A Study on the recent developments in CBDC implementation in relation to Successful Launch and Failures of CBDC's

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Abstract -The advent of computers and telecommunications technology in the latter half of the 20th century paved the way for electronic money, also known as digital cash. This transition enabled the storage, transfer, and exchange of monetary value electronically. Payment cards, online money transfers, and platforms like PayPal exemplify the shift towards electronic money. In 2009, Bitcoin, the first decentralized digital currency, emerged, introducing blockchain technology—a decentralized and transparent ledger that records all transactions. Bitcoin's success paved the way for numerous other cryptocurrencies like Ethereum, Ripple, and Litecoin, aiming to address limitations and offer additional features. Blockchain technology transcended the realm of digital currencies and found broader applications in sectors such as supply chain management, healthcare, finance, and voting systems. Its versatility demonstrated the potential to revolutionize traditional industries, enhancing transparency, security, and efficiency. Stablecoins are a type of digital currency designed to minimize price volatility by pegging their value to a stable asset, such as a fiat currency or commodity. They offer the advantages of cryptocurrencies, like fast transactions and borderless transfers, while addressing the issue of price fluctuations that often deter mainstream adoption. Decentralized Finance (DeFi) refers to the development of financial applications using blockchain and cryptocurrency technology, without the need for intermediaries like banks. It offers decentralized alternatives to traditional financial services, including lending, borrowing, trading, and asset management. DeFi has gained significant traction and demonstrated the potential to disrupt the traditional financial system.

The present research paper focus on the concept of Central Bank Digital Currency (CBDC's) due to the popularity gained by digital currencies. CBDC's are digital representations of fiat currencies, issued and regulated by central banks, aim to combine the benefits of digital currencies with the stability and trust associated with traditional currencies. Overall, this research paper aims to provide a comprehensive understanding of the evolution of digital currency, shedding light on its historical roots, technological advancements, and implications for the financial landscape of the future.

Keywords: CBDC, DCash, JAM-DEX, Sand Dollar

I - INTRODUCTION

The concept of digital currency has revolutionized the way we perceive and conduct financial transactions. It represents a significant shift from traditional forms of exchange, such as the barter system, to the emergence of cryptocurrencies and central bank digital currencies (CBDCs). This research paper explores the evolution of digital currency, tracing its roots from the early stages of human civilization to the innovative technologies and frameworks that shape the current landscape.

The barter system served as the primary method of trade in the earliest phases of human civilization. It involved direct exchanges of goods and services between individuals, lacking a standardized medium of exchange. However, as communities developed and trade expanded, the limitations of barter became evident, leading to the emergence of commodity money. Items with intrinsic value, such as salt, cowrie shells, and precious metals like gold and silver, started being employed as a means of commerce. Representation money system emerged to overcome the challenges associated with carrying large amounts of precious metals. It involved the use of paper certificates or notes that could be exchanged for a fixed quantity of precious metal held by reputable institutions like banks. This transition facilitated easier transactions, while the paper notes symbolized the underlying value. The 20th century witnessed the rise of fiat currency, driven by governments' desire for

greater control over monetary systems. Fiat currency, declared as legal tender by governments, derives its value from their authority rather than physical backing like gold. Paper money, created and regulated by central banks, became the predominant form of exchange.

The advent of computers and telecommunications technology in the latter half of the 20th century paved the way for electronic money, also known as digital cash. This transition enabled the storage, transfer, and exchange of monetary value electronically. Payment cards, online money transfers, and platforms like PayPal exemplify the shift towards electronic money. In 2009, Bitcoin, the first decentralized digital currency, emerged, introducing blockchain technology—a decentralized and transparent ledger that records all transactions. Bitcoin's success paved the way for numerous other cryptocurrencies like Ethereum, Ripple, and Litecoin, aiming to address limitations and offer additional features. Blockchain technology transcended the realm of digital currencies and found broader applications in sectors such as supply chain management, healthcare, finance, and voting systems. Its versatility demonstrated the potential to revolutionize traditional industries, enhancing transparency, security, and efficiency. Stablecoins are a type of digital currency designed to minimize price volatility by pegging their value to a stable asset, such as a fiat currency or commodity. They offer the advantages of cryptocurrencies, like fast transactions and borderless transfers, while addressing the issue of price fluctuations that often deter mainstream adoption. Decentralized Finance (DeFi) refers to the development of financial applications using blockchain and cryptocurrency technology, without the need for intermediaries like banks. It offers decentralized alternatives to traditional financial services, including lending, borrowing, trading, and asset management. DeFi has gained significant traction and demonstrated the potential to disrupt the traditional financial system.

