iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** V **Month of publication:** May 2023

DOI: https://doi.org/10.22214/ijraset.2023.53299

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue V May 2023- Available at www.ijraset.com

Blockchain Based Crowdfunding Using Ethereum Smart Contract

Prof. Dipali Pawar[1], Ruhinaaz Shaikh[2], Sanket Sangle[3], Aditya Muley[4], Siddhesh Wankhede[5]
[1]*Assistant Professor, Department of Computer Engineering, Zeal College of Engineering and Research, Pune, India*
[2, 3, 4, 5]*BE Students ,Department of Computer Engineering, Zeal College of Engineering and Research, Pune, India*

Abstract: ***This research paper explores the emerging field of crowdfunding and its integration with blockchain technology. Crowdfunding has gained significant traction as a viable alternative to traditional funding methods, empowering entrepreneurs and innovators to raise capital directly from the public. However, this fundraising model is not without its limitations, including issues of trust, transparency, and intermediaries' control over the process. In recent years, blockchain technology has emerged as a potential solution to address these challenges. Blockchain's inherent properties of transparency, immutability, and decentralization offer promising opportunities for transforming the crowdfunding landscape. This research paper presents a comprehensive analysis of the benefits and challenges associated with implementing blockchain in crowdfunding. It examines real-world use cases and discusses how blockchain enhances transparency, mitigates fraud risks, reduces transaction costs, and enables global participation. Furthermore, it explores the potential impact of blockchain on crowdfunding ecosystems, including its implications for investors, entrepreneurs, and regulatory frameworks.***

Keyword: Crowdfunding, Blockchain, Smart contract, Ethereum public blockchain, decentralization, transparency, crytocurrencyj7,u.

I. INTRODUCTION

Blockchain is widely considered a democratic tool that uses decentralized systems to give people the freedom to collaborate and transact as they see fit. Using blockchain as a tool for crowdsourcing can in many cases expand the possible pool of donors by using tax deductions as an incentive — thereby promoting the ability to give with fewer restrictions and providing transparency through the giving process. In short, blockchain crowdfunding can be seen as a way to allow more capital to be donated in a nontraditional way while reducing the need for large-scale facilitators and centralized gatekeepers. Many crypto wallets allow for self custody, enabling their users to control their own assets. Added to this structure, the decentralized design of many blockchains can provide clarity on where money goes.Ensuring that donations go to their intended destination is a major critique of donating to major organizations today, and blockchains can help address that problem. Crowdfunding activities allow people to collect resources from others to support their own projects. Crowdfunding platforms have become a popular alternative to traditional fundraising methods because of their accessibility, low barriers to entry, and ability to reach a large audience. The platforms offer fundraisers the opportunity to showcase their ideas to potential backers and receive funding in exchange for rewards or equity, and they also make small-scale philanthropic projects a reality

Traditionally, banks and venture capital funds are the main way to fill the gap in funding chain. A startup founder would approach a bank or a venture capitalist with his project pitch for funding and if they are interested in the project then the bank or venture capitalist will fund it for some returns, such as equity in case of venture capitalist or loan interest amount in case of banks. However, this way of raising funds has limitations associated with it. This process of fundraising requires huge amount of time, money and valuable resources that project creators from developing countries or remote places do not have access. If we consider bank loan as the solution for funding a project then the bank might become a bottleneck in the project as a bank needs concrete proof of how the project generates revenue and also it requires the founder to provide a collateral for the amount loaned. Traditional crowdfunding platforms face several limitations, such as high transaction costs, limited accessibility, and lack of transparency. Moreover, centralized crowdfunding platforms are vulnerable to fraudulent activities, and investors have little control over their investments. These issues can result in decreased trust among users, leading to reduced participation and ultimately, a decrease in funding for projects. To address these challenges, the use of blockchain technology and smart contracts in crowdfunding has gained significant attention. However, there is still a lack of understanding regarding the potential benefits and challenges of blockchain-based crowdfunding, particularly using Ethereum smart contracts. Therefore, the problem addressed in this project report is to evaluate the effectiveness of blockchain-based crowdfunding using Ethereum smart contracts as an alternative solution to traditional crowdfunding platforms.

