



EVOLUTION OF CRYPTOCURRENCIES AND THEIR UTILIZATION IN THE DIGITAL ECONOMY

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Abstract

Cryptocurrencies and blockchain technology have revolutionized finance and technology, presenting unparalleled opportunities for innovation. Emerging with Bitcoin in 2009, the crypto ecosystem has significantly evolved, encompassing a wide range of digital assets and decentralized applications. This paper delves into the origins of cryptocurrency, the dynamics of crypto transactions, and the transformative potential of blockchain technology. It examines various types of cryptocurrencies, including coins and tokens. Also, it explores the multiple layers of blockchain technology, from foundational infrastructure to advanced applications. Despite facing challenges, like market volatility and regulatory uncertainty, continuous collaboration and innovation drive the field forward. By adopting responsible development practices, stakeholders can harness the potential of cryptocurrencies and blockchain to foster a more inclusive, transparent, and efficient financial ecosystem. This evolution promises to redefine traditional financial systems and enable new forms of economic participation and digital interaction, ultimately contributing to a more equitable global digital economy worldwide.

Keywords: Coin, Cryptocurrencies, Token, Blockchain.

1 INTRODUCTION

The emergence of cryptocurrencies represents a groundbreaking evolution in the realm of finance

and technology, revolutionizing traditional modes of currency exchange and paving the way for innovative business transactions. Since the inception of Bitcoin in 2009 by an anonymous entity known as Satoshi Nakamoto, the landscape of financial transactions has experienced a paradigm shift, leading to the creation of a decentralized digital economy. This research

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paper embarks on a journey to explore the origins of cryptocurrencies and delve into the intricate dynamics of business transactions within the crypto realm.

The genesis of cryptocurrencies can be traced back to the global 2008 financial crisis, which eroded trust in traditional banking systems and highlighted the vulnerabilities of centralized financial institutions. Against this backdrop, Satoshi Nakamoto introduced Bitcoin, a peer-to-peer electronic cash system based on blockchain technology. The innovative concept of blockchain, a decentralized ledger that records all transactions across a network of computers, laid the foundation for a new era of digital currency and financial autonomy.

Bitcoin's inception marked the beginning of a proliferation of cryptocurrencies, each with unique features and functionalities. Ethereum, launched in 2015 by Vitalik Buterin, introduced smart contracts, enabling the execution of programmable agreements without the need for intermediaries. Subsequently, a myriad of alternative cryptocurrencies, commonly referred to as altcoins, emerged, further diversifying the crypto market and fostering technological innovation.

The advent of cryptocurrencies has catalyzed a paradigm shift in business transactions, offering unprecedented opportunities for individuals and enterprises to engage in a borderless and censorship-resistant digital economy. Cryptocurrencies facilitate instant and low-cost transactions, transcending geographical boundaries and eliminating the need for intermediaries such as banks or payment processors. This decentralized nature of cryptocurrencies empowers individuals to have control over their financial assets, enhancing privacy and security in transactions.

Moreover, blockchain technology integration into various sectors has paved the way for innovative business models and applications. From decentralized finance (DeFi) platforms enabling lending, borrowing, and yield farming to non-fungible tokens (NFTs) revolutionizing digital ownership and authentication, the crypto realm continues to push the boundaries of possibility. These developments underscore the transformative potential of cryptocurrencies

beyond mere monetary transactions, ushering in a new era of decentralized governance, supply chain management, and digital identity verification.

However, despite the promises of decentralization and financial inclusion, the crypto realm poses challenges and risks. The volatility of cryptocurrency prices, regulatory uncertainties, and security vulnerabilities underscore the need for robust risk management frameworks and regulatory oversight. Moreover, concerns regarding the environmental impact of cryptocurrency mining and the proliferation of illicit activities underscore the importance of addressing these issues to ensure long-term sustainability and cryptocurrency legitimacy.

2 BLOCKCHAIN TECHNOLOGY

Blockchain technology stands at the forefront of technological innovation, poised to revolutionize modern industries with its decentralized and transparent framework. Originally synonymous with cryptocurrencies and NFTs, blockchain has evolved into a versatile solution capable of reshaping the fundamental processes of various sectors worldwide.

At its essence, blockchain operates as a distributed ledger, recording transactions across a network of interconnected nodes. This decentralized structure ensures that no single entity has control over the data, enhancing security and mitigating the risk of fraud. Each transaction is cryptographically linked to the preceding one, forming an immutable chain of blocks, hence the name "blockchain."

