

## **The Role of Central Bank Digital Currency on Features, Perceived Benefits and Challenges Compared to Physical Currency**

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### **ABSTRACT**

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*Achieving unanticipated personal and corporate desired goals requires the use of technology and innovation as the keys to unlock unattainable imaginations. This study focused on the role of the novel phenomena known as central bank digital currency (CBDC) in comparison to traditional currency notes. A total of 158 publications, spanning the years 2018 through June, 2022, were initially acquired from several research databases. However, 40 papers that fulfilled the criteria for title, abstract, and contents were chosen as the study sample size after being examined from the total number of articles downloaded. Additionally, based on individual and organizational perspectives, the outcomes of this study employed systematic literature review (SLR) to explain in detail why CBDC should be chosen and why it replaces the conventional physical currency.*

#### **Keywords:**

*CBDC, Physical Currency, Perceived Knowledge, Perceived Benefits, Challenges*

#### **JEL Classification Codes:**

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### **INTRODUCTION**

The contribution of ICT to the automation of financial activities, and business innovation through the use of digital currency is significant in corporate contexts. Determined on the basis scenario of financial transactions where physical currency is prominent way of storing and resolving of business transactions. Due to the physical currencies' unstable pricing values as compared to other international currencies for crossborder transactions, these are not a trustworthy or ideal form of payment (Saito & Iwamura, 2019). About 63 central banks globally participated in the survey from various jurisdictions (Barontini & Holden, 2019). The nation's central bank is in charge of

creating, managing, overseeing, and controlling the nation's currency. Being the top bank in a nation, several central banks are looking into the prospect of issuing Central Bank Digital Currency (CBDC) as a potential replacement for physical money in the future. As an alternative, several central banks suggest various policies based on the nation, like: digital money, crypto currency (Naheem,2016), Many nations have introduced money, some cashless, as a response to the political, economic, and financial unrest that has led many nations to corruption, currency depreciation, and a steady rise in the cost of goods and services (Isah & Babalola, 2019). Even cryptocurrencies such as *Bitcoin, Ethereum, Facebook's Diem, Corda, Fabric, and Ripple* are competing for a spot in the cashless world, constantly reinventing themselves in the hope of offering more stable value and quicker, cheaper settlement (Chapman, 2021; Lagarde, 2021; Shao et al., 2021; Zhang & Huang, 2021). The sole aim of introducing digital currency is to reduce the volume of physical currency in circulation, which in turn destabilizes the socioeconomic development of a country (Barontini & Holden, 2019).

This was a well phenomenon that many individuals and organizations reject advances, particularly those brought on by technology. For illustration, it used to occur when new technologies like the Internet, robots, artificial intelligence, mobile banking, management information systems, and cryptocurrencies, as well as digital money, first came into being. In Roger's Innovation Diffusion Theory, early, mid, and late movers (adopters) are a result of people's general resistance to change. Of course, early, mid, and late movers each have advantages and disadvantages, which are referred to as movers' advantages (Rogers & Everett, 1983). Recently, the way customers have paid for goods and services has been undergoing fundamental change in recent years especially during the period of COVID-19 outbreak (Chapman 2021). Although Lagarde (2017) said that change may seem daunting task, unpredictable, and even unsafe, especially when it interferes with our routines, employment, and social connections, the main goal of this shift is to take advantage of technology advancements while minimizing the dangers associated with adopting them. Additionally, central banks are still studying CBDCs.

Despite this, there appears to be no widespread or significant effort to expand this research into testing and pilot arrangements. Nonetheless, a few central banks with appropriate motive are testing various ideas (Boar et al., 2020). Prior to the invention of bank cards, automated teller machines (ATMs), point of sale (POS), Internet, and mobile banking were used to replace actual currency for bills, salary payments, and disbursements (International Monetary Fund, n.d, pp.1). This study intends to highlight the importance of CBDC over physical currency by comparing the two in terms of characteristics, potential benefits, and barriers, based on the facts reported in previous studies.

