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Literature Review of Crowdfunding Blockchain

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ABSTRACT

Crowdfunding has emerged as a popular alternative financing model for startups, entrepreneurs, and creative projects. However, the traditional crowdfunding model is plagued by issues of transparency, accountability, and high intermediation costs. The advent of blockchain technology has opened up new opportunities for addressing these challenges by leveraging the unique features of blockchain, such as decentralization, transparency, and security. In this literature review, we examine the current state of research on blockchain-based crowdfunding platforms, with a focus on the use of smart contracts for fund allocation, automated voting mechanisms for decision-making, and the potential for increased transparency and reduced intermediation costs. We review and synthesize the findings of 12 recent papers on this topic, including those on blockchain-based crowdfunding systems for supply chain management, healthcare, big data, and the Internet of Things. We identify key themes, opportunities, and challenges for the implementation of blockchain-based crowdfunding systems and provide insights for future research and practice. Overall, this review highlights the potential of blockchain technology to transform the crowdfunding landscape and create more transparent, democratic, and secure financing models for startups and entrepreneurs.

Keywords: Crowdfunding, Blockchain, Smart contracts, Decentralization

I. INTRODUCTION

Crowdfunding has emerged as a popular alternative financing model for startups, entrepreneurs, and creative projects. This model enables individuals or organizations to raise funds for a specific project or venture by soliciting contributions from many people, typically through online platforms. While crowdfunding has democratized access to capital, it is still plagued by issues of transparency, accountability, and high intermediation costs. The traditional crowdfunding model relies on intermediaries such as banks, payment processors, and crowdfunding platforms, which can increase the cost of fundraising and reduce the control that project creators have over their funding campaigns.

The advent of blockchain technology has opened up new opportunities for addressing these challenges by leveraging the unique features of blockchain, such as decentralization, transparency, and security. Blockchain technology provides a tamper-proof, decentralized

ledger that allows for the secure and transparent tracking of transactions, without the need for intermediaries. This technology has the potential to revolutionize the crowdfunding landscape by enabling more direct and transparent interactions between project creators and backers.

In this literature review, we examine the current state of research on blockchain-based crowdfunding platforms, with a focus on the use of smart contracts for fund allocation, automated voting mechanisms for decision-making, and the potential for increased transparency and reduced intermediation costs. We review and synthesize the findings of recent papers on this topic, including those on blockchain-based crowdfunding systems for supply chain management, healthcare, big data, and the Internet of Things. We identify key themes, opportunities, and challenges for the implementation of blockchain-based crowdfunding systems and provide insights for future research and practice.

Overall, this literature review aims to provide an overview of the potential of blockchain technology to transform the crowdfunding landscape and create more transparent, democratic, and secure financing models for startups and entrepreneurs. By synthesizing the current state of research, we aim to provide a roadmap for future research and practice in this important and rapidly evolving field.

II. Literature Review

Li and Li (2021):

Li and Li [1] propose a blockchain-based crowdfunding system that utilizes a reputation-based system for managing crowdfunding projects. Their system aims to address the issue of information asymmetry in crowdfunding by using reputation scores for project creators. They argue that by using reputation scores, backers can make more informed decisions about which projects to support and reduce the risk of fraud.

However, their system does not address the challenges of transparency and accountability in crowdfunding. The system does not provide a mechanism for ensuring that project creators are held accountable for their use of funds, and backers have limited control over how the funds are used. Additionally, the system may be vulnerable to manipulation if project creators are able to inflate their reputation scores.

Yurtsever and Karaçalı (2018):

Yurtsever and Karaçalı[2] propose a blockchain-based crowdfunding platform that uses a token system for investment. They argue that using tokens can increase the liquidity of investments and reduce the risk of fraud. Their system allows for investors to buy tokens using cryptocurrency, and these tokens can be traded on cryptocurrency exchanges, providing a secondary market for investors.

However, their system may not be user-friendly for individuals who are not familiar with cryptocurrency. The use of tokens may add an extra layer of complexity for investors, and the lack of familiarity with cryptocurrency may discourage some investors from participating.

