

Comparison of digital RMB and private payment platform: Gap Analysis and Improvement.

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Abstract

Although the digital RMB in China has made some achievements since its launch in late 2019, there is still a big gap in comparison between the RMB and We Chat as well as AliPay. The study uses the Unified Theory of Acceptance and Use of Technology (UTAUT) and Porter's competition Theory to construct a model to identify how the differences in each key factor affect the willingness to use digital RMB. The research was conducted by collecting 314 questionnaires, testing the reliability and validity of the questionnaires, using SEM modelling to make different attempts on the pathways, and discovering the optimal route, which verified the hypotheses and their relationships among the variables. The results of the model showed that awareness, habit, and safety have a weak positive effect on intention to use digital RMB, while compatibility and trust have a low moderate impact on the intention. In addition, it shows that though facility condition, perceived ease of use, and perceived usefulness have no direct impact on usage intention, they have a direct impact on habit, thus indirectly affecting usage intention. The study also used the K-Means model to group respondents and analysed them with low scores in several dimensions. The study reveals that more than 70% are young and middle-aged people with knowledge, and a certain economic base can understand and have the ability to use digital RMB, but they do not actively use it; and their daily life is still dominated by private payment platforms such as WeChat. This shows another angle that digital RMB lacks obvious advantages and is unattractive.

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1. Introduction

As private payment platforms, WeChat and AliPay account for more than 90% of China's local currency payments market (Liu et al., 2024a). Under these circumstances, the digital RMB was introduced by the government in reaction to the revolutionary change with the goals of updating its financial system, preserving monetary sovereignty, and utilizing the advantages of digital innovation (Wu et al., 2024). However, five years have passed; most users still insist on using WeChat and Ali pay and reluctant to use the digital RMB because the digital RMB has great gaps compared to WeChat and AliPay in terms of overall functionalities. In previous literature, researchers have explored the factors affecting business intelligence (BI) on the usage of the digital RMB, such as those by Liu et al. (2024a) and Liu et al. (2024b).

However, these studies tend to focus on individual factors and lack a comprehensive comparative analysis to show how differences in these factors affect the BI. Meanwhile, these studies didn't analyse the data in depth, thus lacking measures to improve the use of the digital RMB. To fill the research gap in this area, it is necessary to analyse the various factors from another perspective. In the study, using WeChat as a benchmark, a new model is constructed to identify how differences in these factors affect the intention to use the digital RMB based on the unified theory of acceptance and use of technology (UTAUT), combining with Porter's competition theory.

The results of this study are of great practical significance, not only providing valuable insights to the government and proposing targeted measures but also meeting the public's needs and expectations for the digital RMB. Liu et al. (2024b) noted that social groups such as consumers, merchants, and companies are very interested in the potential usage of the digital RMB to improve payment efficiency and protect data security.

Based on the questionnaire data, this study empirically examines the pathway relationships and influence mechanisms between variables by using the SEM modelling, verifies the proposed research hypothesis, and proposes the optimal pathway. Also, the questionnaire data are categorized by using the K-Means model and analyzed in a multi-dimensional manner, which verifies the results of SEM modelling from another angle. The structure of the study is as follows: section 2 will be the literature review, section 3 devotes to data and methodology, and section 4 presents empirical results and discussion; section 5 concludes the study.

2. Literature Review

Prior studies on BI influencing have assumed that the digital RMB is a new technology and then built a model to analyse relationships between variables. However, although the digital RMB adopts new technologies, its performance relative to WeChat has no distinct advantages. So, in this case, the impact on BI may not be as influential as described in the literature, and the actual situation also shows this point. That is to say, a new technology without a competitive advantage is also unable to attract customers. Evidence based on this assumption can be found in the following literature.

First, Liu et al. (2024b) combined the TAM and IDT models to explore the BI of using the digital RMB, but it didn't mention whether the digital RMB has a significant advantage over the existing solutions. An important factor of IDT, i.e., relative advantage, is missing; also, it can be seen from the design of the questionnaire that the whole scale is centred around the digital RMB without comparison to other payment platforms. Second, Liu et al. (2024a) used the UTAUT model to analyse the factors affecting BI and proposed that comparative advantage is an important mediating factor affecting BI, but the article's research assumed that the digital RMB was built on the cutting-edge blockchain technology, which has an inherent comparative advantage. The assumption that it would surely become the preferred method of payment is problematic.

The following research provides different views into the advantages and disadvantages of the digital RMB and how to increase its use. Shen and Hou (2021) note that the digital RMB is guaranteed by creditworthiness, which eliminates the possibility of bank runs. The digital RMB employs a controlled anonymization mechanism that allows the government to track all transaction records, identifying and preventing fraud and ensuring the security of user accounts. So, the digital RMB is similar to cash, without the risk of commercial bank insolvency, and very safe compared to WeChat (Xia, 2021).

