Central Bank Digital Currency E-Rupee (e₹) Usage Patterns : The Interplay of Awareness and Satisfaction in India

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Abstract

Purpose : The present study assessed bank employees' usage patterns, degree of awareness, and satisfaction level with the Central Bank Digital Currency. Various features such as accessibility, transparency, security, and efficiency were used to analyze bank employees' perceptions of the digital currency ecosystem.

Design/Methodology : The regression analysis, factor analysis of variance, *t*-test, and descriptive analysis were used to evaluate the relationship between awareness, adoption, satisfaction, and usability of Indian e-rupee (e₹) digital currency. To gain a deeper understanding of the effectiveness of the Central Bank Digital Currency (e₹) currently implemented in India, a study was conducted involving a selected sample of 202 bank employees.

Findings : In the current study, a model has been conceptualized to test the potency of e₹ among bank employees in Indian banks. The trends and findings provided valuable insights to experts and practitioners in the context of e₹ digital currency usage.

Practical Implications : This study is a ground-breaking analysis of bank employees' opinions on digital money and their preferences for transactions with it. It also analyzed the impact of Central Bank Digital Currency usage and the factors determining its usability.

Originality : This study is a novel contribution focusing on awareness and satisfaction in India. It could be assessed based on its unique contribution to the existing literature and understanding of emerging technology.

Keywords : **e-rupee, CBDC, RBI, awareness, satisfaction, ANOVA**

JEL Classification Codes : D12, E42, E58, G21, O33

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Central Bank Digital Currency (CBDC) was developed as a revolutionary force in the global monetary landscape in an era dominated by digitization and financial innovation (Narayanaswamy & Karthika, 2018). Indeed, digital representations of a country's currency maintained and overseen by its central bank have drawn much attention because of their potential to upset established monetary systems and transform the way economies perform (Kotishwar, 2020). Governments worldwide are dealing with the fallout from the financial revolution (Georgieva, 2022). While the idea of central bank digital money is not new, it has grown in favor recently. The central bank will issue, regulate, and monitor a digital version of the national money

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(Auer et al., 2022). CBDC, unlike digital currencies like Bitcoin or Ethereum, are backed by the issuing government's complete confidence and credit, making them authorized tenders with identical inherent value as regular notes and coins (Bhattacharjee & Kaur, 2015). While this technology appears to be cutting-edge, it is based on the concepts that underpin current monetary systems, providing benefits such as increased transparency, security, and financial inclusivity (Javaid et al., 2022). CBDCs are gaining popularity internationally, with some governments exploring their digital currencies. The Digital Dollar in the United States, the Digital Euro in the Eurozone, and the Digital Yuan in China are notable examples. India's participation in this trend is about more than just keeping up with global financial changes; it is also about promoting international commerce, investment, and financial integration (Kumar et al., 2018).

To understand CBDC's relevance, one should first comprehend the historical framework of India's monetary system. India has a long history of monetary development, dating back to the minting of coins during the Mauryan Empire in the 3rd century BC (Eichengreen et al., 2022). Over the past thousands of years, the Indian subcontinent has experienced the rise and fall of many currencies, including mohar, rupee, and paisa, all reflecting the economic and political conditions of the time. The Reserve Bank of India (RBI) has played an important role in shaping the country's modern monetary policy, overseeing monetary policy, and managing financial markets since its establishment in 1935 (Tripathy, 2013). Digitalization in India started long before the CBDC concept gained international support. Measures like Jan Dhan Yojana and Aadhaar registration have brought millions of previously unbanked people into the enabling financial model, paving the way for a more inclusive financial environment (Kumar et al., 2022).

Furthermore, there has been a considerable increase in the use of digital payment structures such as the unified payments interface and mobile wallets. These developments demonstrate the Indian financial infrastructure's preparation for adopting a CBDC (Haque & Shoaib, 2023). India has had to deal with a sizable informal sector that works outside the reach of taxation and regulation (Sarda et al., 2020). The government hopes to limit the use of physical currency in criminal operations and increase transparency in financial transactions by providing a digital substitute (Narayanaswamy & Muthulakshmi, 2017).

