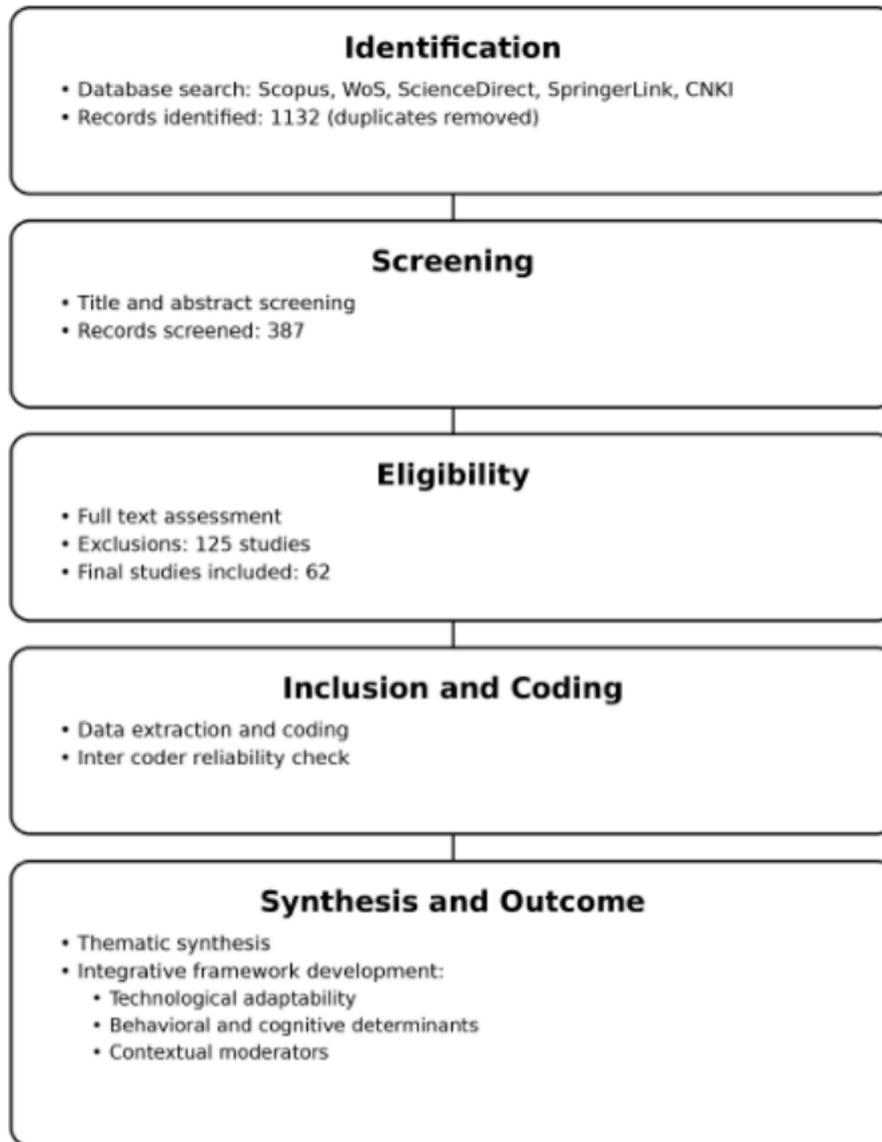


Figure 1. Methodological Framework for the Systematic Review.

3. Theoretical Foundations

Understanding the adoption of China’s digital currency requires an integration of both technological and behavioral perspectives. Theoretical frameworks such as the Unified Theory of Acceptance and Use of Technology (UTAUT) provide a structural basis for analyzing technology driven behavior, while behavioral finance and cognitive psychology offer insights into users’ perceptions, trust, and decision making patterns. The integration of these perspectives forms a comprehensive lens for analyzing e-CNY adoption behavior within China’s institutional and cultural context.

3.1. The Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model, proposed by Venkatesh et al. [19], synthesizes eight earlier models of technology adoption, including the Technology Acceptance Model (TAM), the Theory of Reasoned Action (TRA), and the Innovation Diffusion Theory (IDT). It posits that behavioral intention and actual use behavior are shaped by four central constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions.

