

## **1. Introduction**

### **Background**

In almost every country, general elections are one of the complementary practices of democracy. In accordance with the advancement of time and democracy, a general election was held to elect legislative members and executive leaders at both the national and regional levels. This political venture has given rise to new problems in various forms over time, including general election administrative disputes [1]. Another significant issue to overcome is the anonymity of the voters. As a result of increased research and innovation in the field of big data analytics, this data is vulnerable to discovery and manipulation [2]. Democracy and elections are like two sides of the same coin; the implementation of elections, which are the people's passion, characterizes a country's continued upholding of a democratic system. In general election activities, the principle of democracy from the people, by the people, and for the people can be seen [3].

General election systems have now evolved from using traditional methods to using electronic voting systems for general elections. Estonia was the world's first country to use an electronic voting system in national elections [4]. New technologies have the potential to transform a fundamental democratic act, voting. As more and more transactions move to the Internet, the traditional concept of voters physically visiting a polling place becomes uncertain [5]. The emergence of these technologies poses a significant challenge to the cornerstone of democratic society, casting doubt on the need for voters to engage in the traditional, physical act of voting at polling locations in an era when everyday transactions seamlessly transition to the digital domain [6]. Despite the attractiveness of convenience, recent events have raised concerns. Due to growing worries regarding the integrity and security of Internet voting systems, several countries have paused or discontinued testing. These concerns have fuelled calls for a return to the steadfastness of traditional paper ballots, while questions about the sustainability of any sort of electronic voting remain [5]. Due to various confidentiality concerns, the format of the ballot E-Voting system is restricted. The IV thing's centralization of power makes DDOS attacks vulnerable, making electoral elections unavailable to voters [4]. To improve this situation, integrating blockchain technology can improve electoral election security by providing a tamper-proof and decentralized data infrastructure [7].

The concept of blockchain was first proposed in 2008 with the implementation of Bitcoin, which operates on a Proof of Work (PoW) time-stamping scheme [4]. Blockchain is the underlying technology that powers digital currencies like Bitcoin, Ethereum, and Hyperledger. Blockchain has recently attracted a lot of interest as a decentralized and distributed public ledger system in a peer-to-peer network. It uses a linked block structure to validate and store data and a trusted consensus process to synchronize data changes, allowing it to construct a tamper-proof digital platform for storing and exchanging data [8]. There are two types of Blockchain: public blockchain and private blockchain. Public Blockchains are unrestricted allowing anyone with necessary resources to join the network, whereas private Blockchain networks require permission from the network administrator [9]. The advantages of such a system include security and transparency [10].

Telkom University offers numerous associations ranging from the most basic to the most advanced. One of these is the student association, specifically the departmental student association, which functions as a governing body for students in a certain study program. To handle the voting system in this case, this study proposes a blockchain to handle digital voting system [11], so this technology appears to be one viable option for creating a safe decentralized environment for information storing [12].

### **Problem Definition and Limitation**

Implementing a private blockchain for the Telkom University Association General Election involves various issues, most notably the security and integrity of election data. Due to the sensitive nature of the information involved, it is critical to ensure a secure and reliable e-voting procedure. To establish an efficient voting platform, issues such as scalability, accessibility, and user authentication must be solved inside the blockchain. While the implementation of blockchain will focus on campus associations, particularly those linked with Telkom University, the strategy will use a basic blockchain foundation without smart contracts. Despite its simplicity, the system's security and integrity remain primary priorities. Furthermore, the platform must meet legal and regulatory standards to assure the election's legality and transparency.

**Aim**

The goal is to successfully implement a private blockchain solution for the Telkom University Association General Election that addresses security, integrity, scalability, accessibility, and user authentication concerns. Furthermore, the goal is to ensure compliance with legal and regulatory requirements, resulting in the establishment of a dependable and transparent platform for conducting the e-voting process.