The central bank has been strongly supporting the development of the digital RMB, and part of the issuance needs to be in cooperation with commercial banks. However, Huang and Li (2023) do not mention that there will be problems in the cooperation. Shen and Hou (2021) explain that the digital RMB in the field of mobile payment and the commercial banking industry have a competitive relationship, which also affects the incentives of commercial banks to promote the digital RMB.

Parasol (2022) points out that WeChat and AliPay, the two main private payment platforms, have made China almost a cashless society. They are easy to use, based on QR codes to receive and pay, and there is no need for special equipment like POS. So, the digital RMB must be compatible with private payment platforms, which can also increase the use of digital RMB overseas. It is difficult to change customers' habits, but the digital RMB can be used to motivate consumers to use it by waiving transaction fees, etc. Bai et al. (2025) agree with the view that the digital RMB lacks competitiveness compared to WeChat and AliPay because the digital RMB only has a payment function, which can't be compared to private payment platforms' very tempting eco-payment system. Wu et al. (2024) demonstrate that the collaboration between the digital RMB and private payment platforms can lead to mutually beneficial outcomes for the digital RMB. It should focus on expanding its user base through collaboration and take advantage of government policy and policy drivers to build public trust and acceptance.

From the literature above, it can be seen that the digital RMB may not have much impact on BI in terms of PU and PEOU; users are more accustomed to using WeChat. However, the digital RMB may have advantages in terms of safety and trust as it has the endorsement of the government and does not have the risk of clearing. This is because of continuous support from the government in terms of policy and infrastructure; the digital RMB may be comparable to WeChat regarding CMP and FC, which is a positive boost to BI. The promotion of the digital RMB also needs the active cooperation of commercial banks, which will help improve AW. The users will adopt the digital RMB when they know it exists and believe the digital RMB is superior even if they can't feel it now.

Based on the above analysis and reality, the hypotheses are provided as follows: 1) PU, PEOU, and HAB have no comparative advantage and no positive impact on BI; 2) TR and Safety have a comparative advantage and strong positive impact on BI; 3) CMP and FC have a weak positive impact on BI; 4) AW has a weak positive impact on BI; 5) Tax has a negative impact on BI; 6) Try to explore unknown relationships between variables.

To validate the hypotheses, a new model needs to be built to analyse the impact of each factor on BI, while the model is based on UTAUT theory. UTAUT integrates models such as TAM and TPB, which is one of the most powerful models to explain users' acceptance and use of new technologies (Venkatesh et al., 2003). The advantage of UTAUT is its greater integration and extensibility, which not only accommodates different types of variables, but also allows for the examination of pathway relationships between variables through SEM modelling, while the openness of UTAUT allows for the incorporation of different theories to complement.

A new technology adoption may be affected by competition (Porter and Strategy, 1980). For example, whether the digital RMB is more advantageous than WeChat determines the choice of users. By analysing the competition, it will be better understood how the digital RMB can find its position in the Chinese market. Therefore, the new model constructed using UTAUT and Porter's competition theory is theoretically sound and provides solid support for this study at the empirical level.

3. Data and Methodology

3.1 Data

The research uses a questionnaire survey approach, which consists of three parts: the first part of the description, including the purpose of the survey and those who could participate; the second part contains a demographic survey covering gender, age, occupation, income, and educational background; the third section contains 12 questions that allow for the assessment of 10 latent variables, which are 9 independent variables (PU, PEOU, TR, SAFETY, FC, CMP, HAB, AW, TAX.), which are explained in Figure 1, and 1 dependent variable (BI). All questions are on a 5-point Likert scale (1=completely disagree, 5=completely agree) and can directly measure variables.

Data were collected from 13 Mar 2025 to 9 Apr 2025 through the Questionnaire Star platform. 317 questionnaires were returned, eliminating 3 invalid questionnaires, and finally, we obtained 314 valid samples. The survey was promoted through WeChat channels to cover respondents from different backgrounds. The IPs of all participants are checked, and no duplicate IPs were involved. To alleviate the fatigue of the respondents and improve the efficiency of answering questions, all questions were set in a simple and easy-to-understand manner, and the number of questions was reduced so that the questionnaire could be answered in less than 2 minutes. Although this approach may limit the comprehensiveness of the questionnaire, it helps improve completion rates and data quality. To address this limitation, the questionnaire items were optimized by merging similar questions and removing redundant ones. Meanwhile, all questions were adapted from existing literature to ensure that each variable has a core question to measure. The sample covers participants with diverse demographic characteristics in terms of gender, age, education level, income, and occupation, which enhances the representativeness of the data. However, due to the fact that the sampling method is mainly based on convenience, there may still be potential sampling bias, which is considered one of the limitations of this study.

