



Research on the Research Path of Electronic China Yuan(e-CNY) Promotion Under the Background of Digital Economy

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Abstract. As one of the important manifestations of digital economy, digital RMB is widely used in daily life. In order to study the promotion of digital RMB in China's actual economic situation, this paper collected 820 questionnaires, and the effective questionnaire recovery rate was 96.22%, which passed the reliability and validity test. The project members used three mathematical models for quantitative and qualitative analysis of the questionnaire data. The model methods were grey correlation method, Pearson coefficient method and principal component analysis method. The team found that the traditional media is the main way for the public to understand the digital RMB at present, and the monthly income is an important factor affecting the frequency of the use of digital RMB by the public. Finally, it was concluded that the use frequency of digital RMB APP is relatively low. On the basis of the above, the researchers put forward relevant promotion suggestions: the country should innovate the promotion means of digital RMB, and determine the main audience groups of digital RMB, so as to enrich the ecological functions of digital RMB APP and provide visualization, which is conducive to increasing user stickiness and improving the promotion strength and efficiency of digital RMB.

Keywords: Digital RMB · Digital RMB APP · Grey correlation method · Pearson coefficient method · Principal component analysis

1 Introduction

Under the background that information and communication technology has gradually become the leading force of the world economy, the digital economy is currently in a new era of rapid development. The data shows that China's digital economy will still maintain a rapid growth of 9.7% in 2020 under the impact of the epidemic [5] (China Information and Communication Research, 2021). The People's Bank of China has issued a legal digital currency, the digital renminbi (e-CNY). By the end of 2021, the number of digital RMB pilot scenarios has exceeded 8.0851 million, 261 million personal wallets have been opened in total, and the transaction amount is 87.565 billion yuan [1] (Central Bank Digital RMB R&D Working Group, 2021).

The development of digital RMB has a profound impact on the development of China's economic and financial market. Its convenient payment, high security and low

issuance cost help to break the market monopoly and payment barriers and bring new vitality to the money market [2] (Gao Jie, 2022).

However, throughout the process of the pilot development of digital RMB, there are still problems such as weak technology application, lack of security, insufficient acceptance of cross-border payment and imperfect regulatory framework [3] (Yan Wenli, 2022). At present, the digital RMB is still in the pilot stage, and still faces problems such as weak technology application, lack of security, insufficient acceptance of cross-border payment and unsound regulatory framework. Based on the background of digital economy, this paper uses the establishment of e-CNY financial linkage center as a tool to solve the problems existing in the online and offline development of digital RMB in many aspects and dimensions.

2 Date and Mathematical Model

This paper focuses on the problems existing in the promotion of digital RMB in China's pilot cities. It uses the questionnaire platform to publish digital RMB questionnaires, collect relevant information from different groups, and summarize people's effective information about digital RMB on the basis of gender, age, regional differences, income and education differences. In order to collect the questionnaire data to the largest extent, the questionnaire was released through online network channels, such as WeChat, QQ, Weibo and new media, with the residents of Guangdong Province as the main distribution object, and the key survey object was Shenzhen City. The sampling method was simple random sampling.

A total of 820 questionnaires were collected in this survey, and 789 valid questionnaires were collected in Guangdong Province. According to the integrity of the questionnaire and the useless data screened by reliability and validity analysis, 789 valid questionnaires were collected, and the effective questionnaire recovery rate was 96.22%. In order to study the promotion of digital RMB in China's actual economic situation, three mathematical models are used, namely, grey correlation method, Pearson coefficient method and principal component analysis method. The data sources of the three mathematical models correspond to the different types of data that the respondents understand or use, and the problems of the digital RMB studied by different mathematical models in the actual promotion are different. The specific corresponding relationship is shown in the following Fig. 1:

