Implementation of the Village Institution E-Voting Application

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Abstract— Problems in traditional elections are related to fraud, efficiency, transparency, accessibility, and cost. As a solution, a website-based e-voting system is proposed to overcome this.
This study used effort expectancy, social influence, performance expectancy, and facilitating conditions to have a significant positive correlation with the user's intention to use an e-voting system. E-voting can address a variety of traditional election issues by improving efficiency, transparency, accessibility, and reducing costs. These results highlight the key factors influencing the adoption of e-voting technology, providing guidance for developers and policymakers in designing more effective, secure, and user-friendly systems. A significant correlation value at the level of 0.01 shows that all factors play an important role in increasing user acceptance of an e-voting system.

Keywords— website, information system, e-voting, indonesia

I. INTRODUCTION

Indonesia is a democratic country and is in the sixth position with the most internet users in the world. Indonesia's population is 281.6 million with 79.5% internet users [1]. An information system is a combination of information technology that shapes business processes and people involved in processing data and information to achieve certain business goals[2].

Input is data or information that is entered into the system for activities carried out to process data or information. Output is the result of the process, and feedback is the response given by the user or system to the output produced. Finally, a collection of various components in the company that are interconnected and form a requested information system [3].

PHP is a server-side scripting language, a programming language used to develop static websites or dynamic websites or Web applications. PHP stands for Hypertext Pre-processor, formerly called Personal Home Pages [4].

PhpMyAdmin is one of the most popular and easy-to-use web database management tools. phpMyAdmin was developed in the PHP programming language and is used to manage MySQL databases [5].

MySQL is a DBMS (Database Management System) that uses SQL (Structured Query Language) commands that are open source. Creating complex applications that can be run dynamically, databases are needed to store various data in the form of information [6].

XAMPP is an open source web server software that supports various operating systems such as Windows, Linux, and Mac OS. The abbreviation XAMPP stands for X Platform, Apache, MySQL, PHP, and Perl. Used as a standalone or locally hosted server to simplify the process of editing, designing, and developing web applications [7].

Website design is a planning process for the preparation of the structure, layout, content, and features that will be created in the website. This includes the selection of

visual design, navigation, technology used, and desired user experience [8].

CSS (Cascading Style Sheets) Styling is used to design the appearance of web pages created with pre-created HTML. CSS can set the layout, colors, typefaces, and other visual appearance of HTML elements [9].

Database Management Systems (DBMS) are a critical element in data-intensive applications, but they are difficult to manage due to the many "knobs" of configuration that are not standardized, interdependent, and universal. The effect of this knob is often only known through experience, which can be costly [10].

II. METODE

The development of the E-Voting Information System for Web-Based Village Institutions using the waterfall method on the website-based e-voting involves the implementation of phases of sequential waterfall to ensure that the e-voting system is developed in a structured manner. Here's how the Waterfall method can be applied to website-based e-voting:

There are 6 steps required:

System analysis creates a continuous management workflow. Consider the design, or what needs to be done, in detail. System design, which is the creation of the workflow needed to build an information system. System implementation. In other words, running the system according to its respective functions. Test, which is to test the system that has been created. System maintenance, which is the introduction and maintenance of the system that is created.

After identifying the need, e-voting creates a use case diagram to visualize the interaction between the user (actor) and the system. Actors involved in the e-voting system include voters, admins, and committees

The activity diagram for the "Candidate Selection" use case illustrates steps such as displaying the list of candidates, voters voting for candidates, submitting votes, confirming voters, and storing votes in a database. This diagram helps the team in understanding and detailing the selection process from start to finish.

Flowcharts for e-voting create voter data such as entering codes, ID cards of prospective voters, names, ages, addresses, genders, usernames, and passwords. Flowcharts provide a visual guide to the flow of the process.

The implementation of the web-based e-voting system uses native PHP and HTML with a MySQL database managed through phpMyAdmin to store data, as well as the implementation of security features such as data encryption.

Testing the e-voting website using user acceptance test. The variables used to test user acceptance were Performance *Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions and Behavioral Intention* [12].

