

## PAPER

# A Study on Influencing Factors of Willingness to Use E-CNY Based on Logistic Model

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## ABSTRACT

The development of mobile technology has facilitated the widespread adoption of digital currency worldwide. An important application of mobile technology is digital currency, which has gained global popularity due to its blockchain and peer-to-peer mobile payment mechanisms. The emergence of private digital currencies, such as Bitcoin, poses a challenge to the monetary policy of governments. To address this threat, many central banks are developing their own central bank digital currencies (CBDCs) with legal support. China's CBDC, e-CNY (electronic China Yuan), is one of the most advanced examples of this innovation. However, the adoption and usage of e-CNY by residents is still limited and requires improvement. This paper aims to identify and analyze the factors that influence residents' willingness to use e-CNY, based on a literature review and a logistic regression model. The results indicate that residents' awareness, convenience, cost, promotional activities, and the involvement of relevant parties (merchants, commercial banks, payment institutions, and the People's Bank of China (PBC)) significantly influence their willingness to use e-CNY. This paper presents implications and suggestions for promoting and implementing e-CNY in China.

## KEYWORDS

mobile technology, logistic model, electronic China Yuan (e-CNY), usage willingness, influencing factors

## 1 INTRODUCTION

The rapid growth of online payments, particularly mobile payments, in the global market is attributed to the advancement of mobile technology and the widespread adoption of financial digitalization. Digital currency-based mobile technology has transformed people's lifestyles and become a viable alternative to cash.

There are two types of digital currencies: private and central bank-issued. Yao Qian argues that private digital currencies lack the support and supervision of

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national credit and monetary authorities, which limits their potential and creates risks [1]. On the other hand, central bank digital currencies (CBDCs) are backed and issued by the state and are subject to centralized control and regulation. This can greatly mitigate the adverse effects of private digital currencies.

Central bank digital currencies can be classified into two categories: wholesale and retail. Wholesale CBDC is designed to replace deposit reserves and facilitate large-scale transfers and remittances among banks and financial institutions. Retail CBDC is designed to replace cash and facilitate small daily mobile payments for the public [2].

China began developing a retail-oriented CBDC in 2014 and officially launched e-CNY in 2020. The introduction of e-CNY aligns with the development trend of China's digital economy. As a digital form of currency, e-CNY ensures the legal status of the RMB in the context of a digital economy [3].

Most of the existing literature on CBDC focuses on its macroeconomic implications and neglects the perspective of residents. However, the actual adoption and acceptance of CBDC by residents will significantly impact the effectiveness of monetary policy.

This paper examines China's CBDC, e-CNY, as a case study and utilizes a logistic regression model to analyze the factors influencing Chinese residents' willingness to use e-CNY and their concerns about it. The paper aims to offer insights and recommendations for China's top-level design of e-CNY issuance, promotion, and usage in the future. It also aims to provide reference value for other countries in formulating monetary policies, enhancing mobile payment systems, and designing and promoting CBDCs.

The research objectives of this paper are as follows:

- To identify the factors that influence residents' willingness to use e-CNY using a logistic regression model.
- To analyze the effects and significance of these factors on residents' willingness to use e-CNY.

## 2 LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

According to the white paper "Progress in Research and Development of China's e-CNY," published by the e-CNY R&D Working Group of the PBC in 2021, e-CNY is the digital fiat currency issued by the PBC and is considered to have the highest level of security as an asset. As a crucial national retail payment infrastructure, e-CNY utilizes commercial cryptography technology to guarantee the authenticity, confidentiality, integrity, and non-repudiation of the system [4].

The vice president of the Shanghai New Financial Research Institute argued that e-CNY should not only serve as a payment method but also create new and distinctive application scenarios [5]. He used UnionPay's cloud flash payment as an example and pointed out that it does not align with the user's usage habits in the current platform economy. This starts with payment and extends to other services. He argued that simply having a quick and easy mobile payment method is not sufficient to establish a strong currency. It is more crucial to meet the needs and consumption patterns of market participants in the digital economy.

The Development Research Center of the State Council suggested that e-CNY should involve a more diverse range of participants and expand its application scenarios [6]. He mentioned that e-CNY has already been adopted by e-commerce

platforms such as Taobao, Ele.me, and Hema. Additionally, mobile phone manufacturers such as Xiaomi and Vivo have supported the no-electricity mobile payment feature of e-CNY. He also suggested that e-CNY should increase its usage in government funds, financial loan disbursement, provident funds, and cross-border payments.