Furthermore, the sample size of this study exceeded the threshold typically recommended by structural equation models, indicating that a sample size of around 200 is usually considered a common benchmark for reliable estimation (Kline, 2023). In addition, the reliability and validity of the questionnaire were evaluated, and the results confirmed that these data are suitable for further analysis.

In the samples shown in Table 1, 48% are male, and 52% are female. The age group of 18-50 years accounts for 73%, 81% have high school or above, and 74% have a monthly income of more than RMB5000. It is clear that most of the participants are relatively young and educated; they are more likely to understand and accept the new technology. And, they have a certain economic base, which indicates that they can use the new technology. It is noticed that 24.2% of government employees attended the survey, and the digital RMB was first implemented in the government sector, so their feedback is valuable to the research.

3.2 Methodology

After collecting data using a questionnaire, the study empirically analyses the main factors affecting users' adoption of digital RMB versus WeChat, and the methodology includes the following steps:

3.2.1 Tests of the reliability of questionnaires

Internal consistency of assessment scales using Cronbach's Alpha ensures that all questions on the same scale correlate well. DeVellis and Thorpe (2021), in the guidelines for scale development, show that reliability in the range of 0.7 to 0.95 is usually acceptable, indicating that the questionnaire is reliable.

Table 1. Demographic Information

Title	Options	Frequency / Percentage (%)
Gender	Male	152 / 48.41%
	Female	162 / 51.59%
Age	Under 18	0 / —
	Years of age 18–25	71 / 22.61%
	Years of age 26–30	68 / 21.66%
	Years of age 31–40	46 / 14.65%
	Years of age 41–50	44 / 14.01%
	Years of age 51–60	43 / 13.69%
	Years of over age 60	42 / 13.38%
Education	Middle school and below	59 / 18.79%
	High school	47 / 14.97%
	College	73 / 23.25%
	Bachelor	84 / 26.75%
	Postgraduate and above	51 / 16.24%
Income	Less than 5000 yuan	81 / 25.8%
	5000–10,000 yuan	59 / 18.79%
	10,001–20,000 yuan	59 / 20.06%
	20,001–50,000 yuan	59 / 18.15%
	Over 50,000	59 / 17.2%
Occupation	Student	0 / 0.00%
	Employee (Private Sector)	95 / 30.25%
	Employee (Public Sector)	76 / 24.2%
	Self-employed (business owner)	68 / 21.66%
	Freelancer	62 / 19.75%
	Retired	9 / 2.87%
	Other	4 / 1.27%

KMO measure and Bartlett's test are used in evaluating the suitability of data for factor analysis. KMO checks whether the overall correlation of variables is strong enough. The higher the value, the higher the quality of data. While Bartlett's test checks whether the correlation is significant and whether the variables are suitable for factor analysis. DeVellis and Thorpe (2021) note that a KMO value greater than 0.6 is accepted, and Bartlett's test should be significant to proceed, which means a p-value less than 0.05.

The relationships between variables, designed questions, and hypotheses are shown in Figure 1.

UTAUT Variables	Questionnaire (Likert 1-5)	Hypotheses
Perceived Usefulness (PU)	Do you think DIGITAL RMB can improve payment efficiency and reduce transaction costs compared to WeChat Pay?	No comparative advantage and no positive impact on BI
	Do you think DIGITAL RMB is more suitable for various payment scenarios (e.g., cross-border payments) compared to WeChat Pay?	
Perceived Ease of Use (PEOU)	Do you think DIGITAL RMB is easier to understand, and use compared to WeChat Pay?	No comparative advantage and no positive impact on BI
	Do you think DIGITAL RMB is more convenient to use across different devices (e.g., mobile phones, PCs) compared to WeChat Pay?	
Trust (TR)	Compared to WeChat Pay, do you trust the central bank-issued DIGITAL RMB more?	digital RMB has a positive impact to BI
Perceived Security (SAFETY)	Compared to WeChat Pay, do you think DIGITAL RMB accounts are more secure?	digital RMB has a positive impact to BI
Facilitating Conditions (FC)	Do you think DIGITAL RMB can better integrate with existing payment methods (e.g., bank cards, Alipay) compared to WeChat Pay?	No comparative advantage and no positive impact on BI
Compatibility (CMP)	If DIGITAL RMB becomes compatible with WeChat Pay in the future, would you be more willing to use DIGITAL RMB?	No comparative advantage and no positive impact on BI
Habit (HAB)	Compared to WeChat Pay, have you already become accustomed to using DIGITAL RMB for	No comparative advantage and no positive impact on BI
Awareness (AW)	Compared to WeChat Pay, do you feel you have a sufficient understanding of DIGITAL RMB's technical principles and application scenarios?	Positive impact to BI
Tax Concern (TAX)	Compared to WeChat Pay, do you think DIGITAL RMB will reduce your personal tax burden?	Negative impact to BI
Behavioral Intention (BI)	Would you prefer DIGITAL RMB over WeChat Pay if only one payment method exists in the future?	