The emergence of cryptocurrencies pressures the existing banking system and regulatory institutions (Shah, 2018). India may offer a regulated and secure alternative to cryptocurrencies by adopting a state-backed digital currency, minimizing some of the hazards associated with uncontrolled digital assets (Gowda & Chakravorty, 2021). CBDC can lower total transaction costs in financial transactions (Ozili, 2022). CBDC transactions can become more efficient and cost-effective by removing the need for intermediaries such as banks or payment processors, particularly for cross-border remittances (Sethaput & Innet, 2023). CBDC gives the central bank new instruments for conducting monetary policy. It allows for more excellent management of the money supply, more effective transmission of monetary policy, and real-time data on economic activity (Chopra & Saldi, 2022). Indian digital currency greatly supports the country's price stability and economic complications. Innovation in the Indian financial sector, like blockchain and digital infrastructure, offers a better environment to advance and implement Indian digital currency (Reddy et al., 2021).

Earlier studies analyzing the variables that affect digital payment mode usage and adoption behavior have employed different theoretical models, such as the unified theory of acceptance and use of technology (UTAUT) (Patil et al., 2020) and the technology acceptance model (TAM) (Dixit et al., 2022). Even though only limited studies have observed CBDC usability and behavior, the UTAUT model was utilized to examine the variables affecting the adoption of the Central Bank of China digital currency (Wu et al., 2022). China was the first country to pilot a CBDC as e-CNY in 2020 (Benzmiller, 2022). Recently, the RBI initiated a CBDC pilot project in 2022 for the bank employees and wholesale and retail sectors in India.

This study developed a conceptual framework to understand several factors impacting employee satisfaction toward digital currency in India. The present study intends to find the connection between employee knowledge,

adoption, usability, and satisfaction toward e₹. In addition, this study concentrates on analyzing gender and age awareness and satisfaction with digital currency in India. The results of this study help us understand employee satisfaction and the possibilities of digital currency implementation in India.

Research Methodology

This study employs a quantitative approach to investigate the relationship between awareness and satisfaction in e₹ usage. Primary data was collected using a structured questionnaire distributed to e₹ users. The questionnaire was designed to capture detailed insights into user awareness, satisfaction, and usage patterns. A 5-point Likert scale was employed to measure satisfaction levels and perceptions as it is widely accepted for such studies. The following objectives are investigated in the study.

- To study the relationship between awareness, adoption, and satisfaction with e-rupee CBDC.
- Assessing the impact of age and gender on employee perception, usability, and satisfaction with e-rupee CBDC.
- Examine the impact of awareness, adoption, and satisfaction on the usability of e-rupee CBDC.

Hypotheses of the Study

- **H_{01} :** There is no significant relationship between employees' awareness and satisfaction with the CBDC of e-rupee.
- **H_{02} :** There is no significant relationship between employees' satisfaction and the adoption of CBDC by the e-rupee.
- **H_{03} :** There is no significant relationship between employees' awareness and adoption by CBDC of e-rupee.
- **H_{04} :** There are no significant differences in perception, awareness, adoption, and usability based on gender.
- **H_{05} :** There are no significant differences in awareness, satisfaction, adoption, and usability across different age groups.

Methodology

Data Collection

Bank employees answered the final survey using Google Forms. Two hundred fifty questionnaires were issued to e-rupee users in India, with 202 replies chosen as the sample for this study. Unfortunately, 48 people did not respond appropriately. This study focuses on four dimensions: awareness, adoption, user satisfaction with CBDC, and usability. The study was conducted from January – June 2023. The respondents' average age ranged from 25 to 60 years, with the majority (62%) falling between the ages of 25 and 35. The sample had 57% male respondents and 53% female respondents. Notably, most respondents claimed a higher monthly income, with 69% earning more than ₹ 50,000. Most of the respondents worked in public sector banks (76%).

Questionnaire Design

The questionnaire was structured into three distinct sections. Part I pertained to the socio-demographic variables

of the employees. Part II focused on inquiring about employees' awareness and the usability of the e-rupee. This section also explores employees' awareness of e-rupee transactions and their relation to usability. Part III delves deeper into understanding employees' opinions on the features of the e-rupee and ascertains their satisfaction level regarding its current usage. This part of the survey consists of questions about awareness, adoption, usability, and satisfaction. The survey questionnaire was obtained from 202 public sector banking industry employees. This study used several standardized scales to collect data (Krejcie & Morgan, 1970). Various statistical techniques were used to analyze the data, including descriptive statistics, analysis of variance (ANOVA), and regression analysis. Regression analysis determined the relationship between awareness, adoption, and satisfaction. This method is used to understand how the value of a variable changes with the other variable while holding one of the independent variables. Analysis of variance is used to investigate the relationship between three or more independent groups. Specifically, the study used ANOVA to examine the relationship between gender and frequency of use and three key factors, i.e., awareness, adoption, and satisfaction.