Cheng Xi (2019) identified several factors that influence the effectiveness of payment tools for residents [7], including the anonymity and security of personal transaction information, the convenience of using mobile payment tools, the availability of offline payment options, and the associated fees.

A survey conducted by “Sina Finance” revealed several issues with the actual usage of e-CNY [8]. Firstly, many residents are unfamiliar with or do not know how to use e-CNY, leading to a low circulation rate of e-CNY in MO (approximately 0.13%). Furthermore, the adoption rate of e-CNY varies significantly among the pilot cities. Secondly, residents have privacy concerns about the mobile payment behavior, as they believe that e-CNY is directly issued and monitored by the central bank. Thirdly, e-CNY has limited application scenarios because many businesses need to install special equipment to accept e-CNY payments. Residents prefer using WeChat and Alipay for mobile payments because they do not perceive any clear advantage of e-CNY over third-party payment platforms. Furthermore, residents are hesitant to keep money in e-CNY wallets because e-CNY does not provide any interest or financial functionality. Lastly, there is a lack of national promotion and incentive programs for e-CNY, which diminishes the motivation of both businesses and consumers to use e-CNY.

Yang Peiwen, a journalist from Red Star, reported on the implementation of e-CNY salary payments in Changshu [9]. He discovered that most citizens would promptly transfer their e-CNY salaries to their bank cards upon receiving them. The main reasons were twofold: first, there were not enough situations where e-CNY could be utilized; second, people were not accustomed to using e-CNY and did not perceive any distinction between e-CNY and WeChat or Alipay in terms of mobile payment.

The Gyro Research Institute highlighted that the dual offline payment feature of e-CNY is susceptible to issues of double spending and overpayment [10], and the hardware encryption is also prone to hacking. Furthermore, the dual offline payment feature of e-CNY has stringent transaction conditions that restrict its use to small transactions. It also regulates the transaction time, frequency, and payment device.

Based on a comprehensive review of the existing literature, we have formulated the following hypotheses for this study:

- Hypothesis 1: There is a positive correlation between the comprehension of e-CNY and the inclination to use e-CNY.
- Hypothesis 2: There is a positive correlation between the level of convenience in using e-CNY and the willingness to use e-CNY.
- Hypothesis 3: There is a negative relationship between concerns about the privacy and security of e-CNY and the willingness to use e-CNY.
- Hypothesis 4: There is a negative relationship between the absence of a payment environment for e-CNY and the willingness to use e-CNY.
- Hypothesis 5: There is a negative relationship between the use of other payment tools and the willingness to use e-CNY.
- Hypothesis 6: There is a positive correlation between the costs and benefits of using e-CNY and the willingness to use e-CNY.

- Hypothesis 6a: There is a negative correlation between the cost of using e-CNY and the willingness to use e-CNY.
- Hypothesis 6b: There is a positive correlation between the interest income from using e-CNY and the willingness to use e-CNY.
- Hypothesis 7: A positive relationship exists between the functional diversity of e-CNY apps and the willingness to use e-CNY.
- Hypothesis 8: There is a positive relationship between the promotion and promotional activities of e-CNY and the willingness to use e-CNY.
- Hypothesis 9: There is a positive correlation between the level of involvement of relevant stakeholders in e-CNY and the inclination to use e-CNY.
- Hypothesis 9a: There is a positive correlation between merchants' participation in e-CNY and their willingness to use e-CNY.
- Hypothesis 9b: There is a positive correlation between the involvement of commercial banks in e-CNY and the inclination to use e-CNY.
- Hypothesis 9c: There is a positive correlation between the involvement of payment institutions in e-CNY and the inclination to use e-CNY.
- Hypothesis 9d: There is a positive correlation between the involvement of the PBC in e-CNY and the willingness to use e-CNY.

### 3 METHODOLOGY

As e-CNY is still in the trial operation stage in China and has not been implemented nationwide, we chose four cities that have taken part in the pilot projects as our research sites. According to the website of the Central People's Government of the People's Republic of China (2022), as of July 2022, 17 provinces and cities were participating in the pilot program for e-CNY [11].

