International Journal of Innovative Research and Scientific Studies, 8(2) 2025, pages: 4435-4450

IJIRSS
International Journal of Innovative Research & Scientific Studies

**ISSN:** 2617-6548

URL: www.ijirss.com

# What drives user stickiness in digital currency? The moderating role of contextual complexity

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## Abstract

The understanding of the factors that drive user stickiness in extant studies remains limited to date. To bridge the research gaps, this study explored whether system quality, information quality, and service quality influence user stickiness in digital currency, based on the IS Success Model. We further investigated the moderating role of contextual complexity by drawing upon complexity theory. By surveying 528 Chinese users of the electronic Chinese Yuan, our hierarchical regression analysis revealed that system quality, information quality, and service quality are positively associated with user stickiness in digital currency. We also found that high contextual complexity positively moderates these relationships. Our findings suggest that improving system quality, information quality, and service quality are crucial factors for increasing user stickiness in digital currency. Our findings also suggest that greater contextual complexity enhances user-system interactions and facilitates the co-evolution of digital currency usage environments. Our study provides practical contributions for policymakers and managers by highlighting that harmony, derived from the transparency of digital currency, an innovative institutional environment, and an efficient system, enables innovation and enhances the retention of digital currency.

**Keywords:** Complexity theory, contextual complexity, digital currency, electronic Chinese Yuan, IS Success Model, user stickiness.

**DOI:** 10.53894/ijirss.v8i2.6377
**Funding:** This study received no specific financial support.
**History: Received:** 4 March 2025 / **Revised:** 7 April 2025 / **Accepted:** 9 April 2025 / **Published:** 22 April 2025

**Competing Interests:** The authors declare that they have no competing interests.
**Authors' Contributions:** Both authors contributed equally to the conception and design of the study. Both authors have read and agreed to the published version of the manuscript.
**Transparency:** The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
**Publisher:** Innovative Research Publishing

## 1. Introduction

In recent years, central bank digital currencies (CBDCs) have increasingly emerged as a prominent payment method in the global financial system [1]. As of 2023, 130 countries around the world were exploring CBDCs, accounting for 98% of global GDP [2]. Among them, 64 countries were actively advancing CBDC initiatives through issuance, pilot testing, or development phases. As payment methods have evolved from cash to credit cards to electronic money, this trend marks a significant shift toward innovation in digital currency and the broader development of Fintech [3]. Notably, China's transformation stands out. It is among the few countries that bypassed the credit card phase entirely, moving directly from cash to electronic money [4]. Since October 2020, China has been conducting pilot tests for its electronic Chinese Yuan (e-CNY) in major cities such as Beijing, Shenzhen, and Suzhou [5]. By June 2022, the cumulative transaction volume of the digital yuan had surpassed 680 billion yuan (approximately 110 billion USD), and the number of users exceeded 200 million.

By 2030, the digital yuan is expected to account for 6% of China's base money and 20% of total retail payments, coexisting with both cash and third-party payment platforms.

Despite this rapid paradigm shift, research on digital currencies remains limited. Most related studies are still at an early stage. Specifically, much of the existing research has focused on Bitcoin or regulatory issues. Even when related studies exist, there is a significant shortage of empirical investigations into the factors that could promote broader user adoption of digital currencies [6]. For instance, in China, the mobile payment usage rate has reached approximately 90% [4], yet the adoption rate of e-CNY remains relatively modest when compared to established private payment platforms [2]. This suggests that, compared to existing third-party payment systems such as WeChat Pay and Alipay, e-CNY has not yet developed strong user stickiness. Thus, enhancing its long-term usage has become a key concern for governments, financial institutions, and scholars navigating this new payment paradigm [7]. Nevertheless, limited attention has been paid to this issue, and few studies have explored the factors that can enhance user stickiness in the context of digital currencies [8, 9].

We have identified several research gaps in previous studies. First, there are few studies that examine the factors that enhance user stickiness in digital currencies. Based on information systems (IS) research, various factors can influence the usage of digital currencies, particularly the quality dimensions of the digital currency system itself. However, most existing studies focus on user adoption and are primarily grounded in the Technology Acceptance Model (TAM), emphasizing users' intention to use [10]. In reality, the frequency of digital currency usage remains lower than that of existing mobile payment platforms, which underscores the importance of studying user stickiness. As noted, digital currencies are used less frequently than widely accepted third-party mobile payment platforms, such as WeChat Pay and Alipay.

This suggests that while users may be aware of digital currencies or may have adopted them, they tend not to use them regularly or consistently [11]. This highlights the importance of understanding user stickiness, that is, the reasons why users continue or discontinue their use of digital currencies over time. Yet, empirical research on the drivers of user stickiness in the context of digital currencies remains scarce. This gap underscores the need for further investigation into long-term engagement, retention strategies, and the underlying factors that encourage sustained use of digital currencies.

Second, there are very few studies on the moderating variables that influence the relationship between system-related quality factors and digital currency user stickiness. Even when such studies exist, they have primarily focused on user intention to use, mostly emphasizing TAM constructs such as perceived ease of use and perceived usefulness as mediating variables [12]. However, while the complex environment surrounding digital currency systems may moderate these relationships, few studies have addressed this issue. As a result, our understanding remains limited regarding the mechanisms through which digital currency systems interact with and adapt to their complex usage environments.

Based on these research gaps, we sought to answer the following two research questions: (1) What factors drive user stickiness in digital currency? and (2) What factors moderate user stickiness in digital currencies? To address these questions, this study examined the effects of system quality, information quality, and service quality on user stickiness, drawing on the IS Success Model. Additionally, we integrated the IS Success Model with complexity theory to explore whether contextual complexity moderates these relationships. Specifically, we investigated how and whether users' varying needs across different payment contexts with differing levels of complexity might moderate the effects of quality dimensions on user stickiness. For instance, simple transactions (such as daily purchases) and complex transactions (such as cross-border or high-value payments) may influence users' payment preferences and habits, which may ultimately influence user stickiness in digital currency [13]. In doing so, this study aims to determine whether the impact of each dimension of the IS Success Model varies across different payment scenarios. To test our hypotheses, we conducted a survey with 700 e-CNY users and present the empirical results.

This study makes several academic contributions. First, it extends the application of the IS Success Model to the digital currency domain and reveals the impact of its dimensions on user stickiness, offering a new perspective for digital currency research. Specifically, our study explores whether the three dimensions of the IS Success Model, system quality, information quality, and service quality, affect user stickiness and the tendency of users to continue using digital currency over time. In particular, this study empirically tests the impact of these dimensions on user stickiness, addressing existing research gaps and contributing to the broader field of IS research. Therefore, the study provides novel insights into digital currency studies.