Performance expectancy refers to the degree to which users believe that adopting new technology will improve

their efficiency or effectiveness. In the context of e-CNY, users are more likely to adopt the digital currency when they perceive tangible benefits such as secure transactions, faster payments, and potential cost savings [12,28].

Effort expectancy describes the perceived ease of using a system. A clear interface, seamless integration with mobile payment environments, and minimal operational complexity can significantly enhance users' willingness to adopt e-CNY [24,29].

Social influence captures the perceived expectations of significant others, such as family, peers, and government institutions. In China, where collectivist cultural norms and institutional trust are strong, endorsement by state authorities and visible public usage can greatly influence adoption behavior [7,22].

Finally, facilitating conditions represent users' perceptions of the availability of necessary resources and support infrastructure, including access to smartphones, internet connectivity, and banking integration. Regional disparities in these conditions have led to uneven adoption across China's provinces [29]. Subsequent research has broadened the UTAUT framework to include social, cultural, and cognitive elements that influence individual decision making. These extensions highlight that technology adoption involves both rational evaluation and subjective perception. Emotions, trust, and perceptions of institutional credibility often interact with technological expectations and shape how users respond to financial innovations such as the e-CNY.

Although UTAUT provides a robust framework for explaining technology related behavior, it primarily captures functional and social aspects of technology use. It does not fully account for the cognitive, emotional, and behavioral factors that influence financial decision making in a highly regulated digital currency environment. For this reason, behavioral and cognitive extensions are required to complement the model.

3.2. Behavioral and Cognitive Extensions

Behavioral and cognitive theories emphasize that users' financial decisions are not purely rational but are influenced by perceptions, biases, and emotional evaluations. In the case of e-CNY, three constructions are particularly relevant: perceived risk, financial literacy, and perceived awareness.

Perceived risk refers to users' concerns about data privacy, surveillance, or potential misuse of financial information. Studies indicate that individuals who associate digital payments with higher levels of data exposure tend to delay or avoid adoption [30,31]. Addressing these concerns requires institutional transparency and clear communication about data protection.

Financial literacy affects individuals' capacity to understand and manage digital currency applications. Higher levels of financial literacy are positively associated with confidence and adoption intention, as users are better equipped to evaluate benefits and risks [32,33].

Perceived awareness reflects users' knowledge of e-CNY's functions, accessibility, and potential advantages. Limited awareness, especially among older or rural populations, remains a major obstacle to large scale adoption [34]. Effective public communication campaigns and education initiatives can bridge this cognitive gap and foster greater acceptance.

These behavioral and cognitive dimensions complement the UTAUT constructs by introducing psychological depth. They acknowledge that digital currency adoption depends not only on technological convenience but also on users' trust, understanding, and confidence.

3.3. Integrative Conceptual Framework

To capture the multifaceted nature of e-CNY adoption, this study integrates technological and behavioral cognitive constructs into a single framework. As shown in **Figure 2**, the model is divided into two major components: technological adaptability and behavioral–cognitive conditions.

Despite general consistency across studies, variations in results suggest that contextual and cultural factors continue to influence adoption outcomes. For example, studies in metropolitan regions highlight the importance of convenience and interoperability, whereas rural focused research emphasizes trust and perceived government support. Divergent findings may also arise from methodological differences, such as survey based versus experimental designs. In addition, temporal factors, including users' exposure to pilot programs or changes in communication strategy, may explain shifting perceptions over time. Recognizing these sources of variation can guide future work toward developing more nuanced, regionally adaptive models of digital currency adoption.

