



Indian Institute of Information Technology, Allahabad

Summer Internship Report
on

***“An Analysis of Consumers Acceptance towards Usage of
Central Bank Digital Currency ”***

At

Indian Institute of Information Technology, Allahabad

(1st June 2024-30th July 2024)

Submitted By:

Sarthak Gaur

Internal guide:

Dr.Anurika Vaish

Associate Professor

IIT-Allahabad



Indian Institute of Information Technology, Allahabad

DECLARATION/UNDERTAKING

- Name Of Student: SARTHAK GAUR
- Title of Project: An Analysis of Consumers Acceptance towards Usage of Central Bank Digital Currency
- Internship Duration: 2 months

I, the undersigned, hereby declare that the work included in Page no.16 to 39 of this report is my own work and is true to the best of my knowledge. The sole responsibility of claiming it to be my original work lies with me. No responsibility of the external and internal guide be made thereof.

Sarthak Gaur

30th July,2024



Indian Institute of Information Technology, Allahabad

SUMMER TRAINING CERTIFICATE

This is to certify that Sarthak Gaur of Indian Institute of Science, Education and Research, has successfully completed his Summer Internship from 1st June-30th July at Indian Institute of Information Technology Allahabad.

The Project undertaken by him is titled as " An analysis of consumers acceptance towards Usage of central bank digital currency". The Project on evaluation fulfils all the stated criteria and the student's findings are his original work.

I hereby certify his work has been Excellent / Good/ Satisfactory to the best of my knowledge.

Date: 30/07/2024
Place: Allahabad


30/07/2024
Dr. Anurika Vaish
Associate Professor



भारतीय सूचना प्रौद्योगिकी संस्थान, इलाहाबाद
Indian Institute of Information Technology, Allahabad

An Institute of National Importance by Act of Parliament
Deoghat, Jhalwa, Prayagraj-211015 (U.P.) INDIA

Ph.: 0532-2922025, 2922067, Fax : 0532-2922125, Web : www.iiita.ac.in, E-mail : contact@iiita.ac.in

Dated 30/07/2024

F.NO: IIIT-A/INT/MS/2024/S-5

To whom it may concern

This is to certify that **SARTHAK GAUR S/o Shri RAJNISH KUMAR GAUR** from "Indian Institute of Science Education and Research Bhopal" has successfully completed summer internship program on the topic of "**An analysis of consumer acceptance towards usage of Central Bank digital currency**". from 01.06.2024 to 30.07.2024 at the Department of Management Studies, Indian Institute of Information Technology Allahabad, Prayagraj under the supervision of Dr. Anurika Vaish.

The performance of the candidates has been Poor/Average/Satisfactory/Very Good/Excellent during the internship.

We wish him all the best for his future endeavors.


Supervisor
(ANURINKA VAISH)


Faculty-incharge-internship
Faculty Incharge (Internship)
Indian Institute of Information Technology Allahabad
Deoghat, Jhalwa, Prayagraj-211015 (U.P.) INDIA



Indian Institute of Information Technology, Allahabad

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to Dr. Anurika Vaish, my research advisor, for her invaluable guidance, support, and mentorship throughout this internship period. Her expertise, patience, and constructive feedback has been instrumental in shaping my research skills and deepening my understanding of the field. I am truly grateful for the opportunity to work under her supervision and learn from her wealth of knowledge.

Furthermore, I am thankful to IIIT-Allahabad and Dr.Rekha Verma for providing me with the necessary resources, and facilities, to conduct this research internship. I would also fail in my duties if I did not acknowledge Mr. Ujjwal Kesarwani for his continuous support in this internship report.

Last but not least, our heartfelt thanks to all my friends, family members and well-wishers who have patiently extended all sorts of help in accomplishing this undertaking. I would also like to thank GOOGLE, GOOGLE SCHOLAR, SCIENCE DIRECT, RESEARCH GATE and other online platform which have helped me a lot in clearing my concept of the topic.

This internship has been a transformative experience, allowing me to apply classroom knowledge to real-world research challenges, develop critical thinking and problem-solving skills, and gain valuable insights into the research process. I am grateful for the opportunity to have been part of this enriching experience, and I look forward to applying the skills and knowledge gained during this internship to future endeavours.

Sarthak Gaur

Content

Executive Summary.....	06
Introduction.....	07
Literature Review.....	08
1. About CBDC(Central Bank Digital Currency).....	09
2. CBDC and its needs.....	14
3. Factors affecting CBDC adoption.....	15
Problem Statement.....	16
Theory and Hypothesis.....	16
Methodology.....	22
Findings and Analysis.....	24
Results.....	33
Recommendation and Suggestions.....	33
Limitations.....	34
Conclusion.....	35
References.....	36
Appendix.....	37
Appendix-2.....	40

Executive Summary

The Reserve Bank of India launched its pilot phase survey of the e-Rupee on 1st December, 2022 intending to increase financial inclusion, higher security, and easy cross-border payments this caught us thinking that if it's such a revolutionary step then we should study the factors that will affect its adoption. As the concept was new in the Indian context not much work has been done to analyse the factors from the user-centric perspective.

The objective was to determine and analyse the factors that will affect the adoption of CBDC/e-Rupee adoption in the Indian context and to analyse those factors which have not been taken into account and reach a more diverse group of population. We devised our own conceptualized model inspired by TAM and UTAUT models which are predominantly used to analyse the effect of technology adoption in various domains. The primary data was collected using a questionnaire of 30 closed-ended statements, circulated among 16 states in India and was measured on a 5-pointer Likert scale. The Cronbach's alpha value for the survey conducted was found to be 0.858 showing high reliability.

The data obtained was analysed using the IBM SPSS 25 software and Microsoft Excel. Literature Review was conducted using the reports, news article published and research paper. The study conducted try to understand that how these 7 variables affect the adoption of CBDC which are performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, pre-existing modes of payment and awareness.

KEYWORDS: CBDC(Central Bank Digital Currency), e-Rupee, UTAUT, TAM, Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, Pre-existing mode of payment, Awareness, Perceived Risk, Usage Intention.

1. Introduction:

In recent years, disruptive technologies have revolutionised the financial sector. Digital networks, machine learning, and cryptocurrencies have transformed financial systems, paving the way for innovative products and the next transformation in currency. This engrossing endeavour prompted me to ponder whether India has ventured into the realm of digital currency, given that private cryptocurrencies have garnered significant attention in the global market. It was striking to note that the Indian population has not fully embraced digital currencies to the same extent as the rest of the world.

The increasing popularity of cryptocurrencies and the emergence of private digital currencies have highlighted the potential benefits and challenges of adopting digital forms of money. Many central banks around the world, including the RBI, have recognised the need to explore the concept of CBDCs to maintain their relevance in the evolving financial landscape. According to the Bank for International Settlements (BIS), as of January 2023, 114 countries, representing over 95% of global GDP, are exploring CBDCs. These countries are at various stages of research, development, and pilot testing, with some, like the Bahamas and Nigeria, already having launched their own digital currencies. The Indian government and the RBI have been actively engaged in discussions and research related to the potential introduction of a CBDC. In the 2022 Union Budget, the Finance Minister announced the launch of a digital rupee using blockchain technology, to be issued by the RBI starting in the financial year 2022-23.

The Reserve Bank of India (RBI) envisions the e-Rupee/Indian CBDC, which represents the digital form of the fiat currency issued and regulated by the RBI, as the next frontier in payment systems. This digital currency is expected to offer seamless transactions, widespread accessibility across various platforms, and anonymity, thereby catering to the diverse needs of customers. The RBI anticipates that this innovative form of currency will deliver exceptional value and provide customers with a highly satisfying payment experience, revolutionising the way people engage in financial transactions.

The adoption of a CBDC in India could bring about several potential benefits, including enhanced financial inclusion, improved efficiency in cross-border payments, reduced cost of cash management, increased transparency and reduced illicit activities. However, the adoption of a CBDC in India also faces several challenges, including technology infrastructure and cybersecurity concerns, regulatory and legal framework, user adoption and trust, and potential impact on monetary policies and financial stability.

To have a better understanding of the issue of the adoption of CBDC in the Indian context the idea of the topic "*An Analysis of Consumers Acceptance towards Usage of Central Bank Digital Currency*" has been taken into consideration. This report aims to provide a comprehensive analysis of the key factors that can influence the adoption of a CBDC in India, the study will offer insights into the potential opportunities, challenges, and implications of implementing a digital currency in the Indian context. This report can help in having better recommendations and strategies for policymakers, financial institutions, and other stakeholders to facilitate the smooth and effective implementation of a CBDC in India while

addressing the identified challenges and concerns by providing a comprehensive analysis of the key factors that can influence the adoption of CBDC/e-Rupee in India.

2. Literature Review:

For many decades, the idea of digital currencies has been in existence. Visionaries like David Chaum played a crucial role in introducing secure electronic cash systems such as eCash during the 1980s. Nevertheless, the contemporary epoch of cryptocurrencies was initiated with the introduction of Bitcoin in 2009.

Proposed in an article in Kriptomat suggests the history that in 2008, a mysterious individual or group operating under the pseudonym Satoshi Nakamoto unveiled a groundbreaking whitepaper titled "Bitcoin: A Peer-to-Peer Electronic Cash System." This influential document introduced the revolutionary concept of a decentralized digital currency, enabling direct peer-to-peer transactions without relying on traditional financial intermediaries.

On the historic date of January 3, 2009, an individual using the pseudonym Nakamoto successfully mined the inaugural block of the Bitcoin blockchain. This block, known as the Genesis Block, serves as the inception of Bitcoin's influential path as the pioneering and renowned cryptocurrency.

After the widespread acceptance of Bitcoin, a wave of alternative cryptocurrencies, also known as "altcoins," entered the digital market. Among the pioneering altcoins was Litecoin, introduced in 2011, which was soon followed by others such as Ripple (now XRP) and Ethereum. These altcoins were created with the goal of enhancing Bitcoin's technology, providing faster transaction speeds, improved security features, and diverse consensus mechanisms.

During the period from 2016 to 2018, Initial Coin Offerings (ICOs) gained significant popularity as a fundraising method for startups. This involved the issuance of their own tokens. While many ICOs were genuine and legitimate, the absence of regulatory oversight resulted in a proliferation of scams and fraudulent activities, ultimately causing damage to the industry's credibility.

Cryptocurrency Adoption and Regulation :

With the surge in popularity of cryptocurrencies, regulatory bodies across the globe initiated investigations into their potential impact on financial stability, consumer protection, and money laundering. Some countries, like China, have banned cryptocurrency activities, while others, like El Salvador, have embraced Bitcoin as legal tender.