## **LITERATURE REVIEW AND RELATED STUDIES**

The decision to launch a central bank digital currency (CBDC) is one of the major problems confronting central banks as technology advances (Sarmiento, 2022). It is a very well-known scenario that people nowadays use mobile phones or computer-related gadgets to buy and sell items, offer services, and make payments (e-commerce or e-business). Besides credit and debit cards, payment systems apps such as Google Pay, Apple Pay, PayPal, or one of the many other payment systems apps on the market are available. Mobile phones now enhance consumer a lot of choices for making payments via e-wallets and e-money solutions (Isah & Babalola, 2019). Furthermore, rather of using credit or debit cards, younger people appear to prefer using mobile payment options to pay for products and services (Bilotta, 2021). Recently, there are some

researches titled: China's transition to a digital currency does it threaten dollarization? (Aysan, and Kayani, 2022); The Effects of Central Bank Digital Currencies News on Financial Markets (Wang, Lucey, Vigne and Yarovaya, 2022); Seven lessons from the e-Peso pilot plan: The possibility of a Central Bank Digital Currency (Sarmiento, 2022); Central bank digital currency in an open economy (Minesso, Mehl, and Stracca, 2022); Digital currencies in financial networks (Castrén, Kavonius, and Rancan, 2022). All of this shows how CBDC is changing in relation to the global economy.

Many experts have started to theorise the economic consequences of the CBDC as it has become a source of great concern for central banks (Chapman, 2021). CBDC is not a new concept in most industrialised countries, but it is fresh from the perspective of developing countries. Eventually, many researchers defined the idea depending on their own monetary policies and background. CBDC is described by Saito and Iwamura (2019) as any central bank's electronic, fiat obligation that can be utilised to settle payments or as a store of value. According to Lagarde (2017), CBDC is "digital cash that is utilised to represent physical cash that is already in use."

Payment methods are evolving at a breakneck speed. Changes in the way payments are made aren't the only thing that's changed. Clearly, Barontini and Holden (2019) identify the four important aspects of physical cash as follows: issuer (central bank or not); shape (digital or physical); accessibility (widely or restricted); and last, technology (enabling IT physical resources and non-physical). CBDC, on the other hand, is based on this research and has some of the qualities and characteristics currency but in a virtual form. The issuer (central bank), accessibility (anywhere using internet network offered by network service providers), acceptability (gradually rises), technology (allowing IT physical and non-physical resources), form (digital not physical), and convertibility are the features (changing one digital currency into another type of digital or physical currency). Furthermore, the CBDC has been one of the digital currencies based on Bitcoin's Blockchain technology, which has seen widespread adoption.

Clearly, the research of Barontini and Holden (2019) identifies the four important aspects of physical cash as follows: issuer (central bank or not), shape (digital or physical), accessibility (broad or restricted), and technology (enabling IT physical resources and non-physical). CBDC, but at the other hand, inherits some attributes of physical currency but in a virtual form, according to this research. Issuer (central bank), accessibility (anywhere with internet network offered by network service providers), acceptability (gradually rises), technology (allowing IT physical and non-physical resources), form (digital, not physical), and convertibility are the features (changing one digital currency into another type of digital or physical currency). Furthermore, the CBDC is one of the digital currencies based on Bitcoin's Blockchain technology that is no longer restricted in its use.

Blockchain technology underpins Bitcoin, Ethereum, and other digital currencies and cryptocurrencies. Bitcoin, unlike bills and coins, has no physical representation and is not issued or guaranteed by any government or private entity. Its worth is governed by a number of elements, the most important of which is demand. The value of Bitcoins rises when people buy them and falls when people sell them. As a result, its value is prone to significant fluctuations (Bilotta, 2021).

Payment services provided by private sector can successfully address fiat money's flaws. As a result, central banks cede currency issuance authority to the private sector, allowing it to issue currency backed by bank deposits or electronic money in order to create a payment system with broad coverage and a variety of payment systems (Qian, 2019). Digital illiteracy, increased

proclivity for cyber-attacks, data theft, and the shifting role of banks in a packed CBDC economy are among the issues cited by Ozili (2021). Policymakers should take advantage of CBDC's advantages and create a legislative framework for digital assets. And, once implemented, it will help to mitigate some of the CBDC-related dangers. The CBDC decisions are based not only on technical aspects, but also on the cultural ramifications of money use, as has been stated. The acceptance of this new payment method will be gradual, but it will not be reversible (Sarmiento, 2022).

