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SUBMISSION DATE:

DECLARATION

I declare that this project work as presented in this paper is my original work and has not been presented anywhere else for any degree, diploma or award.

Signature:

Date:

Approval

ACKNOWLEDGMENT

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ABBREVIATIONS

CAGR Compound Annual Growth Rate

AGM Annual General Meeting

CHAPTER ONE: INTRODUCTION

1.1 Introduction:

The process of voting in a corporation can be quite tedious for shareholders, not only due to the extensive information that needs to be reviewed but also due to the cost and security issues that arise with traditional voting methods. The cost of mailing and printing the financial documents and information packages can be significant for the corporation and may not be environmentally friendly.

Additionally, traditional voting methods can be vulnerable to fraud and errors, making it difficult to ensure the accuracy and integrity of the voting process. Many shareholders often choose to vote by proxy, which requires them to appoint a representative to attend the annual general meeting and vote on their behalf. This process can be time consuming, as it requires shareholders to communicate with the proxy and ensure that the proxy will vote in line with the shareholder's wishes.

With blockchain technology, a blockchain-based voting system could offer a more secure and cost-effective solution. The decentralized nature of blockchain technology ensures that the voting process is tamper-proof, and the use of smart contract technology can automate the voting process, reducing the need for paper-based documents and the costs associated with mailing and printing.

This can also increase the trust and confidence of shareholders in the outcome of the voting process which in turn increases voter turnout and engagement, as it allows for remote voting and makes the voting process more accessible to a wider audience. This can also lead to a more representative and democratic decision-making process.

A blockchain-based voting system for corporations has the potential to provide a secure and transparent method for conducting voting. It can improve the accuracy and integrity of the voting process while also increasing voter engagement and participation. This is why many companies

are exploring and implementing blockchain-based voting systems as it can potentially solve the problems and issues associated with traditional voting systems in corporations.

1.2 Background of the Study:

1.2.1 Background

Blockchain-based voting systems have been gaining attention in recent years as a potential solution to enhance the security and transparency of voting processes. According to a report by Grand View Research, the global blockchain voting market size is expected to reach USD 441.5 million by 2025, growing at a compound annual growth rate (CAGR) of 61.5% from 2020 to 2025.

Blockchain technology, with its decentralized and secure ledger system, can provide a tamper-proof and transparent way of conducting elections and voting. In a blockchain-based voting system, votes are recorded as transactions on a decentralized ledger, making it nearly impossible for anyone to manipulate the results. The use of cryptographic algorithms and consensus mechanisms further enhances the security and accuracy of the voting process. Blockchain technology has the potential to revolutionize the way voting systems are designed and implemented.

According to a report by Allied Market Research, the global blockchain voting market size was valued at \$181.5 million in 2019 and is expected to reach \$1,866.9 million by 2027, growing at a CAGR of 38.4% from 2020 to 2027.

This statistic indicates a significant potential for growth in the blockchain voting market in the coming years. The increasing demand for secure, transparent, and tamper-proof voting systems is one of the key factors driving the growth of the market. Blockchain technology is seen as a promising solution to address the challenges of traditional voting systems, such as fraud, manipulation, and low voter turnout.

The report also highlights that the adoption of blockchain-based voting systems is still in its early stages, and the market is highly fragmented with the presence of several small and large players. However, with the increasing interest and successful pilot projects, the market is expected to witness significant growth in the coming years.

1.2.2 Overview of the Existing Systems

Voting is an essential process in corporations, and the method used for voting can vary depending on different factors. For instance, the size and structure of the corporation, as well as legal requirements in the jurisdiction where it operates.

One common method of voting is in-person voting, where shareholders or members of the corporation attend an Annual General Meeting (AGM) in person and cast their votes. In-person voting is often conducted using paper ballots, which are then counted manually or by electronic voting machines.

Another method is proxy voting, where shareholders who cannot attend the meeting in person appoint a proxy to vote on their behalf. This can be done through various means, such as mail, email, or online, and the appointed proxy can be another shareholder, an attorney, or a representative of the corporation.