In the grey correlation method, the data of six basic information are collected to quantify the impact of basic information on the understanding of the digital RMB. The correlation degree is the change within the range. The closer the correlation degree is, the more sensitive the influence factor of the subsequence is to the stability coefficient of the parent sequence [11] (Zhang Guofa, Zhang Yuguang, Zou Qimin and Yang Yuanxiang, 2021). The correlation index is:

$$Q_i = \frac{1}{n} \sum_{j=1}^n l_{ij} \quad (1)$$

In order to study the relevant impact of six basic information on the use of digital RMB, this paper uses Pearson correlation coefficient to build virtual targets and calculate

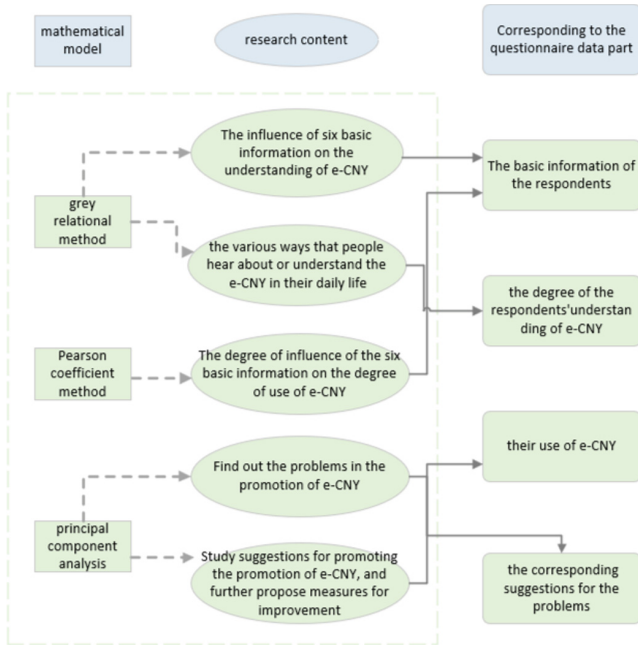


Fig. 1. Mathematical model and thought map of digital RMB promotion research

Pearson correlation coefficient [15] (Liu Zijun, 2022), whose calculation formula is:

$$P = \frac{\sum_{i=1}^n (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^n (x_i - \bar{x})^2} \sqrt{\sum_{i=1}^n (y_i - \bar{y})^2}} \tag{2}$$

On the basis of the above, this paper uses principal component analysis to transform multiple original variables into a new set of principal component coefficients through linear combination under the premise of losing a small amount of information. The more important the principal component represented by the corresponding eigenvector is, the more conducive it is to find the principal component factors with greater contribution, and put forward relevant suggestions for digital RMB.

3 Results

3.1 The Impact of Six Basic Pieces of Information on the Understanding of the Digital Yuan

In order to study the impact of six basic information on the understanding of digital RMB, this paper establishes a grey correlation method and lists five options: whether understanding of digital RMB, how to know or understand digital RMB, what aspects of information you want to know about digital RMB and understanding of offline payment of digital RMB APP. Team members analyzed the above indicators. The following Fig. 2 shows the correlation between basic information and various indicators of understanding.

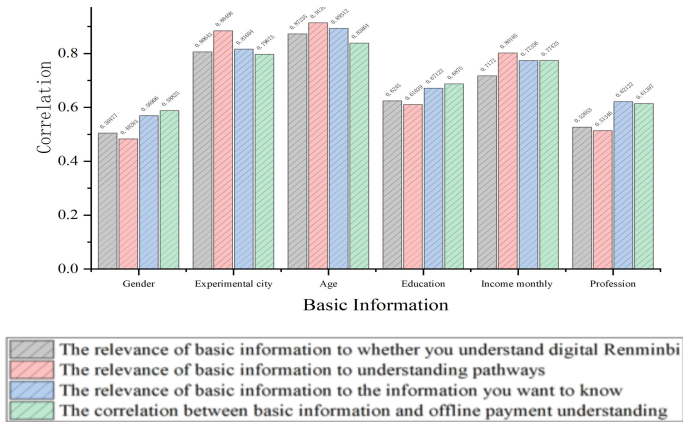


Fig. 2. The relevance of basic information to various indicators of understanding

