

Implementation of Electronic Voting In The Election Of The Chairman Of The Student Council (Dema) of Darunnajah University

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Abstract– With the increasing development of technology nowadays, all activities and work can be carried out and monitored through technological devices. Advanced information and telecommunications technology is now applied in the voting system, which is known as voting or voting. In the era before the industrial revolution 4.0 era, general elections were carried out using paper and ink, now with Electronic Voting, people no longer need to bother opening and folding ballot papers after voting. E-Voting is an abbreviation for Electronic Voting and has a close relationship with e-government, an information technology system developed by the government to facilitate access to information and services. By implementing E-voting, Darunnajah University students can elect the chairman of the Student Council (DEMA) to obtain maximum and more efficient results

Keywords: Vote; Java; Netbeans; Dema Darunnajah

1. INTRODUCTION

Technological progress is increasingly rapid along with the times. Increasingly sophisticated technology makes it possible for all activities and work to be carried out and monitored via technological devices. Technological progress cannot be avoided because it is in line with the development of knowledge. Innovations resulting from technological advances provide many conveniences and positive benefits for humans, and currently many people have experienced various benefits from these innovations (Habthiah et al., 2021).

The very rapid development of technology in the industrial revolution 4.0 era affects various aspects of life, including politics and government (Pratama et al., 2023). Advanced information and telecommunications technology is now applied in voting systems, known as voting or pentrengan. If previously general elections were carried out using paper and ink, now with electronic voting, people no longer need to bother opening and folding ballot papers after voting (Kurniawan, 2023).

E-voting is an abbreviation of Electronic Voting and has a close relationship with e-government. E-government is an information technology system developed by the government to provide options for the public. This system allows easy access to government information and services anytime and anywhere. This information technology is an alternative for the government as an additional channel of choice (Tuttnauer & Hazan, 2023).

The election for the chairman of the Student Council (DEMA) at Darunnajah University is still carried out traditionally, where students who have the right to vote come to the polls on election day. Students vote or tick the ballot paper, then put it in the ballot box. This traditional manual method causes several problems, including cost overruns, long election times, a long counting process, and the possibility of fraud in the election process. Utilization of information technology with an e-voting system can be used to solve these problems (Restu Aji & Trisari Harsanti Putri, 2023).

2. THEORETICAL FRAMEWORK

2.1. Implementation

At its inception, implementation studies were understood as the process of implementing public policy as a socio-political phenomenon, which was often referred to as a political game. In the Indonesian context, the policy implementation stage is placed in different positions, but in principle every public policy is always followed by policy implementation (Muchamad Bachram Shidiq et al., 2023).

Implementation involves activities, actions, or mechanisms within a system. A mechanism means that implementation is more than just an activity; it is a planned and deliberate effort carried out based on certain norms to achieve specific goals. Therefore, implementation cannot be separated from the influence of other elements, such as the curriculum. The curriculum provides a framework and guidelines that shape how implementation occurs, ensuring that the activities and actions align with educational objectives. Additionally, successful implementation requires continuous monitoring and evaluation to adjust strategies as needed and address any challenges that arise. This comprehensive approach ensures that the implementation process is effective and sustainable, ultimately leading to the desired outcomes. (Muchamad Bachram Shidiq et al., 2023).

The implementation of applications through algorithms enables the development of more efficient and effective systems, with algorithms specifically designed to optimize processes and solve problems systematically. These algorithms can be used for various functions, such as data processing, predictive analysis, and task automation, all of which contribute to enhancing the application's performance. Additionally, by using the right algorithms, applications can be improved to handle large volumes of data and higher operational complexity. This process not only increases the speed and accuracy of the application but also ensures that the application remains scalable and reliable as user needs grow (Panggabean, 2021).

2.2. E-Voting

E-voting is an acronym for electronic voting. E-voting is closely related to e-government, namely an information technology system developed by the government to facilitate access to information and services (Vladucu et al., 2023). Apart from that, e-voting also supports e-government goals which are in line with the implementation of the ITE law, in accordance with the objectives of the 1945 Constitution (Yanti et al., 2023).