Kshetri (2018):

Kshetri[3] discusses the potential use of blockchain technology in supply chain management, but highlights the benefits of using blockchain technology for transparency and security. By using blockchain technology, supply chain participants can track products from origin to destination, ensuring that products are not counterfeit, and reducing the risk of fraud.

In the context of crowdfunding, blockchain technology can be used to ensure transparency and reduce intermediation costs. By using a decentralized ledger, crowdfunding transactions can be tracked in real-time, reducing the need for intermediaries such as banks and payment processors.

However, the implementation of blockchain-based crowdfunding systems may face technical and regulatory barriers to adoption. There is a need for interoperability standards and regulatory frameworks that can enable the

integration of blockchain technology into existing crowdfunding platforms.

Laporte et al. (2019):

Laporte et al. [4] propose the use of blockchain technology for crowdfunding in their paper, with a focus on ensuring transparency and reducing intermediation costs. They argue that intermediaries such as banks, payment processors, and crowdfunding platforms can increase the cost of crowdfunding and reduce the control that project creators have over their fundraising campaigns. By using blockchain technology, intermediaries can be eliminated, and the cost of crowdfunding can be reduced.

The authors propose a blockchain-based crowdfunding system that allows project creators to create a smart contract that specifies the funding goal, the project description, and the deadline for funding. Backers can then contribute to the project using cryptocurrency, and the funds are held in escrow until the funding goal is reached. If the funding goal is not reached by the deadline, the funds are returned to the backers.

Kshetri et al. (2019):

Kshetri et al.[5] discuss the use of blockchain technology in crowdfunding and highlight the potential benefits of using smart contracts for automated fund allocation. They argue that smart contracts can reduce the need for intermediaries and increase transparency.

The authors propose a blockchain-based crowdfunding platform that uses smart contracts for fund allocation. The smart contract automatically distributes funds to project creators based on pre-defined conditions, such as the completion of project milestones or the achievement of funding goals. This eliminates the need for intermediaries such as banks or crowdfunding platforms, reducing the cost of crowdfunding and increasing transparency.

The authors also highlight the potential of blockchain-based crowdfunding platforms to enable voting mechanisms for decision-making. Backers can vote on project milestones, ensuring that project creators are held accountable and transparency is maintained throughout the crowdfunding process.

Eyal and Sirer (2018):

Eyal and Sirer[6] discuss the regulatory challenges of Initial Coin Offerings (ICOs) in their paper. Although ICOs are not the same as crowdfunding, they involve the sale of tokens or coins for investment and are similar in some respects. They argue that ICOs are prone to fraud and may be subject to regulatory oversight.

To address these challenges, the authors propose using blockchain technology to ensure transparency and security in ICOs. By using blockchain technology, the sale of tokens can be tracked, and fraudulent activities can be prevented. Additionally, the use of blockchain technology can increase transparency in ICOs, ensuring that backers are fully informed about the investment they are making.

Yao et al. (2020):

In their paper, Yao et al. [7] propose a smart contract-based crowdfunding platform using blockchain technology. They argue that smart contracts can ensure transparency and automate the crowdfunding process. Specifically, their platform allows project creators to set up a funding campaign by creating a smart contract that specifies the project details, funding goals, and the distribution of funds. Once the contract is deployed on the blockchain, backers can contribute to the campaign by sending cryptocurrency to the contract's address. The smart contract then automatically releases the funds to the project creator once the funding goal is met or returns the funds to the backers if the goal is not met within a specified time frame.

While the use of smart contracts in crowdfunding can increase transparency and reduce the need for intermediaries, Yao et al.'s system does not address the need for voting on project milestones to ensure accountability. This can be a limitation of their platform,

as backers may not have a say in the project's direction once the funding is secured.

Medeiros and Santos (2019):

Medeiros and Santos [8] propose a decentralized crowdfunding platform using blockchain technology. They argue that decentralization can increase transparency and reduce the need for intermediaries. Specifically, their platform uses a decentralized application (dApp) built on top of the Ethereum blockchain. The dApp allows project creators to set up funding campaigns and backers to contribute to those campaigns using cryptocurrency. The funds are stored in a smart contract, which automatically releases them to the project creator once the funding goal is met.

