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Research Article

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Leveraging ERC20 Crypto Tokens for Business Growth: Overcoming Regulatory Challenges and Market Monopolies

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Abstract

Private companies seeking to grow often face complex regulations that hinder their development or delay decision-making. These challenges stem from market monopolies that tend to absorb smaller entities. However, principles of free markets and democratic governance protect social justice and prevent the concentration of corrupting power. This article explores company-issued crypto assets as a promising growth avenue. It emphasizes the importance of carefully timing the introduction of crypto assets to the public, as this can significantly impact their success and value. The Ethereum-based ERC20 protocol is highlighted as a key standard for issuing crypto tokens. Ethereum, a decentralized blockchain platform, is advantageous for implementing complex business logic and smart contracts. Companies often issue tokens to raise capital through ICOs, with the ERC20 protocol being the most widely used standard. This protocol ensures compatibility within the Ethereum ecosystem, making it a preferred choice for new crypto token development.

Keywords: Blockchain, Cryptocurrency, Ethereum, ERC20 protocol, ICO (Initial Coin Offering), Decentralized networks, Tokenization

Introduction

Cryptocurrency, or virtual currencies, has become a revolutionary form of digital exchange. These currencies, such as Bitcoin and Ethereum, utilize cryptography to secure transactions, ensure privacy, and offer decentralized control. The term "crypto" comes from the Greek word "kryptós," meaning hidden or private, reflecting the secure and concealed nature of these transactions. Unlike traditional currencies, cryptocurrencies have no physical form and are not regulated by governments or banks, allowing people to exchange money directly over the internet without intermediaries.

Blockchain is the technology that powers most cryptocurrencies, serving as a decentralized digital ledger that securely records all transactions. It organizes data into blocks that are linked (chained) together chronologically, creating an immutable timeline of transactions. The data within each block is encrypted and cannot be altered, ensuring security and transparency. A blockchain is essentially a type of database, but unlike traditional databases, which are managed by a central authority, blockchains are decentralized and distributed across a network of computers. This decentralized nature is a key feature that makes cryptocurrencies resistant to censorship, fraud, and hacking.

Cryptocurrency mining is the process through which new coins are created and transactions are validated. Miners use powerful computers to solve complex mathematical problems that validate the transactions and add new blocks to the block chain. Once the problem is solved, the miner is rewarded with newly minted cryptocurrency. While mining can be lucrative, it requires expensive hardware, consumes vast amounts of energy, and the rewards decrease over time, making it less profitable for many miners (Figure 1).

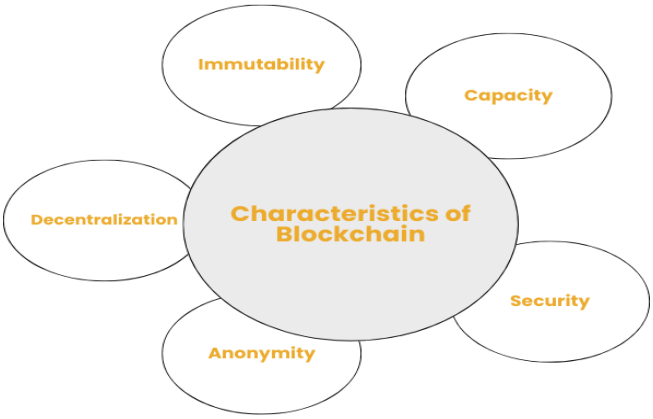

Figure 1: Characteristics of block chain.

One significant advantage of cryptocurrencies is their efficiency in facilitating peer-to-peer transactions without needing third parties like banks. This can reduce transaction fees and increase the speed of transfers, especially in cross-border payments. However,

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cryptocurrencies are not without challenges. Due to their decentralized nature, they often operate outside traditional financial regulatory frameworks, leading to issues such as money laundering and tax evasion. Moreover, the value of cryptocurrencies is highly volatile, making them risky for investors and businesses (Figure 2).