Central Bank Digital Currencies (CBDCs)

As per reports published by U.S.News the Rise of CBDCs is in response to the growth of cryptocurrencies and the potential challenges they pose to traditional financial systems, central banks around the world have begun exploring the development of their own digital currencies, known as Central Bank Digital Currencies (CBDCs).

Key Characteristics of CBDCs- CBDCs are digital versions of a country's fiat currency, backed by the central bank and designed to function as a legal tender. Unlike cryptocurrencies, which are decentralized and use blockchain technology, CBDCs are centralized and typically built on traditional database infrastructure.

Potential Benefits and Challenges of CBDCs:

Potential benefits of CBDCs include increased financial inclusion, faster and more efficient payment systems, and improved monetary policy transmission. However, CBDCs also raise concerns about privacy, financial stability, and the potential for central banks to have greater control over the financial system.

Global CBDC initiatives several countries, including China, Sweden, and the United States, are actively researching and developing CBDC projects. The Bank for International Settlements (BIS) has also been coordinating international efforts to explore CBDC design and implementation.

2.1 About CBDC(Central Bank Digital Currency):

Central Bank Digital Currency (CBDC) is a nuanced term that encompasses various interpretations. Generally, it is considered a new form of central bank money, defined as a liability of the central bank in an established unit of account. It serves the functions of a medium of exchange and a store of value. The distinction between CBDC and traditional forms of central bank money, such as reserves and settlement account balances, poses a challenge in precisely defining what CBDC is. Therefore, it is challenging to predict the potential changes it might bring it is easier to define a CBDC by highlighting what it is not: “*a CBDC is a digital form of central bank money that is different from balances in traditional reserve or settlement accounts*”[Bank of International Settlements].

The Central Bank Digital Currency (CBDC) is defined by the Reserve Bank of India as a digital form of legal tender issued by a central bank. It is equivalent to fiat currency and can be exchanged one-to-one with traditional fiat currency. The key difference between CBDCs and private virtual currencies lies in their issuance and backing:

1. CBDCs are issued and backed by central banks, whereas private virtual currencies are not issued by any sovereign authority and lack intrinsic value or issuer.
2. Bank deposits, though private, are licensed by central banks and can be converted into sovereign currency, unlike private virtual currencies which lack such backing or convertibility.
3. Bank deposits entail the lending of sovereign currency to banks by the public, whereas private virtual currencies do not have a similar relationship with central banks or sovereign currency.
4. CBDCs are digital representations of fiat currency, while private virtual currencies do not align with the historical concept of money and do not represent any person's debt or liabilities.

Central Bank Digital Currencies (CBDCs) are digital currencies issued and regulated by central banks. In contrast, private virtual currencies are decentralized, unregulated, and lack an intrinsic value or issuer. According to a report by McKinsey & Company, 87 countries are currently exploring CBDCs, with some having already implemented or launched pilot phases. Different countries are testing various models of CBDCs, including account-based models like DCash in the Eastern Caribbean, China's e-CNY, and Nigeria's e-Naira. The European Central Bank is considering a model where licensed financial institutions operate permission nodes of the blockchain network to distribute a digital euro. Another model involves issuing fiat currency as anonymous fungible tokens to enhance user privacy.

As we have clearly stated what is CBDC let's take some time to understand what technology, design, and model types these are based on.

Firstly we will talk about whether it has the conventional infrastructure or the DLT-based infrastructure. [From BIS report published on
Centralized Databases:

- Centrally-controlled databases are a relatively simple and straightforward approach for implementing CBDCs.
- They can potentially provide key functionality often associated with blockchain solutions, such as offline transactions and smart contracts through Payment Service Provider (PSP) overlay services.
- When designed properly, cloud-enabled centralized database solutions can help central banks meet key operational requirements like high availability, resilience, and robust security.

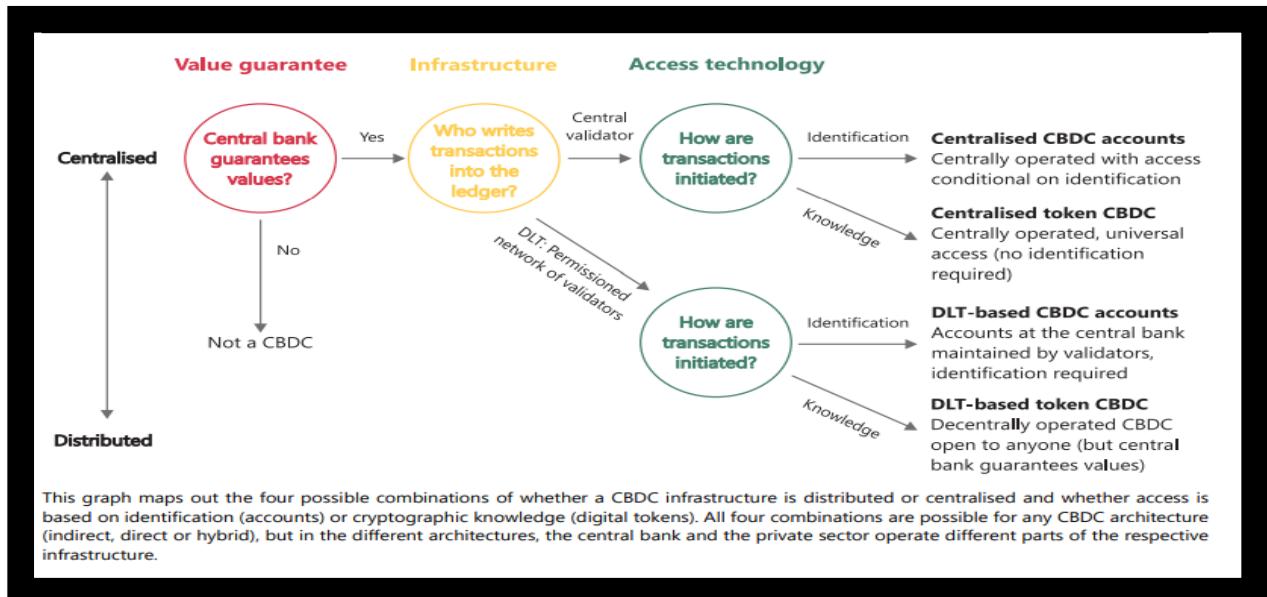
Distributed Ledger Technology (DLT) / Blockchain:

Distributed ledger technology (DLT) is the technological infrastructure and protocols that allow simultaneous access, validation, and record updating across a networked database. DLT is the technology blockchains are created from, and the infrastructure allows users to view any changes and who made them, reduces the need to audit data, ensures data is reliable, and only provides access to those who need it.

- DLT and blockchain offer the advantage of a cryptographically assured chain of records, which can enhance the security and transparency of CBDC transactions.
- However, there are still challenges with DLT in terms of performance, scalability, and resilience that need to be addressed for it to be a viable option for general-purpose CBDCs.
- Some central banks have experimented with DLT-based CBDC prototypes, but the technology is still maturing and may not yet be ready for large-scale CBDC deployment.

As per the reports from the Economic Times central banks are exploring both centralized database and DLT/blockchain approaches, weighing the trade-offs between the two in terms of factors like security, scalability, resilience, and ease of implementation. There is no clear

consensus yet on the optimal technology, and further research and experimentation is ongoing to determine the best fit for CBDC requirements.



(Source-BIS Report) Figure:1-Explains different combinations of CBDC infrastructure.

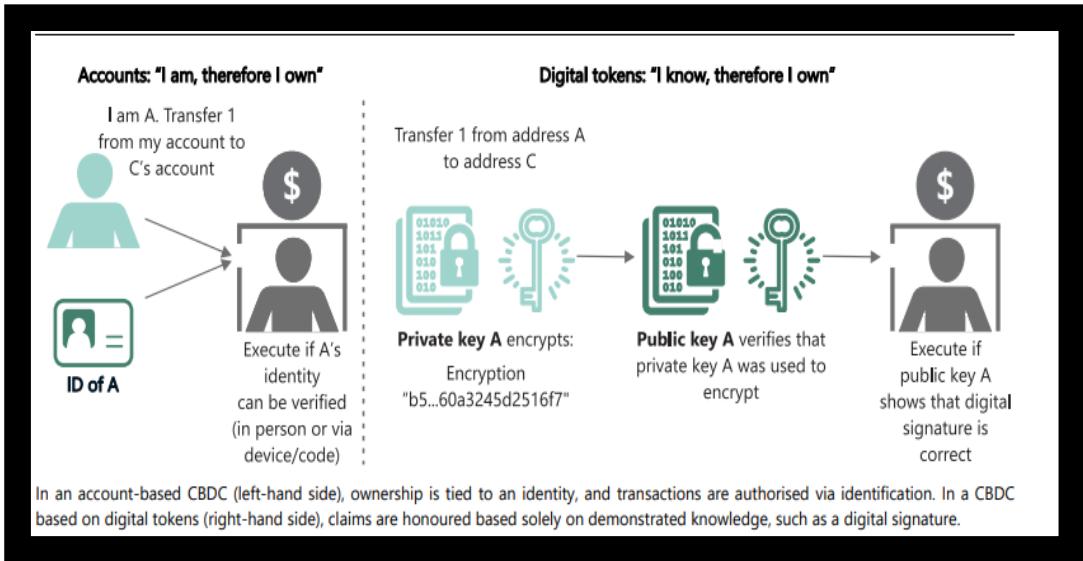
The structure of CBDC; Account-based or Token based:

A token CBDC involves digital tokens issued by the central bank, functioning like digital banknotes that can be transferred electronically. It operates as a "bearer-instrument," with the holder presumed to be the owner. Token-based CBDC:

- The CBDC system consists of individual digital assets or "tokens" that can be held and transferred.
- Transactions involve verifying the token holder (e.g. through a private key) rather than checking account balances.
- Token-based CBDCs may provide more cash-like features, such as the ability to make anonymous or offline payments.
- Token-based models are often preferred for wholesale CBDC applications, such as facilitating securities settlements on distributed ledgers.

In an account-based CBDC system, the account holder's identity is verified during initial account creation, allowing for rapid and secure payment transactions. Account-based CBDC:

- The CBDC system is made up of accounts that each have a recorded balance.
- Transactions involve updating the payer and payee account balances, typically requiring verification by a trusted third party.
- Account-based CBDCs are often seen as more suitable for retail CBDC applications, as they can better support offline functionality and scalability compared to token-based models.



(Source- BIS Report.) Figure 2-Explains about the difference between account and token-based CBDC.