E-voting is voting using electronic media or electronic devices, the Council of Europe (CoE), defines it as an electronic voting device so that it has the ability to speed up data tabulation, reduce election costs and contribute to preventing unauthorized voters (Panggabean et al., 2023).

The understanding of e-voting refers more to the process of utilizing electronic devices to better support the smooth running of the process and also an automation model that allows minimal intervention from individuals in all processes (Hassan et al., 2023). The urgency of adopting e-voting includes threats to confidentiality and security, as well as another important question: can adopting e-voting reduce abstention rates? This question is relevant because several countries that have implemented e-voting have not shown significant increases in voter participation. Therefore, Schaupp and Carter emphasize the importance of understanding from all parties before adopting e-voting, so that its implementation can be better accepted without bad precedents (Budi et al., 2023).

Regardless from the various models of implementing e-voting in various countries and the development of the general election process with its various procedures, it is very important to understand the advantages and disadvantages of each electoral system. Argument is interesting to study in an effort to compare each election implementation system, from traditional ones to more modern ones such as e-voting and i-voting (Bach et al., 2021). This orientation towards comparison aims to minimize risk, because technology adoption always has the threat of risk (Park et al., 2021).

Therefore, electoral system innovation will continue to develop towards more perfect improvements, because this is related to human rights and voter participation for the advancement of democracy. This means that although e-voting is the best for now, it is not the only safe system (Kusuma et al., 2023).

2.3. Student Council (DEMA)

The Student Council (DEMA) is a significant campus organization that plays a crucial role within the Student Government System. It acts as a legislative body representing the student body's interests and concerns. DEMAs were established with the primary objective of providing a platform to address various student aspirations and interests, ensuring they are channeled through legal means within the campus bureaucracy.

One of the core responsibilities of DEMAs is to serve as the voice of the students. It works to represent students' interests, coordinate extracurricular activities among student organizations at the faculty level, and offer opinions, suggestions, and recommendations to faculty leaders. DEMAs' role is particularly crucial in shaping and achieving the educational objectives set at the national level.

The election process for the chairman of the Student Council (DEMA) at Darunnajah University is held annually at the beginning of the even semester, with each term lasting for one year. During the election, students exercise their voting rights by participating in the voting process. This can be done either through traditional paper-based voting or through electronic voting methods, depending on the system adopted by the university.

The election serves as a vital democratic process within the university community, allowing students to choose their representatives who will advocate for their needs and concerns. It is an opportunity for students to actively participate in the governance of their institution and contribute to its development. Through fair and transparent elections, the university ensures that student voices are heard and respected, fostering a culture of inclusivity and democratic values among its members (Nabilah & Amrozi, 2019).

2. RESEARCH METHODOLOGY

The research method used is qualitative research with a case study approach which took place at Darunnajah University, where data collection used a literature review because there was no implementation of electronic voting in the campus environment (Budi et al., 2023). The rules of literature study that researchers must pay attention to include the process consisting of identification, systematic theory, literature discovery, and analysis of information documents related to the research topic (Haryati et al., 2014). Apart from that, data collection was also carried out through field observations. The type and source of data used in this research is secondary data.

3.1. Object Oriented Analysis (OOA)

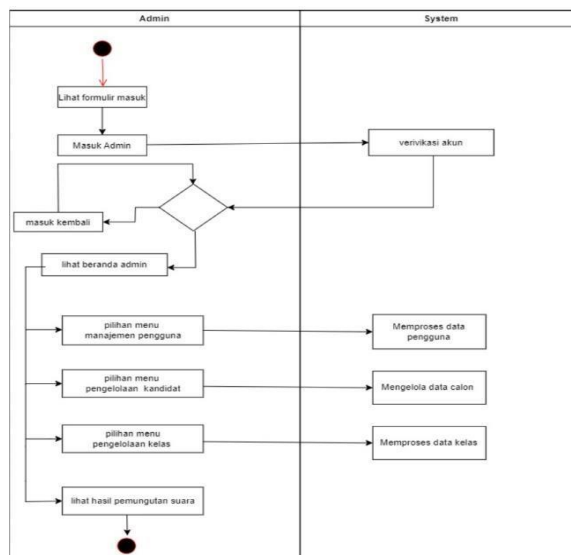
From the actor identification table, the actors involved can be identified, and detailed explanations can be provided regarding the roles and responsibilities of each actor in the E-Voting application program for the election of the DEMA Chair. This table serves as a comprehensive guide to understanding the various stakeholders involved in the electoral process, including administrators, candidates, voters, and technical support personnel. By delineating the specific tasks and interactions of each actor, it becomes easier to ensure that the application program functions smoothly and effectively. For instance, administrators oversee the setup and management of the voting system, candidates interact with the system to register and campaign, voters use the application to cast their votes securely, and technical support personnel troubleshoot any issues that may arise during the election period. Thus, the actor identification table not only aids in clarifying roles but also facilitates better coordination and communication among all parties involved in the electoral process, contributing to its integrity and success.