Central banks globally began exploring the concept of Central Bank Digital Currency (CBDC's) due to the popularity gained by digital currencies. CBDC's are digital representations of fiat currencies, issued and regulated by central banks, aim to combine the benefits of digital currencies with the stability and trust associated with traditional currencies. Overall, this research paper aims to provide a comprehensive understanding of the evolution of digital currency, shedding light on its historical roots, technological advancements, and implications for the financial landscape of the future.

1.1Research Objectives:

1. To examine the motivations and objectives behind the development and implementation of Central Bank Digital Currencies (CBDCs) in various countries.
2. To assess the present status and progress of CBDC adoption globally, including a focus on countries that have launched CBDCs.
3. To identify the challenges and risks associated with issuing and managing CBDCs, such as the impact on traditional banking systems, cybersecurity threats, data privacy, and the need for regulatory frameworks.

II - REVIEW OF LITERATURE

Awang Abu Bakar et al (2023) examined the case of Malaysia and show that Malaysia's Central Bank has no intention to issue a CBDC for Malaysia; however, Malaysia's Central Bank continues to study the CBDC potential especially in the digital assets and payments space

Peterson K. Ozili (2022), study on "Central bank digital currency in India: the case for a digital rupee" demonstrated possible advantages of CBDC adoption like decrease in dependence on cash, increased seigniorage due to lower transaction costs, and less settlement risk. CBDC must be carefully weighed dangers against the advantages, need to make modifications to its existing laws and regulations for the progressive implementation of the CBDC.

Lal B. Suresh (2022), study on "Central Bank Digital Currency in India- an Overview" affirms that CBDC can replace widespread cash usage due to India's unusually high currency-to-GDP ratio (CBDC) and Real-time payments without any interbank settlement would be possible, and the cost of currency administration would be decreased.

According to Hayashi and Toh (2022), central banks in many advanced economies have not yet found a compelling reason to issue a retail CBDC, even though

they have implemented or plan to implement general-purpose or retail CBDCs to promote financial inclusion and enhance their payment systems in a number of emerging markets and developing economies.

Ozili (2022a) conducted a review of the CBDC literature and discovered that many central banks are looking into the possibility of issuing a CBDC due to its numerous advantages. However, some studies have warned against being overly optimistic about the potential advantages of CBDC due to its limiting nature and inability to satisfy multiple conflicting goals.

Ozili (2022c) review on Nigeria introduced the eNaira CBDC, expected to bring about efficient payments and more financial inclusion, but it also carries hazards like digital illiteracy, a higher risk of cyberattacks, data theft, and a shift in the role of banks in a fully developed CBDC economy.

Ozili (2022d) demonstrated that the rise of CBDC has numerous consequences can lead to cryptocurrency regulation and the acceptance of stable coins though the advantages of stable coins do not outweigh the advantages of creating a CBDC. Nonetheless, the overall societal advantages of CBDC seem to outweigh the risks, making it more alluring than cryptocurrencies.

Adalid et al. in 2022, carried out some analytical exercises to determine how a digital euro CBDC might affect bank intermediation in the euro region. It reveals that bank intermediation will differ across credit institutions in times of normal prosperity, and it could be greater during periods of economic hardship. Additionally, they discover that the CBDC compensation and usage caps determine how well the digital euro can influence system-wide bank run dynamics.

Bolt et al (2022) study states that Private digital currencies like cryptocurrency, stable coins, etc. go along with public money unless the effective statute

Xu (2022) elevate the China CBDC will play a role in the RMB's internationalization or even the international monetary system's evolution. Internet and technology companies may join with commercial banks in distributing the China CBDC, which might help to improve domestic financial monitoring and policy implementation.