The transformative potential of blockchain extends across numerous industries, offering unparalleled benefits in transparency, efficiency, and security. In finance, blockchain technology facilitates the establishment of decentralized financial systems, eliminating the necessity for intermediaries such as banks and transforming the landscape of financial transactions. Through smart contracts and self-executing agreements stored on the blockchain, parties can automate and enforce the terms of their agreements without the need for intermediaries, reducing transaction costs and delays.

Moreover, blockchain technology has vast implications for supply chain management, providing a transparent and immutable record of product movements from production to distribution. By tracing the origin and journey of goods, blockchain enhances supply chain efficiency, reduces counterfeit products, and ensures product authenticity.

In the healthcare sector, blockchain enhances data security and interoperability, allowing patients to maintain ownership of their medical records while securely sharing them with healthcare providers. That ensures the integrity and confidentiality of sensitive health information, enhancing patient privacy and trust.

Furthermore, blockchain technology facilitates the transition to renewable energy by optimizing energy trading and incentivizing sustainable practices. Through peer-to-peer energy trading platforms built on blockchain, individuals can directly buy and sell excess renewable energy, fostering a more efficient and sustainable energy ecosystem.

While blockchain technology holds immense promise, challenges like scalability, interoperability, and regulatory concerns remain significant barriers to widespread adoption. However, ongoing research and development efforts continue to address these challenges, driving innovation and expanding the potential applications of blockchain across industries. (Wamba, Wamba-Taguimdje, Lu, & Maciel M. Queiroz, 2024)

2.1 Cryptocurrency types

Based on blockchain technology, we recognize two types of cryptocurrencies: coins and tokens.

A coin is a digital asset that has blockchain technology. The most well-known example of a coin is Bitcoin. The main characteristic of coins is that they are designed to be a medium of exchange. That means they can be used to purchase goods and services, much like any other currency. In addition to being a means of payment, coins can also be used for speculation. That entails purchasing coins in the hope that their price will rise, allowing them to be sold at a profit.

On the other hand, a token is also a digital asset. However, it does not have blockchain technology.

Instead, tokens are created based on existing blockchain technology. Tokens and coins share many similarities in terms of operation and underlying technologies, but they differ in purpose. Tokens are created to raise funds for projects. They can be likened to companies selling their shares through stocks.

Essentially, although coins and tokens are digital assets, they fulfill distinct roles within the blockchain ecosystem. Coins are primarily used as a medium of exchange, akin to traditional currencies, whereas tokens are often created to represent ownership of assets, participation in a project, or access to a service within a specific ecosystem. Understanding these distinctions is crucial for investors and enthusiasts navigating the diverse landscape of cryptocurrencies and blockchain-based assets. (Charfeddine, Benlagha, & Khediri, 2022)

2.2 Layers

The layers in cryptocurrencies refer to different levels of the technological stack that constitute the cryptocurrency ecosystem. Each layer has its own functions and specific tasks, contributing to the overall operation of the cryptocurrency network. Generally, the cryptocurrency ecosystem is divided into four main layers known as Layer 0, Layer 1, Layer 2, and Layer 3.

Layer 0, also known as the "base layer," is the foundational level of the blockchain technology stack. It consists of the physical infrastructure, including hardware and network protocols required for the blockchain technology operation. This layer focuses on designing the network architecture, consensus mechanisms, and cryptography used to ensure network security. Layer 0 is crucial for the overall security and operation of blockchain technology, as it provides data processing and transmission integrity. Examples of protocols in layer 0 include the Internet Protocol (IP), Transmission Control Protocol (TCP), and User Datagram Protocol (UDP), which provide the necessary framework for data packet transmission across the network. In essence, Layer 0 serves as the backbone of the blockchain technology stack, providing the fundamental infrastructure needed for blockchain operation.

Layer 1 refers to the base blockchain layer that acts as the primary accounting system for cryptocurrencies. This layer includes cryptographic mechanisms, consensus mechanisms such as Proof of Work (PoW) and Proof of Stake (PoS), and other basic functionalities required for blockchain operation. Layer 1 enables the storage and processing of conducted users' transactions and ensures security and transparency throughout the cryptocurrency network. The mining process, necessary for verifying and confirming transactions in the blockchain, also takes place in this layer. Layer 1 is crucial for the operation of cryptocurrencies and serves as the foundation for further development of other layers in the cryptocurrency ecosystem. Technologies such as blockchain are used in this layer to ensure security, reliability, and decentralization across the entire cryptocurrency network. An example of a cryptocurrency acting as layer 1 is Bitcoin.