## **METHODOLOGY**

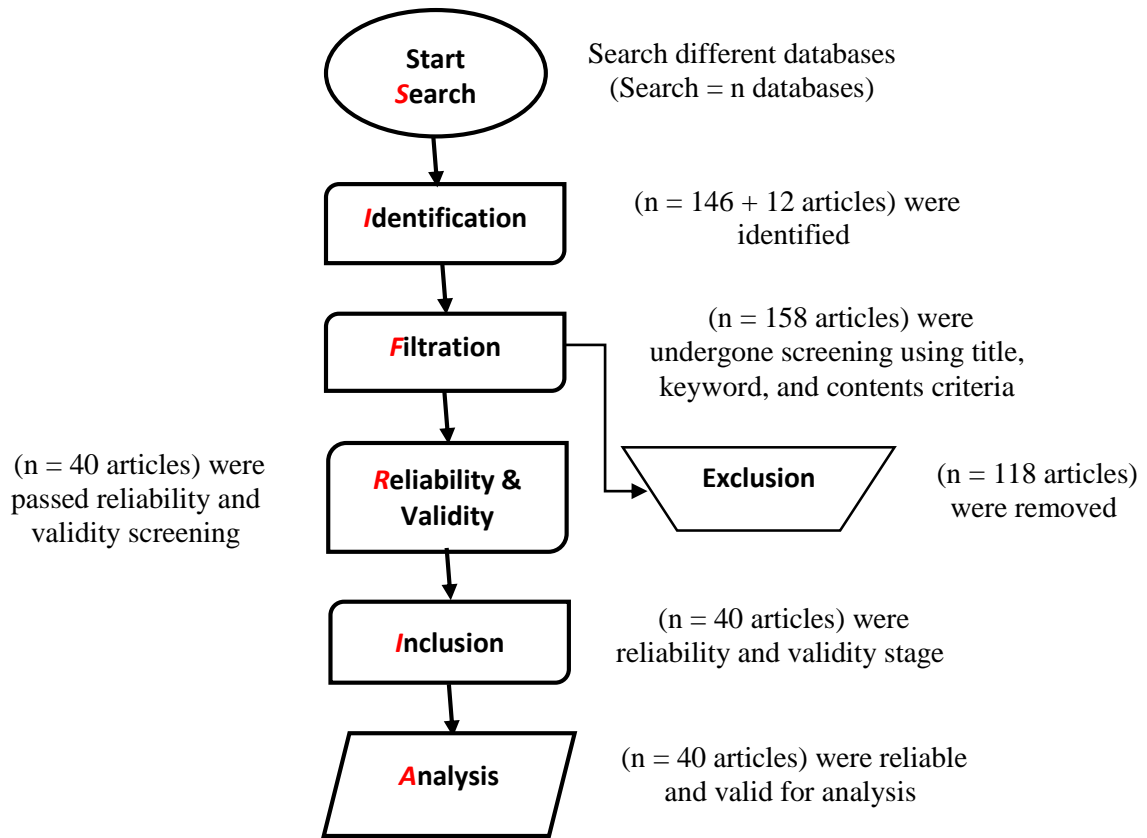
The purpose of this study is to analyze and synthesize the benefits of the central bank digital currency on functionalities and challenges compared to physical currency that could be resulting from its adoption and usage in a country and the globe.

### *Data Collection Techniques*

From 2017 to June, 2022, the articles were sourced from various research articles published in various journals and available in various databases (see table 1). Using Boolean operators (AND, OR, and/or combinations of the two) and a Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram, this study initially gathered roughly 146 papers. PRISMA is a meta-analysis and systematic review technique that focuses on presenting data from randomised trials, evaluating interventions, and critically reviewing published systematic reviews. The Search, Identification, Filtration, Reliability/Validity, Inclusion, and Analysis (SIFRIA) Flowchart was created using past research (Ibidunni et al., 2021). The virtue behind and benefits of using the SIFRIA flowchart include: first, it ensures a systematic literature search for inclusion in the list; second, it ensures that inappropriate articles are removed from the list for analysis; third, it ensures the reliability and validity of papers originating from various reputable journal databases; fourth, it helps to guarantee literature verification and rigorous evaluation; and finally, it exists to serve as a roadmap for new and existing projects.

### *Sample and Sampling Techniques*

As a result, 40 papers were chosen as the study sample size from a total of 158 articles downloaded. The procedures for gathering and further assessing the quality of articles sourced for stability studies include a literature search, identification filtration, reliability and validity, inclusion, and analysis. The articles were found using Boolean operators like (Digital currency OR (Cryptocurrency, Bitcoin) AND Physical currency) to find them. Using the SIFRIA flowchart, abstracts, keywords, and content of materials were considered in addition to looking for relevant articles (central bank digital currency AND (physical cash, OR fiat money, bank notes, paper money, and coins)) (see figure 1).



**Figure 1. SIFRIA Flowchart adapted from PRISMA (Ibidunni et al., 2021)**

*Method of Data Analysis*

The results were analysed and compiled using content skimming and scanning to produce rigorous analysis based on the findings of prior studies related with the role of CBDC over physical currency in terms of its features, benefits, and challenges (see table 2 in the appendix).

