IMPACTS OF DIGITAL CURRENCY ON FINANCIAL NETWORKS

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Abstract. *The evolution of currency has seen significant advancements, which have been accelerated by the advent of the Internet. When comparing digital currency to traditional forms of money, it becomes evident that digital currency offers several distinct advantages. Cryptocurrencies, such as Bitcoin, Ethereum, and others, represent a range of potential payment methods. The current epidemic precipitated a notable increase in attention in emerging digital technologies. The appreciation of money has led to an increased focus on the study of digital currencies. The establishment of several central banks has been prompted by the launch and increasing popularity of new currencies. Consequently, banks have initiated investigations into the feasibility of developing their own forms of currency. All things are novel. Academics are credited with the origination of the term "central bank digital currency." There exists a lack of consensus about the operational mechanisms and implementation strategies for digital currency. The future is characterised by uncertainty due to the numerous and diverse possibilities it encompasses. There are evident deficiencies that require attention, along with a multitude of possible options to enhance existing systems. When building this new currency, it is important to have a comprehensive understanding of the diverse use cases and their corresponding requirements for its execution. Ultimately, the available data indicates that digital currency is now in its promising phase, as seen by ongoing research on central bank digital currency that highlights promising prospects. Theoretically, there exists the potential to provide a more efficient transactional solution compared to conventional currencies. Further investigation into digital money is warranted, since little modifications to existing currency systems have the potential to provide more effective and advantageous future resolutions.*

This article would not have been possible without the guidance and continuous support of my lecturers. The mentor's insightful instruction has greatly enriched my comprehension and broadened my viewpoint as a researcher, resulting in a considerable enhancement of my experience. Within my thesis, I have included citations from other scholars whose work I have utilised as references. I find their studies to be inspirational and I acknowledge the plethora of concepts and theories that I have included into my own work. The support received really aided in the integration of my studies, and the understanding of the subjects has been crucial in the effective accomplishment of my project.

Keywords*: money, cryptocurrencies, banks, advancements.*

Background

Throughout its inception, the role of money within our societal framework has undergone a series of transformations, advancements, and broadened scopes. With the advent of novel concepts and technological advancements, currency has assumed a more robust and influential role in facilitating commercial transactions and facilitating the exchange of goods and services. Significant transformation and advancements emerged throughout the 7th century inside the Yellow River Valley of China, coinciding with the reign of the Tang dynasty, with the use of paper

currency. The introduction of the Internet marked a huge advancement, leading to several opportunities like online banking, e-commerce, and the establishment of a more interconnected global society.

The notion of digital currency was first introduced by David Chaum during the early 1980s. E-gold, which may be considered as the pioneering form of digital currency, was introduced to the public more than fifteen years after its inception. E-gold had a significant increase in its membership base, reaching several million individuals, prior to its cessation by the United States government in 2008. Despite the cessation of e-gold in 2008, the discontinuation of this particular digital currency does not signify the demise of the broader concept of digital currencies. In 2008, an individual or organisation operating under the pseudonym Satoshi Nakamoto published a paper entitled "Bitcoin: A Peer-to-Peer Electronic Cash System." Bitcoin was launched online a few days subsequent to its inception, and subsequently, the initial block, commonly referred to as the genesis block, was generated. The notion expounded upon in this article proposes the elimination of a central authority, hence enabling direct delivery of internet payments between parties.

Digital currency refers to a kind of monetary exchange that exists solely in digital or electronic format. This form of currency is sometimes referred to as electronic money, digital money, electronic currency, or cybercash. Digital currencies lack physical attributes and exist solely in digital format. Digital currency transactions are carried out via computers or electronic wallets that are connected to the internet or specific networks. In contrast, physical currencies, such as banknotes and minted coins, possess tangible attributes that give them discernible physical traits and characteristics. The execution of transactions involving these currencies is only viable when their holders possess them physically. Similar to traditional currencies, digital currencies have inherent value. Cryptocurrencies have the capability to be utilised as a means of payment for various goods and services. They may also be limited to particular online communities, such as platforms dedicated to gaming, online gambling, or social networking. There are digital currencies that may be classified as either centralised or decentralised in nature. Fiat currency, a tangible type of cash, is manufactured and disseminated in a centralised manner by a central bank and governmental entities. Decentralised digital monetary systems encompass prominent cryptocurrencies, like Bitcoin and Ethereum.

As of December 6, 2021, Bitcoin, which holds the largest market share, had a valuation of 925.0 billion dollars. The valuation of Bitcoin and Ethereum is subject to intentional manipulation, and the fluctuations in their prices do not exhibit a correlation with the conventional stock market, although Bitcoin has demonstrated some indications of aligning with the regular stock market in recent times. The value of a cryptocurrency is contingent upon the willingness of others to pay for it, and the substantial increase in overall market capitalization has stimulated the emergence of novel cryptocurrencies and prompted further exploration in this domain. The value of a cryptocurrency is determined by the willingness of people to pay for it, and the rapid increase in overall market capitalization has led to the emergence of other cryptocurrencies and increased research activity within the sector. Price fluctuations can occur at a quick pace due to the inherent uncertainty surrounding the determination of an item's value, which may even be subjective or indeterminate. During the initial weeks of November 2021, the market reached its highest point, approximately amounting to three trillion US dollars. Considerable investigation has been undertaken pertaining to discrete digital money technologies and alternative monetary policies. Nevertheless, it is important to highlight that the current body of research frequently demonstrates

a restricted range, mostly concentrating on the examination of a single digital currency. The primary objective of this study is to offer a complete synthesis of current scholarly literature pertaining to digital currencies. Additionally, this research seeks to contribute original perspectives by investigating many dimensions that digital monetary systems need to consider and tackle. Recent studies have revealed a lack of clarity and a variety of conflicting views, which have not been thoroughly evaluated together.

The examination and analysis of currency's development and examination have been noticed across several historical epochs. The advent of digital currency in modern times implies the possibility of augmenting current systems. There has been a notable increase in the popularity of digital assets and emerging payment mechanisms. The increased utilisation has resulted in an increase in value and a wide range of unique applications. Given the extensive investigations conducted by governmental and organisational entities worldwide regarding digital currency, the current focus revolves around establishing the most suitable attributes and functionalities for an ideal digital currency. Additionally, there is a need to ascertain the preferred operational mechanisms for this currency across various scenarios. The occurrence of globalisation, in conjunction with the current pandemic, has resulted in increased focus on digital currency. The existence of many private currencies highlights the necessity for a government-regulated alternative.

The Aim

The objective of this thesis is to analyse the potential developments of digital money in relation to its underlying technology and existing methods of application. Recognise the inherent constraints and endeavour to develop approaches to alleviate their impact. Governments throughout the globe are currently engaged in the examination and potential implementation of novel currencies, such as the Swedish E-krona, as a direct reaction to the growing need for digital monetary systems. The aforementioned endeavour is being pursued by Sveriges Riksbank, the principal monetary authority of Sweden. Given the extensive and pervasive use of currency as a potent tool, even minor advancements in this emerging technology might provide benefits. Digital currencies have the potential to provide novel opportunities, such as facilitating internet transactions. Additionally, it reduces the expenses and complexities associated with the production and administration of tangible currency. Having a deeper understanding of modern technology might potentially empower individuals and corporations to make more knowledgeable assessments. This research will provide valuable insights for organisations and people seeking to enhance their understanding of the current market and technological landscape. Additionally, it will be of interest to financial institutions and private sectors that are keen on exploring the technology and its potential future developments. The primary emphasis of the study will be on the technological aspects of digital money, rather than its financial legality or importance. This analysis refrains from making any assertions or forecasts on future price or trend fluctuations. Additionally, it does not go into the question of whether people or organisations should use digital currencies. The course assumes that students possess a foundational comprehension of technology, computer science, and the fundamental principles related to digital money. This article will analyze three specific sorts of monetary utilization scenarios. Currency serves three fundamental purposes: as a medium of commerce, a standard for measuring value, and a mechanism for storing wealth. The three cases described earlier will be briefly presented as a series of scenarios in order to assess and compare the efficacy of various therapies. The first scenario comprises a direct in-

person transaction, whereas the second situation refers to an online purchase of big or moderate size, when time restrictions are considerably less important. The ultimate outcome of this investigation will be the preservation of value. Previous research has mostly focused on similar characteristics, and by explicitly investigating the usage of currency, it will be more practical to assess the usefulness and efficiency of digital money. This paper will include a wide array of comprehensive topics.