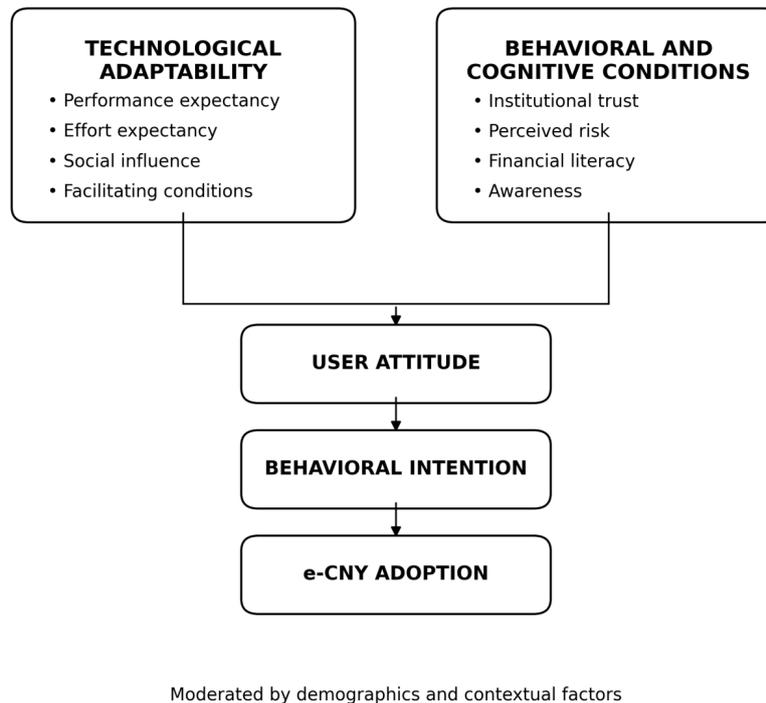


Figure 2. Conceptual Framework for e-CNY Adoption.

Technological adaptability comprises four elements from UTAUT, performance expectancy, effort expectancy, social influence, and facilitating conditions that shape users’ functional evaluation of e-CNY. Behavioral–cognitive conditions include perceived risk, financial literacy, and awareness, representing psychological and informational dimensions of user behavior.

While the reviewed studies converge on the importance of trust and performance expectancy, notable inconsistencies remain in the empirical evidence. Some investigations, for instance, report that privacy concerns are less influential than convenience, whereas others highlight them as major deterrents. These contradictions often arise from sampling bias, limited geographic scope, or short observation periods. Furthermore, few studies examine post-adoption behavior, leaving uncertainty about whether initial enthusiasm translates into sustained use. Addressing these limitations would strengthen the explanatory power of future research on digital currency adoption.

User attitude acts as a mediating variable linking these antecedent factors to behavioral intention. Demographic variables such as age, income, and education, as well as contextual moderators like regional digital infrastructure and government promotion, influence the strength of these relationships. This integrative model provides a comprehensive basis for understanding e-CNY adoption within both individual and institutional contexts.

3.4. Summary

The theoretical foundations presented in this chapter establish a dual perspective framework for analyzing e-CNY adoption. While UTAUT explains how users respond to technological characteristics, behavioral and cognitive constructs capture deeper psychological mechanisms that drive or inhibit adoption. The integration of these dimensions produces a more comprehensive model capable of explaining user behavior in the context of central bank digital currencies. The next chapter applies this framework to synthesize evidence from the reviewed literature, revealing the major themes and empirical patterns underlying e-CNY adoption.

4. Findings and Synthesis

The systematic review identified sixty-two studies published between 2014 and 2025 that met the inclusion criteria. These studies vary widely in focus, methodology, and theoretical grounding, yet collectively they provide a comprehensive understanding of e-CNY adoption. Through thematic synthesis, three overarching themes were

identified: technological adaptability, behavioral and cognitive determinants, and contextual moderators. Together, these themes reveal the multifaceted nature of digital currency adoption in China.

4.1. Technological Adaptability

Technological adaptability represents the extent to which users evaluate e-CNY based on its perceived utility, ease of use, and infrastructural support. This dimension corresponds to the four constructions of the UTAUT model: performance expectancy, effort expectancy, social influence, and facilitating conditions.

Most studies highlight performance expectancy as a central determinant of adoption. Users are more likely to embrace e-CNY when they perceive clear advantages over existing payment methods, such as enhanced transaction security, reduced costs, and faster processing. The effort expectancy factor, reflecting perceived ease of use, is also significant. A simple interface and seamless compatibility with mobile applications increase adoption likelihood, particularly among younger and tech savvy users.

Social influence plays a crucial role in the Chinese context, where government endorsement and social conformity strongly affect behavioral intention. Public demonstrations and pilot programs sponsored by state institutions help legitimize e-CNY as a credible payment tool. Finally, facilitating conditions, such as smartphone penetration, mobile internet access, and integration with banking systems, determine the practical feasibility of adoption. The combination of these technological elements forms the operational foundation upon which user attitudes are built.

4.2. Behavioral and Cognitive Determinants

Beyond functional and structural aspects, users' psychological and informational perceptions significantly shape e-CNY adoption behavior. Three major behavioral-cognitive constructs emerged from the literature: perceived risk, financial literacy, and perceived awareness.