The four cities we selected are Beijing, Suzhou, Shenzhen, and Chongqing. Beijing is the capital and the political center of China. Suzhou, specifically its subsidiary Changshu, is the first city in China to implement e-CNY for salary payments. Shenzhen is a special economic zone in China, granted greater economic autonomy by the government. Chongqing is a municipality directly under the central government of China and a key base for the Western Development Strategy. It has a large population.

To mitigate systematic bias, we employed a simple random sampling method [12] to select our respondents from the four cities. We planned to distribute 400 questionnaires online, with 100 questionnaires allocated to each city.

We initially prepared a series of questions for in-depth interviews with various stakeholders in e-CNY. We planned to interview 30 individuals involved in e-CNY payment, receipt, settlement, competition, or regulation. The interviewees included consumers, merchants, commercial banks, payment institutions, and the People's Bank of China (PBC).

Based on the results of the in-depth interviews and the existing literature, we developed a comprehensive questionnaire that addressed various aspects of e-CNY usage. The questionnaire included inquiries about comprehension levels, convenience, privacy and security, payment environment, payment behavior habits, costs and benefits, diversity of app functions, promotional discounts, and involvement of relevant parties. See Table 1.

**Table 1.** Survey questionnaire

Project	Question	Very Inconsistent	Inconsistent	Uncertain	Consistent	Very Consistent
Understanding level	Have a good understanding of the relevant knowledge of e-CNY					
	Pay attention to the issuance and promotion of e-CNY					
	Frequent use of e-CNY					
Convenience	Opening an e-CNY account is very convenient					
	The operation of e-CNY in the actual payment process is relatively convenient and fast					
	Timely receipt of e-CNY					
Privacy and Security	There is a risk of loss in e-CNY wallets					
	E-CNY dual offline payment may have issues such as overpayment					
	There is a risk of hackers cracking the e-CNY hard wallet					
	There is a risk of hacker attacks and tampering in the payment process of e-CNY					
	The slight anonymity of e-CNY poses criminal risks such as money laundering					
	e-CNY records personal and transaction information, posing a risk of privacy leakage					
Payment environment	There are much public utility charging scenarios that support e-CNY					
	Many commercial banks support e-CNY transactions					
	Many acquirers' merchants support e-CNY payment and receipt					
	Many apps on e-commerce platforms support e-CNY payment and receipt					
Payment behavior habits	Compared with e-CNY, I prefer to use WeChat Alipay					
	Compared to e-CNY, I prefer other payment methods such as cash, bank card, UnionPay cloud flash payment, etc.					
Costs and Benefits	There is no charge for the withdrawal of an e-CNY wallet, and the cost is lower than that of WeChat Alipay					
	Since the e-CNY wallet does not bear interest, I would instead deposit the money in the bank or the financial account of WeChat Alipay than in the e-CNY wallet					
Diversity of APP functions	The interface of the e-CNY APP is easy to understand, and the operation is relatively simple					
	The e-CNY app lacks additional functions such as daily life, financial management, travel, and shopping, thus lacking customer stickiness					
Promotion and Promotional activities	Sometimes there are complete reduction activities and holiday red envelope activities during the use of e-CNY					
	Can use point benefits to exchange for discounts on the use of e-CNY					
Participation of relevant parties (Merchants, Commercial Banks, Payment Institutions, PBC)	If merchants have already popularized e-CNY payment codes and actively guide consumers to use e-CNY for payment, I will increase my willingness to use e-CNY					
	If more commercial banks support recharging and withdrawal in e-CNY wallets, I will increase my willingness to use e-CNY					
	If both the offline payment codes and online apps of payment institutions or commercial banks support e-CNY, I will increase my willingness to use e-CNY					
	If the PBC collaborates with other government departments to enrich scenarios such as salary distribution, education and healthcare, and public services, I will increase my willingness to use e-CNY					

We opted to utilize a logistic regression model to analyze residents’ willingness to use e-CNY for payment. This model is commonly used to study decision-making behavior based on the principles of maximizing benefits and utility.

The primary objective of this empirical study is to investigate the factors that impact the willingness of Chinese residents to use e-CNY. Therefore, we have selected the following variables for our analysis: See Figure 1.

Dependent variable: willingness to use e-CNY.

Independent variables include the level of understanding, convenience, privacy and security, payment environment, payment behavior habits, cost-benefit analysis, diversity of app functions, promotion and promotional activities, and the degree of participation of relevant parties.