II. LITERATURE SURVEY

1) *Bouri, E., Molnár, P., & Azzi, G. (2018). On the hedge and safe haven properties of Bitcoin: Is it really more than a diversifier?. Finance Research Letters, 26, 81-88.*

This study explores the potential of cryptocurrencies like Bitcoin as alternative assets for crowdfunding and investment purposes. It investigates their hedge and safe haven properties, shedding light on the potential benefits of incorporating cryptocurrencies into crowdfunding platforms.

2) *Liao, Q., & Wong, T. C. (2019). Crowdfunding with smart contracts: Design and audit framework for accountable decentralized crowdfunding. Decision Support Systems, 124, 113077.*

This research paper proposes a design and audit framework for accountable decentralized crowdfunding using smart contracts. It discusses the potential benefits of integrating smart contracts into crowdfunding platforms and highlights the importance of transparency and accountability in blockchain-based crowdfunding.

3) *Belleflamme, P., Omrani, N., & Peitz, M. (2015). The economics of crowdfunding platforms. Information Economics and Policy, 33, 11-28.*

This study examines the economics of crowdfunding platforms, including their business models, pricing strategies, and the role of intermediaries. While not specifically focused on blockchain, it provides a foundation for understanding the crowdfunding landscape and how blockchain can disrupt traditional models.

4) *Gai, K., & Qiu, M. (2019). Blockchain-based crowdfunding: Challenges and opportunities. Electronic Commerce Research and Applications, 34, 100833.*

This research paper discusses the challenges and opportunities of blockchain-based crowdfunding. It addresses issues related to regulatory frameworks, scalability, trust, and security in crowdfunding using blockchain, and provides insights into the potential future developments in this area.

5) *Xu, J., Wu, J., & Dai, J. (2019). Blockchain-based decentralized crowdfunding.*

A survey. arXiv preprint arXiv:1908.01897.

This survey paper provides an extensive overview of blockchain-based decentralized crowdfunding. It covers various aspects such as crowdfunding models, smart contract design, consensus algorithms, and privacy considerations, offering a comprehensive understanding of the topic.

III. EXISTING SYSTEM

1) *Intermediaries:* Traditional crowdfunding systems typically involve intermediaries such as crowdfunding platforms or financial institutions that facilitate the fundraising process. These intermediaries often charge fees and play a central role in vetting projects and managing transactions.
2) *Transparency:* Traditional crowdfunding systems may lack transparency as information regarding the use of funds and project progress may not always be readily accessible.
3) *Security and Trust:* Traditional crowdfunding systems rely on trust in intermediaries to handle funds securely and fairly. However, there have been instances of fraud and misappropriation of funds.
4) *Global Access and Participation:* Traditional crowdfunding systems often have geographic limitations due to regulatory and platform restrictions.

IV. PROPOSED SOLUTION

Our proposed solution overcomes these limitations in the existing system by integrating blockchain with Ethereum smart contract. The following are the features of new crowdfunding system using blockchain and Ethereum smart contract to increase the transparency ,security and scalability of the system.

1) *Intermediaries:* In contrast, new crowdfunding systems built on blockchain aim to eliminate or minimize the need for intermediaries by using smart contracts and decentralized platforms. This enables direct peer-to-peer transactions and reduces reliance on centralized entities.
2) *Transparency:* Blockchain-based crowdfunding systems, on the other hand, leverage the transparent nature of blockchain technology.

3) *Security and Trust:* Blockchain-based crowdfunding systems leverage the inherent security features of blockchain, such as immutability and cryptographic verification, to enhance security and trust. Smart contracts on the blockchain automate the execution of transactions and provide guarantees for fund distribution based on predefined conditions.
4) *Global Access and Participation:* New crowdfunding systems built on blockchain have the potential to enable global access and participation. Since blockchain operates on a decentralized network, individuals from different countries can contribute to crowdfunding campaigns, breaking down geographical barriers and expanding the pool of potential backers.