Figure 1. Variables, Questions, and Hypotheses

3.2.2 Tests of the validity of questionnaires

The Exploratory Factor Analysis (EFA) method is applied to identify the potential factors that affect the willingness to use the digital RMB. EFA helps us check the validity. If the factor loading is generally low, it means that the questions do not measure the latent variables well, and the questionnaire needs to be adjusted. The method is often used in the fields of psychology, sociology, and market research (Field, 2024). According to the recommendations of Hair et al. (2010) and Field (2024), when the factor loading is greater than 0.5, it means the variables significantly reflect the factor; loading between 0.3 and 0.5 indicates that the variable is somewhat representative; lastly, loading less than 0.3 means weak and is recommended to be removed. CR and AVE are used to verify the internal consistency of the factors and aggregated validity, assessing whether the factor is consistently measured by its observed variables. Hair et al. (2010) suggest that CR >0.7 indicates that the factor has good internal consistency, and AVE >0.5 indicates that an acceptable level of convergent validity is achieved.

3.2.3 SEM modelling fit test

The test is to confirm that the SEM modelling truly and reliably reflects the relationships between the variables, in which the overall model is reasonable, and the pathways between the variables support the data itself. Fit indices include degrees of freedom of the Chi-square (χ^2 df), comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean square error of approximation (RMSEA). Hu and Bentler (1999) note that a good model fit is indicated by CFI and TLI being greater than 0.9, RMSEA being less than 0.08, and SRMR being less than 0.

3.2.4 SEM modeling

SEM modeling is used to investigate the relationships between the variables. Because UTAUT variables are latent variables such as PU, PEOU, TR, etc. They can't be measured directly but need to be measured by a scale. While SEM modeling can handle the situation, SEM can also deal with multiple causal pathways at the same time. In contrast, traditional regression can only handle a single causality (Kline, 2023). In the pathway analysis, the strength and direction of the relationships between variables are determined by coefficients (estimates) and the level of significance (p-value). Generally, a p-value < 0.05 indicates that there is a statistically significant relationship between variables, and on how to determine the effect size, Cohen (2013) notes that $[0.1 < \text{estimate} < 0.3]$ is a small effect; $0.3 < \text{estimate} < 0.5$ is a medium effect, and a significant average degree of influence; estimate > 0.5 is very strong and dominant pathways effect.

3.2.5 K-Means Modeling

K-Means can automatically group users based on their scores on each factor, and it can reveal whether there are different groups of users with different perspectives. By grouping users, it can predict which groups are prone to accepting and adopting the digital RMB and which groups need to be persuaded further. Once low-scoring groups have been identified, cross-analysing them with demographic variables (gender, age, occupation, income). It will answer which demographic groups are more resistant to digital RMB, which groups are more concerned about safety and tax, and therefore, the segmentation allows policymakers to develop targeted strategies rather than a one-size-fits-all approach.

4. Empirical Results and Discussion

4.1 The test results of the reliability of the questionnaire

The test results show that Cronbach's Alpha is 0.858, greater than 0.7, indicating that these questions are consistent and reliable. KMO is 0.88, greater than 0.6, indicating that the correlation of variables is strong, being suitable for factor analysis. Bartlett's P value is less than 0.05, indicating that the overall correlation is significant and the correlation is not due to chance.

4.2 The test results of the validity of the questionnaire

Five factors were extracted according to the factor analysis model, and the results are shown in Table 2.

- Factor 1, PEOU and HAB load highly (0.829 and 0.854, respectively); CR/AVE: 0.709.
- Factor 2, CMP loads at 0.71; SAFEFY and FC load at (0.465 and 0.43, respectively); CR/AVE: 0.5.
- Factor 3, AW shows the highest loading (0.99); CR/AVE: 0.981.
- Factor 4, Trust loads highly at 0.879; CR/AVE: 0.772.
- Factor 5, PU loads at 0.732; CR/AVE: 0.536.
- Tax loading does not meet the standard and can be considered for removal.