Boundaries

This research will not include all implementations; rather, it will draw generalizations from the chosen ones. Bitcoin, Ethereum, and Tether were used as examples to especially emphasize the notion of Central Bank Digital Currency, encompassing China's CBDC and Sweden's E-krona. Bitcoin and Ethereum were selected due to their significant status as globally recognized cryptocurrencies and their distinctive operational concepts. Tether was selected as the third choice because it has the position of being the stable currency with the most market capitalization, thereby earning it the highest level of respect. China, as one of the countries actively researching central bank digital currencies (CBDCs), possesses a robust economy and is leading the way in CBDC investigation. The Swedish initiative to adopt the E-krona is currently under scrutiny in relation to previous efforts centered around the E-krona. This article presupposes the presence of pre-established infrastructure to facilitate this technology, enabling the examination of the money as if it is now being used. The money is said to be easily obtainable and generally acknowledged. Both of these assumptions will limit the scope of the theory. It presupposes that the systems are employed in a fair and unbiased manner. Put simply, individuals inside the system will prioritize their own interests. While hacking or theft may still occur, people will eventually pursue what is most advantageous for themselves. By assuming fair and just utilization, the discussion might focus only on the technology, therefore restricting its range.

Assessment

The efficacy of the report will depend on its ability to sufficiently answer the scientific inquiries posed, while considering the potential for enhancing existing technologies and concepts. The resolution to question one will be determined after analyzing digital and fiat cash. Fiat currencies are evaluated and employed as a standard against which future technologies must exceed in order to be considered advanced. Question two will be considered resolved after a comprehensive analysis and evaluation of the different currencies and their underlying implementations have been conducted, taking into account the provided scenarios. The aim of this report will be considered accomplished if an assessment of the overall efficiency of current concepts has been carried out, suggested ideas have been expressed, and their viability has been appraised.

Pertinent hypothesis

This article offers a comprehensive summary of the ongoing research and advancements in the field of digital money. The term "currency" is defined and the present restrictions around the usage of money are explained. The preceding study is succinctly outlined, and more investigation is suggested to attain a more comprehensive comprehension of digital currency.

Currency

Currency is a widely accepted means of exchange that facilitates the purchase and sale of goods and services. Currency was utilized to address the challenges inherent in barter and trade, as players were required to hold a desired item that the other party sought in exchange. The main

objective of this technology is to function as a mechanism for storing value and facilitating the exchange of goods and services. Consequently, it enhances the efficiency of the business process. Currency is often categorized as either paper or coins, both of which are officially authorized by a governing body and universally acknowledged to possess a stable value. The fundamental concept has exhibited long-lasting stability over a prolonged period of time. It serves as a method for expressing worth and enables the assessment of items across several categories using a designated measure. Over the course of history, several changes and advancements have occurred, including the current rise of digital money. This topic will be expanded upon in subsequent sections of this inquiry. This study aims to analyze several circumstances in which a currency is employed. The utility of a currency can varies based on the particular context, since diverse circumstances may need distinct criteria for a medium of exchange. In the aforementioned scenarios, it is essential to consider the viewpoints of all parties engaged in the transaction. Both the spender and the beneficiary have the ability to assign different levels of importance to numerous things. Currency may be categorized into three main functions: serving as a medium of exchange, functioning as a store of value, and acting as a unit of account.

A unit of account is employed for the purpose of determining the value of goods and services.

One strategy for the conservation of economic value.

A medium of exchange is a facilitator of economic and financial transactions.

Everyday transactions often include little financial operations that require convenient access and quick, simple use. The situation at hand entails a significant movement of funds over long distances, with the primary focus being on achieving cost efficiency rather than prioritising speedy transactions. Preserving money requires a storage solution that is secure, reliable, and conveniently accessible, with the interest rate being an important consideration. Modern currencies are required to complete a diverse range of obligations and demonstrate effective operation in many situations, while also satisfying the requirements of all important parties involved. Although there may be difficulties in attaining overall improvements in all sectors, focusing on specific areas of application might help identify practical approaches to make progress. How can different technologies be utilized to improve performance based on certain criteria? Currency serves several purposes and may be expressed in different forms. Currency encompasses tangible mediums of exchange, such as paper bills and metallic coins, as well as intangible representations of numerical values held within financial institutions. Moreover, it is essential to acknowledge that currency may also be represented by digital tokens safely stored on a blockchain network.

Digital Currency Types

Digital currency reduces the need for physical monetary transactions. Moreover, it improves banking ease by allowing users to carry out personal banking transactions without the necessity of visiting a physical branch or dealing with physical currency. To align with the increasing adoption of digital money, banks are reducing the size of their retail workforce. Multiple locations are closing down as a result of becoming outdated due to the growing use of online banking. However, this ease comes with a cost since banks are unable to foster personal relationships with customers and cultivate loyalty. Furthermore, due to the lack of in-person sales opportunities, banks are unable to participate in cross-selling their other products. Digital money encompasses the diverse range of currencies that exist inside the electronic sphere. Typically, there exist three types of currencies:

Cryptocurrencies

Cryptocurrencies are digital currencies that employ encryption to safeguard and verify network transactions. Moreover, cryptography is utilised to supervise and regulate the creation of these currencies. Bitcoin and Ethereum are both examples of digital money known as cryptocurrencies. Cryptocurrency regulation differs depending on the jurisdiction. Cryptocurrencies are classified as virtual currencies since they are not regulated and only exist in digital form.

Virtual Currency

Virtual currencies are uncontrolled digital currencies that are supervised by developers or a founding organisation with numerous stakeholders. These currencies can also be governed algorithmically via a specific network protocol. A gaming network token is an instance of a virtual money that is produced and regulated by developers.

Digital Currencies Issued by Central Banks

Central bank digital currencies (CBDCs) refer to digital currencies that are exclusively regulated and issued by a nation's central bank. A Central Bank Digital money (CBDC) has the capacity to function as a complement or substitute for conventional fiat money. A Central Bank Digital cash (CBDC) exclusively exists in a digital format, unlike fiat cash, which may be found in all physical and digital forms. England, Sweden, and Uruguay are now evaluating ideas to develop digital versions of their official currencies. Although the value of Bitcoin and other cryptocurrencies has risen considerably, its main function still revolves around speculation or acquiring other speculative assets. Despite limited merchant adoption in some areas like El Salvador, the high volatility and associated difficulties of digital currencies render them impractical for the majority of daily transactions.

Several organisations have attempted to mitigate volatility by developing stablecoins, which are cryptocurrencies that are pegged to the value of conventional fiat currency. This may be accomplished at times by depositing an equal amount of traditional currency, which is subsequently converted into tokens. Nevertheless, stablecoin issuers such as Tether have employed these deposits for more speculative endeavours, leading to concerns about their vulnerability to a potential market downturn. Another possible use is the introduction of a digital currency by a country's central bank or monetary authority. These tokens will be kept and maintained in online wallets, similar to cryptocurrencies. Nevertheless, the central bank would have the power to generate and halt tokens as necessary. Several countries, notably China, have presented recommendations for the adoption of digital currencies.

Modern innovations pose significant obstacles

While digital currencies and their associated technologies are expected to reduce transaction costs and the costs of obtaining and sharing information, there is a risk that this might disrupt financial markets and accelerate the spread of market contagion. These enterprises have the capacity to significantly impact the current business models and operations of traditional banks inside the financial system, hence influencing the central banks' endeavors to uphold financial stability through the banking sector. Once the numerous deficiencies in the financial system are rectified, banks will cease to derive benefits from prior competitive or anti-competitive earnings. The subject of the emergence of banks and their enduring impact on the generation of currency is exceedingly pertinent. The implementation of monetary policy becomes increasingly challenging when conventional commercial banks see a decline in their position

within the financial sector, resulting in a weakened ability of central banks to settle and facilitate transactions among financial institutions. What are the consequences of decentralizing payment systems? During an economic crisis, central banks should prioritize their focus on the potential difficulties arising from decentralization and the absence of a well-established institutional framework for payment systems. A crisis of trust arises when decentralized payment systems come under scrutiny or encounter obstacles due to various factors. This has the potential to impact both the stability of the monetary system and the general level of economic activity.