Scale Construction

Measures are used in the strategy developed by the research literature and then modified to meet the needs of the current research in both content and design. This study includes three scales, each with its reliability coefficient. The awareness scale has a reliability of 0.89. The reliability of the adoption scale is 0.92. The reliability value of the satisfaction factor is 0.88 (see Table 1). Cronbach's alpha coefficient was determined as 0.851. Cronbach's alpha reliability values above 0.60 indicate that the data is highly reliable (Pallant, 2020).

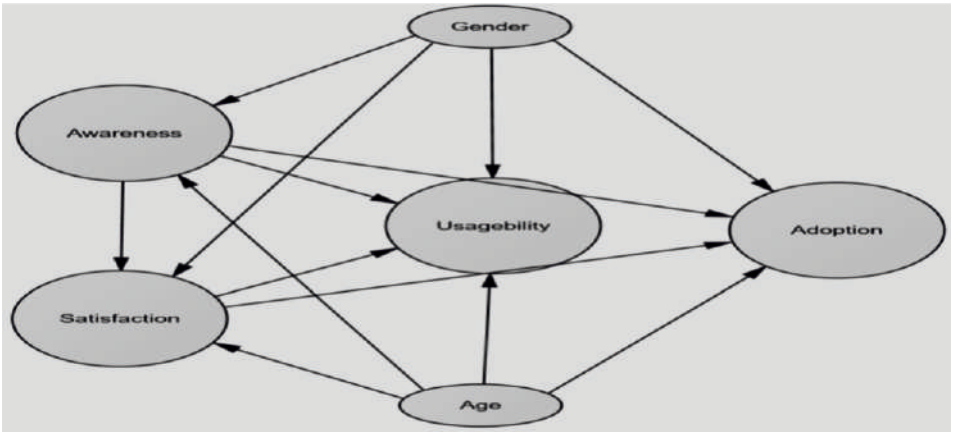
Table 1. ***Scale Construction***

Dimensions	Elements	Alpha
Awareness	08	0.89
Satisfaction	04	0.88
Adoption	06	0.92

Conceptual Framework of the Study

To assess the meaning, correlation analysis was used to determine the relationship between three dimensions: awareness, adoption, and satisfaction. Then, *t*-test and analysis of variance were used in this study to investigate

Figure 1. ***Conceptual Framework of the Study***



the effect of gender and age on various factors. Additionally, this study aims to analyze the relationship between the usability and importance of digital banking. Lastly, the study tries to find a relationship between awareness, knowledge, usability, and satisfaction with digital currency in India (see Figure 1).

Data Analysis and Results

In the present era, the innovation of the CBDC has transformed the international financial landscape, which signifies a change in the digital environment. India initiated the launch of the e-rupee as a digital currency to compete globally and make international transactions for exports and imports. Analyzing employee awareness, adoption, and satisfaction with digital currency implementation in India is necessary (see Table 2).

Reliability data analysis shows that the coefficients range from values 0.67 to 0.88 with a sample size of 202 respondents. The Pearson correlation analysis shows a strong relationship between employees' awareness and satisfaction values (r = 0.88, p = 0.01), rejecting the null hypothesis. As a result, the study's first alternative hypothesis (H_1) is accepted. Further, a strong relationship exists between employees' adoption and satisfaction values (r = 0.67, p = 0.01), resulting in the second null hypothesis being rejected. As a result, the study's second alternative hypothesis (H_2) is accepted. A comparable study among Indian bank employees produced similar results, revealing a strong association between employees' awareness, contentment, and adoption of new currency. There is a favorable association between employee awareness and adoption (r = 0.67, p = 0.01); as a result, the study's third alternative hypothesis (H_3) is accepted.

To improve validation and support the findings, linear regression analysis was used to examine the connection between the research elements. A positive and statistically significant relationship exists between awareness, satisfaction, and adoption (see Table 3). The combined impacts of awareness and satisfaction as independent factors accounted for a 49% change in awareness (the dependent variable) among e-rupee users.

Demographics and Employee Awareness and Adoption

Gender and age are two of the most important aspects when examining employees' understanding of the new

Table 2. ***Employee Awareness, Adoption, and Satisfaction***

Dimensions	Elements	Mean	*SD*	Awareness	Satisfaction	Adoption
Awareness	08	113.76	26.46	0.89		
Satisfaction	04	26.24	7.18	0.88**	0.88	
Adoption	06	31.06	7.97	0.67**	0.67**	0.92

Note. **Indicates significance level $p < 0.01$.