Table 2. Factor Loading

Factor Loadings:	F1	F2	F3	F4	F5
PU	0.084909	0.131616	0.071017	-0.089235	0.732096
PEOU	0.829464	-0.299725	-0.020896	0.153614	0.211088
Trust	0.049988	0.201821	0.026366	0.878613	-0.092531
SAFETY	-0.021877	0.465125	-0.127829	0.098714	0.223318
FC	0.188473	0.431577	-0.001770	-0.106376	0.113595
CMP	-0.070609	0.707426	0.013216	0.045764	-0.027526
HAB	0.853984	0.168281	-0.048826	-0.081563	-0.188539
AW	-0.017580	-0.009814	0.990500	0.020358	0.056229
TAX	0.365062	0.198051	0.120783	0.011299	0.077356
BI	-0.005759	0.598025	0.061235	0.079368	-0.055864

From the above results, it can be seen that the loadings of PEOU, HAB, AW, and Trust are all greater than 0.5, respectively, indicating these variables can represent factor 1, factor 3, and factor 4 well. The CV and AVE are all greater than 0.7, which indicates that the internal consistency of the factor is good and the aggregation validity has reached an acceptable level. For factor 5, the loading of PU is greater than 0.5, although the CR is 0.536, which is slightly lower than 0.7; the convergent validity is at an acceptable level. For factor 2, although the loadings of SAFETY and FC are slightly lower than 0.5 and AVE just reaches 0.5, the variables of SAFETY and FC can still be taken into account because this study belongs to the field of social psychology. Hair et al. (2010) note that although lower factor loadings may indicate that the variable of the observation is of poorer quality, it does not necessarily imply that the variable is related to the underlying variable, but it does not necessarily mean that the relationship between the variable and the underlying variable is completely invalid. In many cases, lower factor loading still affects the target variable through other measures of the underlying factor or multipath relationships.

Table 3. Explained Variance

Factor	Eigenvalue	Variance Proportion	Cumulative Variance
1	1.60160751	0.16016075	0.16016075
2	1.47621451	0.14762145	0.3077822
3	1.02450635	0.10245063	0.41023284
4	0.84017039	0.08401704	0.49424988
5	0.70043084	0.07004308	0.56429296

As can be seen from Table 3, according to Kaiser's Criterion, if the Eigenvalue is less than 1, the factor should not be retained, but without factor 4 and factor 5, the cumulative explanation rate is only 49.24%, while with them, the cumulative explanation rate can reach 56%. Hair et al. (2010) state that for social science research, a cumulative explanation rate of 50% -60% can be considered as a good factor, so factors 4 and 5 should be retained.

To sum up, the above results show that the factors of this scale have good internal consistency, and their convergent validity is all at an acceptable level, indicating that the scale is well structured and accurately measured.

4.3 SEM Modelling

Starting from the most basic path, verifying that each variable has a direct effect on the BI. The fit test results show Table 4. The χ^2/DoF is close to 0, P-value > 0.05, indicating that the gap between the model and the data is not significant. RMSEA is close to 0, indicating a favourable range of <0.08. Furthermore, the CFI to TLI indexes exceed 0.9, which is a strong indication of exceptional fit. As a result, the SEM model is deemed suitable for analysing the factors of the digital RMB adoption.

Table 4. SEM fit test

	DoF		DoF Baseline	chi2		p-value		chi2 Baseline	CFI
Value	36		44	0.000054		1		919.590165	1.041115
	GFI	AGFI	NFI	TLI	RMSEA	AIC	BIC	LogLik	
Value	1.0	1.0	1.0	1.050252	0	18.0	51.744537	1.715155E-07	

As can be seen from the path diagram after the SEM model run, see below Figure 2, the P-value of AW, CMP, and Trust is less than 0.05, indicating that there is a positive influence on BI. However, the influence of AW and CMP is weaker, while Trust is relatively stronger. SAFETY is equal to 0.05, indicating that it is approaching significance. The P-values of FC, HAB, PU, and PEOU are greater than 0.05, indicating that there is no statistically significant relationship with BI.