III. RESULTS AND DISCUSSION

A. PLANNING

A flowchart is a representation of the sequence or process of a system or algorithm that will be implemented into a project, whether web, apps, or others. Flowchart is to visualize the logical sequence of a process or algorithm so that it is easier to understand and implement. Figure 3.1 shows user flowchart diagram in using e-voting system.

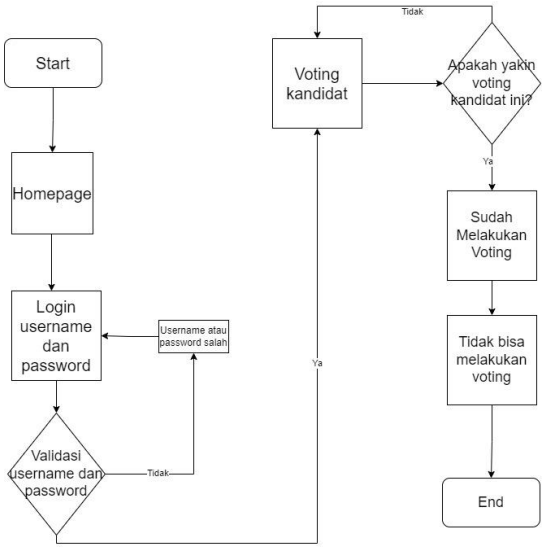

Figure 3. 1 User Flowchart Diagram

In the flowchart figure 3.1, it is explained that if users want to vote, they must first log in with the username and password that has been provided by the admin/committee, each user.

In Figure 3.2 below, it is explained that the flow to access the admin dashboard requires login first. If you have logged in, the admin can add, edit, and delete the necessary data if there is an error in entering data which will be used for candidates or voters who *will vote* [13].

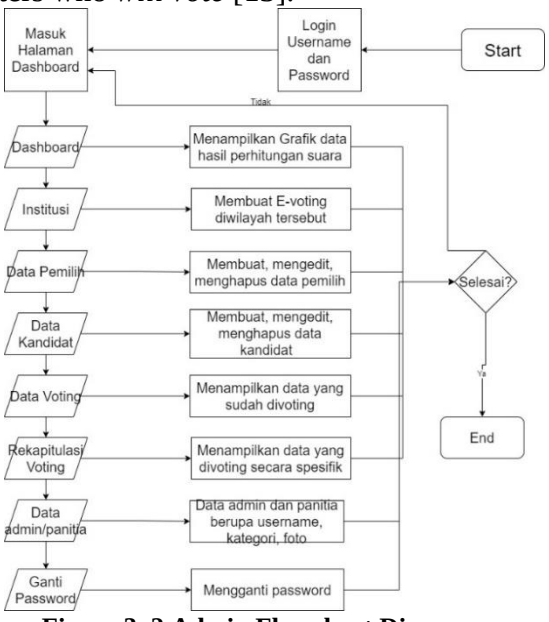

Figure 3. 2 Admin Flowchart Diagram

In the flowchart figure 3.3 below, it is explained that the committee flowchart is similar to the admin in figure 3.2 but the committee cannot edit, add or delete data that has been created such as viewing institution data, voter data, candidate data, voting data, voting recapitulation, and user data. The committee can only see the data that has been made by the admin, if any committee sees an error, the committee is obliged to convey it to the admin so that it can be corrected immediately.

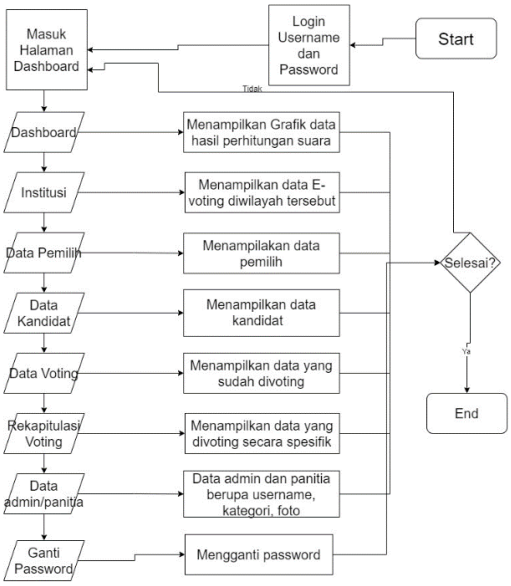

Figure 3. 3 Flowchart Diagram Committee

B. Implementation

User Page

Figure 3.4 The index page is the initial page that when opening the institution's e-voting website, on the index page there are *buttons* such as home, candidates, voting, voter login, admin/committee login. The home button is reused to the original page or back to the index page. As shown in the picture below.