Architectural Models for CBDCs

1. Direct CBDC Model

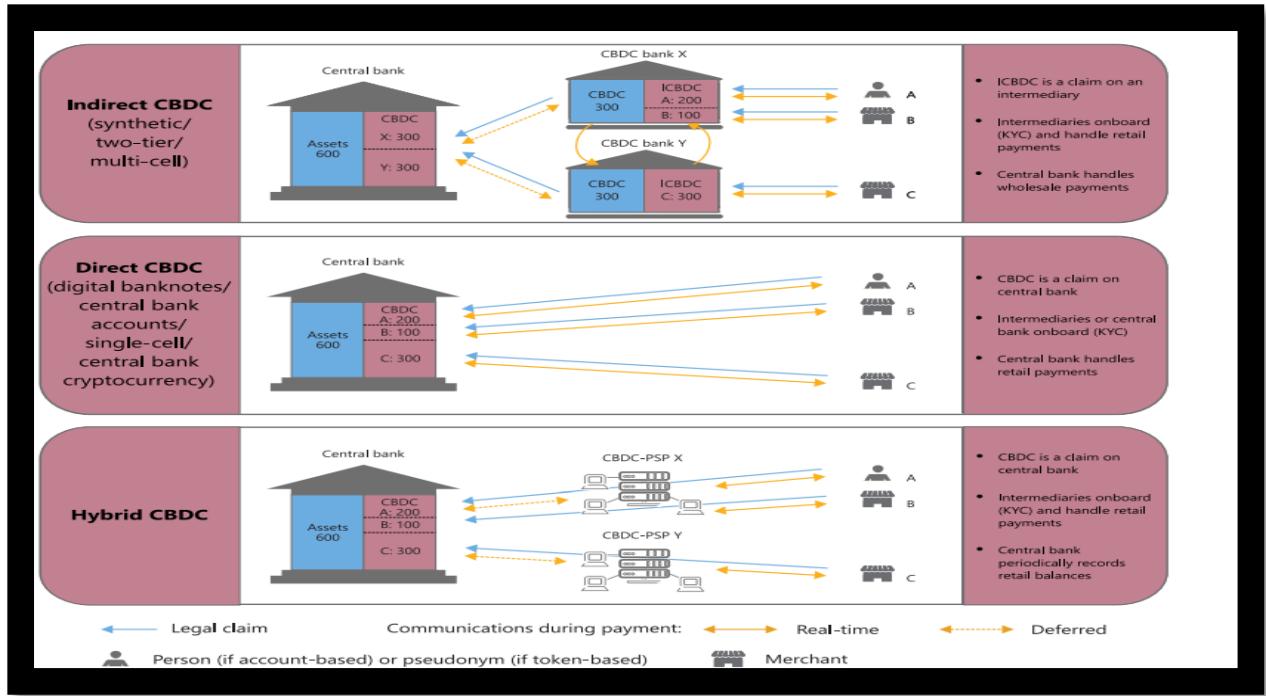
- Central Bank Control: In this model, the central bank handles all payments in real-time and keeps a record of all retail holdings. This requires substantial technical infrastructure and may marginalize private sector involvement.
- Advantages: High resilience and ease of honouring claims due to the central bank's complete knowledge of retail account balances.

2. Indirect CBDC Model

- Intermediary Involvement: In this model, intermediaries handle all payments, and the central bank keeps track only of wholesale accounts. This model is similar to the existing two-tier financial system.
- Advantages: Allows central banks to focus on their core competencies while leaving innovation and customer service to the private sector.

3. Hybrid CBDC Model

- Combination of Direct and Indirect: This model combines the direct claims on the central bank with the convenience of private-sector payment services. It involves a two-tier structure where the central bank retains a copy of all retail CBDC holdings or only runs a wholesale ledger.
- Advantages: Balances the credibility of direct claims with the benefits of using payment intermediaries, offering a robust and resilient payment system.



(Source – BIS Report.) Figure:3- Explains about different models of CBDC implementation.

RBI's concept note and Marco Di Maggio et.al define the key types of Central Bank Digital Currencies (CBDCs) as follows:

Retail CBDCs

- Designed for use by the general public for everyday transactions, similar to physical cash.
- Accessible through digital wallets, smartphone apps, or other payment systems.
- Can be token-based or account-based.

Wholesale CBDCs

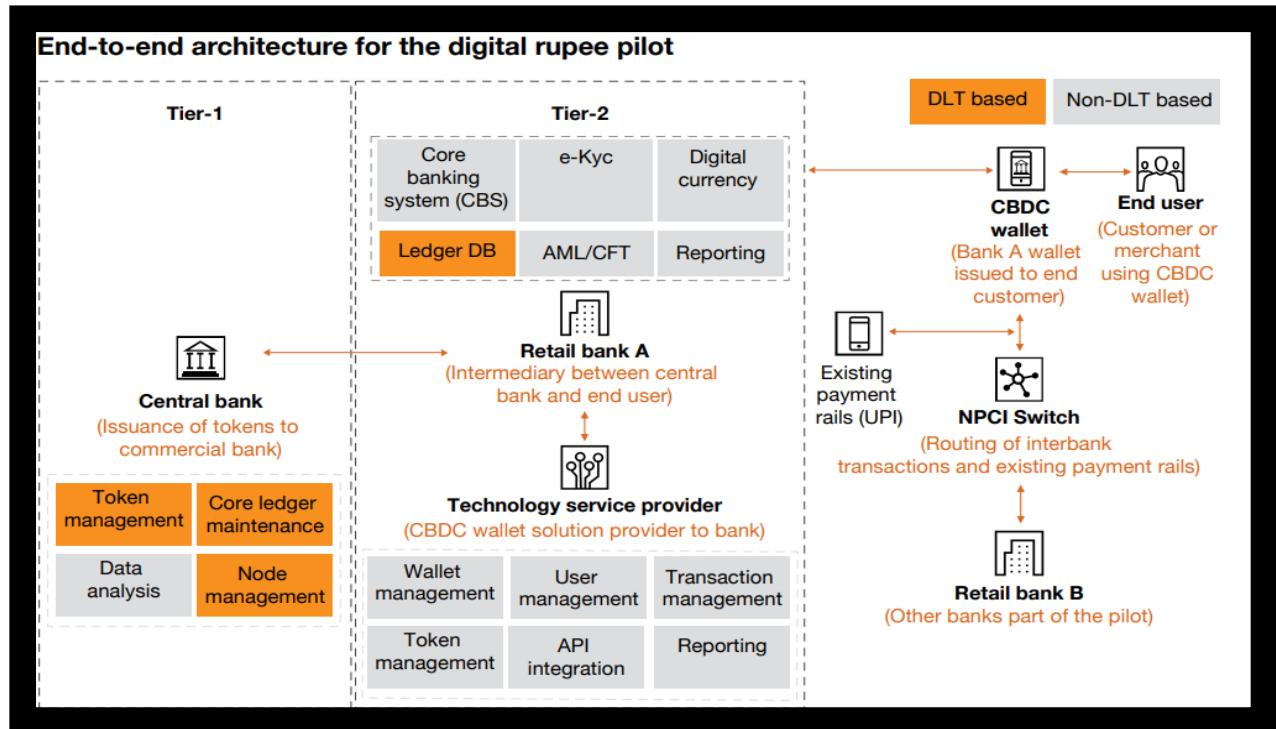
- Intended for use between financial institutions, such as banks, for high-value transactions like interbank transfers and securities settlements.
- Not meant for direct access by the general public.

Hybrid CBDCs

- Combine features of both retail and wholesale CBDCs.
- Can be used by both the general public and financial institutions, depending on the user's needs.
- Offer more flexibility than pure retail or wholesale models.

Overall, the three main CBDC types - retail, wholesale, and hybrid - provide a useful framework for understanding the different use cases and potential applications of central bank digital currencies. However, the landscape continues to evolve as central banks worldwide explore and experiment with various CBDC models.

Now talking about India's digital currency e-Rupee has chosen to opt for a token-based non-interest-bearing system and with this two-tiered model, the issuance and minting of CBDC tokens occur on a DLT platform, while the user interface is based on an API-based application. Commercial banks provide a separate customer interface from the minting layer. Transactions are recorded in the central ledger, providing partial anonymity for wallet owners, as they are not known to the government or intermediaries.



(Source -PWC report.) Figure:4-Explains the structured framework of how does e-Rupee works.

2.2 CBDC and its needs:

The motivation for the issuance of Central Bank Digital Currency (CBDC) is driven by various factors outlined in the Concept Note:

Reduction in Operational Costs: One of the key motivations for exploring CBDC in India is to reduce the operational costs involved in managing physical cash. By transitioning to a digital currency, the costs associated with printing, distributing, and handling physical cash can be minimized.

Fostering Financial Inclusion: CBDC can play a crucial role in fostering financial inclusion by providing a digital payment solution that is accessible to a wider population. This can help in bringing more people into the formal financial system and reducing the reliance on cash transactions.

Resilience, Efficiency, and Innovation in Payments System: Introducing CBDC can enhance the resilience, efficiency, and innovation in the payments system. By leveraging digital technologies, CBDC can streamline payment processes, improve transaction speeds, and promote innovation in the financial sector.

Efficiency in Settlement System: CBDC can add efficiency to the settlement system by enabling faster and more secure transactions. This can benefit various stakeholders in the financial ecosystem by reducing settlement times and enhancing overall efficiency.

Boosting Innovation in Cross-Border Payments: CBDC can also boost innovation in the cross-border payments space by providing a digital currency that facilitates seamless and cost-effective international transactions. This can simplify cross-border payments and promote global trade.

Trust, Safety, and Liquidity: CBDC, being a sovereign currency, offers unique advantages such as trust, safety, liquidity, settlement finality, and integrity. These characteristics make CBDC a reliable and secure form of digital money.

Protection from Private Virtual Currencies: Developing CBDC can provide the public with a risk-free virtual currency that offers legitimate benefits without the risks associated with private virtual currencies. This can safeguard the trust of the public in the domestic currency and protect them from the volatility of private digital assets.

These motivations highlight the potential benefits of introducing CBDC, ranging from cost savings and financial inclusion to enhanced efficiency and innovation in the payments ecosystem. By addressing these motivations, the issuance of CBDC like the Digital Rupee ($e₹$) aims to modernise the monetary system and meet the evolving needs of the digital economy in India.

2.3 Factors Affecting CBDC Adoption:

An article published in the Bulletin of Monetary Economics and Banking by Maryaningsih states that financial development, financial inclusion, cross-border transactions, infrastructures, innovation, macroeconomic, and institutional conditions these are some key factors that can affect the adoption of the e-Rupee. This paper explores the differences in CBDC adoption between emerging and advanced countries. It found that wholesale CBDC projects are more advanced in countries with developed financial markets and higher cross-border transactions, while retail CBDC projects are more advanced in countries with lower financial inclusion and larger informal economies. The factors influencing retail CBDC projects differ between advanced and emerging countries, with cross-border transactions being the most dominant factor influencing wholesale CBDC projects in both country types.