Control variables: gender, age, education level, occupation, monthly household income, and location.

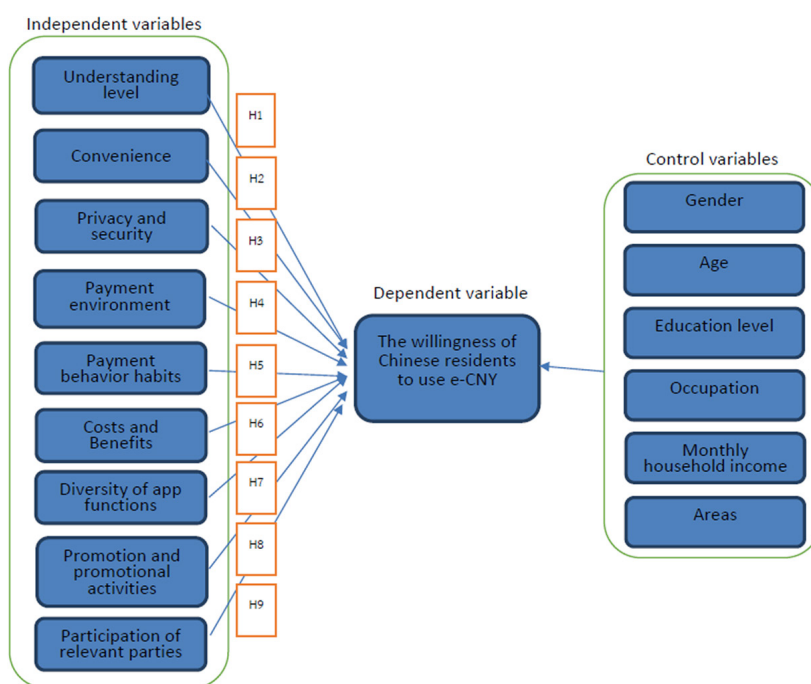


Fig. 1. Variable diagram

## 4 RESULTS AND ANALYSIS

A pilot survey was conducted prior to the formal questionnaire to identify and address any issues related to clarity, semantics, typos, or formatting. The data collection took place from June 4 to June 9, 2023, using online social media platforms to distribute survey questionnaires in four cities: Beijing, Suzhou, Shenzhen, and Chongqing. Out of 518 questionnaires distributed, all 518 were returned, yielding a 100% response rate. After excluding invalid questionnaires, 402 valid questionnaires were retained, resulting in an effective rate of 77.6%.

Our study utilizes Harman’s single-factor method to investigate the presence of common method bias in the questionnaire data. The test results reveal that the largest variance explained by a single factor is 25.9%, indicating that the common method bias is not severe and the data can be further analyzed.

We used Cronbach’s  $\alpha$  and composite reliability (CR) to evaluate the reliability of the questionnaire items. The calculations indicate that both Cronbach’s  $\alpha$



and CR values exceed 0.8, suggesting that the questionnaire items demonstrate high reliability and the questionnaire design is sound. The questionnaire data is suitable for further research and analysis.

We assessed the questionnaire's validity using average variance extracted (AVE), the square root of AVE, and the correlation among the constructs. The calculations indicate that all of the AVE values are higher than 0.4, suggesting that the questionnaire exhibits good convergent validity. The square roots of the AVE values on the diagonal are greater than the Pearson correlation coefficients among the constructs, indicating that the questionnaire exhibits excellent discriminant validity.

Finally, we assessed the convergent validity by examining the factor loadings of each item on its respective construct. The results indicate that all the items demonstrate acceptable convergent validity.

Table 2 presents the demographic characteristics of the respondents, encompassing their gender, age, education level, occupation, monthly household income, and area.