In that among the six factors, age has the highest correlation with each indicator of understanding degree. The correlations of indicators such as related information and understanding degree of offline payment of digital RMB APP are: 0.87235, 0.91399, 0.89311, 0.83864, which indicates that the most important factor affecting people’s understanding of digital RMB is age. Followed by city, income, education, occupation and gender. The correlation between basic information and various indicators is shown in the following Table 1:

The proportion of people who are very familiar with digital RMB and the offline payment function of the digital RMB APP is very low. The proportion of 15.1% and 10.7%, accounting for a very large proportion. This shows that the promotion of digital renminbi by the government and related agencies is not enough and the popularity of digital renminbi in the daily life of the masses is relatively low.

Table 1. Correlation table between basic information and various indicators of understanding degree

Basic information	Whether you know about the digital yuan	Learn about the path to the digital yuan
age	0.87235	0.91399
city	0.80643	0.88408
income	0.71720	0.80184
Degree	0.62449	0.61038
occupation	0.52652	0.51346
gender	0.50476	0.48282

Table 2. Bar chart of the influence of different publicity channels on the promotion of digital renminbi

Options	Information entropy value	Information utility value	weight	Composite score index	sort
Education and training institutions	0.619	0.381	0.208	0.33743194	3
Contacts required for work	0.69	0.31	0.17	0.99484857	1
Traditional media	0.602	0.398	0.217	0.59373498	2
Internet	0.693	0.307	0.168	0.1225168	4
Social	0.755	0.245	0.134	0.00826693	6
other	0.811	0.189	0.103	0.08144705	5

3.2 Influence of Various Promotion Channels on the Understanding of Digital RMB

In order to improve the people's understanding of digital renminbi, this paper establishes an entropy weight TOPSIS model to analyze it and propose related improvement measures by understanding the various ways that people hear about or understand digital renminbi in daily life.

Table 2 above shows the data. The weight calculation results show that the weight of education and training institutions is 20.814%, the weight of work contact is 16.966%, the weight of traditional media (books, newspapers, magazines, television broadcasting, etc.) is 21.75%, the weight of the Internet (microblogging, etc.) is 16.782%, the weight of social networking (relatives, friends, communities, etc.) is 13.373%, and the weight of other indicators is 10.316%, of which the largest indicator weight is traditional media, the option of the minimum indicator weight is Other.

It can be seen from the table that the comprehensive score of contact required for work is the highest and ranks first, followed by traditional media, education and training institutions, the Internet, others and social networking. This shows that digital RMB is mainly used as a means of payment and payment in the daily work of the masses. This shows that the traditional media plays a vital role in the promotion of digital RMB, followed by education and training institutions, contacts required for work, the Internet, social networking, and others.

3.3 The Impact of Six Basic Information on the Use of Digital RMB

In order to study the relevant influence of six basic information, namely gender, whether the region has become a pilot city, age, education, monthly income or monthly living expenses, and the degree of influence of occupation on the degree of use of digital RMB,

The degree of e-CNY usage	-0.057	-0.039	-0.006	0.127	0.029	0.019	1.000
Profession	-0.020	-0.023	0.080	0.108	0.142	1.000	0.019
monthly income	-0.083	0.026	0.085	0.093	1.000	0.142	0.029
Education	-0.031	-0.012	0.056	1.000	0.093	0.108	0.127
age	0.021	-0.107	1.000	0.056	0.085	0.080	-0.006
area	-0.056	1.000	-0.107	-0.012	0.026	-0.023	-0.039
gender	1.000	-0.056	0.021	-0.031	-0.083	-0.020	-0.057
	gender	area	age	Education	Monthly income	Profession	The degree of e-CNY usage

Fig. 3. Pearson coefficient distribution of digital RMB

this paper uses the Pearson correlation coefficient, assumes that there is a statistically significant relationship between the variables, analyzes the positive and negative aspects of the correlation coefficient and the degree of correlation, and summarizes the analysis results. Figure 3 shows the correlation coefficient of the six basic information items to the extent to which the digital yuan is used.