As per previous researches conducted by [Manrai et al. 2021; Patil et al. 2020; Sharma and Sharma 2019; Alejandro Billyjoe Mau Bere et al. 2024] has extensively examined the factors that impact user behaviour and adoption of digital payment methods. This includes the use of prominent theoretical models such as the Technology Acceptance Model (TAM) and the Unified Theories of Acceptance and Use of Technology (UTAUT, UTAUT2, UTAUT3).) [Dixit et al. 2022; Rodrigues et al. 2021; Gabriel A. Ogunmola et al. 2024]. The UTAUT model, recognized for integrating eight theories, has been widely applied in the field of technology adoption. However, there is a noticeable gap in research pertaining to

user intention towards the adoption of Central Bank Digital Currency (CBDC) in the Indian context using the UTAUT model. The research suggests that policymakers should focus on enhancing public awareness and acceptance of CBDC by improving its user-friendliness. Additionally, considering users' prior experience with the Unified Payments Interface (UPI) and implementing advanced and robust technology can attract more users. This can be achieved by improving safety features, creating a conducive environment, and offering incentives to encourage usage. The study also revealed that prior experience with UPI can influence the relationship and usage behaviour for CBDC. Furthermore, the study underscores the significance of trust in new payment modes and users' familiarity with the underlying technology. The combined effect of these factors on usage intention remains unexplored in the study.

3. Problem Definition:

Statement- “*What are the key Factors that influence the adoption of Central Bank Digital Currency(CBDC) in the Indian Context*”.

Objectives:

- To analyse the variables that will affect the adoption of the CBDC, and determine their relationship with user intention.
- To study and overcome the Gap in the pre-existing literature.
- To find out about the level of awareness and the level of understanding the Indian crowd has about CBDC.

4. Theory and Hypothesis:

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a comprehensive framework developed by Venkatesh et al. in 2003 to explain user intentions to adopt and use technology. The model integrates elements from eight previous theories related to technology acceptance, aiming to provide a holistic understanding of the factors influencing technology usage behaviour.

Key Constructs of UTAUT

UTAUT identifies four primary constructs that directly influence user intentions and behaviour regarding technology use:

- Performance Expectancy: This refers to the degree to which using a technology is perceived to enhance job performance. Users are more likely to adopt technology if they believe it will improve their efficiency and effectiveness.
- Effort Expectancy: This construct measures the perceived ease of use associated with the technology. If users find a technology easy to use, they are more likely to adopt it.

- Social Influence: This reflects the degree to which individuals perceive that important others (e.g., peers, supervisors) believe they should use the new technology. Positive social influence can significantly enhance the likelihood of technology adoption.
- Facilitating Conditions: This encompasses the resources and support available to users, such as access to necessary technology and training. Adequate facilitating conditions are essential for users to effectively utilize the technology.

Moderating Factors

The model also posits that several factors moderate the relationships between these constructs and technology usage, including:

- Gender
- Age
- Experience
- Voluntariness of use

These factors can affect how strongly the key constructs influence user behaviour.

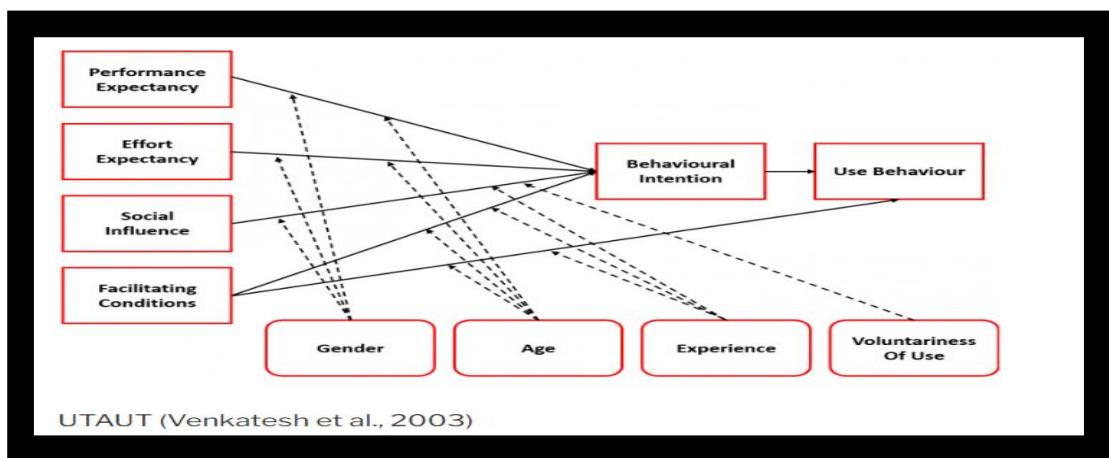


Figure:5 Explains the original UTAUT model.

Extensions of UTAUT

In 2012, Venkatesh and colleagues introduced UTAUT2, which expanded the original model to include additional constructs relevant to consumer technology adoption. These include:

- Hedonic Motivation: The fun or pleasure derived from using the technology.
- Price Value: The cost-benefit ratio perceived by users regarding the technology.
- Habit: The extent to which users have become accustomed to using the technology.

Recent developments, such as UTAUT3, have further refined the model by incorporating additional predictors and moderators, enhancing its applicability across different cultural contexts and technology types.

Applications and Research

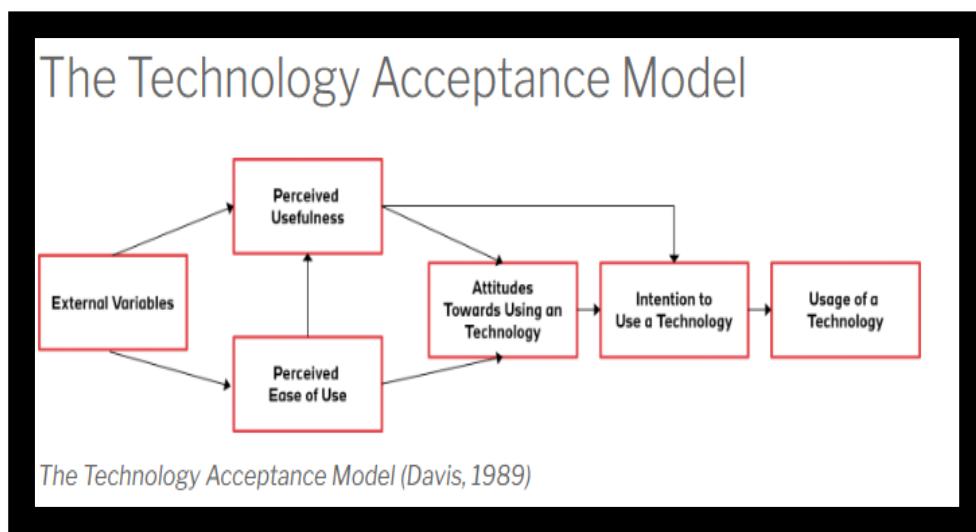
UTAUT has been widely applied in various fields, including education, healthcare, and organizational settings, to study technology adoption. For example, studies have shown its effectiveness in understanding mobile service adoption, social media usage in organizations, and computer use frequency among students

The Technology Acceptance Model (TAM) is a widely recognized framework developed by Fred D. Davis in 1989 to explain how users come to accept and use new technology. It is grounded in the Theory of Reasoned Action (TRA) and aims to predict technology adoption based on users' beliefs and attitudes.

Key Constructs of TAM

TAM identifies two primary constructs that influence user acceptance of technology:

- Perceived Usefulness (PU): This is defined as the degree to which a person believes that using a particular system would enhance their job performance. Essentially, if users perceive a technology as beneficial in improving their productivity, they are more likely to adopt it.
- Perceived Ease of Use (PEOU): This refers to the extent to which a person believes that using a specific system would be free from effort. If a technology is easy to use, it reduces barriers to adoption, making users more inclined to utilize it.
- These two constructs lead to the formation of Behavioural Intention (BI), which is the user's intention to use the technology. BI is influenced by users' attitudes towards the technology, which are shaped by PU and PEOU.



(Source- Innovation Acceptance Laboratory.) Figure:6 Explains original TAM model

Model Dynamics

- The basic flow of the TAM can be summarized as follows:

- External Variables: Factors such as system characteristics, user training, and social influence can affect PU and PEOU.
- Perceived Usefulness (PU) and Perceived Ease of Use (PEOU): These beliefs influence the user's attitude towards using the technology.
- Attitude Towards Use: This attitude, in turn, affects the user's behavioural intention to use the technology.
- Behavioural Intention (BI): A strong intention to use the technology typically leads to actual system usage.
- Actual System Use: This is the final outcome where users engage with the technology.

Extensions of TAM

- TAM has undergone several extensions to enhance its predictive power and applicability:
- TAM2: Developed by Venkatesh and Davis in 2000, this extension incorporates additional factors such as social influence and cognitive instrumental processes, which include job relevance, output quality, and result demonstrability.
- TAM3: Introduced by Venkatesh and Bala in 2008, TAM3 further refines the model by adding constructs related to the antecedents of PU and PEOU, including self-efficacy, trust, and perceived risk. This model aims to provide more of a comprehensive understanding of technology acceptance.

Applications of TAM

- TAM has been applied across various domains, including:
- Information Systems: It is extensively used to study user acceptance of software applications and information systems in organizational settings.
- E-Commerce: Researchers utilize TAM to analyse consumer behaviour towards online shopping platforms and technologies, such as chatbots and mobile applications.
- Healthcare: TAM has been employed to assess the acceptance of health information technologies among healthcare professionals and patients.

In the following report the conceptual model is formed by adapting features from both the UTAUT model and TAM model.

To analyse the factors that will impact the user intention towards the adoption of the e-Rupee it has taken into consideration the modified Unified Theory of Acceptance and Use of Technology(UTAUT) model, the reason why we chose this model is that the model's ability to integrate multiple theoretical perspectives, its strong explanatory power, empirical support, consideration of moderating variables, and practical applicability make it a valuable tool for understanding and predicting technology acceptance and use.

The UTAUT (Unified Theory of Acceptance and Use of Technology) model posits that an individual's intention to use a particular technology has a direct influence on their actual usage. This intention is shaped by various factors including their expectations of the technology's performance, perception of the effort required to use it, social influence, and the facilitating conditions surrounding its use. These elements collectively play a significant role

in determining the likelihood of the individual adopting the technology. In the context of this study, the model has been developed by incorporating various elements such as Perceived Risk from the TAM model, Awareness and user experience with other modes of payment added based on the study conducted by [Alejandro Billyjoe Mau Bere et al. 2024; J. Risk Financial Manag. 2023]. Each of these factors plays a crucial role in determining the user acceptance of the digital Rupee in India.