Table 2. Distribution of Actors

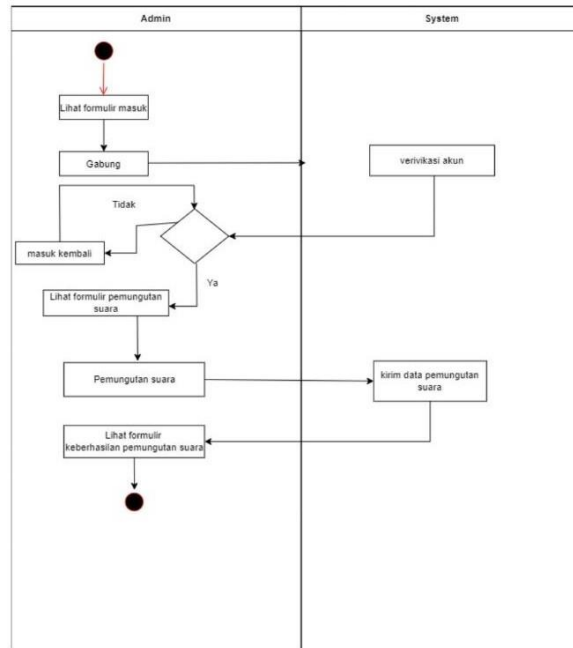
No.	Actor	Actor Type	Actor Activity
1.	Student	Main business actor/Primary Business Actor (PBA)	<ol style="list-style-type: none"> 1. Login as students (voters). 2. Account verification. 3. View details of candidates for chairman and deputy chairman 4. Cast a vote. 5. Sending voting results. 6. Activation of voting success.
2.	Admin	Main system actor/Primary System Actor (PSA)	<ol style="list-style-type: none"> 1. Login as admin 2. Account verification 3. Manage data student(voter) 4. Manage candidate data 5. Manage voting results 6. Do a check

3.2. Activity Diagrams(Activity Diagram)

Activity Diagrams is a diagram that shows the flow from one activity to another in an activity system ((Xiaojun, 2011). Activity Diagrams are also used to define or group system display flows (Hadi et al., 2017). The activities described include data processing by admin and the voting process. Figure 1 shows admin activity starting with login. After logging in, the admin is directed to the admin homepage which contains a data management menu, such as user management, candidate management, class management, data processing in the website database, and viewing voting results. Figure 2 shows the voting process, starting from the user accessing the login page. After logging in, users can access the page voting to choose. To log in, users only need an identity number and date of birth as personal credentials.



Picture 1. Shows admin activity starting with login



Picture 2. Shows the voting process

4. RESULT AND DISCUSSION

4.1. System View

4.1.1. Login Page

The login page is used by users and administrators. On this page, the user or administrator is asked to enter the user name and password obtained from the administrator. After the username and password are entered, users and administrators can press the login button to enter the main page of the voting application. If the username or password is entered incorrectly, the page will remain on the login page. For administrators, if they log in successfully, they will be directed to the admin page provided. The login page display can be seen in Figure 3.