**Discussion of Findings**

This section contains the detail information about the role of CBDC over physical currency by providing sufficient s between the two in terms of features, benefits and challenges.

**The role of CBDC over physical currency based on features**

Table 1 shows key characteristics of CBDC that set it apart from actual money. CBDC is designed to be accepted in a wider variety of transactions than regular currency. When paired with an otherwise comparable economy, CBDC has little influence on transaction costs. CBDC receives interest from the central bank, but not real cash, because CBDC is a store of value rather than a medium of exchange. (Chapman, 2021; Shen & Hou, 2021; Williamson, 2021; Williamson 2021). Because central bank interest is paid on CBDC but not on real cash, there is a substantial contrast between the advantages of physical currency and CBDC as a replacement for physical currency. CBDC is designed to be accepted in a wider variety of transactions than regular currency.

**The role of CBDC over physical currency based on functionalities**

The terms of features, perceived benefits, and problems, this study synthesises and analyses the findings of the study based on the s between CBDC and Physical Currency. Reserves and deposits in digital currency are digitally identical. Reserves, for example, are deposits held in central banks by commercial banks and other financial organisations. Deposits and reserves, on the other hand, are equivalent to CBDC's, as both allow for inter-bank settlement (Shen & Hou 2021). CBDC does not need the use of a financial institution like a bank to assist the transaction, but it does allow for the use of many digital intermediary services (through digital device and the internet). Client transaction expenses are reduced, bank earnings are increased, and the anticipated cost of capital linked fine is reduced. CBDC was created as a financialization and alternative payment option for customers since it ensured financial efficiency by enabling for secure, faster, and less expensive transactions. The usage of CBDC brings into question the central bank's long-held currency-issuing monopoly (Fadhil & Syed, 2019).

**Table 1: Comparison between Central Bank Digital Currency and Physical Currency**

<i>Factors</i>	<i>Central Bank Digital Currency</i>	<i>Physical Currency</i>
Accessibility	Virtually accessible using phones and other computer-related devices anytime from everywhere	Physically accessible by visiting bank, ATM, POS's locations
Mobility	Simple	Heavy and risky
Security	More secured as PIN will be used to authenticate the owner	It requires physical protection and so for the holders
Acceptability	Low	High
Processing Cost	Moderate	High
Risk	Low	High
Agent	Exists	Exists
Issuer	Direct from the Central Banks	Form the Central bank through the Commercial Banks
Uses	Payments	Payments
Intermediation	Not exists	Exists
Physical form	Not exists	Exists
Technological Requirements	Account holder's computer-related devices, Internet services, etc.	Account holders and Banks' computer-related devices, Internet services, etc.
Skills	It requires adequate skills and knowledge	It requires little skills and knowledge since fund can be access physically

**Better Allocation**

CBDC ensures a more effective distribution of digital money. Customers would be encouraged to save expenses by using CBDC instead of cash. CBDC, which has the alluring virtue of bearing interest, may be underutilised as a result of coexistence. The welfare is reduced when the CBDC rate of interest is raised above zero (Davoodalhosseini, 2021; Agur et al., 2021).

### ***Accessibility***

Accessibility is another important aspect of CBDC (Meaning et al., 2018) feature of CBDC may be universal or restricted to limited subset of economic agents for any or limited purpose. Bjerg (2017) also described that CBDC could be universally accessible.

### ***Interest Bearing***

CBDC improves the efficiency with which digital currency is distributed. To save money, customers would be encouraged to use CBDC instead of cash. CBDC, which has the desirable attribute of bearing interest, may be underutilised as a result of coexistence. Raising the CBDC interest rate over zero lowers welfare. However, if the CBDC is too costly, then the economic welfare under the coexistence of the two may be dominated by either CBDC or physical currency, in which only one of the two will be used, because under coexistence, the agents or customers may use the physical currency as a way to escape the applicable tax. Therefore, coexistence may lead to underutilization of CBDC, which has the attractive feature of bearing interest. In turn, the choice of coexistence is more likely to be optimal (Davoodalhosseini, 2021). Taking the CBDC interest rate away from zero causes welfare losses as it creates price distortions of choice between these two payment instruments (Agur et al., 2021).

### ***Convertibility***

Another essential feature of CBDC is its convertibility. CBDC is as close to cash as possible in digital form, and as a result, it can be converted to cash and/or reserves on demand (Fernández & Olga, 2019; Zhang & Huang, 2021). CBDC and reserves are separate, according to Kumhof and Noone (2021), and are not supposed to be instantly changeable into each other at central bank; similarly, banks' deposits are not expected to be directly converted into CBDC at commercial banks.