Second, by integrating the theoretical concepts of the IS Success Model and complexity theory, we demonstrated the moderating effect of contextual complexity on the relationship between quality dimensions and user stickiness in digital currency. Through these empirical findings, the study not only deepens our understanding of the relationship between digital currency and user stickiness but also clarifies the mechanisms driving the evolution of this relationship. To the best of our knowledge, this approach is novel in digital currency research and represents a significant academic contribution. Our findings also help governments and central banks optimize promotion strategies for e-CNY and develop more precise market penetration plans, particularly in high-complexity payment environments such as cross-border transactions and corporate payments. In this regard, our study offers meaningful implications for both academic research and practical implementation.

## 2. Literature Review and Theoretical Background

### *2.1. The IS Success Model*

The IS Success Model, proposed by DeLone and McLean [14], is a widely recognized framework for evaluating the effectiveness of information systems. It is frequently applied in business management, fintech, and e-commerce domains [14]. The model posits that system success can be assessed through three key dimensions: system quality, information quality, and service quality.

System quality refers to attributes such as stability, speed, and security. Higher system quality enhances the user experience and fosters continued usage [15]. Information quality relates to the accuracy, clarity, and transparency of data

provided by the system, which is crucial for building trust [16]. Service quality includes aspects such as technical support and responsiveness, which can significantly impact user satisfaction [17].

Although few in number, recent studies suggest that these three dimensions also play vital roles in the adoption and continued use of digital currencies. For instance, security, reliability, and transaction speed (as elements of system quality) build user trust [18]. Accurate and timely financial information (information quality) enhances satisfaction [19] while effective customer service and usability (service quality) foster loyalty and repeat usage [20]. Collectively, these insights indicate that the IS Success Model offers a valuable theoretical foundation for understanding the successful implementation of digital currencies.

### *2.2. User Stickiness*

User stickiness is defined as the degree to which users consistently use a service or platform, reflecting their loyalty and engagement [21]. It serves as a key metric for measuring users' dependence on a particular product or service, as well as their willingness to continue using it, which is widely used in research on digital products, social media, e-commerce, and fintech [21]. In the payment field, user stickiness is usually closely related to the convenience of payment tools, user habits, reward mechanisms, and market competition [22].

Numerous studies have examined the relationship between the IS Success Model and user stickiness in the context of e-commerce and internet platforms [23, 24]. A number of studies have explored how the dimensions of the IS Success Model, such as system quality, information quality, service quality, user satisfaction, and net benefits, influence user engagement and long-term loyalty in digital environments. For example, a study on e-commerce platforms found that system quality, including factors like website reliability, security, and ease of navigation, directly impacts user satisfaction and trust, which are essential for fostering user stickiness [25]. In addition, information quality, such as the accuracy and relevance of product details, influences users' decision-making processes, leading to higher levels of engagement and repeat purchases. Similarly, service quality, which encompasses factors such as customer support, user interface, and overall service experience, has been found to positively impact user retention and the likelihood of continued use [26].

Moreover, previous studies in internet platforms have highlighted the importance of user satisfaction as a mediator between service quality and user stickiness. Studies have shown that platforms with better customer service, faster response times, and more user-friendly interfaces create a stronger emotional connection with users, leading to sustained usage and higher levels of engagement [27]. Taken together, existing studies demonstrate that applying the IS Success Model to e-commerce and internet platforms provides valuable insights into the factors that drive user stickiness. By optimizing system and service quality, platforms can enhance user satisfaction, which in turn contributes to sustained engagement and higher retention rates. These findings are directly applicable to emerging digital payment systems like e-CNY, where user stickiness is critical for achieving long-term adoption and success.

However, in the realm of digital currency, the determinants of user stickiness remain largely unexplored. As noted, existing studies largely focus on users' adoption intention, but less on their long-term usage behavior [28]. In addition, the variation in user stickiness across different payment scenarios remains underexplored, for instance, whether users' payment preferences differ in high-complexity contexts such as large-value or B2B transactions [29]. Our literature review has revealed that only [30] explored the relationship between the IS Success Model and digital currency [30]. Therefore, research gaps persist, and further studies are needed in this area, despite the evident necessity.

## 3. Hypotheses Development

### *3.1. System Quality and User Stickiness in Digital Currency*

Drawing on the IS Success Model, this study posits that the three core dimensions—system quality, information quality, and service quality—affect user stickiness in digital currency. We argue that system quality positively influences user stickiness in digital currency. System quality refers to the technical aspects of a digital platform, such as reliability, security, speed, and ease of use [14]. When these elements are of high quality, they create a smooth and trustworthy experience for users.

For digital currencies, system quality directly impacts users' confidence in the platform [18]. If the system is fast, secure, and reliable, users are more likely to feel comfortable using it regularly. When users have a positive experience with the platform, they are more likely to return, which fosters user stickiness [22]. That is, users will continuously engage with the digital currency, adopting it as part of their daily financial activities. In addition, system quality minimizes disruptions or frustrations, leading to higher satisfaction and reducing the likelihood of users seeking alternative platforms [19]. As a result, high-quality systems are a critical factor in ensuring long-term user retention and engagement with digital currency. For example, WeChat Pay and Alipay are among the most widely used payment tools in China, primarily due to the exceptional stability of their systems, which makes payment failures extremely rare [31]. This suggests that if a digital currency system can ensure seamless integration with merchant cashier systems and offer an efficient payment experience, users may be more inclined to adopt it for long-term use.

Veeramootoo et al. [15] demonstrated that higher system quality enhances user trust, which in turn strengthens users' intention to continue using the payment system over time [15]. If a payment system is easy to hack, or if there are frequent problems such as transaction failures and lags when making payments, users will be more inclined to choose other payment methods [32]. With those considerations, we hypothesize as follows, and Figure 1 shows our research model.

*$H_1$: System quality is positively associated with user stickiness in digital currency.*