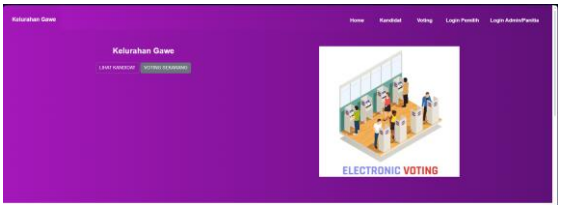

Figure 3. 4 Index page

In Figure 3.5 this is used to see the list of prospective candidates to be chosen and what number is there and can see the details of the prospective candidates.

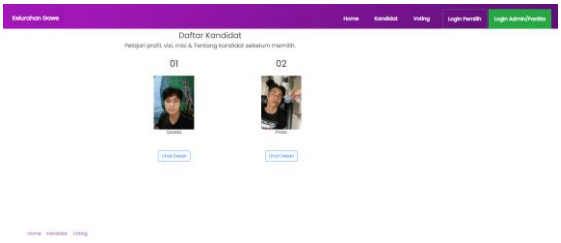

Figure 3. 5 Candidate pages

In figure 3.6 below, the view details button is used to see the candidate's identity in detail, starting from his name to his work experience.

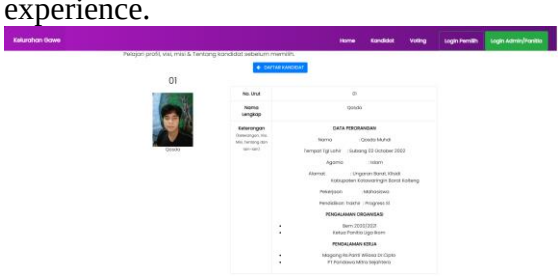

Figure 3. 6 Profile details of the candidate

In Figure 3.7 below, the voting page is used to vote for candidates, which requires a login first to be able to vote.

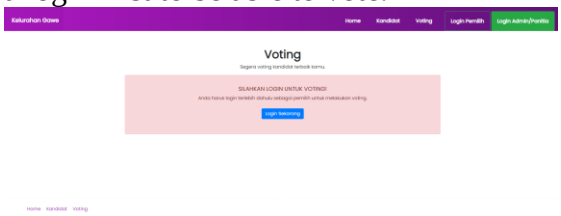

Figure 3. 7 Voting page

In figure 3.8 below, it is explained that to vote, it is required to log in first, if you do not log in, there will be a warning as shown in the figure in 3.7.

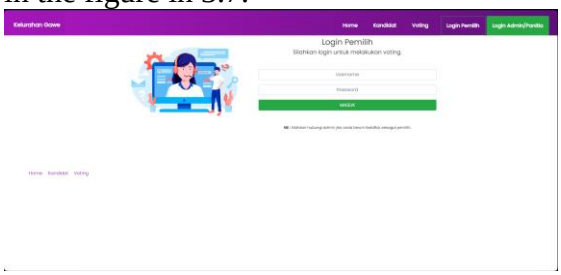

Figure 3. 8 User login page

Figure 3.9 below explains the display if the voter has voted for the voter candidate according to his choice. users cannot revote.

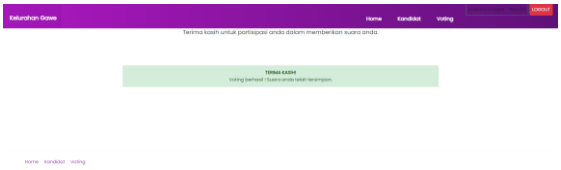

Figure 3. 9 Users have already voted

Admin and Committee Page

In figure 3.10 below, it is explained that anyone can enter the admin/committee login page but cannot log in because the username and password used are secret, this will distinguish the functions of the admin and the committee when logging in.