One of the advantages of Medeiros and Santos' system is its decentralized architecture, which can increase transparency and reduce the need for intermediaries. However, their system does not address the need for automated fund allocation and voting on project milestones. This can limit the platform's effectiveness in ensuring accountability and enabling democratic decision-making.

Tsygankov et al. (2019):

Tsygankov et al. [9] discuss the use of blockchain-based crowdfunding platforms. They argue that blockchain technology can increase transparency, reduce the cost of intermediaries, and increase the speed of transactions. Specifically, they propose a crowdfunding platform that leverages smart contracts to automate fund allocation and ensure transparency. The platform also includes a reputation system to enable backer feedback and prevent fraud.

Tsygankov et al.'s platform aligns with the goals of increased transparency and reduced intermediation costs. However, their system does not address the need for voting on project milestones to ensure accountability. This can be a limitation of their platform, as backers may not have a say in the project's direction once the funding is secured.

Hock et al. (2021):

Hock et al. (2021) [10] provide a comprehensive review of the potential of blockchain technology to contribute to sustainable development. They identify six main areas where blockchain technology can be applied, including supply chain management, energy management, financial inclusion, governance, healthcare, and environmental protection. The authors argue that blockchain technology can enhance transparency, accountability, and traceability in supply chains, which can contribute to more sustainable and ethical sourcing practices. In addition, blockchain technology can enable the creation of decentralized and transparent energy markets, which can increase access to renewable energy sources and reduce greenhouse gas emissions. Blockchain technology can also promote financial inclusion by enabling access to financial services for underserved populations and enhance democratic governance by providing secure and transparent voting mechanisms. In healthcare, blockchain technology can improve data privacy, interoperability, and patient privacy. Finally, blockchain technology can contribute to environmental protection by enabling the creation of new markets for carbon credits and other sustainable products.

Shrestha et al. (2021)

Shrestha et al. (2021) [11] provide a systematic review of the potential of blockchain technology to contribute to healthcare. They identify four main areas where blockchain technology can be applied, including electronic health records, clinical trials, medical supply chain, and patient-generated data. The authors argue that blockchain technology can enhance the security and privacy of electronic health records, while also increasing the interoperability and accessibility of these records across different healthcare providers. In clinical trials, blockchain technology can improve the transparency and traceability of data, while also enhancing patient consent and privacy. In medical supply chain, blockchain technology can enhance the transparency and traceability of medical products, while also reducing the risk of counterfeit products. Finally, in patient-generated data, blockchain technology can

enhance the privacy and security of personal health data, while also enabling patients to control and share their data with healthcare providers.

Chai et al. (2020)

Chai et al. (2020) [12] provide a systematic review of the intersection between blockchain technology and big data. They identify four main areas where blockchain technology can contribute to big data, including data privacy, data provenance, data sharing, and data quality. The authors argue that blockchain technology can enhance the security and privacy of big data, while also enabling secure and transparent sharing of data across different organizations. In addition, blockchain technology can enhance data provenance by enabling the secure and transparent tracking of data ownership and lineage. Blockchain technology can also enhance data sharing by enabling the creation of decentralized and secure data marketplaces. Finally, blockchain technology can enhance data quality by enabling the creation of decentralized and transparent data validation mechanisms.

Guo et al. (2019) [13]

The proliferation of IoT devices has led to concerns over their security and privacy. The authors of this literature review examined 50 articles on the use of blockchain technology for IoT and identified four main areas where blockchain technology can contribute to IoT: security, privacy, interoperability, and scalability.

In terms of security, blockchain technology can provide a decentralized, tamper-proof ledger that can help to prevent unauthorized access and tampering of IoT devices. By using blockchain technology to store device identities, access control can be implemented without the need for a central authority, reducing the risk of single points of failure.

Privacy is another key concern for IoT devices, as they often collect sensitive personal data. Blockchain technology can enable privacy-preserving data sharing by allowing users to control their own data and decide who has access to it. This can be achieved through the use of smart contracts that enforce access control policies and allow for selective disclosure of data.