1) **Performance expectancy:** [Venkatesh et al. (2003)] showed that *performance expectancy* is the most vital determinant of a user's *behavioural intention* to adopt a technology. The more individuals expect technology to improve their productivity, the more likely they will use it [Venkatesh, 2000]. Through our study, we have conceptualized it as the enhancement in the overall quality of life and work productivity that the application of Central Bank Digital Currency (CBDC) can deliver to users. This encompasses the reduction of payment and settlement durations, streamlining the transaction process, and decreasing transaction expenses.

Null Hypothesis

Ho1: *Performance Expectancy(PE) has no effect on usage intention towards CBDC.*

Alternative Hypothesis

H1: *Performance Expectancy (PE) positively affects usage intention towards CBDC.*

2) **Effort expectancy:** The *effort expectancy* construct is the perceived ease of use of the system [Venkatesh et al., 2003]. For instance, the more effort it takes to use technology, the less useful it is perceived to be [Venkatesh, 2000; Venkatesh and Davis, 2000]. In our study, we defined it as consideration of the perceived time and economic costs associated with using a Central Bank Digital Currency (CBDC), including factors such as the ease of obtaining CBDC and the convenience of learning and using it for users.

Null Hypothesis

Ho2: *Effort Expectancy(EE) has no effect on usage intention towards CBDC.*

Alternative Hypothesis

H2: *Effort Expectancy (EE) positively affects usage intention towards CBDC.*

3) **Social influence:** [Venkatesh et al. (2003)] defined *social influence* as the degree to which individuals perceive that someone accepts that they should use the new system. In our study, we defined it as users' perception of the social environment's impact on their usage of CBDC is an important consideration. For instance, the presence of a significant number of friends, relatives, colleagues, and competitors using CBDC could potentially enhance their willingness to adopt it.

Null Hypothesis

Ho3: *Social Influence(SI) has no effect on usage intention towards CBDC.*

Alternative Hypothesis

H3: *Social Influence (SI) positively affects usage intention towards CBDC.*

4) **Facilitating conditions:** refers to how an individual perceives that technical and organizational infrastructure is helping him to use the intended system that is available. [Venkatesh et al. (2003)], in a study about User's Acceptance of Information Technology, revealed that *facilitating conditions* directly affect *user behaviour*. We defined it as users can access various facilities and technical support while using CBDC. This

encompasses the availability of sufficient scenarios to support the use of CBDC and the accessibility of assistance through multiple channels in the process of using CBDC.

Null Hypothesis

Ho4: *Facilitating Conditions(FC) has no effect on usage intention towards CBDC*

Alternative Hypothesis

H4: *Facilitating Conditions (FC) positively affect usage intention towards CBDC.*

5) **Perceived Risk:** refers to how safe the person feels while using CBDC and whether the user has a sense of trust towards the technology or not. eg: while making payment there is no risk of fraud and the transaction is completed without any discrepancy.

Null Hypothesis

Ho5: *Perceived Risk(PR) has no effect on usage intention towards CBDC*

Alternative Hypothesis

H5: *Perceived Risk (PR) has a negative impact on usage intention towards CBDC.*

6) **Pre-Existing Modes of Payment:** Refers to the alternative payment methods available to users, aside from CBDC, and how frequently users prefer to make payments using CBDC. eg: UPI, CASH, DEBIT CARDS, CREDIT CARDS, CHEQUE, and other forms of digital payments. No study till now has taken into consideration other modes of payment as independent variables to study their impact on the adoption of CBDC.

Null Hypothesis

Ho6: *Pre-existing modes of payment(PEMP) has no effect on usage intention towards CBDC*

Alternative Hypothesis

H6: *Pre-existing modes of Payment (PEMP) has a negative impact on usage intention towards CBDC.*

7) **Awareness:** refers to as how informed people are about the CBDC as a mode of payment and why has the government taken the initiative to launch CBDC. eg: how well social media and other formats are telling about CBDC, and how is the government making an effort to propagate its initiative.

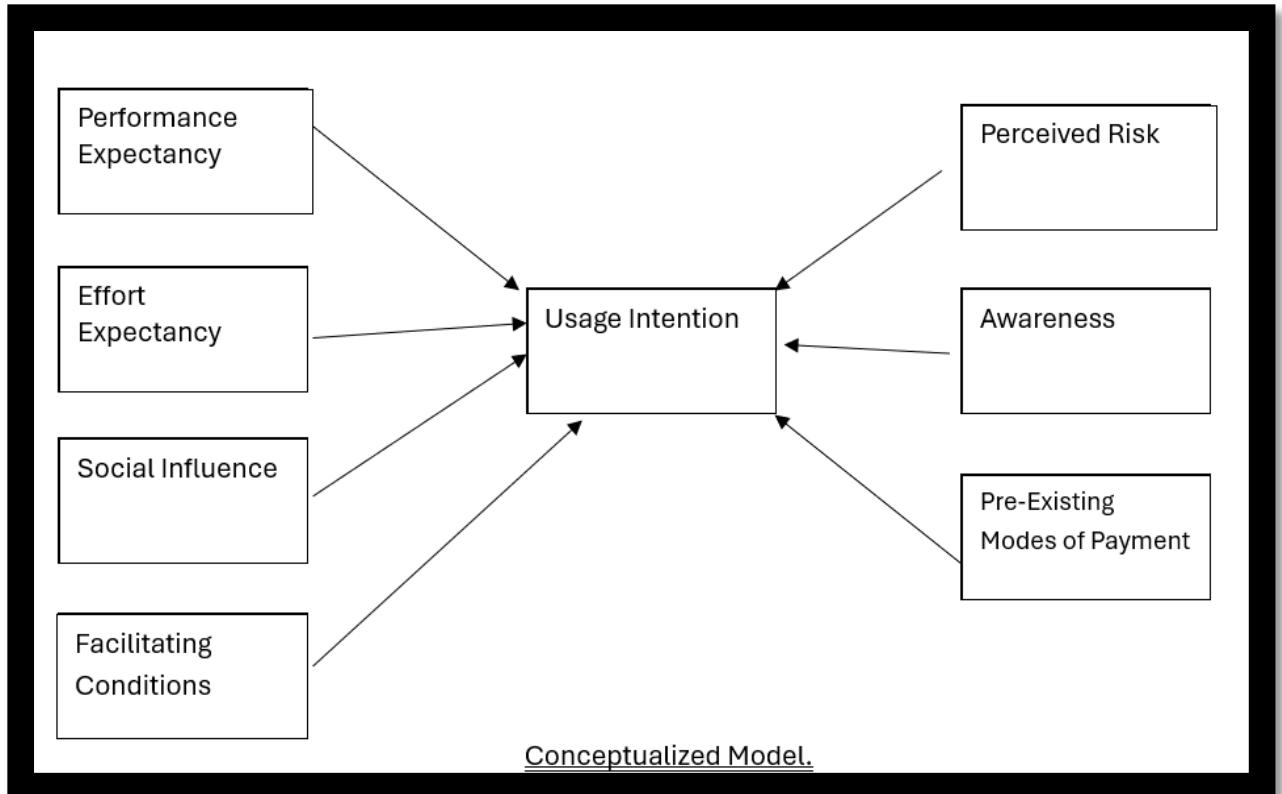
Null Hypothesis

Ho7: *Awareness(AW) has no effect on usage intention towards CBDC*

Alternative Hypothesis

H7: *Awareness (AW) has a positive impact on the usage intention towards CBDC.*

Based on the UTAUT model, the model includes four fundamental explanatory variables: performance expectancy, effort expectancy, social influence, and facilitating conditions. In addition to these, three new explanatory variables—perceived risk, pre-existing tech, and awareness—have been integrated into the model with support from relevant literature. These variables are being studied to understand their impact on the factors under consideration affecting the user's intention/adoption of CBDC.



(Author's creation) Figure:7:Depicts the modified devised model derived from TAM and UTAUT models.

5. Methodology:

In this report non-probabilistic sampling for convenience, as a complete list of all members in the study population was not available. To collect primary data for this quantitative study, an online survey using Google Forms was utilized and distributed via various social media platforms. The survey instrument consisted of 23 statements, with each variable in the study being represented by multiple statements. The online survey approach was selected for its effectiveness in engaging a wide and diverse population for this research.. These statements were adapted from previous research literature[*Gabriel A. Ogunmola et al. 2023; Alejandro Billyjoe Mau Bere et al. 2024*]. Participants in the study were asked to provide their level of agreement with a series of statements using a 5-point Likert scale, which included options such as "strongly disagree," "disagree," "neutral," "agree," and "strongly agree." The researchers then converted these qualitative responses into numerical values (ranging from one to five) based on their order of presentation. These numerical values were then used as data for the study's analysis.. A one-line statement was given at the beginning of the survey form for those who are completely unaware of the e-Rupee. This approach was adopted due to the unknown number of populations. A total sample size of 131 was obtained, which after data filtration tests i.e. removal of outliers was of 117,which were further used for data analysis.

The study used a mix of closed-ended questions on a Likert scale and open-ended questions to gather opinions from respondents in various cities in India. It included 23 items, including

variables measured on a five-point Likert scale. The questions covered perceived usefulness, ease of use, trust, self-efficacy, cost, awareness, attitude toward digital rupees, and intention to adopt digital rupees. The independent variables for analysis were performance expectancy (PE), effort expectancy (EE), perceived risk (PR), social influence (SI), facilitating condition (FC), awareness (AW) and pre-existing modes of payment(PEMP). The dependent variable was the intention to adopt digital rupees (UI).

Respondents were from various parts of India, comprising 16 states (Uttar Pradesh, Uttarakhand, Madhya Pradesh, Rajasthan, Punjab, Delhi, West Bengal, Maharashtra, Tamil Nadu, Andhra Pradesh, Chhattisgarh, Odisha, Gujrat, Haryana, Jharkhand and Bihar). The majority i.e. 58% of the population among which this survey was conducted were aware of the concept of the e-Rupee, and the remaining i.e. 28.2% hadn't heard of and 13.7% population was not sure. 5.3% of the people filled the form had a thorough understanding of e-Rupee, 16 people had 75% understanding, 38 with a 50% understanding level, 35 with 25% understanding level and a big number of 35 people had no understanding about e-Rupee.

The data analysis was conducted using IBM SPSS Statistics and Microsoft Excel because the chosen method is known for its capacity to offer reliable and strong results, making it a fitting choice for this study model that encompasses multiple variables. Cronbach's alpha is a statistical measure used to assess the internal consistency or reliability of a set of items, typically in the context of surveys and questionnaires. It evaluates how closely related a group of questions are, which collectively measure a single latent variable, such as personality traits or attitudes. Cronbach's alpha showed the questionnaire to reach an acceptable reliability value of 0.867. The primary objective was to gain insight into the relationship between latent variables that are independent and those that are dependent.

