THE APPLICATION OF BLOCKCHAIN TECHNOLOGY IN PROJECT MANAGEMENT

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Blockchain plays a significant role in contemporary industries. This paper aims to explain the nature of blockchain technology and its major features and application in project management. The qualitative research methodology is applied to discuss the concept of smart contracts and explain the way they are implemented in project management as well as the advantages they offer to retain employees and meet the interest of all stakeholders involved in the project. The study contains a literature review on the major benefits of blockchain applications in project management. As a result of the literature review, the paper reveals that blockchain offers a wide range of opportunities for project managers as it enables improved control of resources and finances, reduction of expenses, easier reporting, standardized terms of work, and retention of employees. It was also found that such blockchain features as distribution, connectedness, confirmation, and verifiability result in independence and security of work in project management.

Keywords: Smart contracts, Emerging technologies, BCT, Knowledge areas.

1 INTRODUCTION

Blockchain technology is a distributed system of easily verifiable records which are logically connected and validated. The major idea of the technology lies in the fact that blockchain is a huge distributed database enabling all transactions to be verified by a special category of users. They confirm the authenticity of completed transactions and form blocks, which line up in chains. The construction of such a chain is based on each subsequent block containing information about the previous one. In this case, the major advantage of this technology is the absence of intermediaries. Therefore, blockchain ensures the absence of access to crucial information by third parties.

The idea of blockchain refers to the development of smart contract technology that presumes the creation of stable and reliable e-relations between users of valuable data. Smart contracts are electronic transaction protocols based on the terms of traditional contracts. Once a smart contract is organized on the decentralized blockchain, its main feature is the inability to be modified or canceled, creating the conditions for a reliable system for guaranteed implementation of contract terms. As a result, smart contracts based on blockchain technologies ensure complete transparency and effective and timely completion of projects (Casino et al. 2019). Along with it, blockchain and smart contracts provide an effective and confident option for project management. Thus, this technology is an effective way to maintain the work of project managers and ensure the stable and timely completion of projects.
1.1 Overview of Project Management

A project represents the organization of people and resources to achieve a defined objective and purpose (Salameh 2014). Two main approaches to project management (PM) exist: traditional and agile. The traditional PM approach stems from having a robust model that applies to different types of projects. Additionally, it relies on the predictability of projects to form a detailed plan at the beginning that is followed to execute the project. In other words, according to DeCarlo (2004), Shenhar and Dvir (2007), and Wysocki (2007), the goal of this approach is the optimization in following this initial plan to finish the project within the planned time, budget, and scope. The limitations and challenges of the traditional approach lie in what was thought of as its strength; the intense initial planning. However, projects rarely follow the initial plan; clients find it challenging to produce requirements correctly at the start of a project (Salameh 2014).

As for the agile approach, it is more flexible, given how diverse projects are. This approach built on the shortcomings of the traditional approach, mainly by employing adaptability. According to DeCarlo (2004), adaptability is the key characteristic, even more than predictability, which the traditional approach embraces. Since changes are bound to happen, it is impossible to create an initial plan stating all of what is expected. Moreover, the agile approach is not purely dependent on fixed processes but on communication and collaboration as well. Similar to the traditional approach’s five phases (initiation, planning, execution, monitoring and control, and closure), the literature suggests different phases to this approach, which is iterative, meaning that these steps could be repeated. Highsmith (2004) suggested a five-phase method: envision (define the vision, project scope, and project organization), speculate (develop a model defined by the product characteristics and time constraints, and iteration plan for vision implementation), explore (deliver tested parts in a short time and continuously search for a way to reduce project risk and uncertainty), adapt (check deliverables, current situation, and team behavior to adapt if necessary) and close (close project, create lessons learned, and celebrate). DeCarlo (2004) suggested a four-step approach: visionate, speculate, innovate, and re-evaluate, and with the closing phase, disseminate.