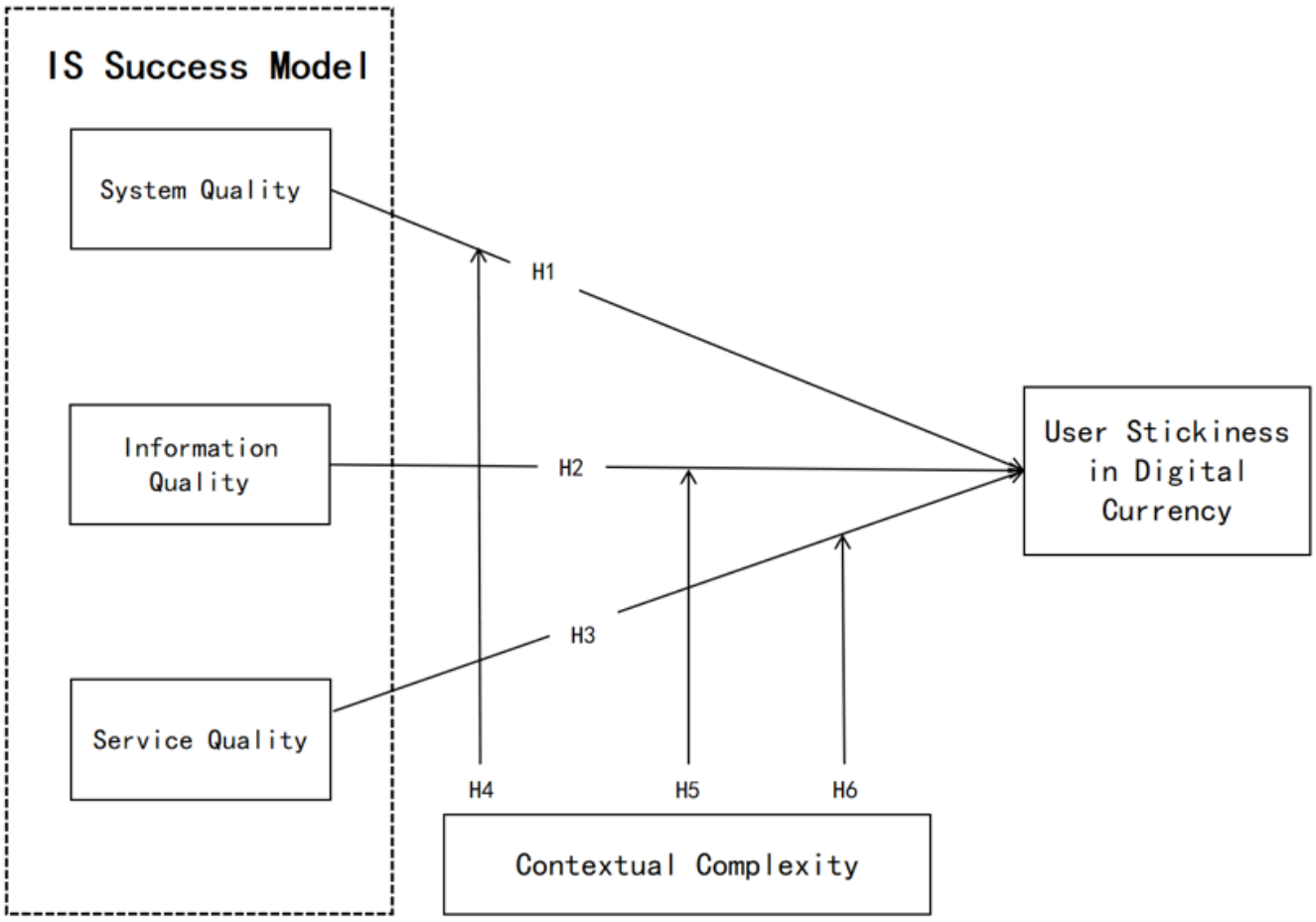


**Figure 1.**
Research model.

*3.2. Information Quality and User Stickiness in Digital Currency*

Information quality refers to whether the information provided by the system is accurate, complete, timely, and understandable [14]. Existing studies highlight that the positive relationship between information quality and user stickiness in digital currency shows that high-quality information significantly enhances user retention and engagement. When users are provided with accurate, reliable, and up-to-date information about transactions, market trends, and security measures, they are more likely to trust the platform and continue using it over time [16]. This trust fosters a stronger emotional connection with the system, leading to increased frequency of use and long-term loyalty [26]. Moreover, clear, accessible, and easily understandable information enhances the overall user experience and encourages users to return regularly, thereby strengthening their intention to use the digital currency system [1].

In research on digital currency and payment, high-quality information can increase users' trust in the system. For example, if the system is able to clearly display transaction details, including time, amount, merchant name, and debit method, after a user pays in digital currency, the user will feel safer and perceive the system as more transparent [16]. On the contrary, if the system does not display transaction records after the payment is completed, or if the information is vague or incorrect, users may be skeptical about its security and use it less [33].

In addition, it has been found that information quality also affects users' decision-making efficiency [34]. In high-frequency transaction scenarios (e.g., takeout, online shopping), if digital currency information provides clear order information, automatically generates receipts, and seamlessly integrates with other e-commerce systems, users may be more willing to continue using it. Conversely, if the information is vague and users need to spend extra time to confirm the transaction, they may choose more sophisticated payment methods (e.g., Alipay, WeChat Pay). Hence, we hypothesize as follows:

*$H_{2:}$ Information quality is positively associated with user stickiness in digital currency.*

*3.3. Service Quality and User Stickiness in Digital Currency*

Service quality refers to the system's ability to provide efficient customer service support, solutions, and help when users encounter problems [14]. Good service quality can enhance users' trust in the payment system and increase their willingness to continue using it. Drawing on the IS Success Model, studies highlight that the positive relationship between service quality and user stickiness in digital currency suggests that when the quality of service provided by a platform is high, users are more likely to remain engaged and continue using the system over time [23]. Service quality in this context includes factors such as the responsiveness of customer support, the reliability of the platform, ease of use, and the speed of transactions [25]. When users experience smooth, efficient, and dependable service, they develop greater trust in the platform, which increases

their likelihood of returning and interacting with the digital currency system [28]. This strong service experience not only enhances user satisfaction but also fosters long-term loyalty, making users more "sticky" to the platform, leading to higher retention rates and prolonged engagement [27].

For example, Petter et al. [17] found that when a payment system provides timely and friendly customer service support, users are more willing to use the payment method for a long time [17]. If users encounter problems such as payment failures and account freezes when using e-CNY, and customer service is able to respond quickly and solve the problems effectively, they may continue to trust the system.

In addition, research by Yuan et al. [35] showed that service quality directly impacts user satisfaction with the payment system. In the highly competitive mobile payment market, both merchants and users expect quick responses when issues arise [35]. This study also suggests that if the customer service system of digital currency is inadequate, or if user feedback is not addressed in a timely manner, users may be more inclined to turn to third-party payment systems. Therefore, we hypothesize as follows:

*$H_{3:}$ Service quality is positively associated with user stickiness in digital currency.*

### *3.4. The Moderating Effects of Contextual Complexity*

Drawing on complexity theory, systems are driven toward emerging states through their interactions with contextual complexity as they coevolve within their environments [36]. In other words, the diverse and contingent dynamics surrounding a system can influence the trajectory of technological innovation [37]. Complexity theory offers insights into organizational change dynamics, which have traditionally been underrepresented in the social sciences. It has gained traction in recent literature and shows growing promise in disciplines concerned with complex, evolving systems. Furthermore, complexity theory challenges reductionist and mechanistic approaches, highlighting how contextual complexity can give rise to novel behaviors and outcomes [38].