Literature Review: Theory

The Dangers of Digital Money

The widespread adoption of digital money has resulted in a substantial rise in payment fraud, presenting a considerable obstacle. Payment fraud involves a broad spectrum of deceitful actions. However, it frequently signifies dishonest or illegal transactions carried out by a cybercriminal. Common types of payment fraud include:

Payments that are fraudulent

Unlawful payments

Internal deception

Theft of data

Embargo violations and punishments

Without a physical monetary exchange, it is impossible to determine the identity of the receiver in a transaction. It allows crooks to get confidential information or deceive individuals through the use of digital money. Despite the progress made in payment security, fraudsters have concurrently developed more complex fraudulent schemes. The prevalence of financial piracy is on the rise and shows no indication of slowing down. Criminals are getting more skilled at finding weaknesses and creating innovative methods to exploit digital currencies. Cybercriminals exhibit unwavering determination in their efforts to infiltrate payment platforms. In the event that they have challenges with one method, they will quickly redirect their focus and turn it towards different sources of transactions.

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Blockchain

The concept often mistaken for cryptocurrency is blockchain. Blockchain is a cryptographic distributed ledger that securely stores data, including records of financial transactions. It enables concurrent access and distribution of this data via a decentralised network that is publicly accessible. Blockchain technologies and distributed ledgers are garnering significant interest from many endeavours across several domains. The concept existed before the establishment of Bitcoin; however, Bitcoin is largely recognised for popularising it. A blockchain is commonly defined as a sequential arrangement of blocks, whereby each block contains either a solitary unit or a collection of data packages including many transactions. The chain experiences extension as each brick is added, and is depicted in a sequential manner, with all blocks sharing a common history. The entirety of the blockchain comprises a comprehensive log that incorporates all verified transactions conducted during the lifespan of the blockchain. Each subsequent block in the chain contains a cryptographic hash of the preceding block, enabling a seamless traceability of the whole chain to the initial or founding transaction.

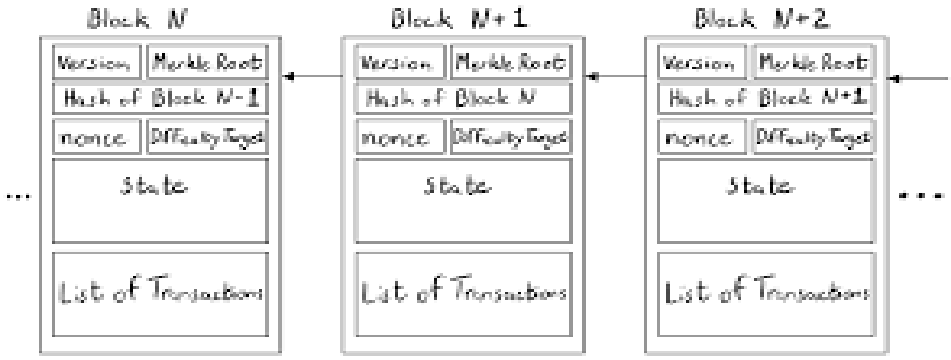

Figure 1. Blockchain structure

Each block inside these ledgers consists of a header, metadata, and block data. The header includes the block number (indicating its position in the chain), its hash, and the hash of the previous block, which creates a link and acts as a distinct identity. The block data comprises all the transactions within the block, organised in a chronological order. The metadata of each block may have diverse particulars such as the timestamp of creation, public key, and the signature of the originator. A problem may arise when the size of the blocks is quite great in comparison to the frequency of adding new blocks to the chain, leading to a steadily expanding ledger. Every digital currency has the capacity to create its own block structure and accept varying sizes and amounts of transactions. The effective use of a blockchain relies on its specific intended function. Nevertheless, the core idea of a database that is open to the public and can be verified by anybody at any time is a noteworthy advancement, regardless of the particular cryptographic methods and consensus procedures used. To gain a more thorough comprehension of blockchain technology, I suggest reading the essay on Blockchain Technology by Berkley Engineering.

Ethereum

Ethereum is the main competitor to Bitcoin. Presently, it maintains the second-highest market capitalization, having formerly shared the top spot with Bitcoin before descending to second place. Ethereum and Bitcoin, as cryptocurrencies, exhibit several characteristics. Both Ethereum and Bitcoin employ the blockchain network. This enhances the worth of these cryptocurrencies and also raises the amount of security required to maintain authority over the digital money. However, Ethereum is the name given to the network, but Ether is the specific coin used within it. The value of ETH is bolstered by the combination of the blockchain's solid security and the substantial demand for it.

Tether

Tether is a well-recognised stable cryptocurrency that operates as a form of digital currency. Since its establishment in 2014, it presently ranks as the fourth-largest cryptocurrency worldwide in terms of market capitalization. Tether launched a digital asset specifically created to maintain a stable exchange rate of one-to-one between a cryptocurrency token and a fiat currency. Tether is generated on the Bitcoin network and backed by a 1:1 ratio, indicating that each tether is roughly equal to one US dollar. Once a Tether is established, it operates in a manner comparable to other digital currencies, enabling users to engage in transactions, transfer cash, or save wealth. Tether functions on the Bitcoin blockchain and shares comparable characteristics with other cryptocurrencies. The system functions via a peer-to-peer network, offering a partially anonymous,

decentralised, and cryptographically protected environment. The main goal is to reduce and eliminate differences in value and encourage the adoption of a uniform unit of measurement for financial reporting. Despite the possibility of inflation, it is now tied to the US dollar, which is a fiat currency without backing from a physical object. The Tether white paper delineates several possible risks, including the probability of the firm encountering insolvency or the likely occurrence of the bank responsible for protecting its funds imposing a freeze or seizure. Moreover, this system functions in a similar fashion to Bitcoin, but also depending on a centralised authority.

Virtual Currency

Virtual currency denotes an uncontrolled kind of digital money. A central bank lacks the jurisdiction to generate or oversee it. Virtual currencies, such as Bitcoin, Litecoin, and XRP, exemplify this point. Cryptocurrency is a form of digital currency that is classified as a virtual currency. Virtual cash is an unregulated kind of digital currency. This currency is issued and managed by a private company instead of a central bank. As a result, it stays unaffected by alterations in monetary policy. Cryptocurrency is a form of digital currency that employs encryption to guarantee the safety and authentication of financial transactions. Cryptocurrencies rely on blockchain networks. Cryptocurrencies are digital currencies that function in a decentralised fashion.

Around five years ago, Bitcoin demonstrated the ability to provide anonymity. However, a significant change is taking place, led by the Federal Bureau of Investigation (FBI) and other law enforcement agencies. Most Bitcoin users are law-abiding individuals who highly prioritise their privacy. Anonymity is often perceived as a means to engage in financial fraud. This served as a trigger to demonstrate a concerted effort towards the regulation of digital money. Policymakers are facing increasingly intricate challenges due to the growing popularity of virtual currencies. In 2013, the US Department of Treasury published a comprehensive guidebook providing thorough instructions on the use of digital currency and money transmitters. Various attempts were implemented during that period to enact legislation concerning Bitcoin, signifying that Bitcoin should be classified as a taxable asset. The use of digital currencies has gained popularity as a means of conducting transactions due to its ability to provide anonymity and privacy. As previously stated, cybercriminals used to heavily target digital currency.

Bitcoins are exchanged directly among participants, removing the necessity for a middleman, so guaranteeing a substantial level of confidentiality and anonymity. The transactions are documented in a publicly available ledger as cryptographic representations, devoid of any incorporation of personal data. Engaging in Bitcoin trading is akin to exchanging actual cash, but conducted through online means. Enforcing laws on digital currency weakens a technology that supports the idea of confidentiality. Regulation is eroding the privacy associated with digital currency. Consider it as managing a business within an account that is subject to strict secrecy requirements. To exercise control over those transactions, the system must eliminate the aspect of secrecy.

Regulating digital currency would compromise its function as a facilitator of privacy and diminish its appeal. People seeking anonymity in the field of digital currency will actively seek out other platforms in places with less strict restrictions. However, the obligation for businesses and individuals to reveal information to the government and other groups might potentially lead to infringements on privacy in the context of regulating digital currency. The absence of

regulation for digital currency elicits apprehension among citizens globally, mostly owing to the constrained amount of confidence it entails.

Establishing a legal framework for digital currencies is crucial not just for maintaining public safety and deterring criminal activity, but also for other important reasons. However, it is essential to refrain from obstructing the advancement of nascent technology. To ensure effective regulation of digital currency, it is crucial to achieve a balanced state where privacy is protected, corporate growth is fostered, and cutting-edge technology is promoted.