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.867	.878	23

Table:1:Depicts about the reliability of the survey questions.

The model test consists of R^2 , f^2 , Q^2 and Chi-squared test. The primary objective of the test was to assess the accuracy and consistency of the research tool. The test results will be presented in the next section.

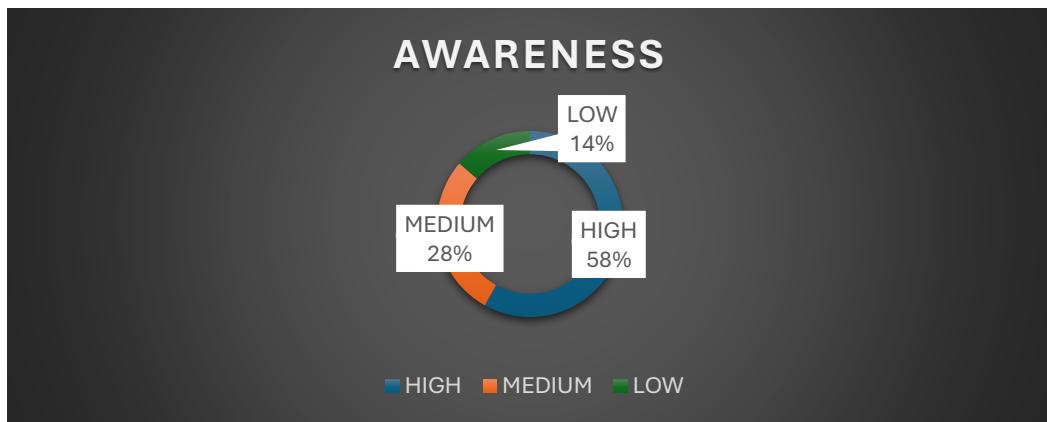


Figure:8:Depiction of the percentage of population awareness about CBDC.

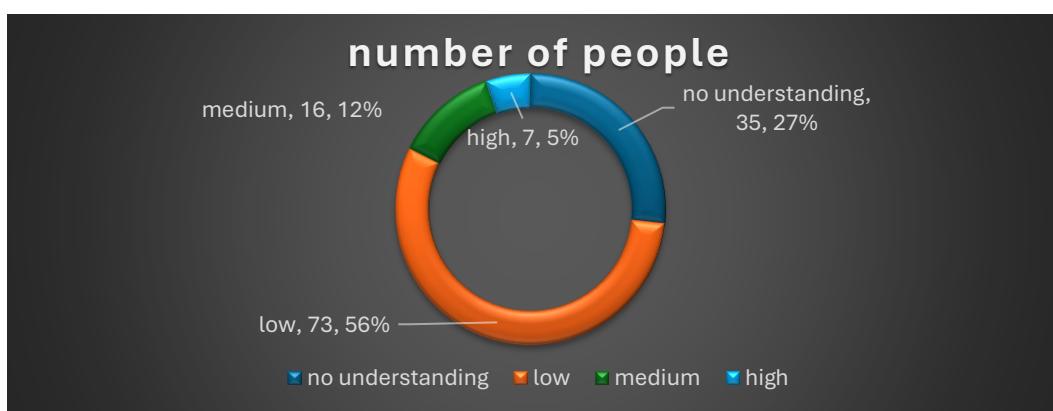


Figure:9-Depiction of the level of understanding of CBDC by the population.

6. Findings and Analysis:

Demographic information about the data collected is given below Table:2

Criteria	Response	Count
Gender	Male	84
	Female	47
Age	<18 years old	04
	18-30	80
	31-40	13
	41-50	15
	51-65	19
Income	Not earning	25
	<1,25,000	47
	1,25,000-5,00,000	27

	5,00,000-30,00,000 >30,00,000	31 01
Education	Secondary School	02
	Senior-Secondary School	40
	Diploma	00
	Undergraduate	45
	Post-Graduate	41
	PhD	02

Table:2

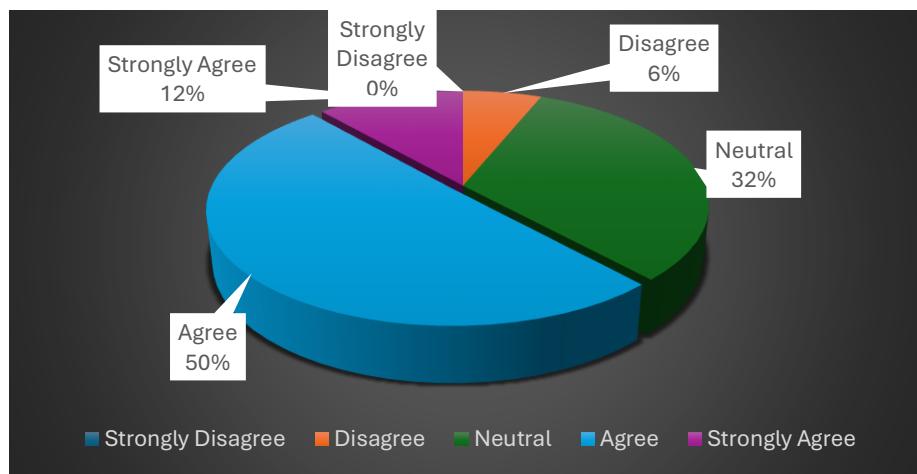


Figure:10

The above statistics in Figure:10 show the percentage of people who would be willing to use CBDC as a means of payment in future.

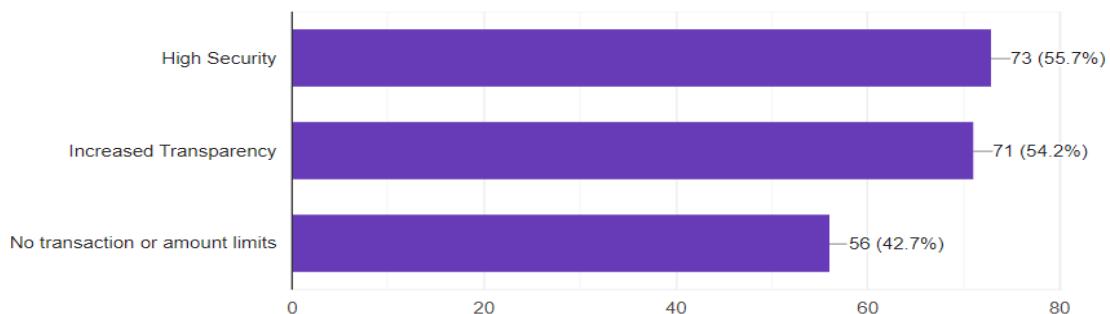


Figure:11

The above statistics in Figure:11 show that many users were willing to adopt CBDC as a means of payment if it provides them with the following features.

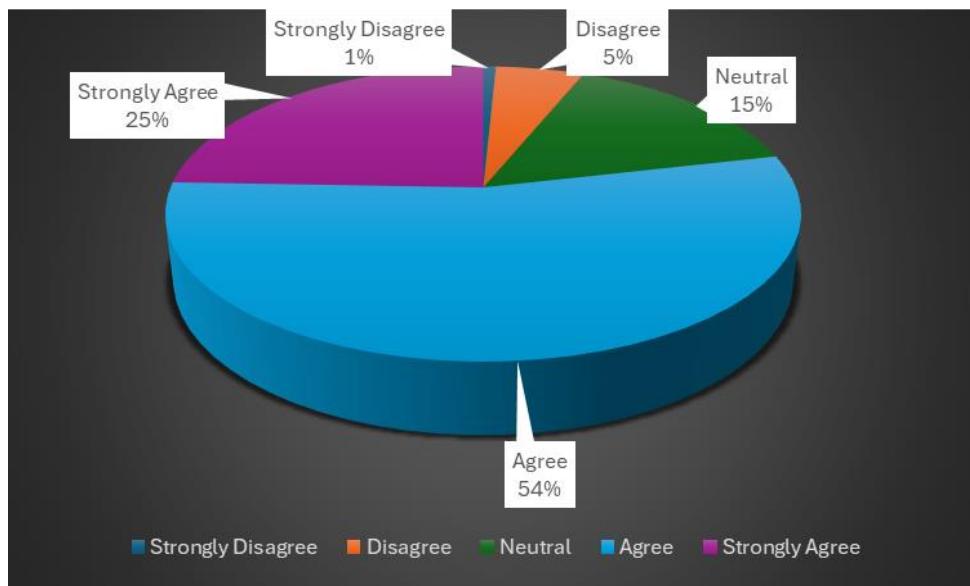


Figure:12

The above statistics in Figure:12 show the percentages of users who were willing to learn about e-Rupee.

6.1 Chi-Square Test

The given table shows relationship about the Performance Expectancy and the User intention towards adoption of CBDC.

	Value	Df	Asymptotic Significance(2-sided)
Pearson Chi-Square	63.226 ^a	9	<.001
Likelihood Ratio	41.968	9	<.001
Linear-by-Linear Association	26.332	1	<.001
N of valid cases	117		

Symmetric Measures

Ordinal by Ordinal	Value	Approximate Significance
Pearson Correlation	0.557	<.001
Spearman's rho	0.520	<.001

Table:3

Discussion- In the table provided, the value of the Chi-Square Statistic is 63.226 that exceeds the threshold chi-square value 16.919. This indicates a significant relationship between PE (Performance Expectancy) - how the technology will perform and enhance productivity. UI(Usage Intention) - the user's intention towards adoption. The result demonstrates the result demonstrates a noteworthy correlation exists between the variables, with a probability value of less than the alpha value of 0.05. Additionally, Spearman's rho and Pearson Correlation values show that the variables have a moderate association and are positively related. This supports our hypothesis that PE positively affects UI. Therefore, we can conclude that the two variables are dependent and we can reject the null hypothesis.

The given table shows relationship about the Effort Expectancy and the User intention towards adoption of CBDC.

	Value	Df	Asymptotic Significance(2-sided)
Pearson Chi-Square	88.214 ^a	12	<.001
Likelihood Ratio	62.974	12	<.001
Linear-by-Linear Association	22.860	1	<.001
No. of valid cases	117		

Symmetric Measures

Ordinal by Ordinal	Value	Approximate Significance
Pearson Correlation	0.423	<.001
Spearman's rho	0.375	<.001

Table:4

Discussion: In the provided table, the value of the Chi-Square Statistic is 88.214 that exceeds the threshold chi-square value 21.026. This value indicates a significant relationship between EE (Effort Expectancy) - how easy it would be for the user to learn the technology. UI(Usage Intention) -the user's intention towards adoption. The result demonstrates the result demonstrates a noteworthy correlation exists between the variables, with a probability value of less than the alpha value of 0.05. Additionally, Spearman's rho and Pearson Correlation values show that the variables have a weak association and are positively related. This supports our hypothesis that EE positively affects UI. Therefore, we can neglect the null hypothesis and conclude that there is a significant association between two variables.