Fegatelli (2022) examined the conditions that would allow for the widespread adoption of a digital euro without leading to bank disintermediation or a credit crunch. According to the author, the central bank would require suitable procedures in order to regulate the quantity and user cost of CBDC that is in circulation. The central bank should continue to make it simple to use its long-term lending facilities so that banks have an affordable alternative to using client deposits as funding. A digital euro, according to the author, may also improve bank profitability and competitiveness by absorbing substantial amounts of expensive and idle surplus reserves without impairing lending and promoting bank digitalization.

Michel (2022) looked at the American release of a digital dollar CBDC. Although Americans have long held money mostly in digital form, CBDC would be different from other digital currencies that are accessible to the general people because it would be a liability of the Federal Reserve rather than a commercial bank. This characteristic is crucial to the argument that Congress should use to prevent the Federal Reserve from ever issuing a retail CBDC and the federal government would be in charge of issuing deposits, not independently held commercial banks. For a free society, this would be a serious issue because it would give the government an excessive amount of control over people's finances.

The best monetary policy was examined by Davoodal hosseini in 2022 when agents in Canada had access to only cash, only CBDC, or both cash and CBDC. The author demonstrated that, as long as the cost of employing CBDC is reasonable, it might be used to conduct more efficient allocations than cash. Furthermore, having both cash and CBDC readily available could lead to poorer welfare than in situations when either cash or only CBDC are offered in Canada.

Minesso et al. investigated the adoption of a central bank digital currency's effects on the open economy in 2022. They demonstrate that the inclusion of a

CBDC amplifies the international spillovers of shocks to a large level, enhancing international links, but the size of these effects critically depends on the CBDC design and can be significantly dampened if the CBDC possesses specific technical features.

Auer et al (2022) showed that CBDCs should be considered in the full context of the digital economy and the centrality of data; however, CBDCs could raise concerns around competition, payment system integrity and privacy. Chen and Siklos (2022) explored the hypothetical impact of CBDC on inflation and financial stability, and showed that CBDC may not lead to high inflation but it could increase financial instability risks.

Whited et al (2022) examined how introducing a central bank digital currency can affect the banking system. They showed that CBDC might not reduce bank lending unless frictions and synergies bind deposits and lending together. They showed that a CBDC could replace a significant fraction of bank deposits especially when it pays interest. They also showed that CBDC has a much smaller impact on bank lending because banks can replace a large fraction of any lost deposits with wholesale funding

Keister and Monnet (2022) showed that banks would do less maturity transformation when depositors have access to CBDC, which leaves them less exposed to runs. They also showed that monitoring the flow of funds into CBDC allows policymakers to identify and resolve weak banks sooner, which also decreases depositors' incentive to initiate a run on banks. They conclude that a well-designed CBDC may decrease financial fragility

III – THEORETICAL FRAMEWORK

CBDCs (Central Bank Digital Currencies) are digital representations of a country's fiat currency issued and regulated by the central bank. CBDCs aim to combine the benefits of digital currencies, such as fast and secure transactions, with the stability and trust associated with traditional currencies. It is important to note that the specific design and features of CBDCs may vary across different countries and central banks. The implementation of CBDCs requires careful consideration of technological infrastructure, regulatory frameworks, and the potential impact on the financial system and economy. As a result, the types and characteristics of CBDCs may evolve as central banks continue to explore and develop their digital currency strategies.

CBDCs have been around for three decades, despite the misconception that they are a recent idea. The Bank of Finland introduced the Avant smart card, an electronic form of money, in 1993. It is possible to consider the system the first CBDC in history, even if it was ultimately abandoned in the early 2000s. However, it has only been more recently that research into CBDCs has become widely popular worldwide, due to the advancements in technology and a drop in the use of cash. The potential advantages of these technologies, such as how they boost the effectiveness and security of payment systems, are currently being investigated by central banks all around the world. Nearly 100 CBDCs were in either study or development as of July 2022, and only two were operational: the Nigerian eNaira, which debuted in October 2021, and the Bahamian sand dollar, which debuted in October 2020. There are many diverse reasons why nations investigate and issue CBDCs, but in the instance of The Bahamas, the necessity to provide banking services to underserved and unbanked communities on more than 30 of its populated islands was the main impetus.