Due to the significant trading volume of cryptocurrencies, it is crucial for accounting standard-setters to tackle this matter. By February 2022, it is projected that the total market capitalization of cryptocurrencies would reach around USD 200 billion. This value represents a substantial decline in comparison to the highest point reached in November 2021, when the total value of the cryptocurrency market nearly approached USD 300 billion (DeMatteo, 2022). Existing financial reporting standards do not explicitly include or provide instructions on how to handle cryptocurrency. Given the lack of applicable IFRS standards for cryptocurrencies, several accounting practises are utilised worldwide. Existing regulations include an agenda decision made by the International Financial Reporting Interpretations Committee (IFRIC), an interpretation published by the Australian Accounting Standards Board (AASB), and reports produced by major accounting firms. The IFRIC agenda decision, disclosed in June 2019, mandates that cryptocurrencies be categorised as an intangible asset within the purview of 'IAS 38 Intangible Assets'. The agenda also includes requirements for the disclosure of cryptocurrency in financial statements. At now, there is an absence of an International Financial Reporting Standards (IFRS) guideline specifically for cryptocurrencies. Consequently, there is a dearth of universally accepted accounting procedures for incorporating them into financial statements. Based on recent research by EY (2021), the International Accounting Standards Board (IASB) has not yet issued any further directives on cryptocurrencies. However, it remains vigilant in monitoring their progress.

Research Methodology

This section provides a clear explanation of the approach used to explore the issue of digital money and the reasons for choosing it. Firstly, the research process is presented. The methodological approach is thereafter explained using three unique phases. The method is finally proven to be correct or justified. In the end, the assessment of the approach's reliability and validity is conducted.

An investigation will be conducted to scrutinise the chosen matter. Before moving on, a thorough analysis of the existing literature will be conducted. This will be conducted in order to improve understanding of existing problems and promote the creation of innovative concepts. Moreover, data and information from previous research will be collected. As data is collected and improved, the scope of the investigation will get narrower. By using data from previous research, this approach will efficiently decrease the amount of time required and minimise the possibility of mistakes that may occur during the measurement of the data in question. Given the limited time and resources of the thesis, it will also enable a broader scope.

The data collecting and analysis requirements are connected to the above listed conditions. The key considerations for prioritising a rapid face-to-face transaction are the transaction's speed, a user-friendly interface, the system's capacity to manage increasing activity, and cost-effectiveness for all parties involved. The second scenario would put the focus on the reliability, safety, and affordability of online transactions. In order to effectively preserve value, some

essential elements must be present: security, stability, quick accessibility, and user-friendly accessibility.

First stage

The first step involves a thorough analysis of pertinent literature. The author must use prudence and have a critical perspective when evaluating information. The vast bulk of the papers, books, and research will be obtained from esteemed publishers and periodicals. Using biased sources that may provide a misleading representation of the subject matter. The literature review serves as the essential groundwork for subsequent investigation and analysis. Adopting this method will result in a thorough understanding of the topic and a deeper grasp of collecting and analysing data. An examination of contemporary literature that addresses the subject of digital currency, either explicitly or implicitly, is imperative. My interests have encompassed a wide range of topics, spanning from the fundamental notions of digital money to the intricate applications of issues like consensus procedures, monetary policy, and blockchain technology. To get a profound comprehension of contemporary subjects, the author must utilise analytical reasoning while selecting literature and participate in extensive reading.

Second stage

The last stage involves gathering easily accessible data from existing academic research and analysis. The data is collected with a specific application of the fundamental science in mind, with the primary goal of being analysed in connection to this progress. The following data sources, obtained from existing implementations and research, should be considered:

- **Efficiency**
- **Scalability**
- **Usability**
- **Security**
- **Stability**

The **efficiency** will be evaluated by analysing both the total energy usage and the energy consumption per transaction. The chosen units of measurement will be Watts and Joules. **Scalability** pertains to the ability of a digital currency to effectively process a substantial volume of transactions. The performance will be measured using the metric of transactions per second. Furthermore, it will predict the pace of growth of the blockchain or other data when new transactions are included, quantified in Bytes. The length of time needed for the validation and receipt of cash will be taken into account when determining the **usability** rating. Furthermore, it will consider the expenditure of the transaction in US dollars. The degree of **security** will determine the amount of challenge in gaining control over the network, obtaining a significant portion of voting power, or exerting influence on the system. Hence, it is imperative to do a comprehensive analysis of the potential, costs, and computational resources required to accomplish any of these goals. The units of measurement will be denominated in US dollars and expressed as percentages. The **stability** will be assessed by employing the pricing history. The currency used will be the United States dollar. Furthermore, it will assess the frequency of network disruptions and the number of reversed transactions in past occurrences.

Third stage

The last phase will entail the examination and evaluation of the data. Assessing several implementations over three specified scenarios. The evaluation will analyse the energy usage and financial expenses associated with the implementation. Scalability, however, refers to the

degree to which an implementation may be expanded and its capacity to accommodate changes. The effectiveness of an implementation depends on its capacity to function efficiently and smoothly in certain circumstances, whereas the security of an implementation is determined by its susceptibility to hacking or bypassing the system. Both the fluctuation in prices and the dependability of the network are components of stability. In order to tackle the research problems and achieve the goal of this thesis, each of the three instances will be analysed separately using the pre-defined data categories. The basic scientific worry will be addressed by a thorough evaluation of various implementations within these specific scenarios. A comprehensive analysis of each response in connection to one another will lead to a resolution for the second and final scientific investigation.

Method choice

This approach is utilised to analyse digital currency due of its limited scope and duration. By using current research and literature, this study has the capacity to cover a broader scope of subjects, reduce errors, and yield more precise conclusions. This study is informed by researchers who prioritised the collection of data through interviews. The strategy was further impacted by a methodology that collected data from several sources and focused on assessing the outcomes. The CBDC research enabled the classification of money usage, allowing for its analysis in three unique circumstances.

By employing established methods, it is possible to obtain fresh perspectives and enable further exploration of the technologies examined in this research. The aim is to assess current implementations and gather this information and data for those who are interested, which may be quickly achieved by scrutinising reliable research. When evaluating digital currency, this method carries the risk of disregarding essential factors. The three specified criteria have the ability to impact the analysis and data collection process. In order to fully understand the topic and reduce variations in data, it is essential to incorporate a diverse range of literature. To improve the dependability of information, it is important to carefully choose sources and prioritise articles from established publishers and journals, which will further bolster reputation. To mitigate bias during source selection, the author must consistently retain a critical stance. The author minimises the risk of inaccurate data by acquiring material from research, on the condition that sources are carefully chosen. The data's authenticity may be greatly enhanced by sourcing it from relevant sources and ensuring it directly addresses the study queries. To minimise the possibility of inaccurate data, it is advantageous to collect the same information from many sources, enabling the examination of any inconsistencies. Through conducting a comprehensive review of existing research and gathering relevant data, it is feasible to examine the three previously described scenarios and address the initial scientific issue. Through a thorough examination of current research and publications on digital money, one may discover and investigate novel ideas and their consequential effects, finally culminating in the resolution of the ultimate scientific investigation. The aim of this article will be accomplished by concluding the report with a thorough examination of the results.

Discussion (Result and Analysis)

This unit will evaluate the digital currencies that were previously mentioned, and analyse their underlying technology according to the specified principles.

Data gathering and literature review

The information was initially selected based on author relevance through the utilisation of Google Scholar and the DiVA site. Subsequently, priority was assigned to data with the maximum number of citations and those originated from reputable sources. Information was collected from many sources, such as journals, thesis papers, and websites, by utilising certain keywords such as digital currency, efficiency, scalability, usability, security, stability, implementation, fees, and Central Bank Digital Currency.

Through a thorough examination of several publications, we have discovered and classified noteworthy information according to certain criteria such as effectiveness, scalability, utility, security, and reliability.

Fundamental technology

The fundamental technology of different digital currencies will have an impact on their functionality. In order to enhance current technology, it is essential to have a comprehensive understanding of not just its functioning, but also the underlying reasons for its operation. The data collected during the literature review is used to evaluate the fundamental technology. Given that Tether is stored on the Bitcoin and Ethereum blockchains, its performance will only be highlighted when it deviates from that of Bitcoin and Ethereum.

Efficiency

The bitcoin consensus mechanism regulates the procedure via which blocks are collectively authorised. The currency's transaction verification and validation process significantly impacts the amount of work required to mine new blocks and verify operations.