The main challenge of the agile approach is that it relies heavily on communication and constant reporting. This causes the introduction of the issue of stressing the social skills of the team, since they would need to be able to express their thoughts accurately, which is not common among all people. Not only that but if an organization decides to outsource some of its production or development, the fact that communication will be impaired due to time-zone differences or barriers of language and culture only complicates the issue (Kurup and Sidhardhan 2015). Another problem with agile is that when a project's complexity increases, the team size working on the project will increase, making it difficult for each team to receive daily updates on the work (Kurup and Sidhardhan 2015). Finally, it is essential to note that the emergence of new approaches, like the agile approach, depends on the emergence of new software and methods (Boehm 1988, Aguanno 2004, Williams 2005), one of which, blockchain, will be the focus of this work. That is why there are constant changes in how projects look at and execute.

1.2 Overview of Blockchain Technology

Blockchain technology has gained much attention over the years, taking the world by storm. Blockchain is a distributed ledger secured by cryptography that keeps a history of past transactions (Holotiuk and Moormann 2018). The application of blockchain started in 2008, as an alternative way for completing more secure payment transactions, through the use of cryptocurrencies and bitcoin (Nakamoto 2008). This is mainly why this technology has always been associated with financial services, although its applications go beyond that. Blockchain 1.0 was designed for the...
safe use of Bitcoin, and Blockchain 2.0 adds the concept of smart contracts, which enables its use in wider applications.

Blockchain stores the transactions in blocks linked together to form a chain, hence the name "blockchain" (El Khatib et al. 2021). In other words, data in the blockchain is divided into blocks, each block dependent on the previous one (Holotiuk and Moormann 2018). These blocks also ensure that the data cannot be tampered with or deleted because, ultimately, any changes that happen to the block will cause the history of the transaction to be re-written (El Khatib et al. 2021). Moreover, blockchain uses a single-way mathematical function that maps complex size data into fixed-sized data called Hashing (Kinnaird et al. 2017). The block's hash represents identification and is as unique as a fingerprint.

2 APPLICATION OF BLOCKCHAIN IN PROJECT MANAGEMENT

The use of blockchain has found its broad application in PM as it has proven its effectiveness in project completion and the provision of transparent working processes. Project managers perform a wide range of processes during the completion of projects, so all the project phases require project managers to use various tools for planning and communicating with stakeholders involved in the projects. As a result, blockchain tools are increasingly emerging tools that gain relevance in all industries and markets.

Blockchain technologies within the PM area has found its frequent implementations within the past five years. Project managers find blockchain technologies effective in terms of provision of fairness in resource allocation, phases, task scheduling, and effectiveness of coordination through the creation of trust-enabled blockchain frameworks that advance the reliability, increase transparency, and verifiability of processes (Wienclaw 2021). For instance, construction projects are often accompanied by an application of blockchain technologies to address stakeholder collaboration. It is performed with the help of Internet of things sensors in real-time and blockchain authentications to ensure that all frameworks are working according to set standards and that all data transactions are traceable and correspond to project-related information equally shared across all project stakeholders. Furthermore, blockchain in smart contracts ensures that contract terms are common and equally correct for all transactions and in all stages of the project. It creates opportunities to automate vital project processes and expand smart information system design (Sonmez et al. 2023). It should also be mentioned that the implementation of blockchain smart contracts is frequent for financial transactions in PM. Thus, blockchain application in PM is an opportunity to standardize processes and methods of their control.

The application of blockchain in PM can also be viewed by looking at how it is applied within the context of process groups and knowledge areas. Similarly, the application of blockchain can be viewed on how it applies to the ten knowledge areas in PM, starting with project integration management, where blockchain again serves as an agreement ledger where information about requirements, time, costs, and evolution is stored (Pastor et al. 2018).

3 BENEFITS OF BLOCKCHAIN FOR PROJECT MANAGEMENT

3.1 Retention of Employees

One of the most apparent benefits of blockchain application in PM is the retention of employees and the creation of conditions for fair and transparent working relations. It is easier to manage and follow the personal effectiveness of each employee in all stages of the project completion. Such giants as Google, Amazon, and Facebook use blockchain in the process of completion of their projects to save and further monitor the performance of each participant of the project in each stage of completion. Employees' personal performance indicators cannot change without proper
authentication by the project managers. It contributes to the employees’ retention because of the fair evaluation (Wienclaw 2021). Besides, blockchain is used for creating a unified system for verifying skills and performance indicators, with the help of which it is easier to search for employees and contractors in all stages of project completion (Balon et al. 2022).