At its core, complexity theory encompasses principles such as chaotic behavior, complex adaptive systems, path dependence, system history, non-linearity, emergence, irreducibility, adaptiveness, the balance between order and chaos, and self-organization [37]. These complexities do not hinder technological evolution; rather, contingent environments, through feedback mechanisms, promote self-organization, adaptation, and growth. Complex systems are composed of interdependent agents that interact, learn, and adapt over time. Complexity theory thus provides a dynamic and integrative framework for analyzing interaction patterns within systems of agents pursuing shared goals [39]. In particular, contextual complexity sheds light on the dynamic processes underlying organizational change.

Therefore, drawing on complexity theory, we propose that contextual complexity positively moderates the relationship between system-related qualities and user stickiness in digital currency use. Contextual complexity refers to the various factors that determine the level of intricacy or difficulty users encounter when conducting transactions in different payment settings [40]. In simple payment environments, such as everyday purchases, QR code payments, or supermarket checkouts, users tend to prioritize convenience and speed. In contrast, complex scenarios, such as large-value transfers, contract-based payments, or cross-border transactions, place greater emphasis on payment security, information transparency, transaction integrity, and responsive customer service [15, 32]. In such high-complexity environments, users have heightened expectations and rely more heavily on the functional completeness of the payment system to mitigate uncertainty and reduce transaction-related risks [16].

Therefore, by integrating the IS success model and the complexity theory, we argue that the contextual complexity positively moderates the relationship between system quality, information quality, service quality, and user stickiness in digital currency. First, in complex payment environments, such as those involving large-value transactions or cross-border payments, system quality plays a critical role in maintaining user trust and satisfaction, which directly influences user stickiness. When users are involved in transactions with high value or across multiple jurisdictions, they expect the system to be reliable, secure, and efficient. Any issues like delays, failures, or security breaches can erode trust and cause users to seek alternatives. In short, the more complex the payment environment, the greater the importance of system quality in maintaining user retention. The stability, security, and seamless operation of such systems are directly tied to user loyalty, particularly when dealing with high-stakes transactions [32].

In this context, system quality refers to the reliability, stability, and performance of the payment platform. In a complex payment environment, such as those involving large-value or cross-border transactions, system quality plays a critical role in ensuring that transactions are processed smoothly and securely [41]. These types of transactions often involve more significant amounts of money and are typically subject to more regulations and oversight, which makes any disruption or failure, such as delays, system crashes, or security breaches, more detrimental to users' trust and satisfaction [41]. If the payment system is unstable in these complex scenarios, users are likely to experience frustration, leading to a decrease in their willingness to continue using the platform, thus lowering user stickiness [29]. On the other hand, in low-complexity scenarios, where payments are smaller or simpler (such as domestic transfers or microtransactions), users tend to have less stringent demands for system stability. Minor delays or occasional service disruptions may be more acceptable in these situations, as the perceived risks and consequences are lower. Therefore, system stability may not significantly affect user stickiness in these contexts. Hence, we propose the hypothesis as follows:

*$H_{4:}$ Contextual complexity positively moderates the relationship between system quality and user stickiness in digital currency.*

By integrating the IS Success Model and contextual complexity, we posit that contextual complexity positively moderates the relationship between information quality and user stickiness in digital currency systems. This implies that the complexity of the usage context influences how strongly information quality affects user stickiness. The IS Success Model

emphasizes the importance of system quality, information quality, and service quality in shaping user satisfaction and behavior. When combined with the notion of contextual complexity, the theory suggests that in more complex environments, such as large-value, cross-border, or high-risk transactions, the quality of information provided by the platform becomes even more critical for fostering user stickiness [1]. When the usage context is more complex, users are likely to have higher expectations for accurate, reliable, and timely information, as any discrepancies or delays in the information can lead to user dissatisfaction or even loss of trust [41]. In contrast, in simpler, low-risk environments, information quality may have a less significant impact on user stickiness, as users are less sensitive to minor information-related issues [42]. Therefore, the complexity of the context moderates how strongly information quality influences user retention in digital currency platforms.

For example, the impact of information quality on user stickiness may also be enhanced in complex payment scenarios. Corporate payment and contract settlement scenarios require clear and accurate transaction information to improve the efficiency of financial management, whereas in micropayment scenarios, the user's demand for transaction information is low [35]. Hence, we hypothesize as follows:

*$H_5$: Contextual complexity positively moderates the relationship between information quality and user stickiness in digital currency.*

In addition, we argue that the contextual complexity positively moderates the relationship between service quality and user stickiness in digital currency. We argue that service quality plays a more prominent role in high-complexity payment scenarios because users are more likely to encounter problems during complex transactions, and they need customer service assistance more, and if payment platforms can provide efficient and professional customer service support, users will be more inclined to use them in the long term [17].

We suggest that the contextual complexity significantly influences the way service quality impacts user stickiness in digital currency platforms. In high-complexity payment scenarios, such as large-value or cross-border transactions, users are more likely to face challenges, including issues with transaction processing, security concerns, or difficulties in understanding complex terms [43]. As a result, they are more dependent on the customer service provided by the platform to resolve these issues promptly and effectively [23].

In these complex scenarios, the quality of customer service becomes even more critical. Users expect timely, professional, and knowledgeable assistance when they encounter problems, and the ability of the platform to provide such support can directly affect their satisfaction and long-term commitment [42]. If a payment platform can address users' concerns efficiently and offer high-quality support, it not only resolves immediate issues but also strengthens the user's trust in the platform, increasing the likelihood of continued use and enhancing user stickiness [25]. This reinforces the idea that service quality plays a more prominent role in higher-complexity payment environments, as users rely more heavily on customer support in such situations [17]. Therefore, we hypothesized as follows:

*$H_6$: Contextual complexity positively moderates the relationship between service quality and user stickiness in digital currency.*

## 4. Data and Methods

### *4.1. Research Setting*

China was selected as the research setting due to its suitability for testing the proposed hypotheses. The e-CNY (electronic Chinese Yuan) is currently undergoing active pilot testing across China, with rapid progress in its development. Pilot programs have been implemented in several major cities, where users are gradually becoming accustomed to using digital currency for payments. In particular, the e-CNY payment system was introduced during the 2022 Beijing Winter Olympics, serving as a large-scale experiment. Additionally, e-CNY is now available for everyday use in major cities such as Shanghai, Shenzhen, and Suzhou.

Unlike traditional e-payment tools such as WeChat Pay and Alipay, e-CNY is issued directly by the central bank and functions as legal tender, featuring a centralized issuance but supporting decentralized transaction processing [5, 6]. The rapid development of China’s digital economy has led to significant changes in the traditional financial system [44]. The widespread adoption of digital payments and online shopping has increased the need for a government-backed digital currency in China. Popular mobile payment systems like Alipay and WeChat Pay have paved the way for interest in CBDCs. Despite its progress, e-CNY still faces several challenges. Compared to established third-party platforms, user acceptance and stickiness of e-CNY remain relatively low, and consistent usage habits have yet to form [45, 46].