The expected yearly energy consumption of Bitcoin's proof-of-work mechanism was estimated to be around 140 TWh, with a possible range of 52 TWh to 350 TWh. The predicted energy consumption of the Bitcoin network is expected to exceed the combined energy use of Norway, Ukraine, and the whole gold mining sector, totalling around 131 TWh per year. Based on the coherence of information from several sources, the estimate seems reliable. Reflect about the importance of matching protocols. The implementation of proof-of-work requires extra expenses in the form of hardware, which in turn requires the consumption of energy and materials for its production. Measuring the total costs and efficiency of Bitcoin is difficult due to worldwide shortages of computer chips and the increasing prices of graphics processing units (GPUs). Excluding the mining equipment, the estimated yearly energy usage is at around 140 terawatt-hours (TWh). From 2015-07-15 to 2021-12-06, Ethereum's consensus method, known as proof-of-stake, is expected to require an estimated amount of power ranging from 27 to 61 terawatt-hours (TWh). Because Ethereum's energy assessment is calculated per minute rather than per transaction, it is feasible for one or 1,000 transactions to consume an equivalent quantity of energy. Ethereum claims to need around 0.1 percent of Visa's resources while managing the largest volume of transactions. By shifting from Proof of Work (PoW) to Proof of Stake (PoS), energy consumption is reduced in several sectors by reducing the need for hardware. Given Ethereum's lesser scale and comparative freshness in relation to Bitcoin, it seems that its energy consumption will be less. Gathering precise data on yearly energy use was difficult, while most evidence suggests that Point of Sale (PoS) systems will facilitate more efficient implementation. The energy consumption of a Central Bank Digital Currency (CBDC) may fluctuate based on its particular usage. Quantifying the exact number is difficult because several Central Bank Digital Currency (CBDC) initiatives are still in the experimental or conceptual stages. A Central Bank Digital Currency (CBDC) should have the capacity to competently compete with traditional

banking systems and debit cards. As there is insufficient dependable data about the energy usage of Central Bank Digital Currencies (CBDCs), I am unable to furnish precise figures. Moreover, the effectiveness of CBDCs is predominantly influenced by their specific configuration, rendering it unsuitable for me to provide any broad generalisations.

Open networks seem to enhance the availability of data for current solutions. The Central Bank Digital Currency (CBDC) would be the most optimal choice if it were designed to avoid the necessity of a consensus mechanism such as Proof of Work (PoW). Ethereum would adopt the Central Bank Digital Currency (CBDC) before Bitcoin. **Scalability**

Both Bitcoin and Ethereum are limited by the limits imposed by blockchain technology, which impede their ability to scale efficiently. Bitcoin has a theoretical transaction limit of seven, however, the ledger expanded by 24GB in 2015. In order to accommodate the same volume of transactions as VISA, Bitcoin would require a daily capacity of 3.9 terabytes. During the testing phase, the Ethereum network demonstrated a transaction throughput of around 12-13 transactions per second. The Ethereum ledger reached a capacity of 385 gigabytes in November 2017. Hence, the limited number of transactions raises worries about the ability of blockchain-based digital currencies to handle large-scale growth, especially considering the continuous extension of ledgers. Centralization is a common problem with digital currencies, which requires more resources for participation and ultimately reduces the number of individuals active in mining. Bitcoin is officially capable of processing three to four transactions per second, with a potential upper maximum of seven transactions per second. Visa purports to handle around 1,667 transactions per second. The size limit for each block on Bitcoin's blockchain is capped at 1MB. To accommodate a larger number of transactions, the full nodes, who are responsible for verifying transactions, would incur additional costs to handle the increased ledger resulting from an increase in block size. The research "The Scalability Challenge of Ethereum: An Initial Quantitative Analysis" highlights that concerns over scalability are impeding the mainstream adoption of permissionless Blockchain networks. The Ethereum network is claimed to possess a processing capability of 15 transactions per second, whereas Bitcoin has a processing capacity of seven transactions per second. Their analysis uncovered that attaining superior performance would necessitate a trade-off between decentralisation and scalability. Allegedly, the Ethereum network possesses a processing capability of 20 transactions per second. Both data are approximate, but the one released later will be seen as more trustworthy.

CBDC can exhibit either full centralization or be especially designed to supervise crucial functions, such as the creation of new currency. The article "Implementing a Retail Central Bank Digital Currency (CBDC): Lessons Learned and Key Insights" posits that scholars are now investigating alternative consensus procedures in order to enhance scalability. The paper posits that there is no universally applicable solution for Central Bank Digital Currency (CBDC). Currently, there is insufficient information on the complete transaction processing capabilities, the specific execution strategy, and the potential size of the ledgers if the digital currency utilises Distributed Ledger Technology (DLT). Sveriges Riksbank has successfully tested a Central Bank Digital Currency (CBDC) that fulfils their requirements for scalability. However, given the limitations of the testing environment, it is necessary to carry out a more comprehensive evaluation on a larger scope. Should a Central Bank Digital Currency (CBDC) be established with a restricted number of nodes tasked with managing the whole digital ledger or a similar data structure, the necessity for scalable solutions becomes inevitable. However, larger ledgers may

be more easily handled in this scenario. If the Central Bank Digital Currency (CBDC) functions in a manner comparable to Visa, it possesses the capability to process around 2,000 transactions per second.

Recent research conducted by MIT suggests that a Central Bank Digital Currency (CBDC) is capable of processing up to 1.7 million transactions per second at its peak capability. Alternatively, it has the capacity to manage a considerably reduced quantity of transactions, around 170,000 per second, with the implementation of a fragmented architecture in which payments are either fully completed or not handled at all. Additional comprehensive testing is required to ascertain the practicality of integrating existing principles in real-life situations. These results are not reliable unless they are analysed in a controlled environment, as they are very experimental and were generated inside a limited testing setup.

Cryptocurrencies inevitably encounter scalability challenges, requiring the network to either decrease its transaction volume, enhance its capacity more rapidly, or embrace novel protocols. Bitcoin has a processing capacity of seven transactions per second, Ethereum can handle 15 transactions per second, and CBDCs (Central Bank Digital Currencies) have the power to manage 100,000 transactions per second, as reported by most sources. The veracity of data pertaining to Bitcoin and Ethereum is apparent, however the accuracy of data about Central Bank Digital Currencies (CBDCs) seems to be significantly diminished.

Usability

The Bitcoin network produces around one valid block every 10 minutes, but the whole verification of a transaction normally takes one hour. Upon validation and inclusion in the earliest viable block, the network will finalise and authenticate the transaction within about one hour. In the event that the network experiences an excessive number of transactions that surpass its ability to execute them, the selection of which transactions to prioritise will be determined by the fees received by the miners. Augmenting the payment amount might perhaps lead to a decrease in the processing duration. According to the whitepaper, a fresh block is added to the blockchain every 10 minutes. The necessary expenditures can exhibit substantial variation, and I encountered difficulty in locating a dependable source about this particular issue. Nevertheless, the costs are closely correlated with the duration of the waiting period. If you provide adequate payment, the transaction will still take at least a few minutes to complete. Nevertheless, if you want to delay until further blocks are added, the procedure will need a considerably greater amount of time. The Ethereum network accomplishes transaction processing in around 10 minutes, far faster than the previous length of over an hour. Transaction fees in Bitcoin operate in a similar manner, as they vary depending on the level of demand or the number of transactions being made. Ethereum's fees are measured in a unit known as Gas, and the price is influenced by variables such as transaction demand, fee payments, miner needs, and the current value of Gas. The data given by the Ethereum community is highly reliable, as it provides a specific instance of a transaction involving one ETH, a gas limit of 21,000 units, and a base cost of 100 gwei, all of which are well-documented in the Ethereum documentation. The transaction incorporated a gratuity of 10 gwei, determined by their algorithm to be equivalent to a total of 1.00231 ETH, in order to send 1.0 ETH. The original cost would be completely eliminated, and the miner would get a gratuity of 0.00021 ETH. With Ethereum's current valuation of $2,880 US dollars, the projected cost in March 2022 would be around $7. The cost is little when moving large amounts of money, but it becomes significant when doing small transactions. The latency achieved was less than one second, and it

demonstrated a comparable latency to the atomized architecture, which processes payments in a binary manner, either completing all of them or none at all. The argument suggests that current digital currencies do not have enough support to compete with government-regulated currencies. However, a Central Bank Digital cash (CBDC) greatly decreases the costs associated with generating physical cash. The detailed details on the specifications and expenses related to China's Central Bank Digital Currency (CBDC) were not provided. Nevertheless, the lack of substantial fees implies that it might potentially serve as a more economical substitute for China's current digital currency. Several pilot programmes are contemplating the possibility of refraining from implementing fees. Hence, it is imperative for them to give priority to mitigating the risks linked to denial-of-service assaults that include a large number of modest, legitimate transactions. By utilising a specialist network, these networks must function well even under heavy demand, hence reducing or eliminating the need for incentives. A highly scalable prototype was used during the testing process. The experimental project required fast transactions and large quantities to be handled. As of April 2022, there are specific challenges associated with the proposed technical solutions, notwithstanding the lack of proved efficacy. The potential of CBDC in terms of cost and verification timelines is significant. Several pilot trials have demonstrated that the velocity of purchase and the expense are on par with traditional payment alternatives such as debit cards. The sources analysed are reliable and offer consistent data; nonetheless, some efforts are still in their preliminary phases and require more scrutiny. The time required to complete transactions using Bitcoin, Tether, and Ethereum might vary, ranging from a few minutes to over an hour. The prices of cryptocurrencies are determined by the current market demand. Regrettably, I was unable to get an exact figure. Nevertheless, the cost each transaction might vary from zero to a several US dollars.