Perceived risk consistently appears as a major inhibitor of adoption. Users express concerns regarding personal data protection, transaction privacy, and potential monitoring by financial authorities. High levels of perceived risk reduce behavioral intention even among technologically competent users, underscoring the importance of institutional trust.

Financial literacy has a positive influence on adoption intention. Individuals with higher financial competence demonstrate greater confidence in evaluating the benefits of e-CNY and managing digital transactions. Studies also reveal that targeted financial education programs can reduce cognitive barriers and promote inclusion, particularly among low income or rural groups.

Perceived awareness refers to users' knowledge of e-CNY functions, policies, and advantages, which emerges as another critical determinant. Limited awareness often leads to misconceptions about the system's purpose and safety, hindering engagement [7]. This finding highlights the need for broader public communication and transparency. Collectively, these behavioral-cognitive variables extend the explanatory power of technology adoption models by integrating trust, knowledge, and perception into behavioral intention formation.

4.3. Contextual and Demographic Moderators

Technological and behavioral variables alone cannot fully explain the observed disparities in e-CNY adoption. A range of contextual and demographic factors moderate these relationships. Demographic characteristics such as age, income, education, and location strongly influence users' perceptions and behavioral intentions. Younger, urban, and well educated individuals tend to be more receptive to digital currencies, while older or rural populations often display higher levels of skepticism and lower trust in financial innovations. These differences underline the need to consider user diversity when examining technology adoption in China's financial system [35].

The institutional environment also plays a central role in shaping adoption outcomes. Evidence from early pilot cities, including Shenzhen, Suzhou, and Chengdu, shows that regions participating in initial trials exhibit higher levels of awareness and greater usage rates. This pattern suggests that government led initiatives, public communication, and targeted policy support significantly accelerate the diffusion of digital currency. In addition, the availability of digital infrastructure—such as stable broadband networks, secure mobile payment systems, and access to smartphones—remains a decisive enabler for widespread adoption. Areas with lower digital penetration tend to experience slower uptake, even when policy support is strong.

Comparative insights from other CBDC initiatives also provide useful perspectives for China's continuing e-CNY

development. Sweden’s e Krona project emphasizes inclusivity for non-digital users, the Bahamas’ Sand Dollar highlights interoperability in smaller economies, and the European Central Bank’s Digital Euro stresses privacy protection and user autonomy. These international experiences demonstrate that effective digital currency design must align technological efficiency with transparent governance and credible institutional practices. For China, enhancing collaboration between regulators, commercial banks, and private payment platforms may improve both public trust and system interoperability, while strengthening cross-border financial integration.

Beyond the Chinese context, future research should examine how institutional structures and social trust interact across different regulatory systems. Comparative studies involving emerging markets and advanced economies could clarify whether centralized digital models promote or constrain adoption. Methodologically, the integration of quantitative meta analyses with qualitative case studies could help identify both general trends and contextual variations. Policymakers may also consider participatory mechanisms that allow users to provide feedback during system design and implementation, ensuring that technological innovation evolves in line with social expectations and ethical standards.

Overall, these contextual findings suggest that e-CNY adoption is a dynamic and heterogeneous process shaped by technological readiness, behavioral confidence, and structural opportunity. Understanding these interactions requires more context sensitive theoretical frameworks that capture the interplay of individual, institutional, and environmental determinants in digital financial transformation.

Table 2 summarizes the thematic classification of the reviewed studies, providing an overview of the dominant constructions, theoretical foundations, and representative findings.

Table 2. Thematic Classification of e-CNY Adoption Studies.

Theme	Key Constructs	Representative Studies	Core Findings
Technological Adaptability	Performance expectancy, effort expectancy, social influence, facilitating conditions	Lyu et al. [28]; Liu et al. [12]; Amin et al. [24]; Chen et al. [29]	Functional utility, ease of use, and government endorsement are major predictors of adoption.
Behavioral–Cognitive Determinants	Perceived risk, financial literacy, perceived awareness	Wang and Su [31]; Kshetri [22]; Huang et al. [21]; Cheng and Song [7]	Psychological trust and knowledge critically shape behavioral intention.
Contextual Moderators	Demographics, regional development, policy environment, infrastructure	Kim and Ho [6]; Liu et al. [12]; Huang et al. [21]; Hoang and Phan [17]	Age, income, and local digital readiness moderate adoption patterns across China.