Among the six factors, we can find that education is an important factor affecting the frequency of people’s use of the digital yuan, with a Pearson coefficient of 0.127. At the same time, the monthly income or monthly living expenses of the respondents and occupation are also important factors affecting people’s use of the digital yuan, with Pearson coefficients of 0.029 and 0.019 respectively.

3.4 Problems in the Promotion of the Digital Yuan

In order to find out the problems in the promotion of digital RMB in the questionnaire analysis, we conducted mathematical modeling analysis on the options selected by the respondents, established a principal component analysis model, transformed multiple original variables into a new set of principal component coefficients through linear combination, and calculated the weight value.

As shown in the above table 3, insufficient public awareness in the promotion and issuance of digital RMB is an important problem in the implementation of digital RMB, and its vesting weight is 0.34, indicating that it can improve the popularity of the next step of digital RMB promotion. At the same time, the public believes that there are security risks in the payment process and the problems of unfriendly interface design or system instability of the digital RMB APP are also the main problems in the current promotion, and the attribution weights of the two are 0.19 and 0.12 respectively.

Table 3. Principal Component Analysis Weight Table

issue	Insufficient public awareness	There are security risks in the payment process	APP interface design is not friendly or the system is unstable	Less acceptable scenarios and business activities	Compared with other payment methods, the advantages are not obvious	Cumbersome processes or slow payments	other
Degree of affiliation	2.01	1.61	1.12	1.78	1.07	0.45	0.22
Weight	0.34	0.19	0.12	0.16	0.11	0.04	0.01

4 Conclusions

After investigating the public's understanding of the digital RMB, it was found that most of the surveyed people can understand and accept that the digital RMB is related to age, but the overall understanding is still relatively low, and the popularity of the digital RMB still has a lot of room for improvement. In order to improve the public understanding of digital RMB, the team started with the way for the public to contact digital RMB, and then deeply understood the bottleneck of digital RMB promotion, and concluded through the establishment and analysis of the gray correlation method model: traditional media, namely books, newspapers and magazines, TV broadcasts, etc. (weight accounting for 21.75%) are the main ways for the public to understand digital RMB, and at the same time, digital RMB usually mainly acts on the public's payment and payment means, and the scope of use and audience acceptance are small. The country needs to improve the promotion and publicity of the digital RMB and enhance the popularity of the digital RMB from multiple online levels^[7]. Collect and investigate the publicity reports of many public media, focus on the promotion reports of digital RMB, and find the promotion and browsing content of public interest, so as to improve the publicity efficiency of digital RMB^[10].

This paper uses the Pearson correlation coefficient to analyze the positive and negative directions and the degree of correlation coefficient, and finds that among the six basic factors, the monthly income or monthly living expenses of the respondents and occupation are important factors affecting people's use of digital yuan, and the Pearson coefficients are 0.029 and 0.019, respectively. For the majority of respondents with a monthly income of more than 7000 yuan and between the ages of 20 and 40, the promoters can use their audience characteristics to increase the promotion efforts, use their young and emerging characteristics and have high consumption ability and willingness, awaken consumption desire through various commercial activities, and promote the use of digital yuan in life [12–14].

Through the data results of the survey, it can be seen that the team conducted mathematical modeling and analysis on the existing problems in the promotion of digital RMB, and the analysis conclusion shows that people think that the unfriendly interface

design of the digital RMB APP or the system is unstable [4–9]. It is an important problem in the promotion of digital RMB. The frequency of use of digital RMB APP by the public is still low, most users are affected by education, monthly income or monthly living expenses and occupation, and most users are used in basic consumption such as transportation, public utility payment, internal payment, etc., the scope of use of digital RMB APP is relatively narrow.

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