### *4.2. Data Collection*

This study surveyed Chinese users of digital currency, focusing specifically on e-CNY. The questionnaires were distributed via multiple channels, including social media platforms (e.g., WeChat, Weibo), financial forums, and the survey tool Questionnaire Star. The target participants were actual users of e-CNY across 26 designated pilot cities. The survey was conducted in January 2025. A total of 700 questionnaires were distributed, and 599 responses were received. The response rate was 85.71%, and after excluding invalid responses, 528 valid questionnaires were retained for analysis. Table 1 shows the descriptive statistics of the respondents.

To reduce common method bias (CMB), this study followed the method proposed by Podsakoff et al. to reduce the impact of potential bias through a variety of procedural controls [47]. These controls include ensuring the validity of the questionnaire items, avoiding ambiguous expressions, adding buffer items to the questionnaire structure, and ensuring complete anonymity of the respondents to reduce social desirability bias. In addition, collinearity diagnostics, including

variance inflation factor (VIF) analysis, were conducted to assess the potential impact of common method bias on the validity of the model [48].

**Table 1**.
Sample Characteristics

| Variables | Options | Frequency | Percentage |
|---|---|---|---|
| Age | 20 years and below | 53 | 10 |
| | 21-35 years | 212 | 40.2 |
| | 36-50 years | 169 | 32 |
| | Over 50 years old | 94 | 17.8 |
| Education | High school and below | 90 | 17 |
| | Associate Degree | 205 | 38.8 |
| | Bachelor's Degree | 163 | 30.9 |
| | Master's degree and above | 70 | 13.3 |
| Gender | Male | 188 | 35.6 |
| | Female | 340 | 64.4 |
| Did you install the e-CNY app at the start of the pilot? | Yes | 275 | 52.1 |
| (Installation of platform) | No | 253 | 47.9 |
| How interested are you in choosing e-CNY as a means of payment? | Not at all interested | 27 | 5.1 |
| (Interest) | Not interested | 79 | 15 |
| | Average | 106 | 20.1 |
| | Interested | 163 | 30.9 |
| | Very interested | 153 | 29 |
| Income | Less than 10,000 yuan | 109 | 20.6 |
| | 10,000-20,000 yuan | 134 | 25.4 |
| | More than 20,000 yuan | 110 | 20.8 |
| | Cannot disclose | 175 | 33.1 |
| Total | - | 528 | 100 |

*4.3. Measurements*

This study adopts measurement constructs from the established Information Systems Success Model and employs a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) to measure the variables. All measurement items were adapted from validated scales in the existing literature and modified to fit the context of this study. Table 2 presents the measurements used in this study.

**Table 2.**
List of items

| Variables | Items | References |
|---|---|---|
| System Quality (SYQ) | 1. The e-CNY payment system reliably completes transactions without errors the first time.<br>2. I find the e-CNY payment system easy to use and available whenever I need to make a payment.<br>3. It is easy for me to learn and become skillful in using the e-CNY payment system.<br>4. The e-CNY payment system keeps my data secure and its privacy policies are clearly communicated. | Zaied [49] |
| Information Quality (IQ) | 1. The e-CNY payment system provides complete and sufficient information to meet my payment needs.<br>2. The transaction information from the e-CNY payment system is clear and easy to understand.<br>3. I feel confident that the e-CNY payment system keeps my transaction information private and secure.<br>4. The e-CNY payment system provides accurate and error-free transaction records. | |
| **1.1.**<br>**1.2.**<br>**1.3.** *Service Quality (SEQ)* | 1. Using the support functions of the e-CNY payment system helps me solve problems more quickly.<br>2. The support services of the e-CNY payment system are well-designed and tailored to users' needs.<br>3. The e-CNY payment system provides sufficient and clear information when I seek help or support.<br>4. The information provided by the e-CNY payment system is readily accessible whenever I need it. | |
| Contextual Complexity (CC) | 1. Even in complex payment scenarios, I find the e-CNY payment system fast and easy to operate.<br>2. In different payment situations, the transaction information from the e-CNY payment system remains clear and easy to understand.<br>3. When facing complex payment needs, I receive timely and effective support from the e-CNY payment system. | Pan, et al. [50] |
| User Stickiness (USI) | 1. I tend to spend more time using the e-CNY system compared to other payment tools.<br>2. I plan to continue using the e-CNY system regularly in the future. | Liu and Wang [51] |

*4.4. Estimation Methodology*

Statistical analyses were conducted using Stata 17. Hierarchical regression analysis was used to examine the effect of each dimension of the IS Success Model on user stickiness, and regression analysis with moderating variables was used to assess the moderating effect of contextual complexity on the relationship between the respective variables and user stickiness

**Table 3**.
Correlations.

| **Variables** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. USI | 1.000 | | | | | | | | | | |
| 2. SYQ | 0.434*** | 1.000 | | | | | | | | | |
| 3. IQ | 0.403*** | 0.516*** | 1.000 | | | | | | | | |
| 4. SEQ | 0.394*** | 0.463*** | 0.560*** | 1.000 | | | | | | | |
| 5. CC | -0.300*** | -0.240*** | -0.132*** | -0.106** | 1.000 | | | | | | |
| 6. Age | -0.014 | 0.023 | -0.051 | 0.014 | 0.049 | 1.000 | | | | | |
| 7. Education | -0.025 | -0.082* | -0.033 | -0.046 | 0.044 | 0.042 | 1.000 | | | | |
| 8. Gender | -0.010 | 0.035 | 0.014 | 0.034 | 0.024 | 0.089** | -0.048 | 1.000 | | | |
| 9.Install | -0.026 | -0.069 | -0.023 | -0.138*** | 0.025 | -0.054 | -0.037 | 0.056 | 1.000 | | |
| 10.Interest | -0.040 | -0.059 | -0.021 | -0.036 | -0.006 | -0.068 | 0.011 | 0.009 | 0.054 | 1.000 | |
| 11. Income | 0.084* | -0.013 | 0.054 | -0.015 | -0.033 | -0.065 | 0.035 | 0.059 | -0.011 | 0.156*** | 1.000 |

**Note:** *** p<0.01, ** p<0.05, * p<0.1.

## 5. Results

### *5.1. Model Testing*

Table 3 shows the correlations among variables. To assess the potential threat of common method bias, Harman's single-factor test was performed, and the results indicated that no single factor accounted for the majority of the variance. Therefore, common method variance is unlikely to pose a serious threat in this study Podsakoff et al. [47]. Collinearity was examined by calculating the Variance Inflation Factor (VIF). The results showed that the VIF of all variables did not exceed the critical value of 10, indicating that there was no serious problem of multicollinearity between variables.