Leading experts contend that CBDCs can boost the robustness of domestic payment systems and generate more competition in addition to increasing financial inclusion, which could result in better access to money, improved payment efficiency, and decreased transaction costs. Additionally, CBDCs can increase financial flow transparency and may lessen currency substitution—the practice in which a nation utilizes a foreign currency in addition to or instead of its own—in international transactions. While a CBDC may appear to have many advantages on paper, central banks must first decide whether there is a strong basis for adopting them, particularly whether there will be adequate demand. While many are still considering this, some have determined there is not, at least not yet. Furthermore, central banks must think about the risks associated with issuing CBDCs. In order to buy CBDCs, users may take too much cash from banks all at once, which could lead to a crisis. Central banks will also need to consider their ability to control threats

posed by cyberattacks, ensuring data privacy and financial integrity.

There are different types or models of CBDCs, each with its own characteristics and implementation approach. Here are the main types of CBDCs:

1. Retail CBDC: Retail CBDCs are designed for direct use by the public and retail businesses. They provide a digital equivalent of physical cash, allowing individuals to hold and transact with digital currency issued by the central bank. Retail CBDCs can be accessed through digital wallets or mobile applications, enabling instant and secure peer-to-peer transactions.
2. Wholesale CBDC: Wholesale CBDCs are primarily intended for use by financial institutions, such as banks and other authorized participants in the financial system. They are used for interbank settlements, large-scale financial transactions, and the clearing and settlement of securities. Wholesale CBDCs facilitate faster and more efficient transactions between financial institutions, improving liquidity and reducing settlement risks.
3. Hybrid CBDC: Hybrid CBDCs combine features of both retail and wholesale CBDCs. They can serve both individual users and financial institutions, catering to a broader range of use cases. Hybrid CBDCs offer flexibility and versatility in providing digital currency services to both retail consumers and financial entities.
4. Account-Based CBDC: Account-based CBDCs function similarly to traditional bank accounts. Users have direct accounts with the central bank, which hold their digital currency balances. Transactions are conducted by transferring funds between accounts, offering a high level of security and control. Account-based CBDCs allow for greater financial inclusion, as individuals without access to traditional banking services can hold accounts directly with the central bank.
5. Token-Based CBDC: Token-based CBDCs utilize digital tokens or coins that represent the value of the digital currency. These tokens can be stored and transferred using block chain or distributed ledger technology. Token-based CBDCs offer the advantages of decentralization, transparency, and potentially enhanced privacy. They can also facilitate programmable money, allowing for the automation of transactions and the integration of smart contract functionalities.

Countries Launched Central Bank Digital Currencies until 2023:

S.no.	Digital currency	Country / Region	Central Bank(s)	Announcement Year	Status	Retail/Wholesale
1.	JAM-DEX	Jamaica	Bank of Jamaica	2022	Launched	Retail
2.	Sand Dollar	Bahamas	Central Bank of Bahamas	2020	Launched	Retail
3.	e-Naira	Nigeria	Nigeria Central Bank	2021	Launched	Retail
4.	Dcash	Anguilla (Last country in ECCB)	ECCB - Eastern Caribbean Central Bank	2022	Launched	Retail
5.	Dcash	Saint Kitts and Nevis	ECCB - Eastern Caribbean Central Bank	2021	Launched	Retail
6.	Dcash	Antigua and Barbuda	ECCB - Eastern Caribbean Central Bank	2021	Launched	Retail
7.	Dcash	Montserrat	ECCB - Eastern Caribbean Central Bank	2021	Launched	Retail
8.	Dcash	Dominica	ECCB - Eastern Caribbean Central Bank	2021	Launched	Retail
9.	Dcash	Saint Lucia	ECCB - Eastern Caribbean Central Bank	2021	Launched	Retail
10.	Dcash	Saint Vincent and the Grenadines	ECCB - Eastern Caribbean Central Bank	2021	Launched	Retail
11.	Dcash	Grenada	ECCB - Eastern Caribbean Central Bank	2021	Launched	Retail

Bank of Jamaica

1) Jamaica: On December 31, 2021, the Bank of Jamaica (BOJ) announced that it had successfully completed the trial of its retail central bank digital currency (CBDC)-the JAM-DEX. In May 2022, the BOJ announced a phased rollout of the JAM-DEX.