Table 3. ***Linear Relationship Between Dependent Elements and Predictors***

Elements	$S = X + \beta 1A1 + \beta 2B2$
Awareness	
Adoption	0.43**
Satisfaction	0.28**
R^2	0.49
adj. R^2	0.48
F-value	0.000

Note. **Indicates significance level $p < 0.01$.

digital money. Several previous studies have investigated whether there are significant differences in awareness and satisfaction levels between males and females (see Table 4). There are no statistically significant differences between males and females in the study variables of awareness, adoption, and satisfaction. This implies that people of different genders have similar views on using e-rupee. Age has a significant impact on awareness, satisfaction, and adoption. This suggests significant age disparities in awareness, satisfaction, and adoption (see Table 5). Younger people are more digitally aware and constantly enthusiastic about utilizing digital money as a mode of exchange. Their age heavily influences employees' use of digital money. The study also examines how demographic factors influence the usage of central bank digital money. There is a significant difference in the usage of digital money by the central bank in India between males and females. Age, on the other hand, does not affect usefulness. As a result, the fourth and fifth hypotheses are partially rejected in the research. The study's fourth and fifth alternative hypotheses (H4 and H5) are accepted (see Table 6).

Table 4. ***Relationship Between Gender and Study Elements***

Elements	Gender	*n*	*F*-value	*t*-value	Sig.
Awareness	Male	115	2.56	0.479	0.81
	Female	87			
Satisfaction	Male	115	4.95	–0.263	0.89
	Female	87			
Adoption	Male	115	1.441	0.216	0.92
	Female	87			

Table 5. ***Relationship Between Age and Study Elements***

Elements	Sum of Square	*df*	Mean Squares	*F*-value	Sig.
Adoption					
Between groups	3,447.674	3	889.965	12.405	0.000
Within groups	24,769.842	199	79.385		
Total	26,886.385	202			
Satisfaction					
Between groups	2,147.495	3	456.572	8.929	0.000
Within groups	8,361.878	199	47.366		
Total	9,398.444	202			
Awareness					
Between groups	24,961.418	3	5,727.878	8.782	0.000
Within groups	229,914.432	199	685.128		
Total	243,764.738	202			

Table 6. ***Relationship Between Socio-Demographic Variables and Usability***

	Usability				
	Many Times in a Month	Everyday	Total		
Gender					
Male	32	29	61	Pearson χ^2	9.544

Female	18	11	29	*df*	1
Total	50	40	90	Asymp. Sig. (2-sided)	0.016**
Age					
20–30	36	27	63	Pearson χ^2	4.149
31–40	12	14	26	*df*	1
Total	18	41	59	Asymp. Sig. (2-sided)	0.328

Note. **Indicates significance level $p < 0.01$.

Central Bank Digital Currency Usability and the Study Elements

The final hypothesis contends that employee usability is influenced by awareness, satisfaction, and adoption. Satisfaction and awareness influence employees' utilization (see Table 7). This suggests that increased satisfaction is linked to increased central bank digital money use. The study also discovers that awareness substantially affects usage, implying that the types of transactions chosen by employees may lead to increased adoption of e-rupee in India. As a result, the fifth hypothesis is rejected. To improve usability, digital currency providers should convince consumers to adopt digital transactions for all their payment needs.

Relationship Between Adoption, Satisfaction, and Usability with Elements of Awareness

This study used linear regression analysis to verify the model further and analyze how awareness factors impact adoption, satisfaction, and usability levels. It is worth noting that all eight criteria significantly impact employee satisfaction (see Table 8). This suggests that these elements are important in determining employee satisfaction with digital currency. In beneficiary acceptance, elements such as accessibility, transparency, ease, reliability, and security are found to be the most significant and impactful. These characteristics have a substantial impact on the adoption rate. This implies that when the central bank's digital currency is readily available, safe, and transparent, Indian beneficiaries are more likely to use it for payment.