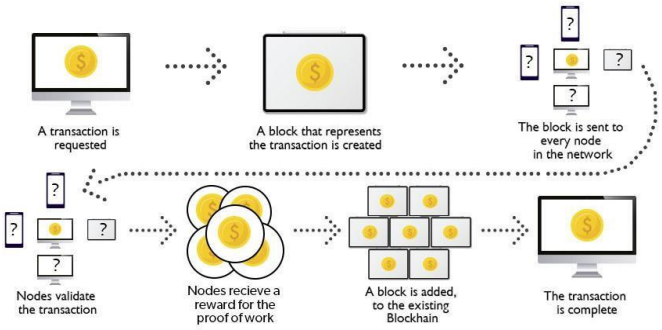

Figure 2: Working of blockchain.

Blockchain's decentralized structure can be used in various industries beyond currency, such as supply chain management, healthcare, and real estate. Smart contracts, for instance, are blockchain applications that automatically execute contracts when predefined conditions are met. These contracts are transparent, immutable, and self-enforcing, removing the need for intermediaries like lawyers or escrow agents.

Despite the potential benefits, blockchain and cryptocurrencies face challenges in mainstream adoption due to regulatory uncertainties, technical complexities, and environmental concerns stemming from the energy-intensive mining process. Governments and institutions are still grappling with how to regulate cryptocurrencies while fostering innovation and ensuring consumer protection. Additionally, the development of more energy-efficient consensus mechanisms, such as Proof of Stake, is being explored to address the environmental concerns associated with traditional mining.

Although cryptocurrencies and blockchain technology offer many advantages, including security, decentralization, and transparency, they also present challenges such as regulatory hurdles and high energy consumption. As technology matures, it holds the potential to transform not only finance but also various sectors of the global economy.

Related Work

The cryptocurrency market has evolved unpredictably and at remarkable speed over the course of its short lifespan. Since the release of the pioneering anarchic cryptocurrency, Bitcoin, to the public in January 2009, more than 550 cryptocurrencies have been created, with the majority achieving only minimal success. Research on the industry remains scarce. Most of it is primarily focused on Bitcoin rather than a broader range of cryptocurrencies, and it is consistently being outpaced by rapid industry developments, including new coins, technological advancements, and increasing government regulation of the markets. However, the volatility of the industry does indeed pose a challenge for research, making a thorough evaluation of the cryptocurrency industry as a whole essential.

Shehhi et al. aimed to resolve two key questions: "What are the factors based on which online clients decide to utilize and mine their digital currency?" and "Which factors significantly influence the coin's popularity and value?" We attempt to answer these two inquiries for eight selected cryptocurrencies by conducting an online survey [1]. Results from the survey show that the majority of participants believe that the currency name and logo influence their decision to use or mine a cryptocurrency.

Albayati et al. proposed that blockchain and cryptocurrencies like Bitcoin, Ethereum, and Litecoin are innovative FinTech technologies that have rapidly entered the financial market, reshaping the global economy [2]. However, there has been low acceptance of these technologies among consumers. A clear gap exists, which has not yet been fully considered and has been misunderstood across many platforms.

Alexopoulos et al. assessed that Blockchain Technologies (BCT) could be described as one of the most promising trends [3]. We are currently witnessing numerous implementations, particularly in the financial sector, with the creation of cryptocurrencies.

Almukaynizi et al. hypothesized that with the increasing prevalence of Dark web/Deep web (D2web) sites specializing in the trade of exploit kits and malware, malicious actors have easier access to a wide range of tools that can enhance their offensive capabilities [4].

Amsyar et al. stated that money is clearly an essential need for every individual, and human necessities can be realized through the use of money [5]. Noting the lack of systematic literature reviews on cryptocurrency, this paper aims to fill that gap. Along with the development of modernization and globalization, which has now entered the era of Industry 4.0, blockchain-based technology such as cryptocurrency has emerged. Cryptocurrency is one of the innovations of blockchain that is frequently used as a decentralized digital currency.

Azouvi et al. conducted a quantitative analysis of the decentralization of the governance structures of Bitcoin and Ethereum. Specifically, they scraped the open-source repositories related to their respective codebases and development proposals to track the number of contributors to the code and to the overall discussion [6].

Baek et al. examined the implementation of financial fraud technologies alongside advancements in the financial sector [7]. The emergence of blockchain technology has also led to financial transaction anonymity through de-anonymization of blockchain technology. This research identifies suspicious transactions from Binance, an open-source cryptocurrency, by classifying and identifying cryptocurrency wallets.

Corbet et al. explored Eastman Kodak, an American technology company that produces imaging products, and its 2018 announcement to enter the cryptocurrency market, raising concerns that it might be exploiting a potential cryptocurrency bubble for short-term gains [8]. We analyze the relationships between Kodak, cryptocurrency, and stock market index returns. Evidence shows a significant and sustained increase in both Kodak's share price and price volatility following the KODAK-Coin announcement, along with an increased correlation between Kodak's stock price and Bitcoin.

Fauzi et al. focused on Bitcoin and other prominent cryptocurrencies, which have gained much attention over the past several years [9]. Known globally as digital or virtual currencies,

these cryptocurrencies are acquired and traded within the blockchain system. The adoption of blockchain technology for cryptocurrency has raised eyebrows within the financial sector, governments, stakeholders, and individual investors. The rise of cryptocurrency in this decade since Bitcoin's inception in 2009 has taken the market by storm. Cryptocurrency is expected to become the future of money, potentially replacing current paper currency globally.

Garriga et al. stated that blockchain is a decentralized exchange and information management solution, the key technology behind the success of Bitcoin and other cryptocurrencies [10]. As the number and variety of blockchain implementations continue to increase, adopters must focus on selecting the best one to support their decentralized applications (dApps), rather than developing new ones from scratch.

Hassani et al. noted that cryptocurrency has been a trending topic over the past decade, pooling significant technological power and attracting investments valued at more than trillions of dollars globally [11]. Cryptocurrency technology and its networks have been endowed with many superior features due to its unique structure, which has determined its overall efficiency, relevance, and data-intensive characteristics. This paper presents and summarizes the interactions between two critical concepts in the digital world.

Kaminskaya and Petrova assessed that the first business transaction with cryptocurrency in 2010 marked the beginning of a revolution in transactions [12]. Blockchain and cryptocurrencies are set to drastically change how we conduct transactions, just as the Internet revolutionized how we communicate. Currently, more than 2,000 cryptocurrencies are listed on the market, and many more are being launched through Initial Coin Offerings (ICOs) to serve as a method of exchange within specific business ecosystems or as rights to assets or liabilities.

Konoth et al. explored cryptocurrency mining and reported that a surge in alternative coins, which can be mined without specialized hardware, and the increase in the value of cryptocurrencies, has led to the development of cryptocurrency mining (crypto mining) services, such as Coinhive, which can be easily integrated into websites to monetize the computational power of their visitors [13].

Krafft et al. evaluated that as cryptocurrencies gain popularity and credibility, marketplaces for cryptocurrencies are becoming increasingly important. Understanding the dynamics of these markets can help assess how sustainable the cryptocurrency ecosystem is and how design choices affect market behavior [14].

Lee argued that as the underlying technology of Bitcoin, blockchain is essential for creating an alternative economic system by transforming how we conduct transactions over the web [15]. Blockchain aims to enhance data security and transparency by dividing encrypted data among Peer-to-Peer (P2P) networks. The decentralized nature of blockchain introduces a new concept of a token-based economy, where community revenue can be directly allocated to content creators and service users who generate value. This article examines how blockchain technology and cryptocurrencies are evolving and interconnected, creating a token economy through various business models.