Security

Bitcoin and Ethereum share comparable weaknesses and are susceptible to similar risks as a result of their unregulated and autonomous characteristics. The work examines the identified shortcomings of bitcoins, which rely on blockchain technology, with a specific focus on Ethereum. The study emphasises that Ethereum possesses 13 frequently overlooked vulnerabilities, underscoring the necessity for individuals to rectify these concerns or face the corresponding risks. This illustrates a well acknowledged strategy referred to as the 51 percent strike. The objective of the 51 percent strategy is to acquire sufficient voting authority to effectively manipulate the accounting records and carry out double-spending with success. Although there may be differences between Proof of Stake (PoS) and Proof of Work (PoW), it is crucial to acknowledge that all consensus processes include inherent dangers. From a technological standpoint, the remaining part of the network has the option to disregard this newly introduced and extended partition in order to uphold the previously authorised record. The lack of a cost or risk assessment for these vulnerabilities hinders the assessment of the financial consequences or probability of success for both Bitcoin and Ethereum.

They demonstrate several methods for reaching agreement, along with the corresponding level of vulnerability to prospective attacks. Both Proof of Work (PoW) and Proof of Stake (PoS) require individuals to possess a significant financial commitment and a minimum voting power of 25%. Although there have been worries about the susceptibility of blockchains to targeted attacks, it is noteworthy that both Bitcoin and Ethereum have not had any recent instances of hacking or upgrading. These chains do not have the capability to delete or reject operations.

Tether bolsters the security of Bitcoin by its backing by fiat currency kept in a bank. Consequently, the bank and the third-party account manager share equal responsibility for the network. However, because to its reliance on the Bitcoin network, it retains an equivalent level of security as Bitcoin. The Bank of Canada states that while developing a Central Bank Digital Currency (CBDC), there are necessary compromises to be considered between ensuring security and increasing ease. Token-based central bank digital currency (CBDC), which is tied to private keys, carries the inherent danger of key loss or password forgetfulness for the wallets housing these keys. Developing these systems will need deliberate decision-making and clear-cut policies. A fully integrated system inherently leads to the presence of a secure and reliable third party. In order to safeguard user privacy, it is imperative for a Central Bank Digital Currency (CBDC) to accurately gather and handle user data, while also ensuring that the network is resilient against deliberate and focused security breaches. In general, there are several hazards and security concerns, however accurately evaluating the financial implications or significant threats is difficult. The paper states that the execution of offline transactions carries inherent risks, and further testing and research are needed for the pilot project to appropriately assess security vulnerabilities. To summarise, cryptocurrencies are vulnerable to attacks, but most of these attacks need substantial resources that may be better used to foster fair cooperation. To generate inaccurate blocks, assailants must acquire a voting stake above 25%. Nevertheless, despite having such a high degree of control, there is no assurance of success in their endeavours. Additional study and analysis are required to correctly evaluate any possible dangers related with Central Bank Digital Currencies (CBDCs), while there are clues on how to alleviate some of the identified issues.

Stability

Bitcoin and Ethereum have experienced substantial price fluctuations during their existence. Tether is being proposed as a viable stable currency to tackle this problem. Tether ensures a substantial degree of stability by providing assurance that each digital unit is backed by at least one US dollar. Bitcoin has substantial daily price volatility, with movements above 10% in both positive and negative directions. Furthermore, the product's long-term pricing demonstrates significant instability. For example, the price of Bitcoin had a substantial surge, climbing from about 7,500 USD in November 2017 to over 20,000 USD in December of the same year. Ethereum has experienced similar price fluctuations. Despite being established in 2018, it consistently experiences price volatility. With a Bitcoin price of 15,000 USD, the standard deviation was around 2,000 USD. Conversely, Ethereum was valued at around 800 USD, exhibiting a standard deviation of approximately 280 USD. The standard deviations of Bitcoin, Ethereum, and Tether are around 13%, 35%, and Tether, respectively. Tether can be characterised as unchanging and long-lasting. The study examines the level of price volatility in 2015 and confirms that Bitcoin has an average daily fluctuation of around 10%, a widely accepted fact substantiated by several reputable sources. The limited price stability of the majority of Central Bank Digital Currencies (CBDCs) can be primarily due to the absence of comprehensive and widespread testing. The determination of price control is anticipated to predominantly rely on monetary constraints rather than the principles of the free market, in contrast to Bitcoin, Ethereum, and Tether. The MIT research examines the resilience of networks and the implementation of protective measures to prevent instances of double-spending. Ensuring the accurate development and comprehensive evaluation of the system is essential in order to minimise system

downtime and minimise errors. However, it is not feasible to predict the system's performance on a large scale without conducting laboratory experiments. In order to reduce potential dangers, providing free transactions might lead to denial-of-service assaults, necessitating the implementation of protective measures such as spam filtering algorithms. The stability of a Central Bank Digital Currency (CBDC) amid crises mostly depends on legal and normative frameworks, indicating that it will exhibit robust operation. P2P networks pose a greater challenge for attackers, and since most cryptocurrencies rely on them, these systems have inherent resilience. To prevent the need for re-verifying transactions, it is advisable to wait for more blocks to be appended to the blockchain. This increases the difficulty for different branches to intersect and ensures the preservation of the longest sequence. The majority of websites seem to provide similar and reliable information. Central Bank Digital Currencies (CBDCs) are expected to provide stability; however, their administration and implementation seem to be largely influenced by legal and regulatory matters rather than technological factors. Cryptocurrencies possess a robust network because to their distribution among several nodes, but their value exhibits significant volatility. Tether and other stablecoins have resolved this issue by creating a constant conversion rate among the currency and the American dollar.

Review

The designated cryptocurrency will be assessed and compared based on the given circumstances. It is crucial to assess and evaluate the current usage of currency, since a certain digital currency may flourish in certain circumstances but have challenges in others. The accuracy of the data in this section may be compromised due to the absence of a standardised implementation of Central Bank Digital Currency (CBDC) and the lack of an official CBDC at the time of authoring this article.

The evaluation of the present digital currency technology is conducted by analysing prepared scenarios utilising insights obtained from literature study and data analysis. **Interactions in Person**

The typical duration for payment confirmation on the Bitcoin network is around 10 minutes. Transactions conducted on the Bitcoin network need a charge, with the current average transaction cost being around three US dollars per transaction as of March 2022. Due to the network's limited processing capacity of less than ten transactions per second, a transaction cost of three dollars, and notable delays in confirmation, it may not be suited for smaller and faster transactions.