**Table 2.** Distribution of sample demographics characteristics

Variable	Category	Frequency	Percentage
Gender	Male	224	55.72%
	Female	178	44.28%
Age	18–25	74	18.41%
	26–40	222	55.22%
	41–60	104	25.87%
	Over 61	2	0.50%
Educational level	Middle school and below	3	0.75%
	High school/Polytechnic school	11	2.74%
	Junior college	84	20.89%
	Undergraduate	220	54.73%
	Master and above	84	20.89%
Occupation	Student	56	13.93%
	Enterprise employees	234	58.21%
	Employees of administrative institutions	49	12.19%
	Freelancer	32	7.96%
	Other	31	7.71%
Monthly household income	Less than ¥1,000	7	1.74%
	¥1,000–2,999	10	2.49%
	¥3,000–5,999	41	10.20%
	¥6,000–9,999	84	20.90%
	¥10,000–14,999	91	22.64%
	¥15,000–19,999	58	14.43%
	Over ¥20,000	111	27.61%
Areas	Beijing	101	25.12%
	Suzhou	99	24.63%
	Shenzhen	100	24.88%
	Chongqing	102	25.37%

We utilized the logistic regression model to analyze the impact of X on Y, with Y being a categorical variable. In this paper, Y represents the willingness to use e-CNY, while X represents the level of understanding, convenience, and other independent variables. The model representing the effect of X on Y can be expressed as follows:

$$\ln\left(\frac{P}{1-P}\right) = \beta_0 + \beta_1 X_1 + \dots + \beta_m X_m$$

The test includes both control variables and independent variables. Table 3 shows the results of the logistic analysis.

**Table 3.** Logistic analysis results

Variable	Regression Coefficient	Standard Deviation	Wald	P	OR	95% Confidence Interval of OR Value		
						Upper Limit	Lower Limit	
Understanding level	0.586	0.214	7.453	0.006***	0.557	0.366	0.848	
Convenience	0.433	0.203	4.546	0.033**	0.648	0.435	0.966	
Privacy and Security	-0.556	0.206	7.322	0.007***	1.744	1.166	2.609	
Payment environment	0.135	0.196	0.479	0.489	0.873	0.595	1.281	
Payment behavior habits	-0.200	0.195	1.048	0.306	1.221	0.833	1.789	
Costs	-0.044	0.181	0.060	0.807	1.045	0.733	1.490	
Benefits	0.019	0.245	0.006	0.939	1.019	0.631	1.646	
Diversity of APP functions	0.21	0.248	0.717	0.397	1.233	0.759	2.004	
Promotion and Promotional activities	0.321	0.197	2.649	0.104	0.725	0.493	1.068	
Participation of relevant parties	Merchants	-0.370	0.296	1.560	0.212	0.691	0.387	1.234
	Commercial Banks	-0.558	0.380	2.154	0.142	0.572	0.272	1.206
	Payment Institutions	0.833	0.389	4.599	0.032**	2.301	1.074	4.927
	PBC	-0.526	0.341	2.377	0.123	0.591	0.303	1.153
Gender	-0.085	0.374	0.052	0.819	0.918	0.441	1.909	
Age	-0.530	0.348	2.320	0.128	0.588	0.297	1.164	
Education level	-0.5	0.252	3.942	0.047**	0.607	0.371	0.994	
Occupation	Enterprise employees	1.976	0.771	6.56	0.010**	7.211	1.590	32.699
	Employees of administrative institutions	2.011	0.901	4.981	0.026**	7.469	1.277	43.671
	Freelancer	1.589	0.918	2.993	0.084*	4.899	0.81	29.64
	Other	1.435	0.88	2.661	0.103	4.201	0.749	23.574
Monthly household income	-0.042	0.131	0.105	0.746	0.958	0.742	1.239	
Areas	Shenzhen	-0.988	0.54	3.353	0.067*	0.372	0.129	1.072
	Suzhou	-0.91	0.529	2.958	0.085*	0.402	0.143	1.136
	Chongqing	-1.056	0.523	4.079	0.043**	0.348	0.125	0.969
constant	3.719	1.481	6.306	0.012**	41.22	2.262	751.125	

Notes: \*\*\*, \*\*, \* represent significance levels of 1%, 5%, and 10%, respectively.



After controlling for gender, age, education level, occupation, monthly household income, and area, four variables have a significant effect on the willingness to use e-CNY at the 0.1 level: level of understanding, convenience, privacy, security, and participation of relevant parties (payment institutions). This indicates that these four factors are not influenced by other variables and have a significant impact on the dependent variable [13].

This paper employs Pearson correlation analysis to investigate the relationship between the independent and dependent variables. Table 4 presents the results of the correlation analysis. The table illustrates that the level of comprehension, convenience, cost, promotional activities, and involvement of relevant parties (merchants, commercial banks, payment institutions, and PBC) are significantly and positively associated with residents' inclination to use e-CNY.