The Jamaican central bank had been working with Ireland-based technology firm eCurrency Mint on the sandbox project between May 2021 and December 2021. The sandbox project completed in February 2022, and named as "Jamaican Digital Exchange or JAM-DEX". In May 2022, the BOJ announced a phased launch of JAM-DEX and stated that users can transact using the JAM-DEX on their digital wallets. The rollout will see a continuation of onboarding existing customers and new customers, allowing two additional wallet providers to distribute CBDCs to their customers.

Motivations

The primary motivation associated with developing the CBDC was to reduce the storage and handling costs of cash usage. JAM-DEX expected to save about seven million US dollars per year, which Jamaica currently spends on replacing, storing, and handling cash.

2) Sand Dollar:

The Bahamian Payments Systems Modernisation Initiative (PSMI) of which Project Sand Dollar is a recent component, targets collectively improved outcomes around financial inclusion and access, making the domestic payments systems more efficient, non-discriminatory in access to financial services across the entire archipelago. The main goals are as follows:

- 100% of the population has access to digital payments services;
- universal access to banking services of a deposit account maintenance nature;
- a reduction in the size of legitimate but unrecorded economic activities that take place in the informal sector;
- Full admission of micro, small and medium-sized businesses into the digital space.

The positive outcomes explicitly aimed at strengthening national defence against money laundering and other illicit ends, including activities that thrive in cash-intensive environments. More universally enabled access to electronic payments and to digital financial services dovetails with the strategy to deliver government services through digital channels, thereby improving tax administration and increasing the efficiency of spending.

Drive toward the Pilot

In November 2019, a special session of the National Payments Council (NPC) convened with key stakeholders to reaffirm the approach to the project, with emphasis on KYC standards for onboarding, zero cost carve out for the P2P payments, and outlines of the intended regulatory standards on data protection. On 27th December, 2019 the Exuma pilot launched, with an expansion to Abaco on 28th February 2020.

Nationwide Launch

On 20th October, 2020 the Central Bank of The Bahamas took Sand Dollar from pilot to production in a national rollout, which made the central bank digital currency available to the general public.

Since its launch, Sand Dollar circulation stands at 303,785, the currency adoption rate is 7.9%. There are 32,736 wallets in circulation with 1,340 sovereign wallets, and circulation has increased by a factor of 3 since the beginning of the pilot.

In October 2020, the Sand Dollar became the first CBDC in the world to go beyond the pilot stage and achieve an official launch. The digital currency became available for use by all Bahamian citizens upon release, while integration with the commercial banking system has been subject to a gradual rollout. The completion of that integration is now imminent, according to the bank. In its statement announcing Project Sand Dollar, the Central Bank of the Bahamas noted that it will "simultaneously promote the development of new regulations for the digital currency, and strengthen consumer protection, especially around data protection standards" as the pilot in Exuma progresses. The Central Bank is now working on achieving full interoperability between its various wallet providers.

Motivations

The motivations for the CBDC pilot include improving financial inclusion and strengthening security against money laundering or illicit economic activities.

3) Nigeria: Project Name – e-Naira

Nigeria launched Africa's first digital currency, the eNaira in October 2021. At the time of launch, the governor of the Central Bank of Nigeria announced that five hundred million eNaira (1.21 million dollars) has already been minted. A phased approach was adopted to the rollout. During the initial phase, only bank account holders could access the eNaira. The next phase includes expansion to the unbanked, with unstructured supplementary service data and offline payments to be released in the medium term. As of December 2021, over six hundred thousand eNaira wallets have been created and more than thirty-five thousand transactions have taken place. Currently, 90 percent of transactions are between people and businesses. As of October 2022, transactions value has risen to just under 18 million USD, 919,000 customers have been on boarded, and 700,000 transactions have taken place. The Nigerian central bank has minted 3 billion eNaira with 2.1 billion issued to financial

institutions. Around 33 commercial banks have been integrated into the eNaira infrastructure.