Ethereum has a transaction throughput of 20 transactions per second, accompanied with an average confirmation time of five minutes. The current transaction cost for Ethereum is around two dollars as of March 2022. Unlike Bitcoin, it is more suited for rapid transactions. Nevertheless, its limited capacity to process just 20 transactions per second hinders its ability to efficiently handle a substantial number of minor operations. Due to its incorporation into the existing Bitcoin network and the lack of credible information on transaction speed and costs, it is anticipated that Tether would demonstrate similar performance to Bitcoin in these aspects. All the cryptocurrencies studied in this study are unsuitable for in-person trading since they are slow, expensive, incapable of handling increasing demand, and less efficient than existing alternatives. The use of Central Bank Digital Currency might enable faster and more efficient transactions at a lower cost. The main emphasis should be on optimising the rate at which transactions are processed, rather than giving priority to the speed at which settlements occur. Although the

spender may encounter nearly instantaneous transactions, resembling those of a debit card, it is essential for the retailer to promptly receive payments. Consequently, the one who spends money should be preferred in this particular circumstance. The network 30 needs to execute a large volume of low-value transactions efficiently, while also successfully handling variations in demand, such as during vacation seasons. The most essential feature needed is the capability to reverse payments. A physical Central Bank Digital Currency (CBDC) must exhibit characteristics such as rapidity, affordability, scalability to handle a substantial volume of transactions, and dependability, functioning ceaselessly for 24 hours a day, seven days a week.

Making purchases online

Bitcoin allows for safe and reliable transactions for those who own a Bitcoin address. This demonstrates your capacity to electronically transmit money to any anyone globally in less than 60 minutes. The cost for transactions made in the previous year totaled around $60 USD in March 2022, with an average range of $2 to $15 USD. Bitcoin has emerged as a more preferable alternative to wire transfers because to its round-the-clock availability and uninterrupted operation, spanning 24 hours a day, seven days a week. The transaction charge is comparable to that of certain banks, but the processing time of one hour is expedited in comparison to other establishments, particularly for overseas transactions. The primary obstacles to the widespread use of Bitcoin for online transactions are its inefficiency and significant energy consumption. If Bitcoin were used for minor online purchases, the speed of transactions would not be a concern. However, the amalgamation of effectiveness and costs associated with transactions may render alternative options more attractive. Between March 2021 and March 2022, the mean transaction fee for Ethereum varied between three and fourteen US dollars, reaching a peak of almost 70 US dollars per transaction. When transferring money internationally, the speed and expenses of transactions may exceed other methods, since Bank of America levies fees above $15 USD for wire transfers. The online transactions exhibit satisfactory dependability and speed. However, the existing capacity of around 20 transactions per second may pose a challenge in accommodating rising demand. Ethereum is most suited for a certain goal, particularly when it is limited to a lower volume of meaningful transactions.

Tether, like to Bitcoin, offers benefits for large-scale international transactions; yet, like most cryptocurrencies, it is improbable to see value appreciation as its usage expands. Due to its limited transaction processing capacity and the requirement for larger blocks, Tether is not appropriate for widespread utilisation in online transactions. It possesses the capability to facilitate a limited number of crucial online transactions, notably those pertaining to Bitcoin and Ethereum. Moreover, all the cryptocurrencies discussed in this article have the advantage of functioning consistently irrespective of the geographical distance between the the transmitting party and recipient.

Financial institutions often impose charges for international currency transfers, and the length of these operations might vary. Western Union has a designated timeframe of 1-5 business days for international bank transactions. To build a successful Central Bank Digital Currency (CBDC), it is crucial to prioritise its accessibility, ensuring smooth operation and worldwide operability. In the event that the Central Bank Digital Currency (CBDC) is specifically intended for a certain nation or geographic area, it need to offer streamlined Application Programming Interfaces (APIs) to facilitate international transfers. In order to maintain competition with contemporary technology, it is imperative that transactions are

completed within a maximum duration of one hour, and the system should possess the capacity to expand in order to substitute debit cards. The system's stability and security are of utmost importance, as it only depends on the faith placed in the central bank. Any system breakdown has the ability to progressively erode that trust.

Savings

Bitcoin, Ethereum, and other contemporary cryptocurrencies have the characteristic of being able to retain their value. By ensuring the secrecy and reliability of your private key, they provide a blend of strong security and efficient entry to your account, thereby safeguarding your digital funds. There is a trade-off between security and convenience when utilising wallets, since they allow for the management of private keys but also expose the user to additional risks. The primary issue lies in the volatility of price. The price has exhibited significant volatility due to the absence of a regulatory authority overseeing the valuation or the variable mechanisms of money creation and destruction. Bitcoin and Ethereum, along with other cryptocurrencies, have mostly been utilised as investment assets rather than traditional currencies, with the aim of appreciating in value. Due to their substantial volatility, these currencies are not appropriate for maintaining value in the short term. However, they can be utilised for long-term investments with the goal of increasing in value. Tether is designed to maintain a stable exchange rate of one-to-one with the US dollar. It may be used as an alternative to traditional money due to the strong security offered by the Bitcoin network. This strategy offers a secure, dependable, and straightforward way to safeguard money in situations when there is no stable currency or strong banking system, regardless of the duration. All the cryptocurrencies examined in this article exhibit adequate security and reliability to function as a medium for storing money. As stated earlier, they would be especially appropriate for individuals living in countries with inadequate financial systems, unstable currencies, or little confidence in traditional ways of safeguarding money. Prioritising the security of a digital currency is crucial for establishing its credibility as a dependable medium of exchange, followed by assuring its accessibility to the appropriate persons. The system must include robust security measures to prevent unauthorised access and breaches, while also preserving the integrity and consistency of data. A Central Bank Digital Currency (CBDC) should possess the capability to undergo enhancements, while ensuring the absence of any flaws, software bugs, or hardware failures. It should be readily accessible with minimal or no disruption. The significance of transaction speed and throughput would be diminished, and the integration of additional functionalities such as smart contracts should only be pursued if security, availability, and resilience have been ensured.

Discussion

This section will include a detailed account of the result, along with the author's insightful remarks. Firstly, a detailed explanation of the operation of current implementations, including their benefits and drawbacks. Following this, an analysis of potential consequences, the possibilities of digital money, a brief summary of this study, and suggestions for future research will be provided.

This study examined the performance and susceptibility of digital money. In answer to this investigation, two scientific questions were raised.

• What are the benefits and drawbacks of the existing approaches in the mentioned scenarios?

Is it possible to modify existing systems and merge different principles to develop an enhanced digital currency?

To summarise, the present solutions demonstrate a notable deficiency in overall performance. Currently, traditional currency payments cannot be substituted by current digital currencies because of their limited ability to handle large volumes, effectiveness, and reliability. Bitcoin and Ethereum are specifically built to facilitate large-scale international transactions, prioritising factors other than speed. Moreover, both cryptocurrencies have a well-established history of being very safe. The most recent iterations have undergone and are still undergoing enhancements. A study on Central Bank Digital Currency (CBDC) suggests that substantial advancements are anticipated, potentially addressing the current challenges encountered by digital assets. This thesis adequately addressed the precise scientific difficulties; however, it only briefly probed the significant effort necessary for these theoretical answers to be efficiently implemented in reality.

Current Digital Currency Performance

At present, bitcoins possess several advantages and disadvantages. While the methods outlined in this article cannot entirely supplant traditional currency, they do provide significant advantages when compared to conventional payment systems. Cryptocurrency transactions exhibit slower processing times in comparison to VISA or cash, although they demonstrate superior speed and cost efficiency when compared to international wire transfers. CBDCs offer the potential to establish a currency that exhibits comparable stability to existing fiat currencies. This can be achieved by implementing same or comparable monetary laws to control inflation and determine its value in comparison to other currencies. In my view, many existing digital currencies serve as a preliminary measure but lack widespread recognition as a legitimate kind of cash. These networks have successfully demonstrated and validated several concepts, such as their ability to substitute insufficient financial infrastructure in rural regions of some nations. Ethereum, Bitcoin, and Tether exhibit exceptional resilience because to their decentralised peer-to-peer network architecture, making their eradication extremely difficult. Furthermore, when combined with the functionalities of smart contracts and decentralised applications (d-apps), they have the potential to provide groundbreaking opportunities. Bitcoin, Ethereum, and Tether have made any reliable intermediary unnecessary. Individuals without access to these dependable intermediaries have benefited by refraining from depending on them. These decentralised alternatives can aid governments, regions, and individuals that lack reliable financial institutions or stable currencies. Bitcoin, Tether, and Ethereum necessitate a substantial quantity of energy, and the Proof of Work (PoW) consensus process necessitates a considerable number of hardware, hence augmenting resource requirements. CBDCs has the capacity to address the issues related to the creation and authentication of digital currency. Hence, it is important to meticulously evaluate them at the design stage. Central Bank Digital Currencies (CBDCs) provide the potential for streamlined and accelerated transactions at a lower expense. When adopting a strategy, prioritising security supersedes prioritising efficiency. The central banks should conduct a thorough evaluation that encompasses not just the network and infrastructure, but also the privacy and data of the users. The third party is required to use utmost diligence in limiting the quantity of information it gathers and oversees. By decentralising tasks over a network, akin to a peer-to-peer network, but yet retaining authority over crucial processes such as CBDC production, it is feasible to enhance dependability and mitigate the hazards of system

unavailability. The current techniques exhibit a deficiency in overall efficiency and scalability, despite their apparent strengths in specific domains that partially compensate for this limitation. Existing implementations require additional efforts to get general acceptance and usage, since emerging concepts and technologies will eventually replace both current digital technology and traditional payment methods. The creation of more digital currency will result in reduced individual motivations. The probability of observing or identifying a modification is low. The new system is expected to provide similar functionalities as the current systems, but with enhanced efficiency, scalability, user-friendliness, security, and stability.