Tables 4 and 5 show the results of the Confirmatory Factor Analysis (CFA) and Discriminant Validity test. We used STATA 17 to assess the credibility and validity of the measurement model. Based on the Information Systems Success Model, the CFA model included five latent constructs: system quality (SYQ), information quality (IQ), service quality (SEQ), contextual complexity (CC), and user stickiness (USI). Each construct was measured by multiple indicators. The standardized factor loadings for all items exceeded the recommended threshold of 0.70 and were statistically significant ($p < 0.001$), indicating satisfactory indicator reliability. To assess convergent validity, composite reliability (CR) and average variance extracted (AVE) were calculated. All constructs had CR values above 0.90 and AVE values above 0.70, indicating excellent internal consistency and convergent validity. In addition, the square root of each construct's AVE exceeded the correlations with other constructs, supporting discriminant validity according to the Fornell-Larcker criterion. Overall, the results demonstrated strong convergent and discriminant validity for all latent variables.

**Table 4.**
Reliability and validity analysis.

| Variables | Mean Loading | Cronbach's alpha | CR | AVE |
|---|---|---|---|---|
| SYQ | 0.9158 | 0.953 | 0.9548 | 0.8411 |
| IQ | 0.8511 | 0.912 | 0.9135 | 0.7257 |
| SEQ | 0.8961 | 0.942 | 0.9423 | 0.8032 |
| CC | 0.9381 | 0.963 | 0.9566 | 0.8801 |
| USI | 0.9561 | 0.955 | 0.9551 | 0.9141 |

**Table 5.**
Fornell-Larcker criterion for discriminant validity.

| Latent Variables | SYQ | IQ | SEQ | CC | USI |
|---|---|---|---|---|---|
| SYQ | 0.9171 | 0.5751 | 0.4968 | -0.2534 | 0.4675 |
| IQ | 0.5751 | 0.8519 | 0.6402 | -0.1462 | 0.4578 |
| SEQ | 0.4968 | 0.6402 | 0.8962 | -0.1196 | 0.4355 |
| CC | -0.2534 | -0.1462 | -0.1196 | 0.9381 | -0.3267 |
| USI | 0.4675 | 0.4578 | 0.4355 | -0.3267 | 0.9561 |

### *5.2. Hypothesis Testing Results*

Hierarchical regression analysis was conducted to test the research hypotheses. The results are presented in Table 6. Model 1 is a regression model that includes only the control variables. Model 2 shows the testing results for system quality and user stickiness. Model 3 shows the impact of information quality on user stickiness in digital currency. Model 4 shows the effect of service quality on user stickiness in digital currency. Models 5 to 7 test the moderating effects proposed in Hypotheses H4 to H6. Model 8 represents the full model, incorporating all variables.

**Table 6.**
Hypothesis testing results

| | Model1 | Model2 | Model3 | Model4 | Model5 | Model6 | Model7 | Model8 |
|---|---|---|---|---|---|---|---|---|
| Constant | 3.866*** | 1.997*** | 1.550*** | 1.255*** | 4.839*** | 5.111*** | 5.271*** | 1.989*** |
| | (10.08) | (5.18) | (4.03) | (3.24) | (9.17) | (9.59) | (10.39) | (4.96) |
| Age | -0.014 | -0.024 | -0.005 | -0.010 | 0.008 | 0.048 | 0.038 | 0.004 |
| | (-0.23) | (-0.43) | (-0.08) | (-0.19) | (-0.16) | (0.88) | (0.71) | (0.07) |
| Education | -0.039 | 0.010 | 0.007 | 0.011 | 0.037 | -0.010 | -0.011 | 0.018 |
| | (-0.66) | (0.19) | (0.13) | (0.21) | (0.72) | (-0.19) | (-0.21) | (0.35) |
| Gender | -0.038 | -0.078 | -0.077 | -0.089 | -0.024 | -0.037 | -0.049 | -0.073 |
| | (-0.33) | (-0.75) | (-0.75) | (-0.89) | (-0.24) | (-0.37) | (-0.49) | (-0.74) |
| Installation | -0.057 | 0.021 | 0.014 | 0.068 | 0.068 | 0.005 | 0.092 | 0.074 |
| | (-0.51) | (0.21) | (0.14) | (0.70) | (0.72) | (0.05) | (0.97) | (0.78) |
| Interest | -0.057 | -0.032 | -0.032 | -0.032 | -0.036 | -0.044 | -0.058 | -0.035 |
| | (-1.22) | (-0.77) | (-0.76) | (-0.78) | (-0.89) | (-1.10) | (-1.46) | (-0.87) |
| Income | 0.104** | 0.105** | 0.090** | 0.098** | 0.093** | 0.066** | 0.103** | 0.090** |
| | (2.10) | (2.37) | (2.07) | (2.28) | (2.21) | (1.55) | (2.46) | (2.16) |
| SYQ | | 0.443*** | 0.318*** | 0.275*** | -0.206* | | | 0.225*** |
| | | (11.01) | (6.93) | (5.92) | (-1.90) | | | (4.86) |
| IQ | | | 0.264*** | 0.171*** | | -0.206* | | 0.169*** |
| | | | (5.28) | (3.13) | | (-1.78) | | (3.17) |
| SEQ | | | | 0.202*** | | | -0.282*** | 0.204*** |
| | | | | (3.95) | | | (-2.68) | (4.11) |
| CC | | | | | -0.855*** | -0.852*** | -0.941*** | -0.190*** |
| | | | | | (-7.24) | (-7.43) | (-8.89) | (-5.39) |
| SYQ*CC | | | | | 0.177*** | | | |
| | | | | | (5.92) | | | |
| IQ*CC | | | | | | 0.178*** | | |
| | | | | | | (5.69) | | |
| SEQ*CC | | | | | | | 0.200*** | |
| | | | | | | | (7.02) | |
| Observations | 528 | 528 | 528 | 528 | 528 | 528 | 528 | 528 |
| R-squared | 0.012 | 0.198 | 0.239 | 0.262 | 0.286 | 0.275 | 0.299 | 0.301 |
| F test | 0.412 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| r2_a | 0.000 | 0.188 | 0.228 | 0.249 | 0.273 | 0.263 | 0.287 | 0.287 |
| F | 1.02 | 18.39 | 20.41 | 20.39 | 23.02 | 21.86 | 24.29 | 22.25 |

**Note:** *p < 0.1, **p < 0.05, ***p < 0.01.

H1 posited that system quality is positively associated with user stickiness in digital currency. As shown in Model 2, the coefficient for system quality is statistically significant and positive ($\beta$ = 0.443, p<0.001). Therefore, H1 is supported. H2 posited that information quality is positively associated with user stickiness in digital currency. As shown in Model 3, the coefficient for information quality is statistically significant and positive ($\beta$ = 0.264, p <0.001). Thus, H2 is supported. H3 suggested that service quality is positively associated with user stickiness in digital currency. Model 4 confirms this with a statistically significant and positive coefficient ($\beta$ = 0.202, p <0.001). Therefore, H3 is supported.