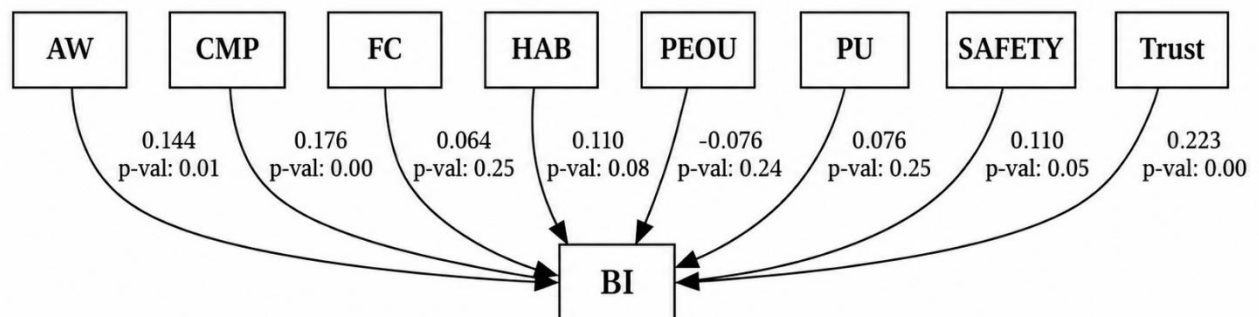


Figure 2. Pathway 1

From Pathway 1, PU, PEOU, and HAB have no impact on BI, which is in line with the hypothesis; AW and CMP have a positive impact on BI, but the estimates are 0.144 and 0.176, respectively. This means the impact is weak, which is in line with the hypothesis. Although Trust has a positive impact on the BI with an estimate of 0.223, still less than 0.3, the impact is not as large as hypothesized. The relationship of SAFETY on BI is close to significance, and the estimate is 0.11. Again, it does not meet the hypothesis. Similarly, FC hasn't lived up to its intended hypothesis. Although the paths constructed in this exploration performed well in terms of the overall fit indices, some of the paths do not reach statistical significance, and the coefficients are low. This suggests that the relationships between these variables are weak and have limited practical influence. Therefore, it is necessary to further optimize the model.

Baron and Kenny (1986) propose a classical theory in social science research that even if the direct effect between certain variables is not significant, a relationship may be observed by indirectly influencing the target variable through a mediating variable. Following this line of thought, although PU, PEOU, HAB, and

FC have no significant relationship with BI, there may be a mediating variable that acts as a bridge. Limayem et al. (2007) point out that PEOU and PU are key factors influencing habit formation, especially in the early stages of technology use. They also emphasize that FC reduces the barriers to repeated use of the technology, thus making it easier to form a habit, which, once formed, further influences behavioural intentions. Therefore, based on these theories, a new pathway can be constructed whereby HAB can be used as a mediating variable, and PU, PEOU, and FC influence BI through HAB.

To validate the new pathway, it is necessary to redo the fit test. The fit test results are shown in Table 5. The χ^2/DoF is close to 0.78, the P-value is 0.815(>0.05), RMSEA is close to 0, and the CFI and TLI indices all exceed 0.9, which means it is an exceptional fit, and the SEM model is deemed suitable for analysis.

Table 5. SEM fit test2

	DoF		DoF Baseline	chi2		p-value		Chi2 Baseline	CFI
Value	35		43	27.4355 33		0.81531		919.590171	1.00862 9
	GFI	AGFI	NFI	TLI	RMSEA	AIC	BIC		
Value	0.970165	0.9963 346	0.97016 5	1.01060 2	0	19.825251	57.3191 81		
	Loglik								
Value	0.087374								

After running the SEM modeling, a new pathway 2 diagram can be seen in Figure 3. Compared to pathway 1, the common point is that AW, CMP, SAFETY, and Trust all have a weak positive effect on BI, with SAFETY having a more statistically significant relationship in pathway 2; while the difference is as follows:

- 1) The p-value of HAB is all less than 0.05 in pathway 2, indicating a statistically significant relationship with BI.
- 2) In pathway 1, HAB does not affect BI, but the combined effect of FC, PU, and PEOU makes HAB have a positive effect on BI; the estimates of FC and PU are less than 0.3, the impact is weak, while PEOU's estimate is 0.44 and greater than 0.3, indicating PEOU has a moderate effect on HAB.

Limayem et al. (2007) provide a new way of thinking, and it can be seen that the variables that do not have a direct effect on BI in pathway 1 do not mean that it is invalid. They may have an important impact through indirect paths; from the theoretical point of view, the UTAUT model itself takes into account multiple paths and variable interactions, and in particular with a particular emphasis on the mediating effects. The change in SAFETY is interesting in the process of model reshaping, which may be due to the fact that certain variables are highly correlated with each other. This, if placed in the model at the same time, would create problems such as multicollinearity, leading to a loss of significance in the original path. After reshaping, the other variables are deleted or adjusted, and the model frees up the true role of the variables. Hair Jr et al. (2021) note that some variables mask the role of the other variables, and that deletion or mediation can make the model clearer.