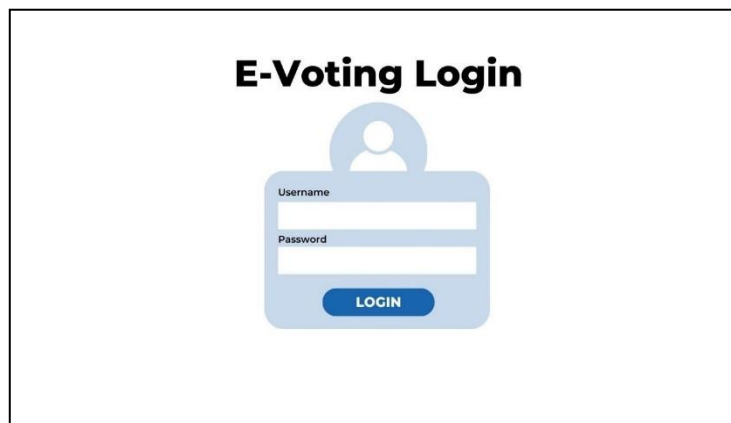


Figure 3. login page display

4.1.2. Admin Dashboard Page

The admin dashboard page is displayed after successful login. On this page, there are several features, such as the results feature to view voting results, the candidate feature to add and update candidate data, and the student feature to add voter participants or students as in Figure 4.

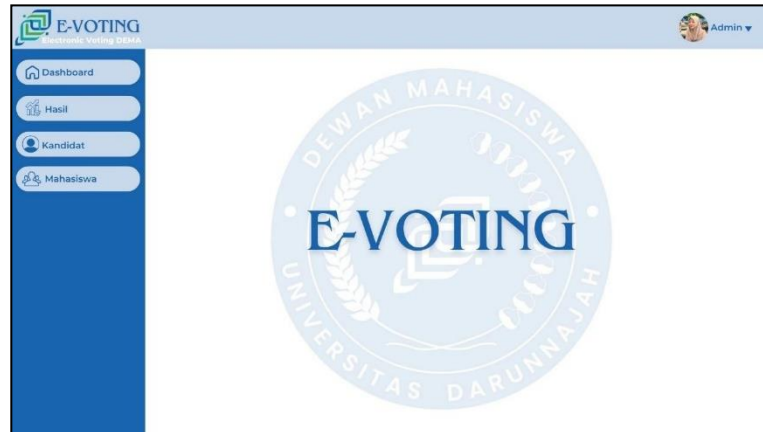


Figure 4. dashboard page is display

Figure 5 shows the admin dashboard page for inputting, editing, and deleting data on candidates or candidates for DEMA chairmanship. This dashboard serves as a central hub for administrators to manage all relevant information regarding the election process. The interface allows for efficient updates and modifications to candidate profiles, ensuring that all data remains current and accurate. Additionally, the admin dashboard provides various tools and functionalities that facilitate the organization and monitoring of election activities. With user-friendly features and a streamlined layout, administrators can easily navigate through different sections to perform necessary tasks such as adding new candidates, updating existing information, or removing candidates from the list. The robust design of the dashboard ensures that all actions are securely logged, maintaining the integrity and transparency of the election process.

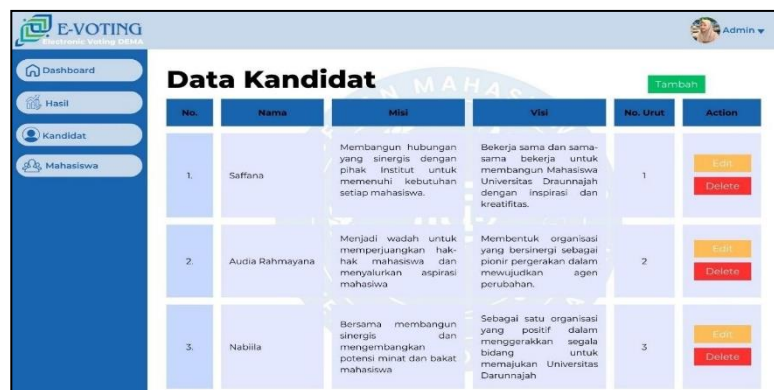


Figure 5. Shows inputting, editing, and deleting data on candidates

Figure 6 shows the admin dashboard page for adding, editing, and deleting data on students who can do e-voting. This page is a crucial component of the e-voting system, as it allows administrators to manage the eligibility of students participating in the election. The dashboard provides a user-friendly interface where administrators can easily input new student data, make necessary updates to existing records, or remove students who are no longer eligible.