3.2 Application in Different Areas

Blockchain implementation forecasts are expected to expand in different industries. The experts foresee that technology revenues are going to reach $23 billion by the end of 2023. Therefore, blockchain demonstrates the considerable potential to improve PM and its components. The reason for its wide application is the potential of blockchain to alter the organization, initiation, control, and practices of project managers (Wienclaw 2021). There are five major areas where blockchain-based applications and platforms will be useful for project managers, which include management of digital records, initiation of exchange of digital assets and resources, authentication and reinforcement of acceptable performance, and building of reputation systems for execution of smart contracts (Sonmez et al. 2023). Therefore, PM may be considerably improved with the application of blockchain.

3.3 Access to Records

Blockchain’s opportunity to access the records is the key reason for its use in PM. Due to a single reliable and mechanically updated record, project managers can investigate inconsistencies and identify problematic areas and disputes with all stakeholders, including such external project stakeholders as clients or subcontractors (Casino et al. 2019). It is extremely important for the successful and timely implementation of projects, effective control, and unbiased relations among all the project participants. Along with it, one can use the information in the ledger for analysis of business operations to discover new efficacies and possible ways to save time and money. Thus, blockchain enables project managers to foresee possible changes and potential savings in project completion.

3.4 Use of Smart-Contracts

The use of smart contracts is one of the most popular and attractive benefits of PM. Its advantage is the idea of a self-executing contract designed of computer code, with an exclusion of any human intervention. Furthermore, it excludes the consideration of the interests of any stakeholder and requires the authentication of all users. Therefore, it excludes any opportunity for bias at any stage of project completion or control. For instance, if a supplier requires payment, it is required to meet the requirements and corresponds to the conditions stipulated in the smart contract first (Amoah and Oh 2021). One more benefit of blockchain smart contract in PM is that it allows vendors, contractors, outsourced consultants, and other stakeholders to get automatic payments only when the conditions of the contract are fulfilled. Blockchain smart contracts are used by project managers to automatically track, save and release reports on project status, handle procurement, control time, and issue expense sheets (Casino et al. 2019).

3.5 Financial Management

Blockchain allows the creation of financial instruments that enable managing financial resources in the project completion process. Such systems as cryptocurrencies, data arrays on operations and transactions, registers of shareholders, and identification of depositors are effective in controlling financial flow and expenses in PM (Wienclaw 2021). Blockchain tools allow reducing commissions and other costs arising from the circulation of funds. This is justified by the
transparency of the transaction and the absence of intermediaries. Digital identification provided based on blockchain technology can ensure the security of financial accounts. It is worth noting that the number of blockchain-based technologies being developed is growing every year. As a result, the range of areas it covers is expanding. New developments in blockchain applications in PM appear to offer more opportunities for companies.

4 LIMITATIONS OF BLOCKCHAIN IN PROJECT MANAGEMENT

Like any new technology, there are certainly some challenges and limitations associated with it. Yet, when it comes to limitations in the implementation of blockchain in PM, it is not explored deeply within the published literature. Some potential limitations are concerned with scalability, and technical limitations, like computing power, are related to the implementation of blockchain. Other issues include the lack of a framework to face legal or regulatory issues, resources, and cultural boundaries, where people are not comfortable with the change. In addition to that, the lack of standardized protocols and models makes blockchain interoperability impossible, which then affects data exchange and can lead to restricted collaboration between platforms (Pastor et al. 2018).

5 CONCLUSION

In conclusion, blockchain technology took the world by storm; it is very much the technology of the future, with tools that are adaptable to any industry and different cases of successful applications. The field of PM requires constant upgradation and adoption of new technologies to be able to meet the ever-increasing demands and awareness of customers. With few limitations found in the literature, blockchain promises many solutions, benefits, and applications that make it worth investing in.

References

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