Figure 3. 10 Admin/committee login page

In figure 3.11 it is explained that there are several features used by the admin, starting from the election graph, on the right there is a dashboard, institution, voter data, candidate data, voting data, voting recapitulation, user data, password change and logout.

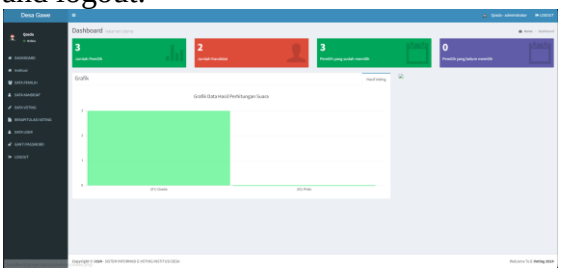

Figure 3. 11 Admin Dashboard Page

Figure 3.12 below explains that this is the institution page where we can add a new institution, then there is an option where the orange one is used for editing and the red one there is a trash can that is used for deletion or called CRUD [16].

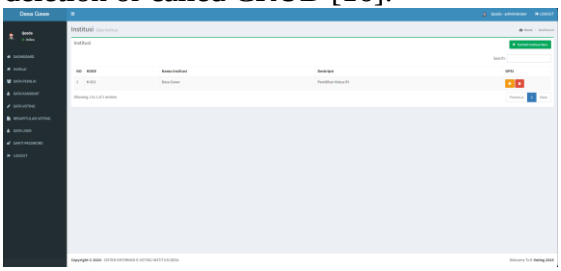

Figure 3. 12 Institution pages

Figure 3.13 below explains that there are several things that need to be filled in to add

a new institution such as a code, institution name, and description.

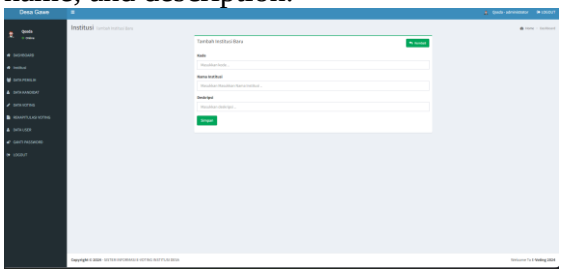

Figure 3. 13 Add a new institution

Figure 3.14 describes the data page selector used to create, edit or even delete.

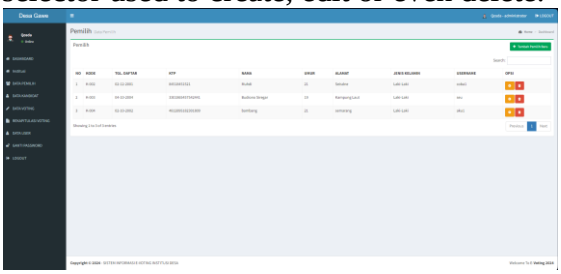

Figure 3. 14 Voter data pages

In figure 3.15 below, it is explained to view candidate data where you have functions such as adding candidates, editing candidates, and deleting candidates.

Figure 3. 15 Candidate data

In figure 3.16 below, it is used to see who are the voters who have chosen the candidate and what number of candidates were chosen.

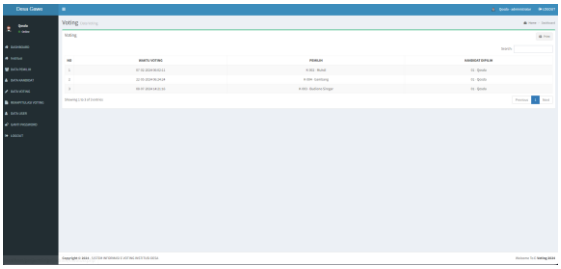

Figure 3. 16 Voting data

In Figure 3.17 below, it is useful to see details about voters who voted for candidates such as how many women voted 01 and so on.