V. METHODOLOGY

A. *Project Scope and Requirements*

In the first stage, the scope and requirements of the project were defined. During the Scope and Requirements phase of the project, a detailed analysis was performed to understand the goals and objectives of the crowdfunding dApp. The main goal was to develop a platform that allows users to create and manage crowdfunding campaigns for various projects and initiatives. Based on the collected requirements, the most important features were identified. This may include features such as creating and customizing campaign pages, accepting donations in the form of cryptocurrencies, tracking campaign progress, and providing transparent reporting on funding and payments. User roles are defined to ensure proper access and permissions within the dApp. Campaign creators can create and manage campaigns, while contributors can view and post to selected campaigns. Administrators are granted additional privileges to monitor and adjust the overall functionality of the dApp. A project timeline was created detailing key milestones, deliverables and deadlines to ensure effective project management. Resource requirements such as development teams, required tools and technologies, and infrastructure were identified in order to allocate appropriate resources for successful completion of the project.

B. *Smart Contract Design And Development*

During the smart contract design phase, careful consideration was given to architecting the smart contracts that would power the crowdfunding dApp. The first step involved identifying the necessary data structures and variables required to effectively manage campaign details, track contributions, and distribute funds. This involved determining the relevant information to be stored, such as campaign metadata, contributor details, and fund allocation information.

Functions and events were defined within the smart contracts to handle key actions such as campaign creation, campaign details, contribution submission, and fund disbursement. These functions provided the necessary logic and interactions between the dApp's users and the smart contracts.

To ensure the security of the smart contracts, appropriate measures were implemented to mitigate potential vulnerabilities. This included adopting best practices such as input validation, access control mechanisms, and handling of edge cases.

By focusing on smart contract design, the crowdfunding dApp was able to establish a solid foundation for secure and efficient execution of the crowdfunding process.

During the smart contract development phase, the design specifications from the previous phase were translated into actual smart contract code using the Solidity programming language. The defined functions, based on the identified features and functionalities, were implemented within the smart contracts. Solidity, as the primary programming language for Ethereum smart contracts, provided the necessary tools and syntax to build the desired functionality.

Local testing was a crucial step in the development process. Development environment Remix was utilized to deploy the smart contracts on a local blockchain network or simulation environment. This allowed to interact with the contracts and simulate various scenarios to identify any bugs, errors, or issues that might arise.

C. *Deployment on Sepolia Testnet*

In the process of deploying the developed smart contracts on the Sepolia testnet, an Ethereum development environment was set up using ThirdWeb. Metamask, an Ethereum wallet and browser extension, was employed to manage Ethereum accounts and enable interaction with decentralized applications (dApps). This involved configuring Metamask with the Sepolia testnet network settings.

To provide a seamless user experience and enable interaction with the Ethereum blockchain, the dApp was integrated with the Metamask wallet and the Thirdweb platform. Metamask allowed users to manage their Ethereum accounts, securely store their private keys, and sign transactions within the dApp. Integration with the Thirdweb platform provided additional functionalities and tools to enhance the crowdfunding experience, such as real-time analytics, campaign management features, and community engagement tools.

Once the development environment and Metamask were ready, the smart contracts were compiled to ensure they complied with Solidity standards and were free from syntax errors. The compiled contracts were then deployed onto the Sepolia testnet using the chosen development tool, specifying network, account, and gas settings. This process resulted in the generation of unique addresses for the deployed contracts, which serve as identifiers for future reference and interaction with the dApp on the Ethereum blockchain.

D. Front-End User Interface Development

During the front-end user interface development phase, a key focus was placed on creating an intuitive and seamless user experience for the crowdfunding dApp. The UI requirements were carefully defined, taking into consideration the desired functionality and visual aesthetics. Technologies such as HTML, CSS, and JavaScript frameworks, specifically React, Redux, and Tailwind CSS, were utilized to build the front-end components.

React, a popular JavaScript library, provided a powerful and efficient way to create reusable UI components. Redux, a state management library, was integrated to manage the application's state and ensure data consistency across different components. Tailwind CSS, a utility-first CSS framework, was employed to streamline the styling and layout of the UI, offering a responsive and visually appealing design.

To enhance the integration between the front-end and the Ethereum blockchain, web3 libraries and Ethereum JavaScript APIs were utilized. Specifically, Ethers.js libraries was integrated into the front-end code to establish a connection with the deployed smart contracts on the Sepolia testnet. This integration enabled users to interact with the crowdfunding dApp, including functionalities such as campaign creation, contribution submission, and campaign tracking.