The table shows the relationship between the Social Influence and the User intention towards adopting CBDC.

	Value	Df	Asymptotic Significance(2-sided)
Pearson Chi-Square	70· 106 ^a	12	<.001
Likelihood Ratio	60.645	12	<.001
Linear-by-Linear Association	36.513	1	
No. of valid cases	117		

Symmetric Measures

Ordinal by Ordinal	Value	Approximate Significance
Pearson Correlation	0.531	<.001
Spearman's rho	0.496	<.001

Table:5

Discussion: In the table provided, the value of the Chi-Square Statistic is 70.106 that exceeds the threshold chi-square value of 21.026. This indicates a significant relationship between SI (Social Influence) – how people in your vicinity and surrounding conditions influence you to use the technology. UI(Usage Intention) - the user's intention towards adoption. The result demonstrates the result demonstrates a noteworthy correlation exists between the variables, with a probability value of less than the alpha value of 0.05. Additionally, Spearman's rho and Pearson Correlation values show that the variables have a moderate association and are positively related. This supports our hypothesis that SI positively affects usage behaviour. Therefore, we can conclude that the two variables are dependent and we can reject the null hypothesis.

The table shows the relationship between the Facilitating Conditions and the User intention towards adopting CBDC.

	Value	Df	Asymptotic Significance(2-sided)
Pearson Chi-Square	64 · 517 ^a	12	<.001

Likelihood Ratio	48.351	12	<.001
Linear-by-Linear Association	9.215	1	.002
No. of valid cases	117		

Symmetric Measures

Ordinal by Ordinal	Value	Approximate Significance
Pearson Correlation	0.379	<.001
Spearman's rho	0.349	<.001

Table:6

Discussion: In the table provided, the value of the Chi-Square Statistic is 64.517 that exceeds the threshold chi-square value of 21.026. This indicates a significant relationship between FC (Facilitating Condition) – how people in your vicinity and surrounding conditions support you to adopt new technology. UI(Usage Intention) - the user's intention towards adoption. The result demonstrates the result demonstrates a noteworthy correlation exists between the variables, with a probability value of less than the alpha value of 0.05. Additionally, Spearman's rho and Pearson Correlation values show that the variables have a weak association and are positively related. This supports our hypothesis that FC positively affects usage behaviour. Therefore, we can conclude that the two variables are dependent and we can reject the null hypothesis.

The table shows the relationship between the Perceived Risk and the User intention towards adopting CBDC.

	Value	Df	Asymptotic Significance(2-sided)
Pearson Chi-Square	33 · 180 ^a	12	<.001
Likelihood Ratio	26.028	12	.011
Linear-by-Linear Association	.527	1	.468
No. of valid cases	117		

Symmetric Measures

Ordinal by Ordinal	Value	Approximate Significance
Pearson Correlation	-0.20	.031
Spearman's rho	-0.20	.030

Table:7

Discussion: In the table provided, the value of the Chi-Square Statistic is 33.180 that exceeds the threshold chi-square value, 21.026. This indicates a significant relationship between PR (Perceived Risk) – how safe people feel while using the technology. UI(Usage Intention) - and the user's intention towards adoption. The result demonstrates the result demonstrates a noteworthy correlation exists between the variables, with a probability value of less than the alpha value of 0.05. Additionally, Spearman's rho and Pearson Correlation values show that the variables have a very weak association and are negatively related. This supports our alternative hypothesis that PR negatively affects usage behaviour and our null hypothesis is rejected stating that there is no relation between Perceived Risk and Usage Intention.

The table shows the relationship between the Pre-existing modes of Payment and the User intention towards adopting CBDC.

	Value	Df	Asymptotic Significance(2-sided)
Pearson Chi-Square	87.452 ^a	12	<.001
Likelihood Ratio	57.360	12	<.001
Linear-by-Linear Association	36.034	1	<.001
No. of valid cases	117		

Symmetric Measures

Ordinal by Ordinal	Value	Approximate Significance
Pearson Correlation	0.716	<.001
Spearman's rho	0.719	<.001

Table:8

Discussion: In the table provided, the value of the Chi-Square Statistic is 87.452 that exceeds the threshold chi-square value, 21.026. This indicates a significant relationship between PEMP (Pre-existing modes of Payment) –Other modes of payment that are available like

UPI,CASH etc. UI(Usage Intention) - the user's intention towards adoption. The result demonstrates the result demonstrates a noteworthy correlation exists between the variables, with a probability value of less than the alpha value of 0.05. Additionally, Spearman's rho and Pearson Correlation values show that the variables have a strong association and are positively related, contrary to our assumption that PEMP has a negative relationship with UI. This rejects our alternative hypothesis that PEMP negatively affects usage behaviour. But, we can conclude that the two variables are dependent positively and we can reject the null hypothesis.

The table shows the relationship between the Awareness and the User intention towards adopting CBDC.

	Value	Df	Asymptotic Significance(2-sided)
Pearson Chi-Square	111· 552 ^a	12	<.001
Likelihood Ratio	77.621	12	<.001
Linear-by-Linear Association	42.010	1	.002
No. of valid cases	117		

Symmetric Measures

Ordinal by Ordinal	Value	Approximate Significance
Pearson Correlation	0.758	<.001
Spearman's rho	0.701	<.001

Table:9

Discussion: In the table provided, the value of the Chi-Square Statistic is 111.552 that exceeds the threshold chi-square value, 21.026. This indicates a significant relationship between AW (Awareness) – how many people in your vicinity and surroundings have heard and know about CBDC. UI(Usage Intention) - the user's intention towards adoption. The result demonstrates a noteworthy correlation exists between the variables, with a probability value of less than the alpha value of 0.05. Additionally, Spearman's rho and Pearson Correlation values show that the variables have a strong association and are positively related. This supports our hypothesis that AW positively affects usage behaviour. Therefore, we can conclude that the two variables are dependent and we can reject the null hypothesis.

6.2 Regression Analysis

R² Test:

The R-squared value, often denoted as R^2 serves as a measure of how well the independent variables in a regression model account for the diversification observed in the usage intention (dependent variable). It can be categorized into three groups: which are weak, medium and large. In the specific case of the regression model involving the variable UI (Usage Intention), an R^2 value of 0.742 has been obtained. This suggests that approximately 74.2% of the variation in the dependent variable can be allocated to the independent variable(s) in the model. An R-squared value of 0.742 suggests that the model fits the data reasonably and that the independent variable(s) significantly influence the dependent variable. However, around 25.8% ($1 - 0.742$) of the variability in the dependent variable remains unexplained by the model. This could be due to factors not considered in the model, measurement errors, or inherent randomness in the data.

Q² Test:

The Q^2 value is categorized into three ranges based on its magnitude. These categories are small (greater than 0), medium (greater than 0.25), and large (greater than 0.5). The regression model, specifically the variable UI (Usage Intention), has a Q^2 -squared value of 0.742, indicating a high predictive value. This suggests that the variable used to predict the outcome is reliable.

Although we also have the same values of R squared and Q square which suggests that:

- Model Fit and Predictive Power: When R^2 and Q^2 are equal, it suggests that the model not only fits the training data well but also has good predictive power on unseen data. This is a desirable situation, as it indicates that the model generalizes well.
- No Overfitting: If R^2 is significantly higher than Q^2 , it may indicate overfitting, where the model captures noise in the training data rather than the underlying relationship. Equal values suggest that the model does not overfit the training data.

f² Test:

When analyzing the impact of independent variables on dependent variables, the f^2 value is used as a measure. If the f^2 value is 0.35, it is considered to have a substantial impact, if it's 0.15, the impact is considered moderate, and if it's 0.02, the impact is considered small.

The table below provides information about the f^2 value and its interpretation.

Variable	UI value	Criteria
(Performance Expectancy)	0.031	Moderate
(Effort Expectancy)	0.000	Small
(Social Influence)	0.034	Moderate
(Facilitating Conditions)	0.007	Small
(Perceived Risk)	0.015	Small
(Pre-existing mode of Payment)	0.166	Substantial
(Awareness)	0.715	Substantial

Table:10

7. Results:

1. The majority of the population was aware about the concept of e-Rupee/CBDC but their understanding about it was not thorough.
2. The survey conducted showed that majority of the population was willing to adopt e-Rupee if the government promoted it, and many did agree to use it as a future mode of payment.
3. Research showed that (AW)Awareness has the highest positive influence on the adoption of the e-Rupee. Other categorical variables like (PR)Performance Expectancy, (EE)Effort Expectancy, (SI)Social Influence, and (FC)Facilitating Conditions also had a positive influence on the adoption of e-Rupee. (PR)Perceived Risk was found to have a negative relationship with usage intention but the association was not very strong due to the small sample size. Contrary to our assumption of the negative influence of pre-existing modes of payment on e-Rupee adoption it was found to have a strong positive influence.

8. Recommendations and Suggestions:

1. Public Awareness and Education

Campaigns: Launch educational campaigns to inform the public about CBDC, its benefits, and how it differs from cryptocurrencies. This can help demystify digital currencies and build trust.

Workshops and Seminars: Organize workshops for various stakeholders, including businesses, financial institutions, and the general public, to explain the functionalities and advantages of CBDC.

2. Enhancing Accessibility

Integration with Non-Banking Payment Systems: Allow non-bank payment system operators to offer CBDC wallets, thus expanding access to a broader segment of users, especially in rural areas.

Offline Payment Options: Develop features for offline transactions to cater to users in remote areas where internet connectivity is limited. This will ensure that CBDC can be used widely, even in less accessible regions.

3. User-Friendly Technology

Intuitive Interfaces: Design user-friendly applications and interfaces for CBDC transactions, making it easy for users of all ages and tech-savviness to adopt the technology.

Support for Multiple Platforms: Ensure that CBDC can be accessed via various platforms, including mobile apps, web applications, and physical kiosks.

4. Security and Trust

Robust Security Measures: Implement strong security protocols to protect users' data and transactions, addressing concerns about privacy and fraud.

Transparency in Operations: Ensure transparency in the functioning of CBDC and provide users with clear information about transaction processes and data usage.

5. Regulatory Framework

Clear Regulations: Establish a clear regulatory framework governing the use of CBDC, addressing potential legal and compliance issues that may arise.

Collaboration with Financial Institutions: Work closely with banks and financial institutions to create a supportive ecosystem for CBDC, ensuring that it complements existing financial products and services.

6. Incentives for Adoption

Incentives for Early Adopters: Offer incentives such as lower transaction fees or rewards for users who adopt CBDC early, encouraging more people to try it.

Partnerships with Merchants: Collaborate with merchants to accept CBDC payments, providing benefits for businesses that adopt this payment method.