Remote voting is also an option in some cases, where shareholders can cast their votes from a distance by mail, email, or online. This method is often used for routine matters, such as electing directors or approving the annual budget.

Finally, hybrid voting, a combination of in-person and remote voting, allows shareholders to attend the meeting in person or participate remotely via video conferencing or other electronic means.

It is worth noting that the specific procedures for voting in corporations are typically outlined in the corporation's bylaws or articles of incorporation. Moreover, these procedures may be subject to legal requirements and regulations in the jurisdiction where the corporation operates.

1.2.3 Overview of the Proposed System

The proposed system will implement a blockchain-based voting system by leveraging the security and transparency features of blockchain technology to record and verify votes.

The corporation would set up a blockchain network with a specific set of rules and protocols for recording and verifying votes. The blockchain network is implemented on a secure online web portal. Shareholders or members of the corporation are given a unique identifier, called a personal access token, that allows them to cast their votes on the blockchain network. The online web portal is only accessible to authorized personnel that have logged in with their personal access tokens.

When a shareholder casts a vote, the vote is recorded on the blockchain as a transaction that is validated by a network of nodes or computers running the blockchain software. The vote is then added to a block of transactions that is cryptographically linked to the previous block, creating a chain of blocks that cannot be altered or tampered with.

Once all the votes have been recorded, the blockchain network can tally the results and verify that they are accurate based on the rules and protocols set up by the corporation. The results can then be made available to shareholders or members of the corporation, providing a transparent and auditable record of the voting process. The results of the votes would be available to download and print for the sake of record keeping.

Blockchain-based voting systems in corporations offer several advantages, including increased security, transparency, and efficiency compared to traditional voting systems.

1.3 Problem Statement:

"Evaluating the effectiveness of blockchain-based voting systems in enhancing shareholder participation and reducing voting fraud in corporate elections." This research problem aims to investigate the potential of blockchain technology in addressing issues such as low voter turnout and voting fraud in corporate elections.

The research involves a comparative study of traditional voting systems and blockchain-based voting systems, examining factors such as voter turnout, the accuracy of vote counting, and the level of transparency and security in the voting process. The findings of this research could inform the decision-making of corporations considering the implementation of blockchain-based voting systems and contribute to the broader understanding of the potential benefits and limitations of blockchain technology in corporate governance.

1.4 Objectives:

1.4.1 Project Goal (Major Objective) Overall Goal:

The system aims to improve the integrity and efficiency of corporate voting processes and promote trust and accountability among stakeholders. It also investigates the current challenges and limitations of the traditional voting systems used in corporations and explores potential benefits of using a blockchain-based voting system. It also evaluates feasibility of implementing a blockchain-based voting system for corporations, including the technical, legal, and ethical considerations.

1.4.2 Specific Objectives:

1. To develop a web-based blockchain application where stakeholders can log in and vote for their respective publicly listed companies.
2. To compare the blockchain-based voting system's performance and efficiency with the traditional system in terms of various factors such as security, transparency, time, cost, accuracy, and voter satisfaction.

3. To create a personal access token that enables identification of stakeholders who are voting.
4. To design a real-time vote counting and display system using smart contracts.
5. The system will allow stakeholders to view their voting history, and the results will be printable for record-keeping purposes.

1.5 Justification:

The system will provide the following benefits to the users of the system:

1. **Improved Corporate Governance:** The use of blockchain technology in corporate voting can increase the transparency, accountability, and integrity of the decision-making process. This can improve corporate governance, reduce the potential for fraud and conflicts of interest, and enhance the trust and confidence of stakeholders.
2. **Enhanced Security:** Blockchain-based voting systems can provide stronger security features compared to traditional voting systems. Blockchain technology provides tamper-proof and immutable records, making it almost impossible to manipulate or alter the voting results, which can reduce the risk of fraud or cyber attacks.
3. **Improved Efficiency:** A blockchain-based voting system can reduce the time and cost associated with traditional voting systems. It can eliminate the need for intermediaries, paper-based documentation, and manual vote counting, reducing the administrative burden on the organization.
4. **Alignment with Technology Trends:** As blockchain technology gains wider adoption in various industries and sectors, it is increasingly becoming a standard for secure and transparent data management. Corporations that adopt blockchain-based voting systems will be aligning themselves with this technological trend and positioning themselves for future growth and innovation.
5. **Improved Stakeholder Satisfaction:** A transparent and secure voting system that enables stakeholder participation in the decision-making process can increase the satisfaction of stakeholders, including shareholders, investors, and employees. This can lead to increased loyalty, trust, and engagement in the organization.