In addition to the mentioned technologies, Vite and Hardhat were used as development tools. Vite, a build tool, facilitated fast and efficient development and enabled hot module reloading for real-time code changes. Hardhat, a development environment, provided the necessary infrastructure for compiling, deploying, and testing the smart contracts during the development process.

E. Testing And Debugging

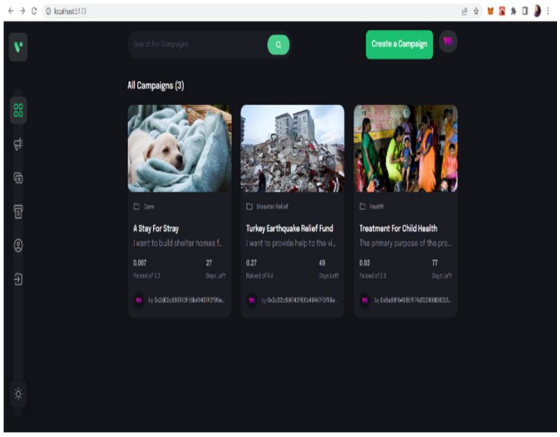
The testing phase was crucial for identifying and rectifying any functional or technical issues within the crowdfunding dApp. Comprehensive testing was conducted to verify the functionality of the smart contracts and the seamless interaction between the front-end and back-end components. Bugs, errors, or security vulnerabilities were addressed promptly to enhance the overall quality and reliability of the dApp.

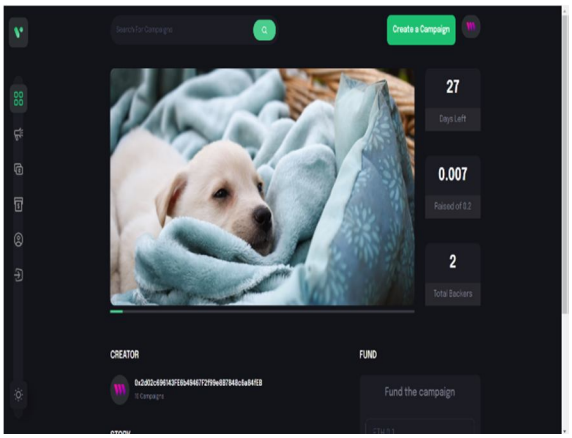
Smart contract testing: Smart contracts are the core of any blockchain crowdfunding project. It is important to test smart contracts thoroughly to ensure that they are free of errors and vulnerabilities.

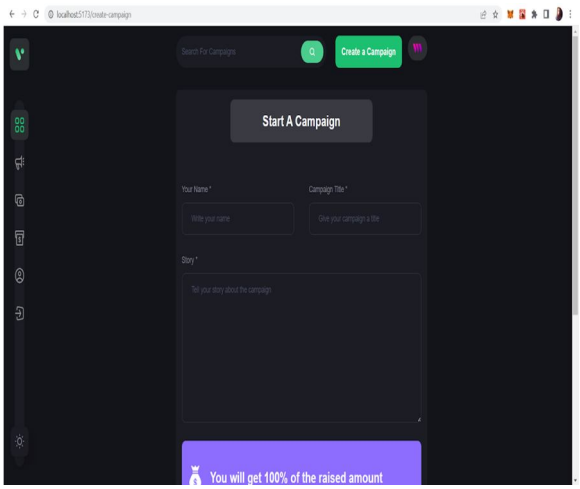
Blockchain network testing: Blockchain networks are complex systems that can be difficult to debug. It is important to test blockchain networks thoroughly to ensure that they are stable and secure.