7. Pilot Programs and Feedback

Conduct Pilot Programs: Implement pilot programs in various regions to test the CBDC system and gather feedback from users. This will help identify challenges and areas for improvement before a full-scale rollout.

Continuous Improvement: Use feedback from pilot programs to continuously refine and enhance the CBDC infrastructure and user experience.

8. Focus on Financial Inclusion

Targeted Programs for Underbanked Populations: Develop initiatives specifically aimed at including underbanked and unbanked populations, ensuring that CBDC serves as a tool for financial inclusion rather than exclusion.

9. Limitations

1. **Limited Sample Size:** The study conducted is based on a survey of prospective users, but the sample size and representativeness of the survey are not large enough. The survey form was distributed to over 300 people and 131 responses were recorded. A larger, more diverse sample would provide more robust insights.
2. **Limited User Perspectives:** While the research explores factors from the user-centric perspective, there is a lack of in-depth analysis of regulatory and institutional perspectives, such as financial development, financial inclusion, cross-border

transactions, infrastructures, innovation, macroeconomic, and institutional conditions, which can significantly impact CBDC adoption.

3. **Lack of Contemporary Literature:** As the concept of CBDC is new in India not much research has been conducted in the domain of its adoption and much work can be done by considering various factors and more robust data collection to have a better understanding.

10. Conclusion

The Digital Rupee (e₹) serves as a tokenized digital version of the Indian Rupee, developed and launched by the Reserve Bank of India (RBI) as a form of central bank digital currency (CBDC). The concept for this digital currency was first introduced in January 2017, and it officially became available to the public on December 1, 2022. The Digital Rupee serves as a modernized and secure way to transact and store value, embracing the advancements in digital technology. Initially introduced in four Indian cities: Mumbai, Bengaluru, New Delhi, and Bhubaneswar, with plans for expansion to all states. Residents in these cities and states can use digital wallets provided by partnering banks to exchange digital rupees for online transactions. The implementation of the Digital Rupee aims to reduce security and printing costs associated with physical currency.

A study was conducted to investigate which factors influence the user adoption of CBDC. The study utilized a conceptualized model based on the UTAUT model and incorporated Perceived Risk from the TAM model. It also considered prior experience with other modes of payment.

It was found in the study that several factors had a positive impact on users' intention towards adoption of central bank digital currency, in line with the proposed hypotheses. Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions, and Awareness all had positive effects on user adoption, as predicted. However, the study found that Perceived Risk had a positive impact on user adoption, contrary to the proposed hypothesis. Additionally, the study found that Pre-existing Modes of Payment had a positive impact on users' intention towards adoption, which was also contrary to the proposed hypothesis. These findings were consistent with previous research conducted by other researchers.

It is crucial to conduct thorough research on the factors that could affect the use and adoption of e-Rupee. In summary, the future adoption and usage of central bank digital currency will likely be shaped by a complex interplay of networks, regulatory policies, monetary policies individual preferences, and technological developments. Understanding and accounting for these factors will be crucial for central banks and policymakers as they navigate the challenges and opportunities presented by the emergence of CBDCs.

11. References:

1. Auer, R., & Boehme, R. (2020). *The technology of retail central bank digital currency*.

2. Adoption, C. b. (2021). *Bank for International Settlements*, 14.
3. Banerjee, S., & Sinha, M. (2023). Promoting Financial Inclusion through Central Bank Digital Currency: An Evaluation of Payment System Viability in India. *Australasian Accounting, Business and Finance Journal*, 17(1), 176–204. <https://doi.org/10.14453/aabfj.v17i1.14>
4. Batucan, G. B., Gonzales, G. G., Balbuena, M. G., Pasaol, K. R. B., Seno, D. N., & Gonzales, R. R. (2022). An Extended UTAUT Model to Explain Factors Affecting Online Learning System Amidst COVID-19 Pandemic: The Case of a Developing Economy. *Frontiers in Artificial Intelligence*, 5, 768831. <https://doi.org/10.3389/frai.2022.768831>
5. *Central bank digital currencies foundational principles and core features*. (2020). Bank for International Settlements.
6. Eichengreen, B., Gupta, P., & Marple, T. (n.d.). *A CENTRAL BANK DIGITAL CURRENCY FOR INDIA?*
7. Gupta, M., Taneja, S., Sharma, V., Singh, A., Rupeika-Apoga, R., & Jangir, K. (2023). Does Previous Experience with the Unified Payments Interface (UPI) Affect the Usage of Central Bank Digital Currency (CBDC)? *Journal of Risk and Financial Management*, 16(6), 286. <https://doi.org/10.3390/jrfm16060286>
8. Jamader, A. R., Das, P., & Acharya, B. (2022). An Analysis of Consumers Acceptance towards Usage of Digital Payment System, Fintech and CBDC. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4278279>
9. Maggio, M. D., Ghosh, P., Ghosh, S. K., & Wu, A. (n.d.). *Impact of Retail CBDC on Digital Payments, and Bank Deposits: Evidence from India*.
10. Maryaningsih, N., Nazara, S., Kacaribu, F. N., & Juhro, S. M. (2022). CENTRAL BANK DIGITAL CURRENCY: WHAT FACTORS DETERMINE ITS ADOPTION? *Buletin Ekonomi Moneter Dan Perbankan*, 25(1), 1–24. <https://doi.org/10.21098/bemp.v25i1.1979>
11. Mau Bere, A. B., Putra, R. W., & Wedari, L. K. (2024). Investigation of digital rupiah acceptance using UTAUT-3 model. *Indonesian Journal of Electrical Engineering and Computer Science*, 35(3), 1710. <https://doi.org/10.11591/ijeecs.v35.i3.pp1710-1721>
12. Mihir Gandhi, Z. T. (2023). Future of digital currency in India. *PWC Immersive Outlook*, 51
13. Mishra, B., & Prasad, E. S. (n.d.). *A Simple Model of a Central Bank Digital Currency*.
14. Ogunmola, G. A., & Das, U. (2024). Analyzing consumer perceptions and adoption intentions of central bank digital currency: A case of the digital rupee. *Digital Policy, Regulation and Governance*, 26(4), 450–471. <https://doi.org/10.1108/DPRG-09-2023-0136>

15. Priyadarshini, D., & Kar, S. (n.d.). *Central Bank Digital Currency (CBDC): Critical Issues and the Indian Perspective*.
16. RBI, F. D. (2022). *Concept Note on Central Bank Digital Currency*.
17. RBI. (2021). *Central Bank Digital Currency – Is This the Future of Money?*, (pp. 1-9).
18. Singh, S., Gupta, S., Kaur, S., Sapra, S., Kumar, V., & Sharma, M. (2023). The quest for CBDC: Identifying and prioritising the motivations for launching central bank digital currencies in emerging countries. *Quality & Quantity*, 57(5), 4493–4508. <https://doi.org/10.1007/s11135-022-01558-8>
19. Venkatesh, Thong, & Xu. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS Quarterly*, 36(1), 157. <https://doi.org/10.2307/41410412>
20. Yang, J., & Zhou, G. (2022a). A study on the influence mechanism of CBDC on monetary policy: An analysis based on e-CNY. *PLOS ONE*, 17(7), e0268471. <https://doi.org/10.1371/journal.pone.0268471>
21. Yang, J., & Zhou, G. (2022b). A study on the influence mechanism of CBDC on monetary policy: An analysis based on e-CNY. *PLOS ONE*, 17(7), e0268471. <https://doi.org/10.1371/journal.pone.0268471>
22. Zhang, T., & Huang, Z. (2022). Blockchain and central bank digital currency. *ICT Express*, 8(2), 264–270. <https://doi.org/10.1016/j.icte.2021.09.014>

12. Appendix:

Questionnaire circulated for data collection is given below.(All the questions and statements were answered on a scale 1-5 with 1 implying strongly disagree and 5 implying strongly agree.)

USER INTENTION TOWARDS ADOPTION OF CENTRAL BANK DIGITAL CURRENCY (E-Rupee).

The response obtained from this survey will help to understand the factors that will affect the adoption of e-Rupee.

Demographics

- 1.) What is your age?
- 2). What is your gender?
- 3). Do you know about the e-Rupee (Central Bank Digital Currency)?
- 4). In which income bracket do you lie?
- 5). How would you define your residence location?
- 6). What is your education qualification?

How would you rate your understanding of the e-Rupee(Central Bank Digital Currency)?

PE(Performance Expectancy)

- 7). I believe that using E-Rupee will improve the efficiency of my financial transactions.
- 8). E-Rupee will allow you to make offline payments.
- 9). Making a payment using E-Rupee will be quick with no transaction cost.

EE(Effort Expectancy)

- 10). E-Rupee is easy to learn and use.
- 11). E-Rupee apps have a user-friendly interface.
- 12). Do you feel that E-Rupee payment issues can be resolved without help?

SI(Social Influence)

- 13). I will use E-Rupee if my friends, family and relatives are using E-Rupee.
- 14). Do you feel that the Government is providing benefits for making payments using E-Rupee?
- 15). Do you feel that people in your workspace and your surroundings are using E-Rupee?

FC(Facilitating Conditions)

- 16). An easily accessible user guide to understand E-Rupee is available.
- 17). If I feel any difficulty while making E-Rupee payment, I can easily contact customer care.
- 18). Do you feel that the E-Rupee requires any prior knowledge, experience or other complementary resources for its use?

PR(Perceived Risk)

- 19). Do you feel that E-Rupee transactions are an easy target for fraud?
- 20). I believe that using E-Rupee will leak my personal information or transaction details?
- 21). Do you feel that making payments using E-Rupee may fail or take more time than required to complete?
- 22). Do you feel that if any problem occurs while using E-Rupee your issues may not be resolved?

PEMP(Pre-Existing Means of Payment)

- 23). If already using UPI, would you like to shift to E-Rupee to make a payment?
- 24). If already using cash, would you like to shift to E-Rupee to make a payment?
- 25). If already using Net Banking, Debit Card, Credit Card, or Cheque as a means of payment would you like to use E-Rupee as well to make a payment?

AW(Awareness)

- 26). Are you aware that using E-Rupee as a mode of payment will provide you with benefits such as high security, increased transparency, offline availability and an improved payment system?
- 27). Do you know the reason behind launching E-Rupee as a means of payment?
- 28). If the government organises campaigns to spread awareness about the E-Rupee, would you be willing to use it?
- 29). Are you willing to learn about E-Rupee and its benefits.?

UI(Usage Intention)

- 30). I intend to use E-Rupee for making payments?
- 31). Would you like to recommend people to use E-Rupee as a means of payment?

32). I am in favour of central bank digital currencies (CBDCs) as an electronic payment system.

Appendix-2(Plagiarism Report).