### ***Cost Reduction***

CBDCs provide the potential for significant cost savings, which could result in speedier and less expensive transactions, such as remittances. CBDC fosters and promotes payment security, robustness, and efficiency, which reduces issue costs and improves transaction ease (Zhang & Huang, 2021).

### **The roles of CBDC over physical currency based on financial transactions**

CBDC uses cryptocurrencies and blockchain technology to enable speedy financial settlement (payment) and secure end-to-end transactions. The use of electronic currency as a weapon to combat financial crime is simple. To maintain the security of digital financial transactions, a regulatory agency must be established (Yanchao, 2021; Altan et al., 2019; Zhang & Huang, 2021; Nelson, 2018). Financial institutions captured comprehensive client transactions, including transaction data, when it came to physical currency, and this model has effectively supported the transformation of physical currency.

Decentralisation is a feature of digital currency, with data scattered and saved at each node and no central database. As a result, rather than being worldwide, data on digital currency transactions remains local. This might result in a reversal of progress, with all governments in charge of digital currency shifting their attention from data to customers (Yanchao, 2021; Isah and Babalola, 2019). It has been discovered that a cashless economic policy has a beneficial influence

on financial inclusion. As a result, a sustained effort must be made to ensure that the cashless policy is extended to the entire population of the country. has a beneficial influence on financial inclusion.

Many governments around the world are attempting to improve their digital currency legislation. China's financial management agencies are very worried about digital currency legislation and implementation, and they are determined to developing a comprehensive and scientific legal framework for digital currency (Yanchao, 2021). Whether digital currency is classified as an ordinary commodity (an asset) or a currency, it is difficult to assess using traditional concepts of right and wrong (Nelson, 2018). The following three relationships must be addressed when determining the legal attributes of digital currency and enacting legislation: first, the relationship between currency and commodity attributes; second, the relationship between authoritarianism and decentralism; and third, the correlation between traditional fiat currency and the digital currency.

With the gradual growth of central bank issuance of digital currency, it is vital to summarise the law of benign interaction involving traditional fiat currency and digital currency (Yanchao, 2021). As previously noted, the coexistence of CBDC and physical currency may result in CBDC's attractive attribute of carrying interest being underutilised. As a result, coexistence is more likely to be the best option (Davoodalhosseini 2021). Taking the CBDC interest rate away from zero, on the other hand, results in welfare losses since it introduces pricing distortions in the choice of these two payment mechanisms (Agur et al., 2021). CBDC's appealing feature of carrying interest may cause it to be underutilised. Increasing the CBDC interest rate over zero, on the other hand, reduces wellbeing. The best approach is likely to be a coexistence of CBDC and actual cash.

### **Possible Challenges of CBDC and physical currency**

Crossborder issues with CBDC, as opposed to real money, include policy, implementation, scalability, cross-chain interoperability (Zhang & Huang, 2021), acceptance, and convertibility (Fernández & Olga, 2019; Yanchao, 2021). As a CBDC facilitator, cryptocurrencies hold the promise of significant cost savings, perhaps resulting in faster and less expensive transactions like remittances. CBDCs may or may not be able to compete in this space with cryptocurrencies. If central banks are threatened by cryptocurrencies, they may be forced to build interconnected payment networks. When it comes to monetary policy difficulties with digital currencies, no digital currency appears likely to become widely used enough to make the control bank's ability to moderate the market more difficult (Nelson, 2018).

CBDC adoption, according to Castrén, Kavonius, and Rancan (2022), may cause funding limitations in banks, which could expand to other sectors. The issuing of a CBDC by one economy generates imbalances in the international monetary system by limiting monetary policy autonomy and welfare in one sector (Minesso, Mehl & Stracca, 2022).

The distinction between CBDC and actual currency is one of the most serious issues that this study tries to address. CBDC has been delayed in most poor countries due to a lack of public comprehension. Several central banks throughout the world are experiencing cash-related issues. CBDCs may want to keep a watch on whether or not an adjustable CBDC interest rate is included. Some central banks, on the other hand, are dealing with the inverse problem of low or declining use of cash for payments, which has prompted study on a CBDC that would keep public access to central bank money intact. Boar and his associates (2020). Central banks may wish to keep a watch



on the addition of an adjustable CBDC interest rate at this early stage, while CBDCs are still in the lab, comparing the benefits against prospective political economy costs (Williamson, 2021; Agur et al., 2021; Boar et al. 2020).