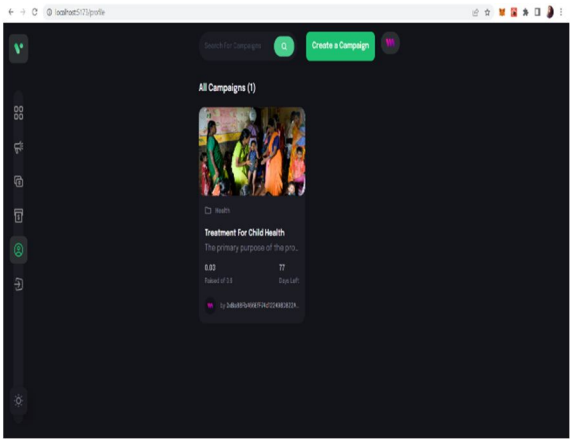
User interface testing: The user interface of a blockchain crowdfunding project is the first thing that users will see. It is important to test the user interface thoroughly to ensure that it is easy to use and understand.

VI. RESULT









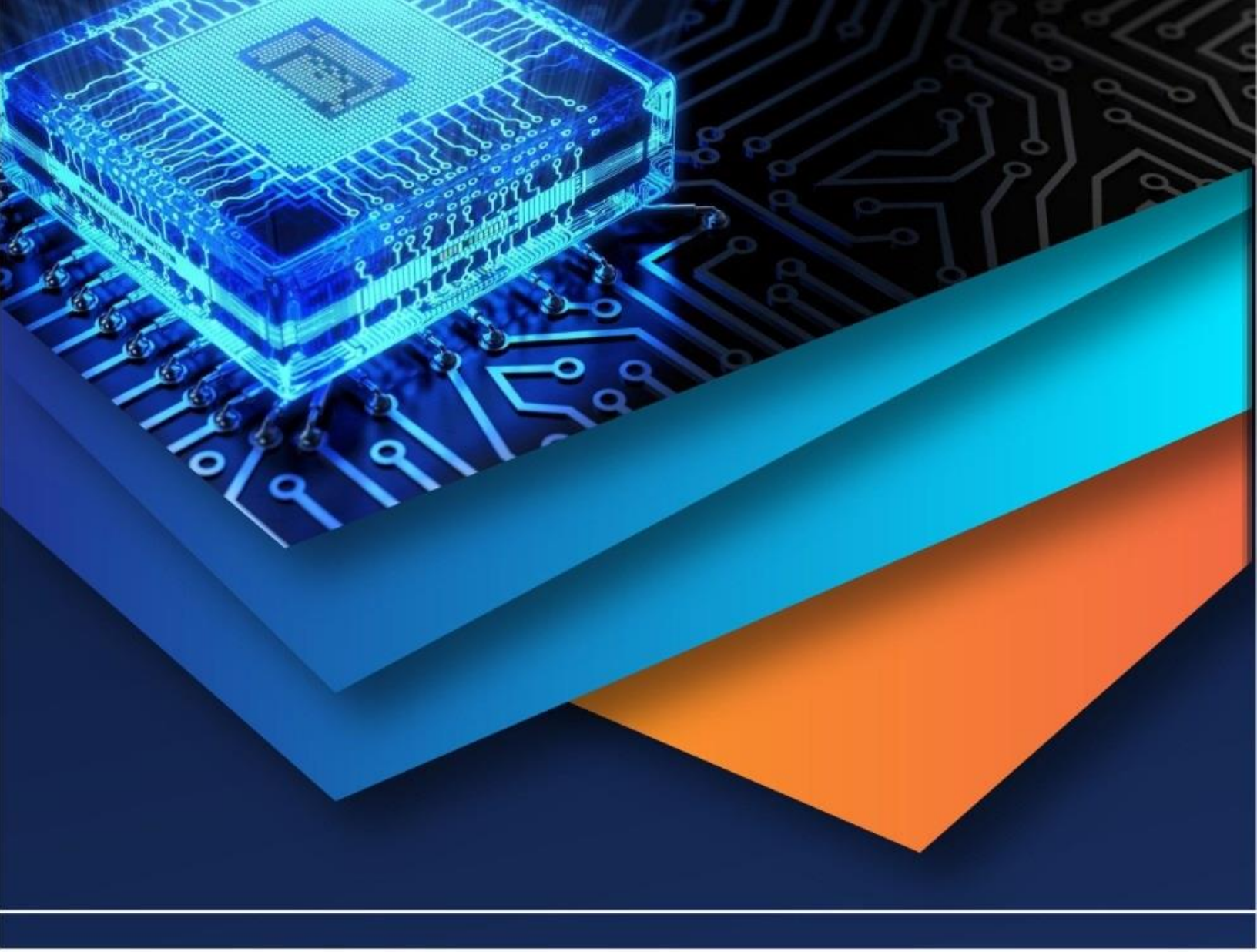
VII. CONCLUSION

In conclusion, crowdfunding using blockchain technology has emerged as a transformative force in the world of fundraising and investment. By leveraging the decentralized and transparent nature of blockchain, crowdfunding platforms are able to offer enhanced accessibility, security, and efficiency to both project owners and investors as the technology continues to evolve, we can expect to see improvements in governance mechanisms, investor protection, and integration with decentralized finance (DeFi) protocols. Cross-chain interoperability, tokenization of real-world assets, and the development of regulatory frameworks tailored to crowdfunding on the blockchain are likely to shape the industry's growth. Furthermore, the integration of AI and data analytics, as well as the rise of sustainable and impact-focused crowdfunding, will add new dimensions to the crowdfunding experience.

While there are challenges to address, such as scalability, regulatory compliance, and user experience, the promise of crowdfunding using blockchain is significant. It has the potential to democratize access to capital, unlock new funding opportunities, and facilitate the realization of innovative projects with global impact. In summary, crowdfunding using blockchain is revolutionizing the way fundraising and investment are conducted. By harnessing the power of decentralization, transparency, and smart contracts, blockchain-based crowdfunding platforms are reshaping traditional models and opening doors to a more inclusive, efficient, and secure crowdfunding ecosystem. With ongoing advancements and innovations on the horizon, the future of crowdfunding using blockchain is filled with promise and potential. It is found that integrating blockchain technology with crowdfunding is possible and it provides benefit to the parties involved in the transaction by not only reducing the cost but from the perspective of governance, there is certainty and trust provided