Madey pointed out that the last decade has seen the development of several virtual currencies, including the most well-known ones like Bitcoin, Ethereum (ETH), Litecoin (LTC), Zcash (ZEC), Dash, Ripple (XRP), and Monero (XMR) [16]. Financial experts, investors, digital analysts, and the scientific community have varying opinions, both positive and negative, about their future.

Miraz stated that blockchain, the technology behind Bitcoin's cryptocurrency system, is considered essential for ensuring enhanced security and, in certain implementations, non-traceable privacy for various applications, including the Internet of Things (IoT) ecosystem [17].

Moradi et al. assessed that power systems are experiencing transformative changes [18]. Future grids will be smarter and more autonomous. Furthermore, the penetration of demand-side small-scale distributed generation is increasing. The rise of Electric Vehicles (EVs) heralds a promising future, particularly for vehicles with V2G (Vehicle-to-Grid) capabilities, which will result in a boom in the prevalence of EVs in the coming decades.

Papík simulated that most cryptocurrency exchanges provide their market data through WebSocket APIs [19]. Consequently, trading systems are recommended to use the WebSocket protocol to connect with exchanges and retrieve the data.

Peláez-Repiso et al. proposed that blockchain is a technology that will reshape the relationships between various actors in society individuals, businesses, and governments by implementing concepts such as Self-Sovereign Identity (SSI) and smart contracts, which support virtual currencies that are not controlled by any state, financial institution, or centralized organization [20].

Rose noted that although Bitcoin was not the first attempt at digital currency, it has been the most successful, and it is now being accepted by various major retailers [21].

Rosales found through statistical analysis that after the oil price collapse in 2014, debates in oil-producing countries centered around the importance of moving away from commodity dependence [22]. Modernization initiatives and educational efforts emerged among both large and small producers. However, several nations remain heavily committed to rentier practices, and many in Latin America and Africa have engaged in new forms of resource dependence by expanding their mining frontiers.

Sabri-Laghaie et al. argued that blockchain technology and cryptocurrencies are essential for confronting this new trustless economy [23]. Millions of smart devices can now execute straightforward financial transactions through blockchain technology and its associated cryptocurrencies.

Thampanya et al. investigated the long-run and short-run asymmetric effects of gold and cryptocurrency returns on the Thai stock market [24]. Using daily data on gold prices from 2000 to 2019 and on cryptocurrency (Bitcoin) from 2013 to 2019 in a linear and nonlinear Autoregressive Distributed Lag (ARDL) framework, they compared the hedging effectiveness of gold and Bitcoin for equities. This study also evaluated whether the hedging capability of gold or cryptocurrency remains equally strong in bearish and bullish market conditions.

Yadav et al. considered key factors by which governments and enterprise leaders have successfully completed initiatives to thoroughly examine the traits of blockchain and how it should be incorporated into standard practices [25]. Some sectors have advanced faster than others. The integration of blockchain technology into regular activities within large multinationals has been officially

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communicated, with the financial sector being the fastest to adapt, followed by the development and market sectors.

Material and Method

This section outlines the process of creating a cryptocurrency token on the Ethereum blockchain using MetaMask for account management and test ETH for transaction fees. The steps described cover network selection, wallet setup, token creation using the ERC20 standard, and deployment through the Remix IDE.

Materials

Ethereum blockchain: Ethereum was used due to its smart contract capabilities and widespread adoption for decentralized applications (dApps) and token creation.

MetaMask wallet: MetaMask, a browser-based wallet, was utilized to manage the Ethereum accounts and interact with the network.

Ropsten test network: A test network that simulates the Ethereum Mainnet, allowing developers to test smart contracts and tokens without real monetary risk.

Remix IDE: A web-based development environment that supports writing, compiling, and deploying Ethereum smart contracts.

Test Ether (ETH): Virtual currency obtained from Ropsten Faucets to cover gas fees during the deployment process.

Methods

Following are steps involved in network selection, wallet setup, token creation using the ERC20 standard, and deployment through the Remix IDE (Figure 3).

