

Chapter 10

Enhancing Democracy Through Blockchain– Enabled Electronic Voting Systems

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ABSTRACT

In contemporary democracies, e-voting marks a shift from traditional paper methods, reducing costs and errors but introducing challenges like transparency and data storage issues. This chapter proposes blockchain technology to enhance the transparency and security of electronic voting. The study explores global advancements in electronic voting and assesses blockchain-based electoral mechanisms, comparing various blockchain technologies for their capacity to uphold democratic integrity. It highlights the vulnerabilities of traditional systems to errors and manipulation and advocates for a gradual transition to digital platforms. Blockchain, particularly Ethereum 2.0 and smart contracts offers robust internal verification, ensuring anonymity, privacy, and fairness while reducing operational costs. This chapter envisions a future where democracy is preserved and strengthened through secure, distributed voting mechanisms, presenting blockchain as an indispensable

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partner in enhancing democratic processes.

INTRODUCTION

The shift from traditional to electronic voting (e-voting) offers efficiency and accuracy, yet issues like centralized data vulnerabilities and transparency challenges remain. With its decentralized and immutable structure, blockchain technology presents a solution to these obstacles, enhancing security and public trust in e-voting systems.

This chapter explores the integration of blockchain into e-voting to improve transparency, security, and reliability. Key objectives include:

- Analyzing e-voting limitations, especially security vulnerabilities.
- Demonstrating blockchain's potential to address these issues through decentralized, transparent record-keeping.
- Proposing a blockchain-based e-voting framework to ensure voter anonymity and data integrity.

The chapter synthesizes global case studies and technological advancements, examining Ethereum 2.0 and smart contracts as vital components in secure election systems. By showcasing blockchain's role in modern voting, this chapter envisions a secure, transparent, and trusted democratic process, setting a foundation for future applications of blockchain in e-voting.

LITERATURE SURVEY

The literature review includes studies on challenges and developments in electronic voting systems. Various authors scrutinized traditional voting mechanisms, highlighting security weaknesses, lack of transparency, lengthy accounting systems, Limitations of digitization and possible manipulation risks; researchers looked for alternative solutions, which focused primarily on integrating blockchain technology into the blockchain application to enhance it, providing unique insights into different aspects of this rapidly growing segment From electronic voting system a designed for specific voting systems to comparative studies of existing solutions the literature review provides an ongoing effort to ensure the authenticity and reliability of online voting mechanisms. Table I Summarizes the objectives and findings of studies addressing transparency, security, and reliability in blockchain-based e-voting systems

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