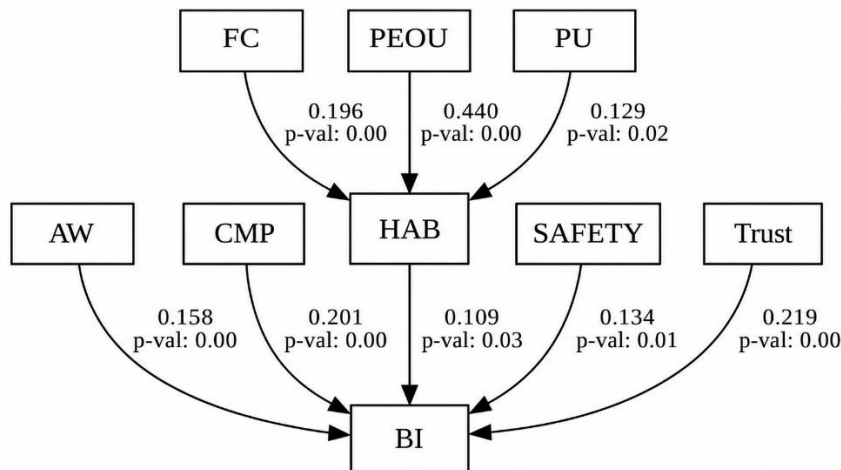


Figure 2. Pathway 2

4.4 K-Means Modelling

After determining the optimal K-value of 5 by the elbow method, the model automatically divides the data into 5 groups; refer to Table 6. The scores of groups 0, 1, and 2 are all lower than 4, so the data of these 3 groups can be put together for further analysis.

These three groups totalled 222 persons, or 71% of all respondents. Out of 222 persons, 51% are female, and 49% are male, which is relatively balanced, indicating that the low acceptance is not limited to a certain gender. And, 74% are between 18 and 50 years old, 80% have a high school education or above, and 76% have a monthly income of more than RMB 5000, which indicates that the group is an educated young group, they are capable of understanding and using digital RMB, and have the ability to pay and consume but they are reluctant to actively use the digital RMB.

Table 6. Clustering

Group	PU	PEOU	Trust	SAFETY	FC
0	3.681373	3.593137	3.470588	3.578431	3.186275
1	3.006667	2.960000	2.906667	2.786667	2.880000
2	1.822222	2.044444	2.133333	2.066667	2.022222
3	4.272152	3.829114	4.012658	3.873418	4.189873
4	2.346154	1.653846	4.692308	4.538462	2.923077
Group	CMP	HAB	AW	TAX	BI
0	3.117647	3.470588	3.637255	3.686275	3.274510
1	2.893333	2.933333	2.813333	2.680000	2.906667
2	1.933333	1.800000	2.000000	2.000000	2.088889
3	4.126582	4.025316	3.848101	3.987342	4.202532
4	4.769231	1.615385	2.307692	2.076923	4.076923

They do not feel that the digital RMB is more convenient, and there is no difference in the way they use it; this group of people has higher expectations of the “new technology”. Interestingly, 23% of government employees also scored low. Their salaries in the pilot area are paid through the digital RMB, so theoretically, they should be the “pioneers”. However, their consumption and money transfers are still dominated by WeChat, so it is not feasible to rely on the government to push the digital RMB without market -driven and

user-perceived benefits. It can be seen that K-Means validates pathway 2 of SEM modelling from another angle in Table 7.

Table 7. Characteristics for the low-score cluster

Feature	Category	Percentage
Gender	Male	49%
	Female	51%
Age Group	18–50 years	74%
	Above 50 years	26%
Education Level	High school or above	80%
	Below high school	20%
Income Level	Monthly income >5000	76%
	Monthly income <5000	24%
Occupation	Company employee	30%
	Gov employee	23%
	Business owner	24%
	Freelancer	19%
	Retirement	3%
	Others	1%

4.5 Discussion on the results

AW has a weak positive impact on BI. Alalwan et al. (2017) state that AW does not necessarily bring a strong perception of relative advantage immediately but rather serves as a sort of preparation to increase the presence of the innovation in the mind of the user. When the market changes or the product is optimized, the user can accept it. Therefore, it's not useless for the government to publicize the digital RMB; users more or less think it is a new trend that can't be ignored and will not feel strange and resistant. This forms a mild positive influence, but whether it translates into action depends on other variables.

For CMP, the digital RMB is currently compatible with WeChat, the interface is friendly and easy to use, can be used for offline code scanning. This indeed lowers the threshold of technology adoption, but it does not form a significant comparative advantage, thus does not materially improve BI. Porter and Strategy (1980) point out that to gain the benefit, the key is to find out the competitor's weaknesses and utilize them to build one's own differentiation. Corresponding to the digital RMB, it is good to take advantage of the fact that WeChat's inability to interoperate with Alipay while the digital RMB can be used as an intermediary and so on.