The development of digital currency is, in the end, a confrontation between a non-centralist ideological movement and the long-term strengthening of the centralist paradigm. We must accept that digital money, based on the decentralisation principle, has the potential to address many of the problems of centralised banking, such as a credit scarcity, high maintenance costs at the centre, and inflation induced by excessive currency issuance (Nelson, 2018).

Due to their market value, cryptocurrencies are not suitable as payment methods. Their prices tend to climb over time and fluctuate significantly in the short term. In the event of a financial crisis, CBDC may make it impossible to revert to the traditional payment (physical currency) system (Saito and Iwamura 2019). The following are some of the issues: First, financial institution disintermediation, in which customers and businesses are permitted to open accounts directly with central banks in exchange for a reduction in the quantity of deposits held by other financial institutions (commercial banks). As a result, the amount of physical currency available in financial institutions decreases, affecting and driving financial institutions out of the market. Second, CBDC may cause difficulty in re-using the old payment (physical currency) system after implementing CBDC during a financial crisis. As it can affect both payment systems, the central banks may decide to regulate the amount of physical currencies in circulation to stabilise the economy during inflation (Shen & Hou, 2021).

Furthermore, according to the research of Naheem (2016), Engert and Fung (2017), digital currency relies on a direct peer-to-peer system to exchange value, eliminating the need for any formal financial institution such as a bank, though several digital intermediary services may be used to facilitate the transaction. Despite the fact that when both payment systems are available, it may appear feasible to implement a negative cash inflation rate through an open market operation, Davoodalhosseini (2021) explained that for agents to take advantage of the benefits of using both CBDC and physical currency at the same time, cash inflation must be strictly positive. Though negative cash inflation may tempt customers to move from CBDC to cash, because the return on cash is larger than the return on CBDC, agents are spared the cost of carrying CBDC. As a result, the central bank would be unable to execute an open market operation in the event of negative cash inflation because the CBDC would not be deployed. Financial inclusion remains a key factor that can be used to track economic activity, free money, sharp practises in government agencies, and intergovernmental expenses, despite the cost of transactions and charges appearing to be a concern for users of cashless policies (Isah & Babalola, 2019). In this regard, Sarmiento (2022) outlines some lessons from the e-Peso (digital currency) pilot plan's implementation: The technological solution is as simple as possible; security aspects and traceable transfers are central to operational risk problems; a token was a good solution for CBDC implementation; digital money was used for small payments and transfers; and finally, CBDCs complement the existing means of payment.

## **CONCLUSION AND RECOMMENDATIONS**

To conclude, the adoption and use of CBDC as a physical currency replacement is dependent on how people and businesses perceive the features (see table 1), perceived benefits (better allocation, accessibility, interest bearing, convertibility, and cost reduction) that can be derived from using it, and the corresponding challenges (all of these benefits, on the other hand, turned into challenges, 4.4) that should be known for preventive measures. Furthermore, the CBDC

is the best solution when compared to physical money transactions, according to the financial transactions. CBDC research and use are becoming increasingly popular around the world. However, developing countries have yet to accept this new and rising technical innovation as a payment method (see appendix). The research also discovered. The study also found and recommended that, given the facts, proper awareness of CBDC characteristics, perceived benefits and problems, and other forms of cryptocurrencies like Bitcoin, Facebook's Diem, and other types of cryptocurrency is a must.

CBDC is intended to be used in a broader range of transactions than traditional cash. CBDC has a negligible impact on transaction costs when partnered with an otherwise comparable economy. Because CBDC is a store of value rather than a means of exchange, it receives interest from the central bank but not in real currency. CBDC was developed to provide customers with a financial and alternative payment option. CBDC ensures financial efficiency by enabling transactions that are secure, quick, and less expensive. The use of CBDC calls into question the central bank's long-held currency-issuing monopoly. CBDC guarantees that digital money is distributed more efficiently. Customers would be urged to use CBDC instead of cash to save money. When the CBDC rate of interest is raised above zero, the benefit is reduced.

CBDCs have the opportunity that could save a lot of money, which might also result in transactions that are faster and less expensive. The use of CBDC calls the central bank's long-held currency-issuing monopoly into doubt. Customers would be encouraged to save money by using CBDC instead of cash. It's possible that CBDC's appealing characteristic of carrying interest is underutilised. Cryptocurrencies are not designed to be used as a payment method. Due to negative cash inflation, customers may be attracted to convert from CBDC to cash, but agents are saved the cost of carrying CBDC. CBDCs have the potential to save a lot of money, which might mean faster and less expensive transactions. The removal of the CBDC interest rate from zero results in welfare losses. Coexistence may result in CBDC being underutilised, despite its appealing attribute of bearing interest. CBDC enables secure end-to-end transactions by utilising cryptocurrencies and blockchain technology. The fact that data is distributed and saved at each node is a property of digital currency. A cashless economic policy has been found to have a positive impact on financial inclusion. China's financial management organisations are working hard to create a thorough and scientific legal framework for digital currency. Because CBDC and real currency coexist, CBDC's appealing feature of bearing interest may be underutilised. On the other hand, raising the CBDC interest rate above zero diminishes happiness. CBDCs may or may not be able to compete with cryptocurrencies in this market. If cryptocurrencies pose a danger to central banks, they may be obliged to create interconnected payment networks. The adoption of an adjustable CBDC interest rate may be something central banks should keep an eye on. Cryptocurrencies are not suited for use as a means of payment. CBDC may make it impossible to return to the traditional payment (physical currency) system in the case of a financial catastrophe. To keep the economy stable amid inflation, central banks may opt to limit the amount of physical currency in circulation. Customers may be enticed to switch from CBDC to cash due to negative cash inflation, but agents are spared the cost of carrying CBDC. Financial inclusion is still a major indicator of economic activity, free money, shady government practises, and intergovernmental spending.

### **Theoretical Contributions**

To begin with, this research adds significantly to the body of knowledge in terms of disseminating adequate information regarding CBDC features, perceived benefits, and problems

to individuals, corporations or other corporate organisations, legislators, and regulatory agencies. Second, this research fills in the gaps left by previous research, the majority of which focused on its adoption and consequences in financial transaction domains. CBDCs have an advantage over traditional physical currencies even if they don't focus on it. Finally, this is the first study of its sort to focus on expanding the reach of CBDC and physical currency information.

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**APPENDIX:**

**Table 2: Articles Distribution based on Author(s), Country(ies), Journals and Theme**

SN	Author(s) and Year	Title	Country (ies)	Source	Source Theme
1	Sarmiento, A (2022)	Seven lessons from the e-Peso pilot plan: The possibility of a Central Bank Digital Currency	Uruguay	Latin American Journal of Central Banking	Central Bank Digital Currencies: E-peso pilot plan
2	Castrén, Kavonius, and Rancan, (2022)	Digital currencies in financial networks		Journal of Financial Stability	Central Bank Digital Currency
3	Minesso, Mehl, and Stracca (2022).	Central bank digital currency in an open economy	Europe, (Ukraine and Swiss)	Journal of Monetary Economics	Central bank digital currency
4	Wang, Lucey, Vigne and Yarovaya (2022)	The Effects of Central Bank Digital Currencies News on Financial Markets		<i>Technological Forecasting &amp; Social Change</i>	Central Bank Digital Currencies
5	Aysan, and Kayani (2022)	China's transition to a digital currency does it threaten dollarization?	China	Asia and the Global Economy	Digital Currency
6	(Davoodalhosseini, 2021)	Central bank digital currency and monetary policy	Canada	Journal of Economic Dynamics & Control	Central bank digital currency
7	(Agur et al., 2021)	Designing Central Bank Digital Currencies		Journal of Monetary Economics	Central Bank Digital Currencies
8	(Ji & Shen, 2021)	Introduction to the special issue on digital currency	China	China Economic Journal	Digital Currency
9	(Chorzempa, 2021)	China, the United States, and central bank digital currencies: how important is it to be first?	China	China Economic Journal	Central bank digital currency
10	(Yanchao, 2021)	On the Legal Attributes of Digital Currency	China	Social Sciences in China	Digital Currency
11	(Zhang & Huang, 2021)	Blockchain and central bank digital currency	China	ICT Express	Blockchain and digital currency
12	(Kumhof & Noone, 2021)	Central bank digital currencies: Design principles for financial stability	UK and Australia	Economic Analysis and Policy	CBDCs
13	(Chapman, 2021)	Discussion of "The macroeconomics of central bank digital currencies"	Canada	Journal of Economic Dynamics and Control	Central bank digital currency
14	(Shen & Hou, 2021)	China's central bank digital currency and its	China	Computer Law & Security	Central bank digital currency

		impacts on monetary policy and payment competition: Game changer or regulatory toolkit?		Review: The International Journal of Technology Law and Practice	
15	(Williamson, 2021)	Central bank digital currency and flight to safety	Canada	Journal of Economic Dynamics and Control	Central bank digital currency
16	(Shao et al., 2021)	Research on venture capital based on information, entropy , BP network and CVaR model of digital currency in Yangtze River Delta	China	Procedia Computer Science	International Conference on Identification, Information and Knowledge in the internet of Things, 2020
17	(Li & Huang, 2021)	The genesis , design and implications of China ' s central bank digital currency	China	China Economic Journal	China ' s central bank digital currency
18	(Kuo et al., 2021)	A global perspective on central bank digital currency	China	China Economic Journal	central bank digital currency
19	(Tong & Jiayou, 2021)	A study of the economic impact of central bank digital currency under global competition	China	China Economic Journal	the economic impact of central bank digital currency under global competition
20	(Balvers & Mcdonald, 2020)	Designing a Global Digital Currency	Canada	Journal of International Money and Finance	Global Digital Currency
21	(Boar et al., 2020)	Impending arrival – a sequel to the survey on central bank digital currency	International	Bank for International Settlements	central bank digital currency
22	(Ferrari et al., 2020)	Central bank digital currency in an open economy	European	European Central Bank	Central bank digital currency
23	(Kyriazis, 2020)	Herding behaviour in digital currency markets : An integrated survey and empirical estimation	Greece	Heliyon	digital currency
24	(Duque, 2020)	State involvement in cryptocurrencies. A potential world money?	Japan	The Japanese Political Economy	Cryptocurrency
25	(Ogbonna & Virtus, 2020)	Cashless Policy and the Nigerian Economy : A Disaggregated Approach	Nigeria	International Journal of Humanities Social Sciences and Education (IJHSSE)	Cashless Policy

26	(Bindseil & Bindseil, 2020)	Central Bank Digital Currency : Financial System Implications and Control	European	International Journal of Political Economy	Central Bank Digital Currency
27	(Altan et al., 2019)	Digital currency forecasting with chaotic meta-heuristic bio-inspired signal processing techniques	Turkey, Italy and Canada	Chaos , Solitons and Fractals	Digital currency
28	(Qian, 2019)	Central Bank Digital Currency: optimization of the currency system and its issuance design	China	China Economic Journal	Central Bank Digital Currency
29	(Isah & Babalola, 2019)	Impact of Cashless Economic Policy and Financial Inclusiveness in Nigeria : An Empirical Investigation	Nigeria	Amity Journal of Economics	Cashless Policy
30	(Saito & Iwamura, 2019)	How to Make a Digital Currency on a Blockchain Stable	Japan		Digital Currency and Blockchain
31	(Barontini & Holden, 2019)	Proceeding with caution – a survey on central bank digital currency	International	Bank for International Settlements	Central Bank Digital Currency
32	(Naheem, 2019)	Exploring the links between AML , digital currencies and Blockchain technology	Germany	AML, Digital Currencies and Blockchain Technology	AML, Digital Currencies and Blockchain Technology
33	(Yazid & Zulhuda, 2019)	Cryptocurrencies and Anti-money Laundering Laws: The Need for an Integrated Approach	Malaysia	Emerging Issues in Islamic Finance Law and Practice	Cryptocurrencies and Anti-money Laundering Laws (Chapter 14
34	(Fadhil & Syed, 2019)	Regulating Digital Currency: Taming the Unruly	Malaysia	Emerging Issues in Islamic Finance Law and Practice	Digital Currency (Chapter 15
35	(Dow & Dow, 2019)	Monetary Reform, Central Banks, and Digital Currencies	United Kingdom	International Journal of Political Economy	Monetary Reform on Central Banks and Digital Currencies
36	(Costantini & Costantini, 2019)	Cryptocurrencies: Will Machines Replace Your Banker?	USA	International Journal of Political Economy	Cryptocurrencies
37	(Nelson, 2018)	Financial stability and monetary policy issues associated with digital currencies	USA	Journal of Economics and Business	Financial stability and monetary policy
38	(Hong et al., 2018)	Crowding Out in a Dual Currency Regime? Digital versus Fiat Currency	Korea	Emerging Markets Finance and Trade	Digital versus Fiat Currency
39	(Mancini-griffoli et al., 2018)	Casting Light on Central Bank Digital Currency	International	I M F Staff Discussion Note	Central Bank Digital Currency



40	(Meaning et al., 2018)	Broadening narrow money: monetary policy with a central bank digital currency	England	Bank of England	Digital Currency and Monetary Policy
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