Layer 2 builds upon Layer 1 and addresses some of the challenges associated with the base blockchain layer. This layer utilizes various technologies such as off-chain transactions, sidechains, and other mechanisms to achieve greater scalability, speed, and efficiency in the cryptocurrency network. In Layer 2, transactions are conducted off the main blockchain, allowing for increased transaction throughput and reduced transaction costs. Layer 2 can also facilitate more complex transactions requiring larger amounts of data. Additionally, Layer 2 addresses the issue of high transaction fees, sometimes characteristic of base blockchain networks, by enabling lower transaction fees and greater accessibility for users. Examples of cryptocurrencies operating on layer 2 include Polygon, Optimism, GMX, etc.

Layer 3 in cryptocurrencies is an extension of Layer 2 and enables the execution of more complex applications such as decentralized applications (DApps), smart contracts, and other projects based on blockchain technology. Layer 3 employs various technologies that enable communication between different blockchains, integration of external data into blockchains, and other solutions that enhance functionality and user experience. Layer 3 is aimed at developers looking to build more complex applications based on blockchain technology. It is a significant step in the cryptocurrency ecosystem development

because it allows greater flexibility and efficiency in application development. Examples of cryptocurrencies operating on layer 3 include Ethereum (ETH), the EOS (EOS), Cardano (ADA), and others that support the execution of decentralized applications and smart contracts. (Zebpay, 2023)

2.3 Uses of cryptocurrencies

Cryptocurrencies have long captured the attention of people worldwide. While most individuals focus solely on their price and use as an investment vehicle, cryptocurrencies offer much more than that. Understanding these different purposes can help cryptocurrency users better leverage the potential of these digital assets. Below are detailed explanations of the purposes of crypto tokens and coins.

Utility tokens are a specific type of cryptocurrency that, unlike coins (e.g., Bitcoin), is not designed as a medium of exchange. Instead, a token has utility value for users, meaning users within the protocol can access various functions. These benefits examples include using applications, purchasing virtual items, voting for ideas, influencing project development, lowering transaction fees, etc. Any crypto project can issue utility tokens, which, unlike Bitcoin, are not mined but rather sold in an Initial Coin Offering (ICO). Projects may also choose to distribute some of their tokens to users as a reward for participating in the initial development phase, a process known as an "Airdrop." Utility tokens primarily serve for the growth and development of a project and use within its system. However, tokens also have a monetary value on the secondary market, making them usable as investments, protection against inflation, and long-term stores of value. (Vidal-Tomas, Briola, & Aste, 2023)

Security tokens are a form of cryptocurrency representing ownership stakes in real-world assets such as company equity, real estate, commodities, etc. Holders of these tokens can receive a share of profits as dividends on traditional markets. Companies seeking additional funding for their business or projects can issue specific ownership of their company through security tokens offered to investors on cryptocurrency exchanges facilitating the purchase of these tokens. Security tokens are also

subject to securities laws and regulations, similar to traditional securities. (Kreppmeier, Laschinger, Steininger, & Dorfleiter, 2023)

As their name suggests, payment tokens exist for the purpose, of payment for services or products, claims author Jei Young Lee in his article (2019). Typically, these tokens have no other function or connection to any project. Generally, these cryptocurrencies serve as value assets similar to cash or gold, facilitating purchases, sales, and various other transactions. They also provide the same functions as fiat currencies.

Exchange tokens are digital assets owned by the cryptocurrency exchange. Generally, there are more main uses of exchange tokens that directly benefit both traders and the exchange itself: Cryptocurrency exchanges are platforms for buying, selling, and exchanging cryptocurrencies and are a significant aspect of the ever-expanding cryptocurrency ecosystem. Exchanges offer users a user-friendly interface, similar to those expected from most traditional online financial exchanges or brokerage accounts but provide access to a spectrum of digital assets. As the cryptocurrency industry evolved, exchanges had to adapt to the evolving needs of their customers – both in terms of expanded trading options and platform functionalities. Exchange tokens are one such innovation. (Makridis, Frowis, Sridhar, & Bohme, 2023)