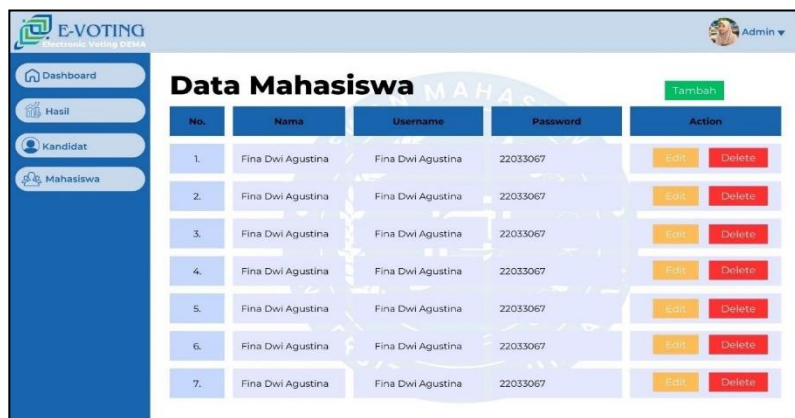


Figure 6. Shows Adding, editing, and deleting data on students

Figure 7 shows the admin dashboard page to see the results of the votes cast by students. This page provides a comprehensive overview of the election results in real-time, allowing administrators to monitor the voting process as it unfolds. The dashboard is equipped with various visualization tools, such as charts and graphs, to present the data in an easily understandable format. These visual aids help administrators quickly assess the distribution of votes among the candidates and identify any trends or patterns. Additionally, the page includes detailed statistics and metrics, such as the total number of votes cast, the percentage of votes each candidate has received, and the overall voter turnout. With features that allow for filtering and sorting of data, administrators can perform in-depth analysis and generate reports for further review. The secure design of the dashboard ensures that all vote data is protected and that the integrity of the election results is maintained. This functionality is essential for ensuring transparency and accountability in the e-voting process, providing stakeholders with confidence in the accuracy and fairness of the election outcomes.

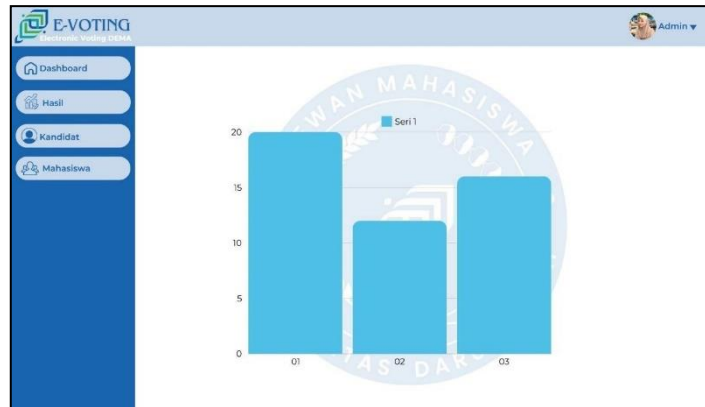


Figure 7. Results of the votes cast by students.

4.1.3. Page (Student) User

The student dashboard page in Figure 8 is displayed after successful login. On this page there are two features, namely voting and viewing voting results.

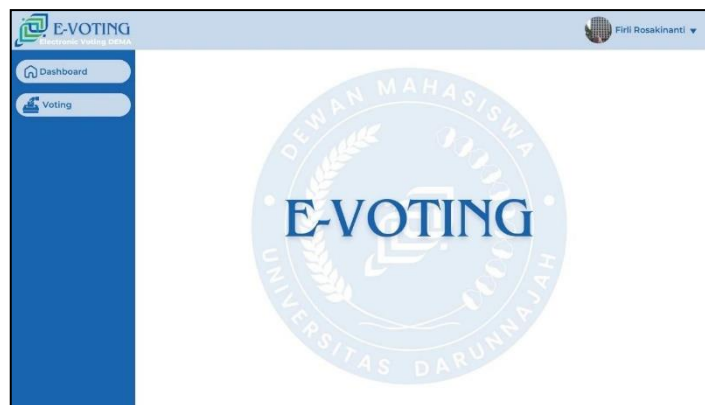


Figure 8. displayed after successful login

In Figure 9 is a picture of the voting page. This menu is designed so that voters can use their voting rights to choose the candidate they want to vote for. When the voter has made their choice, click the vote button and it will save and cannot be thwarted. After the voter presses the vote button, the voting page will automatically change to the results page, so the user has only one chance to vote per vote choose, the function of this is so that voters cannot vote twice and on this page voters can see the vision and mission of the pair of candidates who registered to become chairman of DEMA Darunnajah University.