The influence of ease and trustworthiness on adoption is very significant. The study then investigated the

Table 7. ***Relationship Between Usability and Study Elements***

Elements	Sum of Square	*df*	Mean Squares	*F*-value	Sig.
Adoption					
Between groups	535.112	3	217.111	2.466	0.000
Within groups	26,682.384	199	89.359		
Total	26,886.385	202			
Satisfaction					
Between groups	941.564	3	318.724	6.652	0.000
Within groups	8,567.811	199	48.583		
Total	9,398.464	202			
Awareness					
Between groups	22,393.833	3	3,931.792	5.736	0.000
Within groups	232,481.816	199	685.128		
Total	243,764.738	202			

Table 8. ***Description of Awareness Dimensions and Other Elements***

	Satisfaction (adj. R^2)	Adoption (adj. R^2)	Usability (adj. R^2)
Accessible	0.722*	0.381*	-0.031
Usable	0.878*	0.381	0.318*
Efficient	0.915*	0.398	0.782*
Transparent	0.987*	0.561*	0.783
Convenient	0.999*	0.728*	0.852*
Exchangeable	0.838*	0.728	0.986*
Reliable	0.882*	0.772*	0.988
Secured	0.882*	0.798*	0.991

Note. *Indicates significance level $p < 0.05$.

association between these characteristics and usability in India. According to the findings, usefulness, efficiency, ease, and exchangeability are the most significant in determining usability. This means that when digital money is efficient and attractive, the usefulness of beneficiaries improves.

Discussion

Employees' understanding of digital currency is growing, and as their adoption patterns shift, it contributes to the improved usefulness of the e-rupee in India. Employees expect a future increase in the demand for digital money. As a result, banks and digital payment systems should evaluate the characteristics of e-rupees from the standpoint of beneficiaries. Baskaran (2017) examined employees' awareness, adoption, satisfaction, and use of digital money in India. Furthermore, demographic characteristics such as age and gender are investigated concerning CBDC awareness, satisfaction, and usefulness. The findings are consistent with earlier research, revealing a favorable relationship between employee awareness and satisfaction. All five factors are determined to be statistically significant.

Employee knowledge is identified as a critical aspect in determining happiness with digital money. Wang et al. (2022) explored how the central bank's digital money was intended to improve users' overall experiences, resulting in higher satisfaction. There is a substantial positive association between adoption and satisfaction. This means that when individuals are satisfied with the benefits of the central bank's digital money, they are more likely to use it, which contributes to increasing bank adoption. These findings are consistent with the growing preferences of Indian users, who increasingly choose digital money and digital transactions over traditional means. This movement is influenced by their perceptions of ease, satisfaction, and security assessments. The study examines individual preferences for various transactions and discovers that satisfaction is crucial in encouraging higher adoption of digital money. The central bank's digital currency method provides cost-effective financial services, resulting in consumer satisfaction. This gratification motivates users to use digital money for all their financial activities. When compared with traditional electronic payments, digital payment systems, including digital money, offer the benefit of being more accessible and available at any time. This accessibility changes individuals' perceptions of digital money and encourages them to adopt digital currency as a method of exchange when purchasing or selling goods.

Khan's (2021) research sheds light on awareness and adoption. The findings reveal that employee understanding has a beneficial impact on their adoption of digital money. The most influential elements influencing the adoption are accessibility, transparency, ease, dependability, and security. This is a unique and significant addition to our study, especially given the lack of discussion in the previous literature about the factors

that influence digital currency understanding. Users are more likely to use digital money if they believe it is efficient, safe, easy, and trustworthy. This adoption is driven by safeguarding the financial system from obsolescence and combating concerns such as money laundering and terrorist funding in India. Users use digital currency to control their money and influence the country's macroeconomic policies. Horváth (2023) evaluated the elements influencing user usage levels; it was discovered that usefulness, efficiency, ease, and exchangeability are the most important characteristics. Because digital money offers better efficiency and convenience, Indian users acknowledge that their usefulness has grown.

This study shows that age significantly impacts employees' intentions and use of new digital money. The most significant aspect in determining employee awareness is age. This study discovers a strong link between age and Indian bank employees' levels of awareness and satisfaction. Younger employees prefer digital money more than adults and have better satisfaction. Since a substantial segment of the Indian population is young, digital money as a transaction medium particularly appeals to them.

The younger generation, generally aged 25 to 35, is more interested in digital payment systems, new inventions, and the use of digital money. They are more likely to use digital money regularly, want it for future purchases, and are driven to use it as a method of exchange, mainly through e-rupee. This preference is motivated by several considerations, including the opportunity to save time, reduce costs, provide consumer protection, and limit the dangers of money laundering connected with digital currency. Furthermore, while looking at the influence of age on digital currency adoption, this study discovers that the younger generation is more content with and interested in central bank digital money. Users who are satisfied and optimistic about any new digital currency are more likely to use it repeatedly.