The development of digital currency

Without a question, there is a substantial amount of work that must be completed, and central banks have recently initiated the development of cutting-edge technology to improve the current infrastructure. Although not all notions have been tested or investigated, the global transition of governments from tangible forms of currency, like as paper and coins, presents new possibilities. Even little enhancements to existing systems can provide a huge beneficial effect on the global economy, even if most individuals may not sense a significant alteration.

Although there is no universally applicable solution, there are several distinct digital currencies accessible. Some individuals emphasise fast and cost-effective transactions, while others place greater emphasis on safe storage and convenient customer access. These systems can be classified as token-based, account-based, or completely private. They may either capture minimal private data or a significant amount of data to provide consumers with valuable insights. These potential digital currencies might function similarly to Bitcoin and Ethereum, but they might be verified by a central bank or by some alternate, unimaginable approach. For significant but rare transactions, such as rent or bill payments, the primary emphasis may be on employing smart contracts to guarantee dependability and bolster security, all while bypassing any involvement from third-party intermediaries. Customers' expectations for money might change depending on the unique scenario, hence the solution may provide varied characteristics dependent on its intended purpose. I am unsure if it is preferable to have a unified solution that automatically adjusts to the user's requirements, or whether consumers should have the autonomy to select whichever implementation they like. Developing a thorough solution that deliberately involves compromises may be the most effective approach to fulfil all needs. Expeditiously conducting more testing and research is important following the acquisition of data from extensive studies using Central Bank Digital Currencies (CBDCs), in my view. Instead of merely improving, it may be required to completely replace the existing system and network solutions. Recognising the shortcomings and constraints of current ideas and activities, as well as acknowledging the necessity for more research, is crucial. Our objective is to either address these problems or view them as a potential compromise for implementing another functionality.

Digital currency is an emerging technology that has the capacity to offer advantages to individuals globally. Thoroughly assessing all available options is of utmost importance. The presence of policies, along with the significant risks associated with large-scale projects, especially in the fields of finance and banking, would limit the transformation of existing systems and infrastructure. The current pilot initiatives are expected to grow and enhance our understanding of the advantages and constraints of currency alteration, while also fostering creativity and advancements in ideas and technology.

The specific characteristics of the system, such as its token-based or account-based structure, the level of peer-to-peer capability (limited or unlimited), and whether it would be fully centralised or not, have not yet been determined. The effectiveness of digital money may decrease by reducing the risks associated with dependence on a third party or faith in it. Throughout history, the notion of cash has continuously been linked to the participation of a third party. If the third party successfully fulfils its specified commitments, it is reasonable to have faith in them as the most rational choice. Central banks are gradually gaining power over the direction of money, which might be influenced by unregulated digital currencies like Bitcoin, Ethereum, and Tether. Robust encryption and resilient networks that can withstand interruptions and successfully mitigate denial-of-service attacks are often regarded as essential. The future of currency requires a seamless and effective combination of practical functionalities and strong security measures. To efficiently manage unknown future scenarios, it is imperative to enhance and tailor this digital currency while mitigating the risks associated with system modifications that might result in errors. In order to be deemed suitable, the new currency must surpass fiat money and debit cards in terms of efficiency, scalability, use, security, and stability. In order to introduce a new generation of money, like the implementation of paper cash, the new technology must surpass all the aspects outlined in this study. While the future of money remains uncertain, there are a variety of potential alterations that might be introduced. The use of novel technology or innovative ideas has the potential to facilitate cost-effective, expedited, highly secure, and highly efficient monetary transactions. However, there exist a multitude of obstacles that must be surmounted before such a currency can be actualized, assuming it is ever achieved.

Workings in the future

The study argues that digital money has the capacity to be created and eventually outperform our current currencies through competition. Further inquiry is required to test some assumptions made in this article, necessitating the collection of additional data. The cooperation between computer scientists and economists is essential in order to establish the precise goals and procedures for performing experiments. Additional investigation is required to delve into Central Bank Digital Currencies, namely by conducting thorough experimentation in real-life situations rather than constrained trial settings. Additional examination of the attributes of existing digital currency implementations, together with an assessment of the effectiveness of their different components, is necessary. Additional investigation should be undertaken to explore different methodologies for reaching agreement, encompassing centralised solutions. It is essential to evaluate new ideas such as CBDC in order to gather evidence and validate its veracity.

Conclusion

The thesis topic asked was, "To what degree can digital currency be influenced, and how well does modern technology perform as a means of storing value, measuring value, and facilitating transactions?" Each scientific investigation is followed by a brief summary.

What are the benefits and drawbacks of the existing procedures in the given circumstances? Most cryptocurrencies currently in existence are unsuitable for use as physical currency or for performing face-to-face transactions. Their efficiency in processing transactions, pricing structure, user-friendliness, and capacity to handle increased demand do not fulfil customer expectations and are outperformed by alternative payment methods, such as debit cards and cash. Central Bank Digital Currencies (CBDCs) might be structured to function by merging the ease of debit cards with the dependability and promptness of cash, so enabling efficient, economical, and

dependable transactions in daily situations. At now, there is no compelling digital currency that has the ability to replace debit cards or physical cash. Nevertheless, there exists a potential possibility that this might undergo alteration in the imminent future. Bitcoin, Ethereum, and Tether are trustworthy and secure cryptocurrencies that may be used for international online transactions. These transactions can take anywhere from a few minutes to several hours to complete, and with a transaction fee of around $15 USD, they might potentially be used as a viable alternative to traditional means of international money transfer. The network's constrained ability to process transactions per second is a notable issue because of its insufficient scalability. A Central Bank Digital Currency (CBDC) might potentially mitigate these limitations, but it needs the oversight and support of a trustworthy intermediary. Cryptocurrencies can function as a means of preserving wealth, despite their vulnerability to fluctuations in value. Cryptocurrencies work as a method of preserving wealth in regions where traditional financial institutions are difficult to access, dysfunctional, or completely absent. Countries facing significant inflation in their own currency may choose to utilise bitcoins as a secure and efficient alternative, provided that the private key is properly protected. Nevertheless, it is difficult to anticipate the precise value that cryptocurrencies will maintain because of their very unpredictable nature. Thus, Tether, a stable cryptocurrency, has the ability to address this specific issue. Central Bank Digital Currencies (CBDCs) ought to provide equivalent functionalities as existing systems and function without any disruptions. Despite the electronic nature of the solution, it is susceptible to continuous risks such as D-DOS attacks and vulnerabilities. Due to the system's wide and adaptable characteristics, it is imperative to evaluate and prioritise security measures. Is it possible to improve existing methodologies and include additional concepts to develop a more all-encompassing digital currency?

The use of digital money has proven its viability, and substantial progress has been made. The ongoing discussion mostly centres on the techniques and tactics for effecting change, rather than questioning the feasibility of altering circumstances. For example, Ethereum has begun the process of replacing several core components. The transition from Proof of Work (PoW) to Proof of Stake (PoS) has the capacity to enhance the validation process and enhance overall efficiency. An approach to generate novel Central Bank Digital Currencies (CBDCs) involves amalgamating concepts from current implementations. This might involve the adoption of a tokenized system like cryptocurrencies, although with a centralised element that oversees and validates transactions. A substantial portion of the research is now in its preliminary phases, and several prospective remedies have solely been validated in a theoretical manner. Nevertheless, it has been determined that there is room for enhancement, although in certain domains. The influence of currency is so substantial that even little movements can yield benefits.

In conclusion, conducting comprehensive research on digital currency and avoiding unwarranted assumptions is crucial for this endeavour. Novel breakthroughs can emerge from an entirely distinct trade system, contrasting with the current one in use, even if the current methods satisfactorily fulfil the needs of the majority of persons.

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