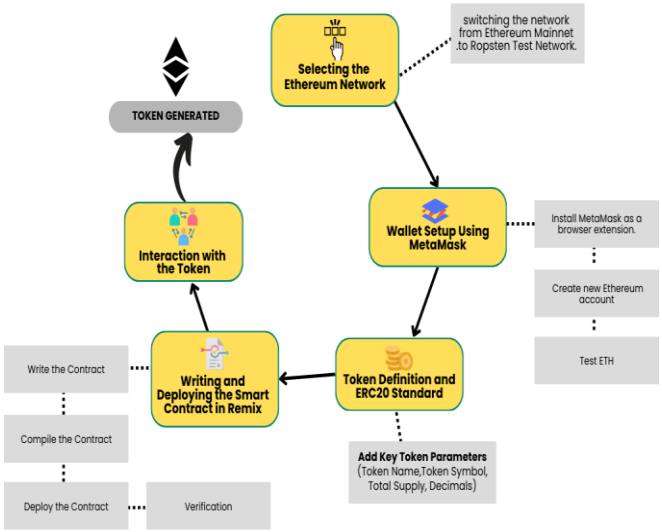


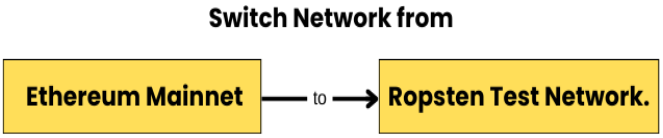
Figure 3: Creating a cryptocurrency token on the ethereum blockchain.

Selecting the ethereum network

Ethereum provides multiple networks, including the "Mainnet" (for real transactions) and various "test networks" such as Ropsten, Rinkeby, and Kovan. For this project, the "Ropsten Test Network" was selected. This environment mirrors the Mainnet's functionality but uses test ETH, which can be obtained for free from faucets. This allows safe experimentation without risking real funds.

Procedure

The Ropsten network was accessed through MetaMask by switching the network from "Ethereum Mainnet" to "Ropsten Test Network."



Wallet setup using metamask

MetaMask was used as the digital wallet to create Ethereum accounts and manage the test ETH needed for the deployment. MetaMask allows users to interact seamlessly with decentralized applications and smart contracts directly from a web browser.

Procedure

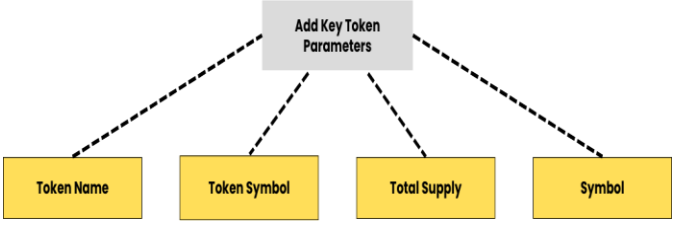
- MetaMask was installed as a browser extension.
- A new Ethereum account was created on the Ropsten Test Network.
- Test ETH was obtained from the [MetaMask Faucet] (https://faucet.metamask.io/), where 1 ETH was transferred to the newly created account. Alternatively, other faucets such as [Ropsten Ethereum Faucet] (https://faucet.ropsten.be/) can also be used to acquire test ETH.

Token definition and ERC20 standard

The token was created following the **ERC20 standard**, a widely accepted standard for tokens on the Ethereum blockchain. The ERC20 standard defines functions and events that all Ethereum-based tokens must implement, ensuring compatibility with decentralized applications.

Key token parameters:

- Token Name: The user-defined name of the token.
- Token Symbol: A unique identifier for the token (e.g., BTC for Bitcoin).
- Total Supply: The number of tokens to be created.
- Decimals: The precision of the token (e.g., 18 decimals allow subdivision into very small units).



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For this experiment, the following parameters were used:

- Token Name:1669 NewToken
- Token Symbol: SMT
- Total Supply: 10,000 SMT
- Decimals: 18 (to allow token subdivision)

Writing and deploying the smart contract in remix

The Remix IDE was used to write, compile, and deploy the token contract. Remix is a browser- based tool that provides a full development environment for Ethereum smart contracts (Figure 4).