Figure 9. picture of the voting page

Next, after voting by clicking vote, the display will automatically switch to the temporary results of the votes as shown in Figure 10.

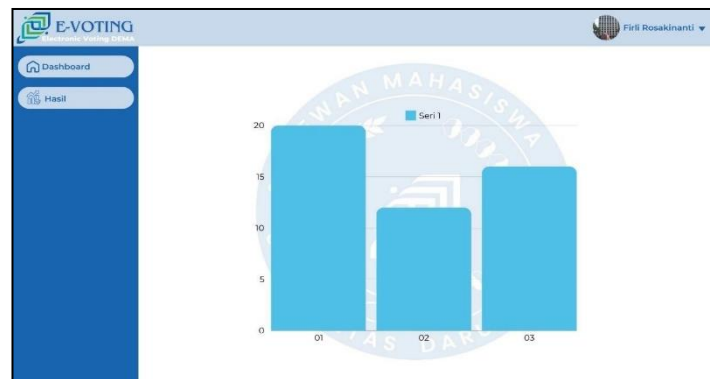


Figure 10. Voting results graph

4.2. Research Result

The position of chairman and all members of the Student Council (DEMA) at Darunnajah University has a term of office of 1 year, during which elections must be held to change chairman every year. In Indonesia itself, voting is often held, but it is still traditional. Whether in the election of President, Governor, Mayor or Head of RT/RW, usually there will be 2 or 3 candidates remaining who have been selected (Azwanti, 2017). However, with elections carried out traditionally, elections with this concept have many problems that must be minimized with electronic voting, some of these obstacles include :

1. Many students abstain because data collection is less systematic.
2. Invalid ballots tend to be more numerous due to voters' lack of understanding of the process of making choices in designated voting booths.
3. Geographical location conditions indirectly hinder it speedvote collection and vote counting.
4. Budget overruns during elections are also a problem that must be minimized.
5. HR and timemore is needed much in the process of voting and counting votes.

The main content of e-voting is the risk aspect, including its relevance to confidentiality and security because technological applications that utilize the internet are very vulnerable to hackers (Moynihan, 2004). In principle, there are two e-voting systems that can be implemented (Zafar and Pilkjaer, 2007), namely:

- a. *E-voting at the pooling booth*: the principle is that e-voting is carried out at certain predetermined places and voters go to those places to make their choice.
- b. *Online e-voting*: the principle is that e-voting is carried out online so that voters do not need to go to predetermined places but can vote anywhere as long as there are online facilities so that the election process runs in real time online.

From the explanation above, it can be summarized that aspects of confidentiality and security are central issues in the era of implementing e-voting (Gerlach and Gasser, 2009. Ondrisek 2009 Kitcat, 2007 Chevallier et al. 2006 Trechsel and Mendez, 2005). Given the facts above, we have to rethink whether e-voting is able to minimize all of these problems? The implementation of e-voting is expected to overcome problems arising from elections held conventionally.15

4. CONCLUSION

Based on the results of observations and secondary data collection obtained by researchers, Darunnajah University has a great opportunity to implement electronic voting in the election of the chairman of the Student Council (DEMA). So that by implementing this, maximum results can be obtained with an efficient process. This transition to electronic voting is expected to streamline the election process, increase voter participation, and enhance the overall transparency and reliability of the election outcomes. Additionally, the use of electronic voting can reduce the logistical challenges and costs associated with traditional paper-based voting methods. With proper planning and execution, the implementation of electronic voting at Darunnajah University can serve as a model for other institutions aiming to modernize their electoral processes.

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