5. Discussion and Conclusion

The findings of this review provide a comprehensive understanding of the behavioral and technological factors influencing the adoption of China’s central bank digital currency, the e-CNY. By integrating the UTAUT framework with behavioral and cognitive perspectives, this study advances a multidimensional view of user adoption that transcends the limitations of purely technological explanations. The discussion below outlines the theoretical and practical implications of these findings, proposes future research directions using the TCCM framework, and concludes with reflections on the broader significance of e-CNY for global CBDC development.

5.1. Discussion

The synthesis demonstrates that adoption behavior is shaped by three interrelated dimensions. The first is technological adaptability, which captures how users assess the usefulness, ease of use, and accessibility of e-CNY. When the system is perceived as efficient, reliable, and convenient, users show stronger adoption intentions. These perceptions are consistent with the core assumptions of the UTAUT model, suggesting that performance and effort expectancy remain foundational drivers of digital adoption [24,29].

The second dimension is behavioral and cognitive perception, which expands beyond functional evaluation to include users’ psychological and informational responses. Factors such as perceived trust, risk, and financial literacy strongly affect willingness to adopt. Users who understand the mechanisms of e-CNY and believe that their privacy is adequately protected are significantly more likely to engage with the platform. This indicates that behavioral confidence complements technological readiness in shaping adoption behavior [22,30,34].

The third dimension involves contextual moderators, including demographic characteristics, regional infrastructure, and government promotion. Younger and urban users tend to adopt digital currencies more readily, while older or rural populations remain cautious due to lower digital literacy and weaker institutional trust. Regional

pilot programs, led by the People’s Bank of China and local authorities, have played an important role in enhancing public familiarity with e-CNY. These contextual factors demonstrate that adoption occurs within a broader ecosystem of technology, policy, and social environment [7,9,12].

Together, these findings suggest that user adoption of e-CNY results from the interaction of functional utility, psychological trust, and institutional support. This multidimensional dynamic distinguishes CBDC adoption from conventional payment technologies, where private market competition and innovation drive diffusion. In contrast, e-CNY adoption reflects both technological design and citizens’ confidence in the state’s financial governance [5,13,16].

5.2. Theoretical and Practical Implications

The review contributes to academic literature in several ways. Theoretically, it extends existing technology adoption models by integrating behavioral and cognitive constructs into the analysis of digital currency acceptance. While UTAUT provides a useful structure for identifying functional drivers, the addition of variables such as perceived risk, awareness, and financial literacy allows for a deeper understanding of user psychology. This integration helps explain why government backed digital currencies, despite their technological efficiency, face resistance related to trust and perceived surveillance [18,22].

Practically, the findings offer several policy implications. Building public trust should be a priority for monetary authorities. Transparent communication about privacy safeguards, data management, and user protection can reduce uncertainty and foster confidence. Strengthening financial literacy through education programs, particularly in rural and elderly populations, will help reduce cognitive barriers. Finally, improving institutional coordination among banks, payment platforms, and regulatory bodies can enhance the accessibility and interoperability of e-CNY. These measures will promote broader adoption and contribute to the long-term success of China’s digital financial transformation. Overall, this study provides an evidence based foundation for understanding CBDC adoption dynamics, offering both theoretical enrichment and practical policy guidance for digital financial transformation [9,12].

5.3. Future Research Agenda: The TCCM Framework

Future research on CBDC adoption should be guided by the TCCM (Theory–Context–Characteristics–Methodology) framework, which helps identify theoretical and methodological gaps in the current literature. **Table 3** outlines the main directions for further study.

Table 3. Future Research Agenda Based on the TCCM Framework.