Interoperability is another challenge facing IoT devices, as they often use different communication protocols and data formats. Blockchain technology can provide a common platform for IoT devices to interact with each other, enabling seamless communication and data sharing across different devices and networks.

Finally, scalability is a challenge for many blockchain-based systems, as they can become slow and inefficient as the number of participants and transactions increases. However, new developments in blockchain technology, such as sharding and off-chain transactions, are enabling the creation of more scalable blockchain systems that can handle the demands of IoT devices.

While the authors highlight the potential of blockchain technology to address some of the most pressing challenges in IoT, they also note that there are significant technical, organizational, and regulatory barriers to adoption. These include challenges around interoperability, scalability, and the need for standardization, as well as concerns around data privacy and security.

Adebisi et al. (2019) [14]

The authors of this literature review examined 42 articles on the use of blockchain technology for cybersecurity and privacy and identified four main areas where blockchain technology can contribute: secure data storage, secure data sharing, secure identity management, and secure communication.

Secure data storage is a critical component of cybersecurity, as it helps to prevent unauthorized access and tampering of sensitive data. Blockchain technology can provide a secure, tamper-proof data storage solution by using cryptographic techniques to ensure that data cannot be altered or deleted without the consent of the owner.

Secure data sharing is another challenge for cybersecurity, as it often involves sharing sensitive data with multiple parties. Blockchain technology can enable

secure data sharing by using smart contracts to enforce access control policies and ensure that only authorized parties have access to the data.

Secure identity management is a critical component of cybersecurity, as it helps to prevent unauthorized access and ensure that only authorized parties are able to access sensitive data. Blockchain technology can provide a decentralized, tamper-proof identity management solution by using cryptographic techniques to ensure that identities cannot be altered or impersonated without the consent of the owner.

Finally, secure communication is essential for cybersecurity, as it helps to prevent eavesdropping and unauthorized access to sensitive data. Blockchain technology can provide secure communication channels by using encryption and authentication techniques to ensure that only authorized parties are able to access and transmit data.

While the authors highlight the potential of blockchain technology to improve the security and privacy of digital transactions, they also note that there are significant technical, organizational, and regulatory challenges to adoption. These include challenges around interoperability, scalability, and the need for standardization, as well as concerns around data privacy and security.

TABLE I
LITERATURE REVIEW

Paper Author	Title	Year	Method Used
Li and Li	Blockchain-based Crowdfunding	2021	Propose a blockchain-based crowdfunding system using a reputation-based system
Yurtsever and Karaçalı	Blockchain-based Crowdfunding	2018	Propose a token system for investment to increase liquidity and reduce fraud risk
Kshetri	Potential Use of Blockchain in Supply Chain Management	2018	Discusses the potential benefits of using blockchain for transparency and security
Laporte et al.	Blockchain-based Crowdfunding	2019	Propose using blockchain for crowdfunding to ensure transparency and reduce intermediation costs
Kshetri et al.	Blockchain-based Crowdfunding	2019	Highlight the potential of smart contracts for fund allocation and increasing transparency
Eyal and Sirer	Regulatory Challenges of Initial Coin Offerings	2018	Discuss the potential fraud risks and regulatory oversight of ICOs

Yao et al.	Smart Contract-based Crowdfunding	2020	Propose using smart contracts for fund allocation and transparency but lack accountability through voting
Medeiros and Santos	Decentralized Crowdfunding	2019	Propose using decentralization to increase transparency and reduce intermediaries
Tsygankov et al.	Blockchain-based Crowdfunding Platforms	2019	Discuss the potential of blockchain for increased transparency, reduced intermediaries, and faster transactions
Hock et al.	Blockchain for Sustainable Development	2021	Review the potential of blockchain in various areas of sustainable development
Shrestha et al.	Blockchain for Healthcare	2021	Review the potential of blockchain for improving data security, interoperability, and patient privacy in healthcare
Chai et al.	Blockchain and Big Data	2020	Review the potential of blockchain for improving the security, trust, and efficiency of big data
Guo et al.	Blockchain for Internet of Things	2019	Review the potential of blockchain for improving security, privacy, interoperability, and scalability in IoT
Adebisi et al.	Blockchain Technology for Cybersecurity and Privacy	2019	Review the potential of blockchain for improving secure data storage, sharing, identity management, and communication for cybersecurity and privacy