Figure 4: Smart contract.

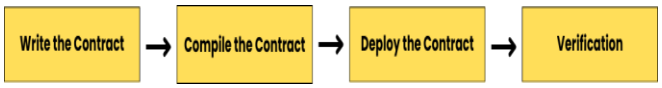
Procedure

Write the contract: An ERC20 token contract was written in the Solidity programming language. This contract defines the total supply, name, symbol, and decimals of the token, as well as basic functions such as transferring tokens between accounts.

Compile the contract: The written contract was compiled using the Solidity compiler within Remix. Any errors or warnings were reviewed and resolved before proceeding to deployment.

Deploy the contract: The contract was deployed to the **Ropsten Test Network**. MetaMask was used to sign and confirm the transaction, with test ETH used to pay the gas fees. Once deployed, a unique contract address was generated, representing the token on the Ethereum blockchain.

Verification: After successful deployment, the contract address was stored, and the token could be viewed in the MetaMask wallet.



Interaction with the token: Once the token was deployed, basic interactions such as transferring tokens between accounts and viewing the total supply were tested using MetaMask and Remix.

Tools and technologies

MetaMask: Browser-based ethereum wallet.

Remix IDE: Ethereum contract development tool.

Ethereum testnet (Ropsten): Test network for deploying smart contracts.

ERC20 standard: Token standard used to create and manage tokens.

Results

Token creation process

The process of generating a cryptocurrency token on the Ethereum blockchain using MetaMask and the Remix IDE was successfully carried out as per the methods outlined. The ERC20 standard was followed, which ensured compatibility with decentralized applications and established basic token functionality, such as transferability and account balance tracking.

Ethereum network selection

The decision to use the Ropsten Test Network proved to be effective for conducting safe and cost-free experiments with the Ethereum blockchain. The ability to simulate real-world blockchain transactions on Ropsten, without using actual monetary value, allowed the development and deployment of the token in a risk-free environment. This network mirrors the functionality of the Ethereum Mainnet, making it a practical choice for testing and validating the smart contract before considering deployment on the Mainnet.

One of the key advantages of using the test network was the easy access to Test Ether (ETH) from faucets, which was used to pay gas fees for contract deployment. This allowed the project to simulate real transaction costs without risking actual Ether.

Wallet setup with metamask

Setting up a new Ethereum account using MetaMask was straightforward. MetaMask's intuitive interface made the account creation and management process seamless. The successful acquisition of Test ETH through the Ropsten faucet confirmed that the wallet was functioning correctly and ready to interact with the blockchain.

MetaMask also played a crucial role in interacting with the smart contract. By linking MetaMask to Remix IDE, transactions were signed and confirmed with ease. This interaction proved how MetaMask could act as a bridge between the web browser and the Ethereum blockchain, facilitating seamless smart contract deployment and token management.

Token definition and contract deployment

The ERC20 token was successfully defined with the following key parameters:

- **Token Name:** 1669NewToken
- **Token Symbol:** SMT
- **Total Supply:** 10,000 SMT
- **Decimals:** 18

The token contract was written in Solidity, the standard programming language for Ethereum smart contracts, and compiled without errors using Remix IDE. The flexibility provided by the ERC20 standard allowed the contract to define essential functions

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Innovative Journal of Applied Science

such as token transfers and balance checks, making the token functional within the Ethereum ecosystem.

Deployment of the contract on the Ropsten Test Network was successful. The transaction was confirmed by MetaMask, and a unique contract address was generated for the token. The total supply of 10,000 SMT tokens was accurately reflected, and the tokens became available for viewing and transfer through MetaMask. This confirmed that the contract was correctly deployed and integrated into the test network (Figure 5).