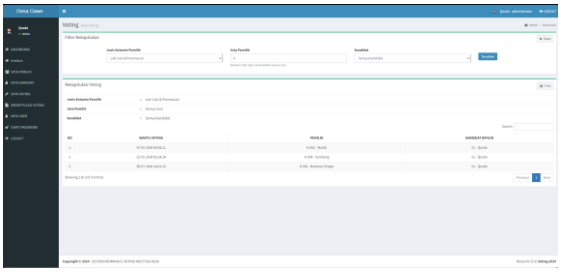

Figure 3. 17 Voting recapitulation

In Figure 3.18 below, it is used to create a username and password for admins and committees that have features such as adding new users, editing users, and deleting users.

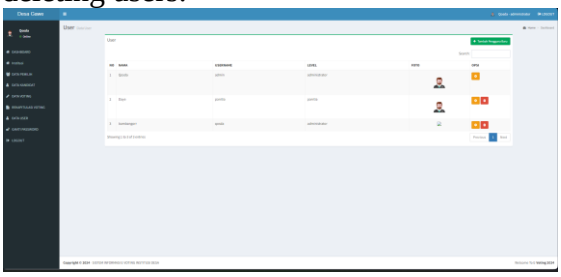

Figure 3. 18 Admin and committee data

C. Testing

The validity test was carried out to show the accuracy of the measurement sound. The validation test results of several variables, including EE, PE, FC, SI, and BI Table 3.1 show that the validated data is valid because the value is above 0.5 [14].

Table 3.1 Validation Test

Rotated Component Matrix[a]			
	Component		
	EE-BI	PE-SI	FC
EE1	.788	.124	.382
EE2	.696	.232	.447
EE3	.697	.196	.433
PE1	.416	.633	.366
PE2	.290	.658	.385
PE3	.243	.786	.057
FC1	.389	.238	.786
FC2	.094	.168	.803
FC3	.193	.304	.720
SI1	.348	.692	.374
SI2	.090	.761	.477
SI3	.372	.570	.354
BI1	.783	.361	.114
BI2	.759	.507	.062
BI3	.753	.382	.190

Table 3.2 describes a summary of the validity test results that have been carried out. The conclusion reached was that there

was a significant relationship with *the alpha of the Cronbach Variable*.

Table 3.2 Reliability Test Results

Variabel	*Cronbach's Alpha*	*Internal Consistency*
EE	0,896	Good
PE	0,866	Good
FC	0,831	Good
SI	0,894	Good
BI	0,924	Excellent

The data correlation test obtained correlation data between the variables Effort Expectancy (EE), Performance Expectancy (PE), Facilitating Conditions (FC), Social Influence (SI), and Behavioral Intention (BI). In the results of the statistical correlation test, data that has been tested and gives significant results with a value of less than 0.01 [15]. The result of correlation test is shown in Table 3.3.

Table 3.3 Correlation Test

Correlations

		SEE	SPE	SFC	SSI	SBI
SEE	PC	1	.617**	.605**	.597**	.703**
	Sig.		.000	.000	.000	.000
	N	67	67	67	67	67
SPE	PC	.617**	1	.557**	.665**	.615**
	Sig.	.000		.000	.000	.000
	N	67	67	67	67	67
SFC	PC	.605**	.557**	1	.624**	.508**
	Sig.	.000	.000		.000	.000
	N	67	67	67	67	67
SSI	PC	.597**	.665**	.624**	1	.636**
	Sig.	.000	.000	.000		.000
	N	67	67	67	67	67
SBI	PC	.703**	.615**	.508**	.636**	1
	Sig.	.000	.000	.000	.000	
	N	67	67	67	67	67

**. Correlation is significant at the 0.01 level (2-tailed).

The EE variable is correlated with the BI variable which can be proven by having a significant value of 0.000 < 0.01 marked with an asterisk (**).

The SI variable is correlated with the BI variable which can be proven by having a significant value of 0.000 < 0.01 which is marked with an asterisk (**).

The PE variable is correlated with the BI variable which can be proven by having a significant value of 0.000 < 0.01 which is marked with an asterisk (**).