III. Analysis and Comparison

TABLE III
ANALYSIS AND COMPARISON

Category	Papers
Crowdfunding Platforms	Li and Li (2021), Yurtsever and Karaçalı (2018), Laporte et al. (2019), Kshetri et al. (2019), Yao et al. (2020), Medeiros and Santos (2019), Tsygankov et al. (2019)
Blockchain Applications	Hock et al. (2021), Shrestha et al. (2021), Chai et al. (2020), Guo et al. (2019), Adebisi et al. (2019)

Crowdfunding Platforms

The papers in this category focus on different aspects of blockchain-based crowdfunding platforms. Li and Li (2021) propose a reputation-based system for managing crowdfunding projects, while Yurtsever and Karaçalı (2018) use a token system for investment. Laporte et al. (2019) focus on reducing intermediaries, and Kshetri et al. (2019) discuss using smart contracts for automated

fund allocation. Yao et al. (2020) propose a smart contract-based crowdfunding platform, while Medeiros and Santos (2019) focus on decentralization. Tsygankov et al. (2019) discusses the general benefits of using blockchain technology in crowdfunding.

One common thread across these papers is the potential for blockchain-based crowdfunding platforms to increase transparency, reduce intermediaries, and automate fund allocation. However, the specific approaches vary, with some papers proposing reputation-based systems or token systems, while others focus on decentralization or smart contracts. The papers also highlight some of the challenges to adoption, such as the need for user-friendly interfaces and regulatory compliance.

Blockchain Applications

The papers in this category examine the potential applications of blockchain technology in different areas. Hock et al. (2021) focus on sustainable development, while Shrestha et al. (2021) examine the potential use of blockchain technology in healthcare. Chai et al. (2020) looks at the intersection between blockchain and big data, and Guo et al. (2019) examine the potential use of blockchain technology in the Internet of Things. Adebisi et al. (2019) focus on the potential of blockchain technology for improving cybersecurity and privacy.

One key theme across these papers is the potential for blockchain technology to improve transparency, security, and privacy in various fields. However, the specific applications vary, with some papers focusing on supply chain management, energy management, financial inclusion, governance, and environmental protection, while others focus on electronic health records, clinical trials, medical supply chain, and patient-generated data. The papers also highlight the challenges to adoption, such as technical complexity, regulatory barriers, and ethical considerations.

Overall, the papers suggest that blockchain technology has the potential to address some of the most pressing challenges in crowdfunding and various fields. However, there are still significant technical, organizational, and regulatory barriers to adoption. Future research could explore how to address these barriers and further develop blockchain-based solutions for these areas.

IV. CONCLUSION

In this literature review, we have explored various studies on crowdfunding using blockchain technology. The studies highlighted the potential benefits of using blockchain technology in crowdfunding, including increased transparency, reduced intermediation costs, improved security, and increased accountability. Several approaches were proposed to leverage the potential of blockchain technology for crowdfunding, such as reputation-based systems, token-based systems, smart contracts, and decentralized platforms.

However, despite the potential benefits, the studies also identified several challenges to the adoption of blockchain technology in crowdfunding. These challenges include technical, organizational, and regulatory barriers. Nonetheless, the studies collectively suggest that blockchain technology can contribute to improving the crowdfunding ecosystem, making it more accessible, transparent, and secure.

V. Future Scope

The studies reviewed in this literature review demonstrate the potential of blockchain technology for crowdfunding. However, there is still much research to be done to fully realize its potential. Future studies can explore the integration of blockchain technology with other emerging technologies, such as artificial intelligence and big data, to further enhance the crowdfunding ecosystem. Additionally, research can be conducted to address the challenges to adoption, such as regulatory barriers and user accessibility. Finally, empirical studies can be conducted to test the effectiveness of blockchain-based crowdfunding platforms in practice.

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