H4 posited that contextual complexity positively moderates the relationship between system quality and user stickiness. As indicated in Model 5, the interaction term between system quality and contextual complexity is statistically significant and positive ($\beta$ = 0.177, p <0.001). Therefore, H4 is supported. H5 proposed that contextual complexity positively moderates the relationship between information quality and user stickiness. Model 6 shows a statistically significant and positive interaction effect ($\beta$ = 0.178, p <0.001), supporting H5. H6 posited that contextual complexity positively moderates the relationship between service quality and user stickiness. As shown in Model 7, the interaction term is statistically significant and positive ($\beta$ = 0.200, p <0.001), thus supporting H6. Figures 2 to 4 illustrate the moderating effects of contextual complexity.

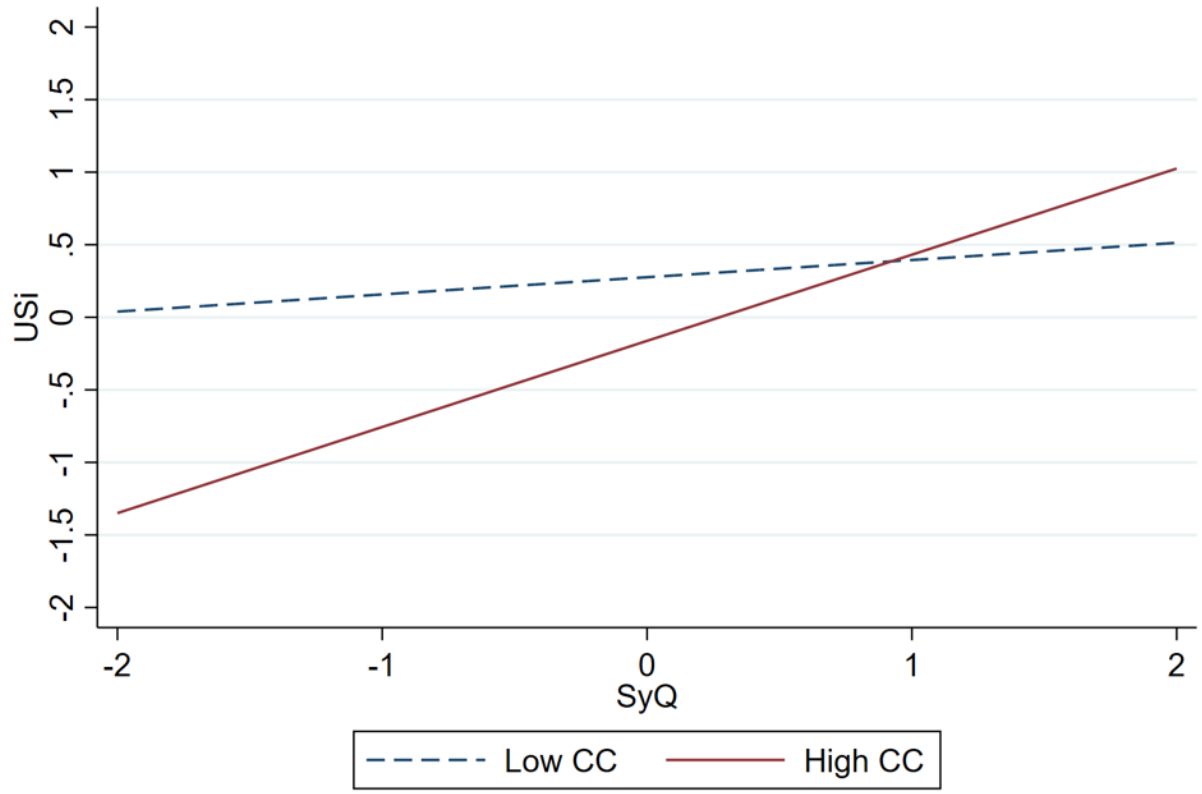


**Figure 2.**
The moderating effect of CC on the relationship between SYQ and USI.

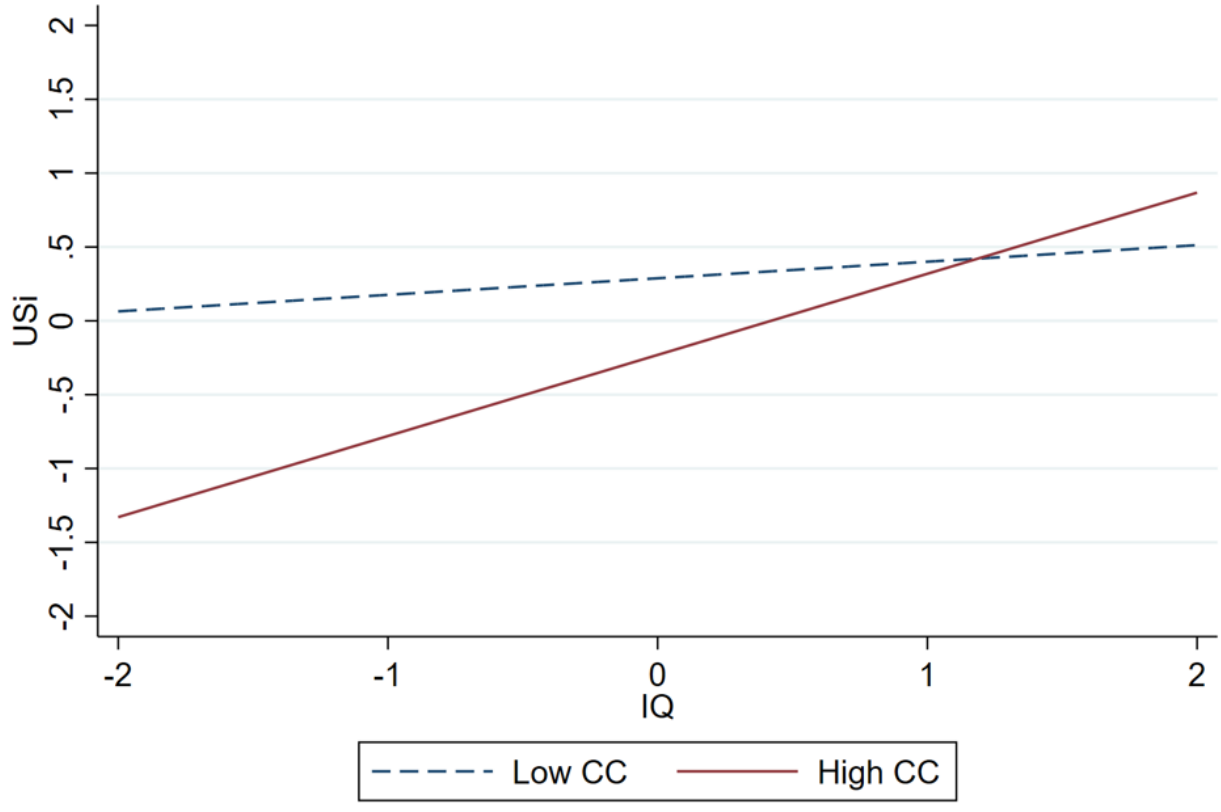


**Figure 3.**
The moderating effect of CC on the relationship between IQ and USI.

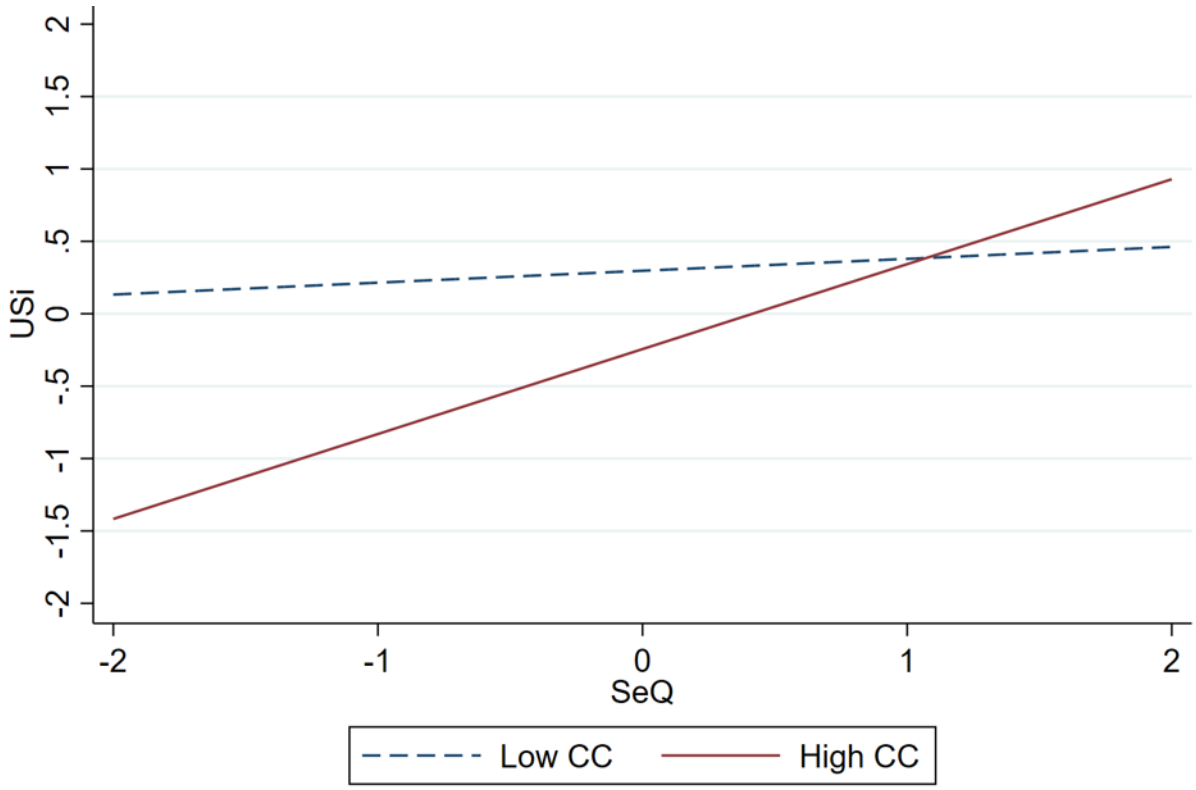


**Figure 4.**
The moderating effect of CC on the relationship between SEQ and USI

## 6. Discussions and Conclusions

*6.1. Discussions*

Drawing on the IS Success Model, this study examines the impacts of system quality, information quality, and service quality on digital currency. In addition, by integrating the IS Success Model and complexity theory, we explore the moderating effects of contextual complexity on these relationships. Our results show that system quality, information quality, and service quality positively influence user stickiness with digital currencies. Furthermore, higher contextual complexity positively moderates these relationships. Based on these findings, the theoretical implications of the study are discussed.

*6.2. Theoretical and Practical Implications*

This study offers several theoretical and practical implications. First, this study extends the application of the IS Success Model to the domain of digital currency. Although the emergence of digital currencies marks a paradigm shift toward fintech, research gaps persist regarding their adoption and sustained use. By addressing these gaps, this study demonstrates that the three dimensions of the IS Success Model, system quality, information quality, and service quality, positively influence user stickiness in digital currency systems. Specifically, system quality improves the platform's performance, reliability, and functionality. A high-quality system ensures smooth experiences, fast and secure transactions, and a reliable interface, which boosts user satisfaction and confidence. Information quality, reflected in accurate, relevant, and timely information, enables users to access clear transaction histories, up-to-date data, and user-friendly interfaces, reinforcing trust and continued engagement.