Motivations

The eNaira is expected to help Nigeria reach its target of increasing financial inclusion from 64 percent to 95 percent. It is projected that a well-managed eNaira could add twenty-nine billion dollars to the GDP over the next ten years.

4) ECCB – Eastern Caribbean Central Bank: DCash in following eight countries:

1) Anguilla
2) Saint Kitts and Nevis:
3) Antigua and Barbuda:
4) Montserrat:
5) Dominica:
6) Saint Lucia:
7) Saint Vincent and the Grenadines:
8) Grenada:

In November 2022, the monetary council of the Eastern Carribbean Central Bank (ECCB) agreed to keep supporting the use of DCash and add two additional functionalities-government payments and third party wallet integration. In June 2022, Anguilla became the last country in the Eastern Carribean Currency Union to launch DCash. The digital currency DCash was officially launched and available to members of the public on March 31, 2021. In January 2022, the entire system was shut down due to technical issues, and resumed service in March 2022.

After commencing development of a digital currency in 2019, the Eastern Caribbean Central Bank launched its digital currency DCash in March 2021 in four of its eight member states. With DCash, the Eastern Caribbean has become the first currency union central bank to issue digital cash. The digital currency pilot is available for use by the public on their smartphones. Consumers and merchants can utilize the DCash App or use it through participating financial institutions. Since its launch in March 2021, DCash has expanded to three more territories. Anguilla is the only remaining state where DCash is to be launched in 2022. In January 2022, the DCash system went offline; customers could no longer transact using the wallet. DCash resumed service in March 2022 and in April 2022, officially launched in Anguilla.

Motivations

Financial inclusion is the primary goal of the Eastern Caribbean Currency Union. The other motives are enhancing anti-money laundering and combating the financing of terrorism measures, and expanding banking across difficult terrains.

Cancelled CBDC's:

Senegal – eCFA

The eCFA project was cancelled in 2016. In early 2016, Dublin-based digital currency specialist eCurrency Mint entered talks with the central bank of the West African Economic and Monetary Union, the Banque Centrale des Etats de l'Afrique de l'Ouest (BCEAO). Senegal, one of the member countries of WAEMU, was meant to be the site of a soft launch of eCurrency Mint's technology and serve as a testing ground for a union-wide digital currency. In November 2016, a regional Senegalese bank, Banque Régionalede Marchés (BRM), announced the launch of a digital currency called the eCFA in Senegal named after WAEMU's fiat currency CFA. Importantly, the eCFA in Senegal was not declared legal tender by the BCEAO, but an experiment that the central bank could observe and learn from. However, the eCFA was soon criticized by the BCEAO due to a lack of compliance with e-money regulations. After the BCEAO distanced itself from the project, and cancelled in 2016. The central bank expressed that it had no desire to establish a central bank digital currency in the near future.

Motivations

One of the principle motivations behind the project was to increase monetary sovereignty.

Ecuador – Dinero Electrónico

The Ecuadorian Central Bank launched its digital currency, the Sistema de Dinero Electrónico (SDE), in 2014. Due to low levels of trust in the central bank, the project failed and cancelled in 2017.

Since 2000, the US Dollar has been the official currency of Ecuador. The Ecuadorian Central Bank towards the end of 2014 launched the Sistema de Dinero Electrónico, and each dollar in the SDE was backed by a physical dollar stored in the BCE. Although the BCE predicted five hundred thousand users by the end of 2015, only five thousand users signed up. At the end of 2017, there were 402,515 accounts, but less than 30 percent of these were active. In 2016, the SDE accounted for less than 0.003 percent of currency in circulation. Widespread mistrust of the BCE, largely due to previous government defaults,

contributed to the meager adoption of the SDE, and the project was shut down in December 2017.

Motivations

The motivations behind the launch in 2014 included improving access to banking for poorer citizens and reducing dependency on physical cash.