1.6 Scope of the Study:

In scope:

A blockchain voting system could be a solution to traditional voting systems. This system could work as follows:

1. Shareholders would be issued digital tokens that represent their ownership in the corporation. These tokens would be stored on a blockchain platform.
2. When a vote is called for, shareholders would be notified via a secure online portal and email. They would be able to review the information and issues to be voted on, and cast their vote using their digital tokens in the online portal.
3. The votes would be recorded on the blockchain platform in a tamper-proof manner, ensuring the integrity of the voting process.
4. The vote counting process will be automated using smart contract technology, eliminating the need for manual counting.
5. The results of the vote would be made available to all shareholders in real-time on the online web platform, increasing transparency and trust in the voting process.
6. The system would include a secure way of identification of the shareholders and also a way of auditing the process, also to make sure that the right person is voting.
7. The system would also include a way of tracking the voting history of the shareholder, to make sure that they can't vote more than once or vote in different ways.
8. The system would also include a way for shareholders to download and print the voting results for record keeping.

Out of scope:

1. Shareholder engagement: While the system may improve the ease and convenience of voting for shareholders, it may not be responsible for driving engagement or participation in the voting process.
2. Non-voting matters: The system would only be designed to handle voting matters related to the corporation, such as electing directors or approving the annual budget. Other

matters, such as discussions or presentations, would not be within the scope of the system.

3. Technical issues outside the system: The system would be designed to ensure the efficiency and accuracy of the voting process, but it cannot account for technical issues that occur outside the system, such as internet connectivity issues or hardware malfunctions on a shareholder's device.

1.7 Limitations of the Proposed System:

Like any voting system, a blockchain-based voting system in corporations has several potential limitations and drawbacks that should be considered. Here are some limitations of the proposed system:

- Cost: Implementing and maintaining a blockchain-based voting system can be expensive, especially for small or medium-sized corporations. The cost of hardware, software, and personnel can make it impractical for some organizations.
- Scalability: The performance and scalability of a blockchain-based voting system may be limited, especially if many users are participating in the system simultaneously. This could lead to delays or other technical issues.
- Legal and regulatory challenges: Blockchain-based voting systems may be subject to various legal and regulatory requirements, which can be complex and vary by jurisdiction. Ensuring compliance with all relevant laws and regulations can be challenging.

1.8 Project Risk and Mitigation:

- Technical challenges: Developing and implementing a blockchain-based voting system requires a high level of technical expertise. This is solved by extensive study and consulting with those that are experienced in the field.
- Resistance to change: Introducing a new voting system may face resistance from shareholders who are accustomed to traditional voting methods. This is solved by conducting an extensive communication and education campaigns to inform stakeholders about the benefits of the new system and address their concerns.

- Laptop devices might crash or infected with a computer virus. This is solved by implementing multiple nodes or computers that can be used to validate and store the blockchain data, ensuring that the system can continue to function even if one node or computer is compromised.

1.9 Project Schedule:

1.10 Budget and Resources

REFERENCES:

1. **Blockchain Technology Market Worth \$1,431.54 Billion By 2030** report by Grand View Research, Inc.
<https://www.grandviewresearch.com/press-release/global-blockchain-technology-market>
2. “**Cryptocurrency Market** By Offering, Process, Type, and End User: Global Opportunity Analysis and Industry Forecast, 2021–2030” by Allied Market Research
<https://www.grandviewresearch.com/industry-analysis/blockchain-technology-market>
3. The Broadridge Next-Gen Technology Adoption Survey Financial services leaders are taking steps to gain a clear advantage.
https://www.broadridge.com/_assets/pdf/broadridge-next-gen-technology-adoption-survey.pdf