Another important aspect evaluated in this study is gender. Ghate and Kletzer (2016) examined the impact of gender on employee intentions and the adoption of new technology. The most important element influencing users' intent and awareness is gender. The outcomes of this study are consistent with those of previous research, demonstrating gender differences in awareness, satisfaction, and adoption in India. Gender is also found to influence the usability of e-rupee significantly. Females are more interested in utilizing digital currency. They prioritize savings and are more likely to favor both convenient and economical solutions. These preferences drive the adoption of digital currency. This study adds to the current knowledge about gender inequalities in CBDC usage. However, it does add to the literature by separating the usability tendencies of male and female users in India. The study reveals that Indian males use digital money more extensively than females for all their financial needs. This study discovers a significant link between digital currency awareness, satisfaction, and usefulness. When individuals are satisfied, their usability improves over time. Users' experiences with any new digital currency are discovered to have a favorable association with awareness, which influences the utility of such digital currency.

This study is notable for its emphasis on analyzing the impact of employee awareness on the use of e-rupee in India. It demonstrates that when individuals prefer to conduct transactions, notably payments using digital currency and are satisfied with its features, their use of digital currency increases over time. The current study provides an empirical evaluation of the model, which will help businesses and scholars understand user behavior and the important elements influencing their adoption of central bank digital money.

Managerial Implications

The current study has various consequences for the FinTech sector and the banking system, leading to the development of new approaches for growing the use of e-rupee. User's intents are heavily influenced by key elements such as security, efficiency, and transparency. This highlights the necessity of FinTech businesses and banks to ensure customer privacy rules are respected while also concentrating on ease to improve user satisfaction

and usage. To increase its acceptance in India, digital technology providers should pay attention to the appearance and design of central bank digital money and actively promote its convenience and benefits.

Based on this study, the RBI can explain the features of digital currency to end users and recognize the impacting factors. This result may assist financial institutions to introduce better features to match beneficiary preferences. This study provides bank employees' perceptions of usability, awareness, and satisfaction with CBDC. The RBI must improve the benefits of digital currency, such as enhanced access to financial services, security, dependability, and efficiency.

Conclusion

E-rupee implementation in India discloses a complicated relationship of awareness and satisfaction among bank employees. The innovation of the digital rupee signifies an important movement in financial evolution that supports worldwide trends toward digital money. The study highlights the relationship between awareness levels and adopting an e-rupee initiative to enrich public understanding. The respondents informed more about the functions and benefits of the digital rupee; the study anticipates a positive relationship between transaction and adoption rates. As a result, financial institutions and policymakers must continue to research awareness to penetrate the e-rupee more deeply into the Indian economy. User satisfaction is essential in raising the continued adoption of the e-rupee. The analysis indicates that satisfied users are likely to integrate digital currency into their regular financial practices, thereby contributing to the progression of a digital economy. Addressing employee concerns, enhancing employee experiences, and ensuring the security of transactions will be vital in maintaining standard public satisfaction levels in the future. The findings presented here serve as an initial source of information for determining the future of CBDC in India.

Limitations of the Study and the Way Forward

The study has some limitations. The first limitation is that this study depends on bank employees' opinions on CBDC. This study also considers employees' opinion awareness, knowledge, usability, and satisfaction. Longitudinal research may be conducted to understand changes in trends and opinions of employees in India. The 202 employees' sample size findings may not reflect the entire population's behavioral intentions toward digital currency. Because most of the young and male respondents participated in this survey, it may not provide a complete view of the Indian population. Future research may investigate other demographic variables like educational qualification, income, and occupation related to digital currency in India.

Authors' Contribution

Dr. Daravath Vikas Nayak conceived the idea and developed a quantitative design for the empirical study. Dr. A. Arun Kumar extracted research papers of high repute, filtered them based on keywords and generated concepts and codes relevant to the study design. Dr. A. Arun Kumar verified the analytical methods and supervised the study. The interviews were conducted in English by Dr. Daravath Vikas Nayak. Dr. Daravath Vikas Nayak did the numerical computations using SPSS 23.0. Dr. A. Arun Kumar and Dr. Daravath Vikas Nayak wrote the manuscript.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial or non-financial interest in the subject matter or materials discussed in this manuscript.

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