to the system by all the parties involved in it. It is understood from this paper that there are two ways in which blockchain technology can be integrated with crowdfunding, with and without cryptocurrency. It is essential to note that to facilitate the technology, it is critical to create a cyber ecosystem where not only the cyber security risks are focused upon but investor literacy and awareness is also being promoted. Financial innovation and evolution are a must and it is crucial for the regulators to realize this and facilitate the process so that financial sectors can take advantage of them. Definitely, integrating blockchain technology to crowdfunding will mitigate the risks facing it in the present day and will assist in boosting the confidence of investors leading to an increase.

REFERENCES

[1] Belleflamme, P., Omrani, N., & Peitz, M. (2015). The economics of crowdfunding platforms. Information Economics and Policy, 33, 11-28.S. Vardoulakis et al., “Modelling air quality in street canyons: A review,” Atmos. Environ., vol. 37, no. 2, pp. 155–182, 2003..
[2] Gai, K., & Qiu, M. (2019). Blockchain-based crowdfunding: Challenges and opportunities. Electronic Commerce Research and Applications, 34, 100833.
[3] Yli-Huumo, J., Ko, D., Choi, S., Park, S., & Smolander, K. (2016). Where is current research on blockchain technology?—A systematic review. PloS one, 11(10), e0163477.
[4] Xu, J., Wu, J., & Dai, J. (2019). Blockchain-based decentralized crowdfunding: A survey. arXiv preprint arXiv:1908.01897.
[5] Liao, Q., & Wong, T. C. (2019). Crowdfunding with smart contracts: Design and audit framework for accountable decentralized crowdfunding. Decision Support Systems, 124, 113077.
[6] Böhme, R., Christin, N., Edelman, B., & Moore, T. (2015). Bitcoin: Economics, technology, and governance. Journal of Economic Perspectives, 29(2), 213-238.
[7] Bhaskar, P., & Mehrotra, S. (2020). Blockchain Technology and Crowdfunding: A Systematic Review. In 2020 2nd International Conference on Innovative Mechanisms for Industry Applications (ICIMIA) (pp. 1-5). IEEE.
[8] Zhang, W., Zheng, Z., & Cai, Z. (2020). Crowdfunding based on Blockchain: A Comprehensive Review. Journal of Industrial Information Integration, 20, 100155.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY