



# The Role of Blockchain in IT Project Management: Literature Review

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ABSTRACT

Many projects fail due to sustainability issues. Lack of transparency, inadequate information communication management and other factors resulting in poor Project Management (PM) are among the explanations that cause projects to fail in developing countries. In many areas, including project management, blockchain offers a fresh approach to altering traditional paradigms through innovative means. Literature offers support for the values and challenges posed by PM and blockchain, and then it interrelates with them. Therefore, this research was geared towards investigating the role of blockchain in improving PM. According to this review, blockchain technology offers a diverse array of functionalities and capabilities that aid in project management. The guideline for emerging blockchain research in project management is also outlined in this review. When PM is integrated with blockchain, it can enhance cost control, process automation, transparency, and stakeholder communication. This results in a successful project.

**Keywords:**

Blockchain, Project Management, Smart contract.

## I. INTRODUCTION

Every day, projects have become more sophisticated due to various factors such as unstable surroundings, diverse stakeholders across different industries, working with advanced technologies, and demanding requirements, which will ultimately impact project success. Nevertheless, complex factors play a crucial role in the successful starting, planning, execution, closure, monitoring, and controlling of projects. Project management serves as a means of controlling spending and improving project outcomes across various sectors and regions [1]. The adoption of a project management practice by organizations has been shown to result in decreased risks and improved success. Hence, implementing project

management across organizations is a strategic decision that will add value to the organization.

It is crucial for any project manager to finish a project on schedule and within budget. Additionally, establishing a productive working framework between businesses, contractors and project teams is essential to the success of projects. A dilemma arises for the project manager with the old-style PM, who must navigate between meeting client demands and maintaining team effectiveness [2].

In recent times, blockchain has gained widespread attention as a groundbreaking technology that can transform physical and digital processes [3]. The original intention behind blockchain was to record transactions on a peer-to-peer network of computers. A

blockchain is used to store transactions on a distributed register, which are safeguarded by cryptographical evidence. The blockchain is updated with new transactions through a decentralized consensus protocol. The blockchain technology's most notable breakthrough is the decentralized consensus protocol, which enables transactions to be executed without the involvement of a central authority.

Blockchain's exceptional features provide significant advantages for decentralized application development [4]. Moreover, The use of blockchain can bring about significant changes in the conventional business practices, which are primarily dependent on centralized architectures that require reliable third-party contractors.

Miscommunication among all stakeholders, lack of integrity, manual activity and human intervention in many processes are the root causes of PM failure. By utilizing blockchain, it can be interpreted as a diverse environment that enhances project management and resolution strategies.

This paper seeks to provide an answer to the question of "how blockchain technology can enhance project management?" The outcomes will be discussed after analyzing the results and concluding with future recommendations.

This paper is divided into eight sections. The second section is a detailed background of IDS system types, detection types and detections approaches, performance metrics, types of cyberattacks, intrusion datasets, and evasion techniques. The third section is about the research questions. The fourth section is about the related work and motivation. The fifth section is about the research methodology. The sixth is the literature review. The seventh section is the results and discussion. The eighth section is the conclusion.

## II. BACKGROUND

### A. What is Blockchain?

A group of researchers started working on blockchain in the early 1990s, initially aimed at developing an alternative peer-to-peer currency system, but it has since undergone development and been applied to various applications. In

recent times, blockchain has gained widespread attention as a groundbreaking technology that can transform physical and digital processes [5]. The original intention behind blockchain was to record transactions on a peer-to-peer network of computers. Blockchain is used to store transactions on a distributed register, which are safeguarded by cryptographical evidence. The blockchain is updated with new transactions through a decentralized consensus protocol. The blockchain technology's most notable breakthrough is the decentralized consensus protocol, which enables transactions to be executed without the involvement of a central authority. The transaction's entire history is preserved by the block that enables data entry and prevents tampering or deletion. The open-source aspect of blockchain has led to the identification of numerous new blockchain networks over the past decade, each offering its own unique features and functionality.

A blockchain ensures that data is stored on all nodes simultaneously, preventing the possibility of a single point of failure. The security of the blockchain is ensured through the use of decentralized consensus protocol and cryptographic proof for distributed storage of ledgers [6]. Smart contracts, which are computerized protocols that can be executed with confidence through a code running on the decentralized blockchain, have been discovered as the next level developments in blockchain technology. The execution of contract clauses in a smart contract is automated and does not involve any intermediaries which is advantageous.

Smart contract, decentralized application, supply chain, and private transaction are among the options that blockchain offers [7]. As a result, blockchain can be used to record, track, and confirm transactions without the need for central authority. The transaction was less risky and cost-efficient for all parties involved. A chain of blocks is formed on blockchain by storing the transaction records. Hence, the name blockchain is given to this technology. The one-way mathematical function known as Hashing is utilized to map intricate size data into structured fixed sized data.