TCCM Dimension	Key Gaps Identified	Future Research Agenda	Suggested Methods and Data
Theory	UTAUT frequently applied in isolation; limited integration with trust, risk, and policy credibility mechanisms.	Develop integrative models that connect technology acceptance with institutional trust, risk perception, and behavioral decision mechanisms in CBDC settings.	Theory building; comparative model testing; SEM/PLS SEM; experiments to test causal mechanisms.
Context	Overreliance on single city or pilot samples; limited cross region and cross group comparisons; underexplored merchant ecosystem effects.	Conduct cross regional and cross demographic studies; examine merchant acceptance and policy communication environments as boundary conditions.	Multi site surveys; matched city comparisons; field studies with merchants; panel datasets.
Characteristics	Inconsistent measurement of privacy, security, and anonymity perceptions; limited focus on post adoption and continued use.	Refine measurement of privacy and security perceptions; study post adoption behavior, habit formation, and real world usage patterns.	Scale development and validation; log data linkage; longitudinal tracking; mixed methods.
Methodology	Predominantly cross sectional designs; limited causal inference; sparse use of longitudinal or experimental approaches.	Adopt longitudinal, experimental, and quasi experimental designs to identify causal effects of policy messages, incentives, and design features on adoption.	Longitudinal panels; randomized message framing experiments; difference in differences using policy rollout timing.

The TCCM framework emphasizes the need for theoretical diversification, contextual expansion, and methodological innovation. Future research should incorporate behavioral economics, sociology, and public policy perspectives to capture the broader societal implications of CBDC adoption.

5.4. Limitations and Future Research Directions

Although this review provides a comprehensive synthesis of current knowledge on e-CNY adoption, several limitations should be acknowledged. First, the analysis relies exclusively on peer reviewed studies, which may

introduce bias to publication and limit the inclusion of recent working papers or government reports. Second, most of the reviewed literature focuses on China's pilot regions, creating potential regional bias and restricting generalization to broader national or global contexts. Third, many studies employ cross sectional survey designs, which capture perceptions at a single point in time and may not reflect changes in user attitudes or behavioral adaptation.

Future research should adopt longitudinal and mixed method designs to observe changes in user perceptions over time. Comparative analyses across different cultural and regulatory environments would help clarify whether institutional trust and perceived transparency influence adoption similarly in other countries. Incorporating experimental and qualitative methods could further uncover psychological and contextual mechanisms that are not fully captured by quantitative surveys. Such efforts will refine theoretical models and strengthen the evidence base for policymaking in the development of central bank digital currencies.

5.5. Conclusion

This review demonstrates that the adoption of the digital renminbi (e-CNY) depends on a balance between technological readiness and behavioral confidence. Users adopt e-CNY when they perceive it as secure, easy to use, and beneficial, but their decisions are equally influenced by trust, awareness, and institutional credibility. Demographic and regional variations further highlight the need for context sensitive policy design [13,29].

The integration of UTAUT with behavioral and cognitive perspectives provides a comprehensive framework for understanding how users form intentions toward government issued digital currencies. The findings also underline that the success of e-CNY is not only a technological achievement but also a reflection of citizens' trust in public governance and digital finance infrastructure [5,15].

Looking ahead, researchers and policymakers should collaborate to deepen understanding of user psychology, promote transparency, and ensure inclusiveness in digital payment systems. Insights from China's e-CNY experience can guide other countries in developing their own CBDCs, contributing to the creation of a more equitable, efficient, and trustworthy global digital monetary system [16,17].

Author Contributions

Conceptualization, A.S., H.M.T., and L.M.; methodology, A.S., H.M.T., and L.M.; software, L.M.; validation, H.M.T.; formal analysis, A.S.; investigation, L.M.; resources, A.S.; data curation, A.S.; writing—original draft preparation, A.S.; writing—review and editing, A.S. and H.M.T.; visualization, A.S. and H.M.T.; supervision, H.M.T.; project administration, A.S.; funding acquisition, H.M.T. All authors have read and agreed to the published version of the manuscript.

Funding

This research received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

No new data were created or analyzed in this study. Data sharing is not applicable to this article as it is based solely on previously published research available in academic databases.

Acknowledgments

The authors wish to express their sincere appreciation to Universiti Utara Malaysia for providing academic resources and research support throughout this study. The authors also thank colleagues and anonymous reviewers for their constructive feedback, which contributed to improving the quality of this manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

AI Use Statement

An AI language model (ChatGPT, OpenAI, GPT 5.2 Thinking) was used to improve grammar, clarity, and academic tone. The AI tool was not used to generate data, results, or novel scientific claims. All intellectual contributions, interpretations, and conclusions are those of the authors, who take full responsibility for the accuracy and integrity of the manuscript.

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