The FC variable is correlated with the BI variable which can be proven by having a significant value of 0.000 < 0.01 which is marked with an asterisk (**)

IV. CONCLUSION

Web-based e-voting using native PHP and HTML with a MySQL database managed through phpMyAdmin is an efficient, affordable, and secure solution for the voting process. The system offers ease of use through a simple interface, low development costs thanks to open-source technology, and has high flexibility in feature customization. Security is maintained through input validation mechanisms and data encryption, while MySQL's good performance and scalability allow it to handle large numbers of voters.

Based on correlation analysis on data using SPSS with a total of 67 respondents, it shows that users' perception of the level of effort required in using the website (Perception of Effort) is very positively related to Behavioral Intention (intention to use) the website, with a significant correlation value of 0.703 at the level of 0.01. In addition, factors such as Social Influence (PE), Performance Conditions (FC), and Supporting Conditions (SI) also showed a very significant correlation with Behavioral Intention, with correlation values of 0.615, 0.508, and 0.636, respectively, also significant at the level of 0.01. This indicates that easy navigation, fast access to information, simple interface, and ease of access and protection of personal data are crucial factors that contribute to user satisfaction in using the E-Voting website.

REFERENCE

[1] A. Z. I. A. P. Junior Hendri Wijaya, "Implementation of the E-Voting System to Improve the Quality of Democracy in Indonesia," vol. 1, no. 1, 2019.

[2] D. E. Rafly Anditya Mukti, Eko Didik Widianto, "Web-based electronic journal information system at Diponogoro University," vol. 15, no. 1, 2021.

[3] A. Sulthoni, "Web-based E-Commerce Information System for Marketing Kluwan Village Agricultural Products", https://media.neliti.com/media/publications/190181-ID-none.pdf

[4] M. F. Tumini, "Application of the scrum method to E-Learning STMIK Cikarang using php and mysql," vol. 6, no. 1, Mar. 2021.

[5] A. H. D. A. A. Indra Muhamad Apriansyah, "Sales information system at counterfanz cell tasikmalaya city based on the web," vol. 6, no. 2, 2019.

[6] Halim Maulana, "Analysis and design of mysql database replica system using vmware on open source operating system," vol. 1, no. 1, 2016.

[7] Rina Noviana, "Creation of a sales application based on the monja store website using php and mysql," *https://journal.admi.or.id/index.php/JTS/article/view/128* , Jun. 2022.

[8] Y. Trimarsiah and M. Arafat, "Analysis and Design of Website as a Means of Information at the Institute of Entrepreneurial Language and Computer AKMI Baturaja," *J. Ilm. MATRIK*, vol. 19, pp. 1–10, 2017.

[9] A. K. Rahmatika, F. Pradana, and F. A. Bachtiar, "Development of HTML and CSS Learning System with Web-based Gamification Concept", *J-PTIIK*, vol. 4, no. 8, pp. 2655–2663, Aug 2020.

[10] Ji. Wiyanto, A. D. Widiantoro, and A. C. Nugroho, "Design and Build Online Store Website at Toko Mas Djanoko," *J. Bus. Technol.*, vol. 2, no. 3, pp. 128–132, 2022, doi: 10.24167/jbt.v2i3.5132.

[11] A. P. G. J. G. B. Z. Dana Van Aken, "Automatic Database Management System Tuning Through Large-scale Machine Learning," May 2017.

[12] Bernardinus Harnadi, "Understanding Behavioral Intention to Use Social Media Technology: Two Comparing Model, TAM and UTAUT," 2024.

10.24252/iqtisaduna.v1i1.15807.

[13] S. T. . . R. O. Dr. Aneu Yulianeu, "Web-based geographic information system for public transportation routes in the city of Tasikmalaya," vol. 10, no. 2, 2022.

[14] Febrinawati Yusup, "Test for Validity and Reliability of Quantitative Research Instruments," vol. 7, no. 1, Jun. 2018.

[15] R. N. H. W. S. Fani Mayang Sari, "Pearson Correlation Analysis of Population with Number of Motor Vehicles in Jambi Province," vol. 2, no. 1, 2023.

[16] E. W. Rayhan Prasetyo, "Creation of an Academic CRUD Website at SMP 3 BAE KUDUS," vol. 2, no. 2, 2022

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