### B. Blockchain + PM:

The use of PM and blockchain can facilitate the movement of resources necessary for project management. A significant number of businesses can enhance their current PM processes by leveraging blockchain, which helps them reduce misappropriation of funds and delays while increasing work efficiency [8]. PM methodology is a science that has been developed through years of experience and knowledge, so there are no changes happening in this domain for such a long time. On the other hand, there is only one modification that could result in the technology being employed to improve the effectiveness of the project. Providing the project manager with all necessary information can increase the likelihood of project success and provide a comprehensive overview of the progress. The project manager must manage resources, coordinate tasks and stakeholders to ensure the alignment of projects with their goals. Additionally smart contracts can provide automatic payment based on project milestones, performance management monitoring, automatic task assignment, or early reward rewards for team members who complete tasks automatically in the first place. In PM, the integration process involves integrating all aspects of a project and organizing all activities within the project framework process [9]. Without tracking the project process, a lack of communication may result in delays or overspending. By leveraging blockchain, decentralized applications can address all of these challenges in any project. The project team and stakeholders can be linked in a decentralized location without any constraints, and all project components can coordinate transparently.

### III. RESEARCH METHODOLOGY

The approach of this study is a literature review that examined the role that can blockchain play in PM. This paper's primary aim is to perform a review of the blockchain use cases in project management, identify the domains that are relevant to blockchain applications, and determine the contributions of blockchain to project administration.

### IV. LITERATURE REVIEW

We will demonstrate the role of Blockchain in the field of Project Management from perspectives:

- Blockchain Exceptionality.
- Challenges in PM.
- Blockchain in PM.
- Benefits of Blockchain in PM.
- Smart Contracts.

#### A. Blockchain Exceptionality:

According to [10], blockchain technology has several distinctive features. The unique attributes of blockchain technology include trust, transparency, Openness, and Immutability. Despite the industry and world government, trust has become a significant issue today. Blockchain technology guarantees trust between different parties involved in business functions, as it requires additional time and functions to establish trust before managing contracts. Also, Information stored in a blockchain system is always up-to-date and transparent. This is achieved through automatic updates. Accordingly, the information can be accessed by respected parties like customers or other organizations or any other stakeholders. Consequently, a project manager can quickly reap benefits for the project from more open and transparent processes. Recurring, altering, or modifying information is not possible once it's stored on the blockchain system. That can only be done if all the concerned parties approve it. Hence, blockchain technology provides unchanging records.

#### B. Challenges in PM:

The vast amount of paperwork involved in a project can be vulnerable to fraud and potentially increase the cost, according to the authors [11]. Digitalized paper records can be used to address these inefficiencies. Consequently, automated paperwork processing could alleviate difficulties in project management and the project work domain. Besides that, projects have been identified with problems such as inaccurate cost estimations, inefficient transactions, and payment transparency. By securely validating transactions, a blockchain-based system can

eliminate these issues, as suggested by the authors. In addition, the lack of clear project objectives in planning often results in failures. Several hours are spent gathering and organizing project briefings and communicating them to different stakeholders. Another research has discovered issues in calculating incentives for employees involved in a project according to their performances [12]. Proper communication among stakeholders within the project team is a significant factor in determining overall success [13].

### **C. Blockchain in PM:**

Blockchain technology is thriving universally, altering old-fashioned businesses by delivering more protected, transparent, and effectual solutions as a new tendency of information technology [14]. It is essential to scrutinize this technology to comprehend its potential in addressing project management issues and improving the likelihood of project success by meeting its targets and objectives [15].

The use of blockchain technology in project management has become widespread in recent times, and various applications have been identified to utilize it. Various blockchain applications for project management were examined by [16]. The authors highlighted that the use of blockchain-based smart contracts and building information modelling for project management in the construction industry can enable the creation of an unchanging data record. Additionally, the authors put forward the idea that using blockchain-based methods to manage digital records, coordinate tasks of stakeholders, and reinforce acceptable performances can assist project management teams in verifying project scope, budget, or schedules more efficiently and effectively. Moreover, the authors stated that blockchain technology can be utilized to manage project deliverables, resources, and transactions in project management information systems while maintaining transparency among stakeholders. Therefore, blockchain can be a groundbreaking project management technology with applications like building information modelling and smart contracts.

The authors in [17] suggested a construction industry information management system that leveraged building information modelling and blockchain technology. Based on the features of smart contracts functionality, their proposed solution is designed to manage construction projects. The authors in [18] examined the potential of blockchain technology in relation to smart contracts for executing various contracts.

### **D. Benefits of Blockchain in PM:**

The authors in [15] examined six use cases that involve blockchain technology, with different project management aspects. They determined that the implementation of blockchain technology in project management would result in improved transparency, process automation, stakeholder control, cost reduction, and learning experiences. Blockchain technology will not replace traditional project management, as per the authors' opinion, but it can help technologically adept project managers improve efficiency and deliver projects successfully.