SAFETY and Trust have a positive impact on BI, but the effect is weaker rather than stronger, which is a bit surprising. Shen and Hou (2021) and Parasol (2022) both state that the government is strengthening the regulation of private payment platforms to deal with any potential risks, and that this proactive approach enhances its trust. On the other hand, it causes the advantages of Trust and SAFETY of digital RMB not to be as obvious as they could be. This explains why there is a deviation from expected assumptions. In addition, Culnan and Bies (2003) note that users are not unconcerned about company-controlled data, but are more sensitive to the consequences of government-controlled data. This confirms the reality that many users trust WeChat more because they care about whether the future use of state-controlled currency is more likely to be regulated and tracked, and that feeling undermines trust in state-controlled currency.

From the path analysis, PU, PEOU, and FC are difficult to form a direct driving force on the BI, but the three variables through HAB have a weak influence on the BI. It can be explained that the government in the past five years has enhanced PU through red packets and social services. Also, it simplifies the interface to enhance PEOU by being compatible with WeChat and Alipay. It also expands the application scenarios and provides technical support to enhance FC, so that users unknowingly begin to get used to using the digital RMB. At present, the ecological construction of digital RMB is still at an early stage; if PU, PEOU, and FC are further optimized, the path strength of HAB is expected to be lifted. Bai et al. (2025) also mention that by the end of May 2024, the total amount of digital RMB transactions has reached 6.6 trillion RMB, and the government has continued to carry out digital RMB on a wider scale, which shows that digital RMB has made great progress and people are gradually accepting and starting to use it in their daily life.

4.6 Improvement of digital RMB

The study provides important practical implications for promoting the digital RMB usage. The next step is to explore how to improve the willingness to adopt the digital RMB along seven dimensions.

Commercial banks have a wide range of service resources and are able to promote it at a low cost. However, due to competitive relationships between the digital RMB and banks' mobile payments, which lead to their low motivation, Policymakers should strengthen cooperation with banks and provide incentives to them to increase AW. WeChat currently has high withdrawal fees and is not interoperable with other private platforms. The digital RMB can fully utilize its advantage of being compatible with them and expand its user base through free or low fees, to increase HAB and CMP.

Digital RMB can provide financial management and points exchange to increase PU. This may have an impact on the bank, but it can cooperate with the bank. The bank provides the underlying services while the digital RMB is only a channel; both sides can realize a win-win situation.

The government could prioritize the digital RMB usage in social insurance and tax subsidies, public healthcare reimbursement, and the use of the digital RMB in the government's daily office system or travel reimbursement to increase PU, FC, and HAB.

WeChat customer service mainly relies on robots, such as handling account blocking and emergencies, which are inefficient. The digital RMB can utilize the strong platform of banks and the government to provide high-quality customer service to enhance FC. Increase application scenarios, encouraging more merchants to access the digital RMB and provide points incentives to increase FC. The registration process can also be simplified in terms of new user registrations with the help of WeChat and Alipay authentication to improve CMP and PEOU.

Beyond its practical significance, this study also offers insights for policymakers. Governments should leverage their strengths by collaborating with financial institutions and promoting the adoption of the digital RMB in the public sector. Through targeted outreach and educational initiatives, along with enhanced regulatory support, public trust can be strengthened. These measures will effectively facilitate the widespread application of the digital RMB.

5. Conclusion

The digital RMB has been promoted for almost 5 years; although progress has been made, its popularity is still low. The factors affecting BI haven't been studied in depth. To fill the research gap, this study constructs a theoretical model combining UTAUT and Porter's competition theory with a new perspective to investigate the effects of the differences in the main factors on the BI of the digital RMB, adopting SEM modelling to explore the optimal path. The model was tested through a survey of 314 digital RMB users. The results show that the proposed theoretical model can effectively explain the related BI. Awareness, HAB, and SAFETY have a weak positive effect on the BI, while CMP and Trust have a low moderate impact on the BI. However, FC, PU, and PEOU do not directly affect the BI but directly affect HAB, then affect the BI through the mediator of HAB. Also, from the results of K-Means modelling, it is clear that without market incentives and the drive of user-perceived benefits, government policies alone can't achieve good results. Based on the above findings, the research puts forward some insightful suggestions to build, improve, and refine the digital RMB, to accelerate the application of digital RMB.

There are some limitations in the study. Firstly, the factors that influence the BI may be more complex, for example, the effect of the tax factor. Although this factor is removed in this study, it does not mean that the factor is invalid. Secondly, there may be other plausible paths that can better explain the BI. Nonetheless, these limitations provide opportunities for future research to deepen the understanding of the topic.

Data Availability Statement

The data supporting the findings of this study are not publicly available due to privacy and ethical considerations related to the survey respondents but are available from the corresponding author upon reasonable request.

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Declaration of the Use of Generative AI

I used ChatGPT to support brainstorming and preliminary literature searches. The manuscript was independently written by me, and all academic judgments, analyses, and conclusions are solely mine.

Conflicts of Interest

I declare no conflicts of interest.

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