NFTs are digital tokens representing ownership rights to digital art, which can appear in the forms of images, music, in-game items, etc. Fundamentally programmed like most cryptocurrencies and operating on the same blockchain technology, they are classified as types of cryptocurrencies. They can also be bought and sold on most cryptocurrency exchanges. NFTs have existed for years but did not gain popularity until 2021, when the market was valued at a record \$41 billion, nearly surpassing the total sum of money in the entire world's physical art market. Like artworks, NFTs cannot be entirely counterfeited, as each NFT contains its identification number, and like any cryptocurrency transaction, each NFT transaction has its number. Purchasing an NFT also entails ownership of the selected item, as it comes with built-in authentication, which serves as proof, a

factor that can be highly significant for an individual collector of a particular collection. NFTs differ from traditional cryptocurrencies. One NFT cannot be exchanged for another NFT, as can be done with fiat currency, euros for euros, or with cryptocurrencies, bitcoin for bitcoin. (Anselmi & Petrella Giovani, 2023)

DEFI refers to a new financial industry within the development of the so-called Web3, which will be discussed in the next chapter. DEFI protocols offer users similar financial services one might expect from a traditional bank but without centralized authorities. These services include options for earning interest on assets, borrowing and lending assets, etc. Instead of intermediaries to verify transactions, these applications prefer to use smart contracts. Smart contracts are blockchain-based programs that automatically execute commands when certain criteria are met. DEFI also does not require user authentication; instead, protocols identify users by their unique wallet addresses. In addition to decentralized crypto lending services, DEFI includes decentralized exchanges, where users can exchange their cryptocurrency for any other, similar to banks where, i.e., we can change euros for US dollars. There are also decentralized staking pools, where users can lock their cryptocurrencies in a specific network for a certain period. By doing so, the user contributes to the security and progress of the entire network. In return, the network rewards the user with a percentage of the total value of locked cryptocurrencies. (Saengchote, Putninš, & Samphantharak, 2023)

DEFI tokens are cryptocurrencies associated with the DEFI projects and serve a specific purpose within the DEFI protocol's ecosystem. These tokens are typically designed on the blockchain on which the corresponding DEFI project is built. The use of tokens is intended for use in specific applications within the ecosystem and is usually designed as a "utility token."

Stablecoins are a specific type of cryptocurrency designed to maintain a stable value, thereby reducing the risk of value fluctuations. Unlike other cryptocurrencies known for their high volatility, the value of stablecoins remains relatively constant. Stablecoins have various use cases, including trading, converting cryptocurrencies into fiat currency to mitigate trading risks, and serving as

a store of value, among others. They have gained popularity in recent years due to their ability to provide users with a reliable means of preserving stability and security in the cryptocurrency world. While stablecoins have proven to be valuable in ensuring stability in cryptocurrency trading and maintaining value compared to other cryptocurrencies, caution is necessary as there have been instances of stablecoin failures in the past (Gubareva, Bossman, & Teplova, 2023)

3 CONCLUSION

In conclusion, the rise of cryptocurrencies and blockchain technology marks a monumental shift in the landscape of finance and technology. From the introduction of Bitcoin to the diverse ecosystem of digital assets and decentralized applications, this revolution has redefined how we perceive and engage in financial transactions.

Cryptocurrencies offer unprecedented opportunities for individuals and businesses to participate in a borderless, decentralized economy. With features such as instant transactions, enhanced privacy, and lower costs, they empower users to take control of their financial assets and engage in transactions without intermediaries. Meanwhile, blockchain technology provides a transparent, immutable ledger that enhances security, efficiency, and trust in various industries, from finance to supply chain management.

However, challenges and risks remain amid the promise of decentralization and financial autonomy. Volatility in cryptocurrency markets, regulatory uncertainties, security vulnerabilities, and environmental concerns associated with mining demand careful consideration and proactive mitigation strategies. Additionally, scalability and interoperability issues hinder the widespread adoption of blockchain technology, necessitating ongoing research and development efforts.

Despite these challenges, the transformative potential of cryptocurrencies and blockchain technology remains undeniable. They promise to drive innovation, facilitate financial inclusion, and transform traditional business models. By embracing innovation, addressing regulatory concerns, and promoting responsible development, we can harness the full potential of these technologies to build a more inclusive, transparent, and efficient financial ecosystem.

In this rapidly changing landscape, it is essential for stakeholders - including governments, businesses, and technology innovators - to collaborate. Together, we can overcome challenges, drive innovation, and unlock the transformative power of cryptocurrencies and blockchain technology to create a more equitable and sustainable future for all.

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