**Table 4.** Results of hypothesis testing and comparison

	Research Hypothesis	Hypothesis Direction	Pearson Correlation	P-Value	Inspection Results
H1	Understanding level → Willingness to use e-CNY	Positive	0.297***	0.000	Positive
H2	Convenience → Willingness to use e-CNY	Positive	0.331***	0.000	Positive
H3	Privacy and Security → Willingness to use e-CNY	Negative	-0.010	0.841	\
H4	Payment environment → Willingness to use e-CNY	Negative	0.074	0.140	\
H5	Payment behavior habits → Willingness to use e-CNY	Negative	0.000	0.994	\
H6a	Costs → Willingness to use e-CNY	Negative	0.144***	0.004	Positive
H6b	Benefits → Willingness to use e-CNY	Positive	0.014	0.779	\
H7	Diversity of APP functions → Willingness to use e-CNY	Negative	0.071	0.156	\
H8	Promotion and Promotional activities → Willingness to use e-CNY	Positive	0.234***	0.000	Positive
H9a	Participation of relevant parties (Merchants) → Willingness to use e-CNY	Positive	0.252***	0.000	Positive
H9b	Participation of relevant parties (Commercial Banks) → Willingness to use e-CNY	Positive	0.259***	0.000	Positive
H9c	Participation of relevant parties (Payment Institutions) → Willingness to use e-CNY	Positive	0.217***	0.000	Positive
H9d	Participation of relevant parties (PBC) → Willingness to use e-CNY	Positive	0.245***	0.000	Positive

Notes: \*\*\*, \*\*, \* represent significance levels of 1%, 5%, and 10%, respectively.

## 5 CONCLUSION AND RECOMMENDATIONS

The study reveals that residents' willingness to use e-CNY is influenced by several factors, including their level of understanding, convenience, cost, promotional

activities, and the participation of relevant parties such as merchants, commercial banks, payment institutions, and the PBC. These factors have a positive impact on the adoption of e-CNY and can enhance residents' confidence and satisfaction with the digital currency. See Table 5.

**Table 5.** Research hypothesis analysis results

Research Hypothesis		Inspection Results
H1	The level of understanding of e-CNY	Accepted
H2	The degree of convenience in use	Accepted
H3	Concerns about privacy and security	Rejected
H4	Lack of payment environment	Rejected
H5	Payment behavior habits	Rejected
H6a	Cost expenditure	Accepted
H6b	Benefits	Rejected
H7	The functional diversity of e-CNY apps	Rejected
H8	Promotion and promotional activities	Accepted
H9a	The participation of merchants	Accepted
H9b	The participation of commercial banks	Accepted
H9c	The participation of payment institutions	Accepted
H9d	The participation of the PBC	Accepted

The Bank for International Settlements (2020) highlighted in its work report on the Rise of the CBDCs: drivers, approaches, and technologies that the People's Bank of China's digital currency, the e-CNY, is leading world [14]. Therefore, the research results of this paper aim to serve as a reference for central banks in various countries, with the goal of enhancing the efficiency of mobile and cross-border payments and strengthening the stability of their financial systems.

Based on the findings, the following recommendations are suggested:

- The country should enhance e-CNY training to improve understanding and usage among a wider population.

The country can disseminate information about e-CNY through government websites, microblogs, WeChat official accounts, newspapers, press conferences, activities, social media discussions, online live broadcasts, and other channels. This will help more people understand the development process, benefits, usage methods, and other relevant information about e-CNY, ultimately enhancing recognition and acceptance of e-CNY.

- Enhance the convenience of e-CNY and simplify the operation of e-CNY apps, utilizing its unique benefits such as offline capability, electricity-free payment, and digital hard wallet to facilitate residents' usage.

The country should continuously improve the user experience of the e-CNY app by making the interface friendly, easy to understand, and easy to operate. Additionally, it should leverage the advantages of the e-CNY hard wallet, which can

be used in situations such as network disconnection, bright screen, off-screen, and power shutdown. Furthermore, it should continuously expand the scope of e-CNY use, including in commercial retail, public transportation, wage distribution, fund transfer, digital exhibitions, port logistics, industrial internet, digital government, supply chain finance, cross-border consumption, and other fields.

- Take advantage of the free withdrawal of e-CNY, expand the acceptance range of authorized merchants, and boost merchants' enthusiasm for payment.