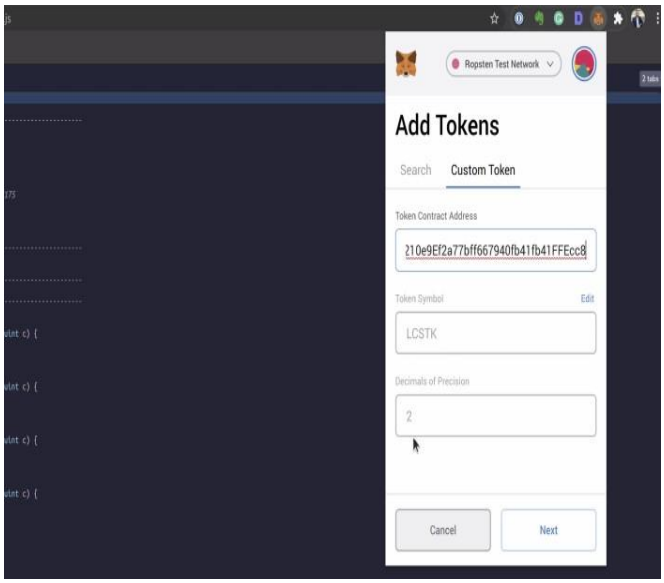

Figure 5: Contract deployment interaction with the token.

After deployment, basic token interactions were tested to verify functionality. Token transfers between accounts were carried out without issues. MetaMask enabled easy transfer of tokens between different accounts on the Ropsten test network, and all transactions were reflected in the respective account balances.

The total supply of 10,000 SMT was verified, and no discrepancies were found in token distribution. This confirmed that the contract's logic was correctly handling the token creation and distribution as defined by the ERC20 standard.

Discussion

The successful creation and deployment of the 1669 NewToken demonstrated the efficiency of using MetaMask and Remix IDE for token development on Ethereum. The use of the Ropsten Test Network allowed for secure testing without the risk of financial loss, and MetaMask proved to be an excellent tool for account management and contract interaction.

One challenge encountered during the process was ensuring that the smart contract was error-free before deployment. However, the Solidity compiler within Remix helped identify and resolve any potential issues, ensuring a smooth deployment.

The interaction with the deployed token also highlighted the flexibility of the ERC20 standard, as it facilitated token transfers and allowed for future integration with other decentralized applications on the Ethereum blockchain.

In future applications, the token could be deployed on the Ethereum Mainnet, after further testing on other test networks such as Rinke by or Kovan to ensure robustness. Additionally, integrating the token with decentralized exchanges and exploring use cases such as tokenized assets or DeFi (Decentralized Finance) applications would be viable next steps.

The experiment demonstrated that creating tokens using Ethereum is not only feasible but also highly accessible for developers and organizations looking to implement blockchain-based solutions. However, scalability, security, and gas fees should be carefully considered when planning large-scale deployments on the Mainnet.

Conclusion

The successful creation and deployment of the 1669 NewToken on the Ethereum blockchain using the ERC20 standard demonstrate the effectiveness and accessibility of the Ethereum ecosystem for token generation. By utilizing the Ropsten Test Network, the process was carried out safely, without financial risks, while closely simulating real-world conditions on the Ethereum Mainnet. MetaMask proved invaluable for managing the Ethereum wallet, acquiring test ETH, and interacting with smart contracts, showcasing its capability as a bridge between decentralized applications and the blockchain.

The Remix IDE facilitated smooth smart contract development, allowing the token to be compiled, deployed, and tested efficiently. The project validated key aspects of token functionality, including token creation, supply distribution, and token transfers between accounts.

This experiment highlights the flexibility and robustness of the ERC20 token standard, making it a practical choice for anyone looking to create and manage their own tokens within the Ethereum network. Future work could involve scaling this token on the Ethereum Mainnet or integrating it into decentralized applications such as DeFi platforms or tokenized assets. Overall, the project illustrates that token creation on Ethereum is highly achievable with the right tools, offering significant potential for further blockchain-based innovations.

Conflicts of Interest

The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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