Project managers can easily measure, monitor, and control project progress with blockchain-based systems, as it eliminates bureaucratic obstacles in project management. Project management is reliant on blockchain because it records all transactions every time, which allows project managers to anticipate a rapid completion of any blockchain transaction. The authors in [19] explain that blockchain can help project managers reduce costs by accurately managing task dependencies, defining team members' roles and responsibilities, securely sharing data, and eliminating time-wasting attempts. Accordingly, this implies that the implementation of blockchain technology in project management will enable projects to be completed without exceeding projected budgets.

### **E. Smart Contracts:**

The late 20th century saw the emergence of smart contracts, which were influenced by decentralized organizations and distributed consensus models [20]. They used a predetermined distributed platform to execute smart contracts and write computer codes. The

contract is executed in a non-trustless setting without any intermediaries to verify the correctness of the code for the involved parties. The agreement will be executed as intended by both parties if the necessary conditions are met, as no one party can modify the contract on their own [21].

## V. DISCUSSION

Through analyzing literature, we can summarize the findings as follows. Despite not replacing traditional knowledge and PM processes, blockchain will provide project managers with advanced technology to improve their efficiency and project management chances. In addition, Blockchain can be advantageous in specific stages, particularly those related to third-party regulation, money circulation, and transactions that necessitate legal documentation.

The following are the main roles that blockchain can play on PM.

### - **Automation:**

Automation is a key factor in speeding up routine tasks. The organization must follow a sequence of procedures, which consumes time and can lead to human errors, requiring external validation. The identification of a project's objective and its tracking can automate various processes such as task completion, approval reporting or information sharing through smart contracts. In complex projects, smart contract is an effective tool to manage interdependent tasks. Once all required activities are fulfilled, the report will be submitted automatically. It'll reduce the delays of time and unnecessary expenses of routine jobs in any project. Moreover, smart contracts have the ability to assign resources automatically by using a task completion recorder from previous projects.

### - **Transparency:**

The shared ledger enables the project team to access all transactions and reports in a secure manner. By leveraging blockchain, the project team can collaborate more effectively by eliminating unnecessary tasks. Identifying reliable contractors based on their past performance will be made easier for others through the ability to track subcontractors and contractors' deliverables. Furthermore, the

security measures are so robust that any changes to data require authorization from all parties involved to prevent manipulation in projects. Moreover, This will enable project managers to concentrate on more demanding and valuable work.

### - **Enhance stakeholder management:**

Stakeholder interactions will be impacted by blockchain. How does this impact communication? In numerous projects, the project's internal events are not known to stakeholders. Under a smart contract, they will be able to monitor the performance of the project and will have proactive involvement in every step to ensure their expectations are met.

### - **Cost management:**

Projects typically require payment time of 82 days, but in some cases, it can take up to 120 days. Organizations can send money internationally with lower fees by utilizing blockchain, eliminating the need for intermediaries. The availability of virtual currencies, including Bitcoin, to individuals who cannot access traditional banks is facilitated. Finance operations rely on top-level management approval for most transactions, while minor cash handling is subject to various conditions. It's much easier and faster than the usual process because there's no third party involved in any of these transactions.

### - **Lesson learned:**

The process of disseminating the lessons learned among project staff helps an organization avoid making repeated mistakes and maximize their effectiveness in implementing best practices. Despite its importance, this stage of PM is often overlooked by project managers who lose valuable knowledge gained during projects and between them. Through the use of blockchain, it is possible to document lessons learned from both past and present projects in a valuable archive that can be utilized as guidance for future projects.

The following are the recommendations we suggest fast-tracking employing blockchain in PM.

- The organization should be more receptive to learning about blockchain advantages and be flexible in sharing their data and decentralized

database. Additionally, transparency is desirable.

- Establish programs between governments and entities with blockchain pioneers in the world to gain knowledge and determine best practices.

- Educate key stakeholders such as financial institutions, startups, and policy makers about blockchain technology so that they can benefit from it.

## VI. CONCLUSION

To sum up, the literature indicates that the use of blockchain and PM can enhance the efficiency of a successful project. It offers a secure, audit-compliant, and transparent means of recording and transmitting information. The use of smart contracts can empower project managers and play a crucial role in streamlining manual processes, improving communication with stakeholders, and providing transparency during various PM phases. Also, the blockchain's security is of utmost importance as it ensures that no one can modify the data unless they reach a consensus. Many organizations are utilizing blockchain technology in their everyday work, as it offers numerous benefits.

Despite the fact that blockchain applications are still in their early stages of development, research shows that there are multiple domains within project management that can be integrated with blockchain-based systems. Therefore, blockchain technology presents an innovative and captivating research domain that can achieve decentralized project management by facilitating significant changes in project control methods.

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