The country can utilize e-CNY withdrawal for free as a breakthrough point for marketing activities [15]. It is also possible to fully leverage the convenience and practicality of e-CNY by offering discounts for e-CNY in various scenarios, such as e-commerce and O2O, to attract users to experience and use e-CNY.

- Mobilize the enthusiasm of all stakeholders (merchants, commercial banks, payment institutions, and the PBC) to actively participate in the construction and promotion of e-CNY.

The government can harness the enthusiasm of various stakeholders to support the issuance, acquisition, clearing, use, and procurement of e-CNY hard wallets. For example, it offers business growth incentives and support for commercial banks and payment institutions. Acquiring merchants can receive rewards for acquiring orders based on the transaction amount and provide subsidy support for commercial banks and payment institutions when purchasing digital wallets.

## 6 REFERENCES

- [1] Q. Yao, "Design considerations for the Chinese version of digital currency," *China Finance (CF)*, vol. 12, pp. 26–27, 2016.
- [2] M. Shoaib, M. Ilyas, and M. Khiyal, "Official digital currency," in *Eighth International Conference on Digital Information Management, IEEE*, 2013. <https://doi.org/10.1109/ICDIM.2013.6693982>
- [3] PBC's e-CNY R&D Working Group, "Progress in research and development of China's e-CNY," 2021. [https://www.gov.cn/xinwen/2021-07/16/content\\_5625569.htm](https://www.gov.cn/xinwen/2021-07/16/content_5625569.htm)
- [4] PBC, "White paper on the research and development progress of China's e-CNY," 2021. <http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/4293590/2021071614200022055.pdf>
- [5] X. Liu, "What are the priority issues to be considered in the next step to promote e-CNY?" 2023. <https://new.qq.com/rain/a/20230111A09F3400>
- [6] W. Wang, "Continue to promote the e-CNY pilot to help boost consumption," 2023. <https://finance.sina.cn/2023-06-02/detail-imyvwrxc9465744.d.html>
- [7] X. Cheng, "Utility analysis of Chinese residents' use of e-CNY based on Hybrid Logit Model," *Hefei: Anhui University of Finance and Economics*, pp. 20–22, 2022.
- [8] F. Sina, "E-CNY has been promoted for four years; why are few people still using it? Five significant issues need to be addressed," 2023. [https://t.cj.sina.com.cn/articles/view/1655703524/62b007e402701b91b?finpagefr=p\\_104](https://t.cj.sina.com.cn/articles/view/1655703524/62b007e402701b91b?finpagefr=p_104)
- [9] P. Yang, "Visiting Changshu, the pilot site of the first batch of e-CNY: Citizens have a certain understanding that some people 'transfer money as soon as they receive it,'" *Chengdu Business Daily Red Star News*, 2023. <https://static.cdsb.com/micropub/Articles/202305/676793d96f1cffd80e215dff1112eb45.html>

- [10] Gyro Research Institute, “‘Red’ and ‘Black’ of e-CNY,” 2022. <https://www.163.com/dy/article/HCTCSJ1N0519SVGF.html>
- [11] Xinhua News Agency, “The central people’s government of the PRC,” 2022. [http://www.gov.cn/xinwen/2022-07/13/content\\_5700838.htm](http://www.gov.cn/xinwen/2022-07/13/content_5700838.htm)
- [12] T. Yamane, *Statistics, An Introductory Analysis, 2nd Ed.*, New York: Harper and Row, 1967.
- [13] B. Orazbayev, A. Zhumadillayeva, M. Kabibullin, M. J. C. Crabbe, K. Orazbayeva, and X. Yue, “A systematic approach to the model development of reactors and reforming furnaces with fuzziness and optimization of operating modes,” *IEEE Access*, vol. 11, pp. 74980–74996, 2023. <https://doi.org/10.1109/ACCESS.2023.3294701>
- [14] BIS, “Rise of the central bank digital currencies: Drivers, approaches and technologies,” 2020. <https://www.bis.org/publ/work880.htm>
- [15] S. Zheng, S. Jiang, X. Yue, R. Pu, and B. Li, “Application research of an innovative online education model in big data environment,” *International Journal of Emerging Technologies in Learning*, vol. 14, no. 8, pp. 125–138, 2019. <https://doi.org/10.3991/ijet.v14i08.10404>

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