FINDINGS

1. CBDCs have gained significant attention globally, with numerous countries exploring and developing their own digital currencies. As of 2023, several countries have already launched CBDCs, including Jamaica, the Bahamas, Nigeria, and various Eastern Caribbean states.
2. The motivations for CBDC adoption vary across countries, but common objectives include enhancing financial inclusion, improving payment system efficiency, reducing transaction costs, and strengthening anti-money laundering measures.
3. CBDCs offer different models and functionalities, catering to the needs of retail consumers, financial institutions, or both. Retail CBDCs provide digital cash for direct use by the public, while wholesale CBDCs facilitate interbank settlements and large-scale financial transactions. Hybrid CBDCs combine features of both retail and wholesale CBDCs, and account-based CBDCs function similarly to traditional bank accounts. Token-based CBDCs utilize digital tokens or coins for transactions.
4. CBDCs have been launched or are under development in various countries, with a focus on improving financial inclusion, enhancing payment systems, and reducing transaction costs. The motivations behind CBDC implementation differ, such as providing banking services to underserved communities (Bahamas), reducing cash handling costs (Jamaica), and increasing financial inclusion (Nigeria).
5. Recent operational CBDCs include JAM-DEX in Jamaica, Sand Dollar in the Bahamas, and eNaira in Nigeria. These CBDCs have achieved successful phased rollouts, enabling users to transact digitally and offering potential benefits in terms of cost savings, increased access to financial services, and improved payment efficiency.
6. The implementation of CBDCs requires careful consideration of technological infrastructure, regulatory frameworks, and potential risks. Central banks need to assess demand, manage the risks associated with CBDC adoption, and ensure data privacy and financial integrity.
7. Challenges include the potential impact on the financial system, the ability to control cyber threats, and the need for interoperability with existing financial infrastructure.
8. Double spending scams exploiting protocol issues or application software vulnerabilities are a risk existing for digital currencies
9. At the individual level, the users will need to be careful and adequately equipped to handle the transactions with proper safeguards relating to password sharing of OTP, protection of the device etc.,
10. At the broader level, the systems will need to be strong enough to withstand all kinds of cyberattacks, as people's wealth and savings are involved and not merely ordinary data.

IV- CONCLUSION

The implementation of Central Bank Digital Currencies (CBDCs) has gained significant attention in recent years as countries explore the potential benefits and challenges associated with digitalizing their fiat currencies. However, the concept of CBDCs dates back several decades, advancements in technology and changing payment trends have sparked renewed interest and research in this area. CBDCs offer several potential advantages, including faster and more secure transactions, increased financial inclusion, improved payment efficiency, reduced transaction costs, and enhanced transparency in financial flows. They have the potential to strengthen domestic payment systems, foster competition, and mitigate currency substitution in international transactions.

Nevertheless, the adoption of CBDCs requires careful consideration. Central banks must assess the demand for CBDCs and evaluate the risks associated with their issuance, such as the potential for bank runs or cyberattacks. Additionally, the design and characteristics of CBDCs can vary, with different types like retail, wholesale, hybrid, account-based, and token-based CBDCs, each catering to specific use

cases. Several countries have already launched their CBDCs, with notable examples including the JAM-DEX in Jamaica, the Sand Dollar in the Bahamas, and the e-Naira in Nigeria. These initiatives aim to address specific challenges and goals, such as reducing cash handling costs, improving financial inclusion, and strengthening security against illicit activities. As central banks continue to explore and develop their digital currency strategies, it is crucial to consider the technological infrastructure, regulatory frameworks, and potential impacts on the financial system and economy. Ongoing research and collaboration among central banks worldwide will play a vital role in shaping the future of CBDCs, ensuring they effectively meet the evolving needs of societies while maintaining stability and trust in the financial system.

V- LIMITATION OF THE STUDY/FURTHER SCOPE

According to Atlantic council CBDC tracker, 120 countries CBDC's tracked, 11 countries launched CBDC's, 18 countries CBDC's are in Pilot stage, 32 countries CBDC's are in Development stage, 40 countries CBDC's are in Research stage, 15 countries CBDC's are in inactive stage and 2 countries CBDC's are in Cancelled stage. The present study focused only on the successful launched and Cancelled CBDC's. Further research can made on the reasons behind the CBDC's launched and became inactive to strengthen the other countries CBDC's are in Pilot stage, Development stage and Research stage.

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