Service quality, encompassing responsive support and technical assistance, allows users to resolve issues efficiently, thereby minimizing friction and promoting retention. These findings answer the core research question of what drives user stickiness in digital currencies and constitute a key academic contribution. In essence, the fewer obstacles users face in their interactions with the platform, the higher the stickiness in digital currency. Overall, our findings answer the research question of what factors enhance user stickiness in digital currencies, drawing upon the IS Success Model and contributing to both information systems and digital currency research.

Second, our study contributes to digital currency research by providing insights into the moderating role of contextual complexity. In previous research, little attention has been paid to the external conditions that facilitate digital currency evolution. By integrating the IS Success Model with complexity theory, our study reveals the critical role of contextual complexity. Contrary to earlier views suggesting that environmental complexity hinders technology adoption [53] our study supports recent arguments that increased contextual complexity fosters interaction, adaptation, and technological evolution [37]. In line with complexity theory, we find that complex environments stimulate system refinement and reinforce user engagement, thereby increasing user stickiness. Taken together, our results on the moderating effects of contextual complexity illustrated that the dynamic and ever-changing nature of the external environment creates a fertile ground for the continuous development and co-evolution of both digital currencies and their users, making them more resilient and persistent

in the long term. In this regard, our study provides a valuable contribution to the academic literature by offering a picture for understanding how digital currencies can co-evolve within our ecosystem.

### *6.3. Limitations and Future Research Direction*

This study is not without limitations. Our study focused on a sample of Chinese users, which may limit the generalizability of the findings to other cultural or economic contexts. Future research should include more diverse samples across different countries to examine whether the effects of contextual complexity on user stickiness vary by region, regulatory environment, or cultural attitudes toward digital currency.

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