Decision Support System for Recruitment of General Election Committee using The Simple Additive Weighting

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Abstract

In the voting process in general elections, committee errors often occur in carrying it out. So the results of the number of votes took a long time to obtain due to the dynamics that existed during the process and the occurrence of counting errors. The purpose of this research is to build a system by applying the SAW method in determining the voting committee selection committee. The type of research used is Research and Development. The system development model uses a prototype model with requirements gathering and analysis stages, quick design, building prototypes, user evaluation, implementing products, and maintaining them, and requirements gathering and analysis. Then the data is analyzed using the Simple Additive Weighting (SAW) method by providing certain types of criteria with weights so that the final value obtained through ranking becomes the final decision. The application was built using the PHP language and a MySQL database. The results of members who pass are then reported to the sub-district voting committee as a research object. The data was calculated from 10 people from each electoral district where they served. So from those 10 people, 7 people will be selected.

Keywords: criteria; decision support system; saw; selection of general election committee members

INTRODUCTION

General elections are a routine program to implement democracy every five years. Indonesia is the country with the largest population that is implementing a democratic party. The 2024 election is an election system that will be held simultaneously and will make history in holding elections in Indonesia (Kristiana, 2018). To be precise, in February 2024, general elections for president, vice president, legislature, and regional heads will be held. Holding elections simultaneously certainly has an impact on all aspects, including making it easier for the government to hold elections, especially in terms of work efficiency and budget efficiency. However, in the implementation process, there are still many obstacles in the direct general election process (Supiandi et al., 2022). Elections are an event to compete for political positions in government based on the formal selection of citizens who meet the requirements. Elections are the most important mechanism for the sustainability of parliamentary democracy so that the public can determine their representatives in representative institutions.

Elections at the sub-district level are carried out by the district election committee, especially the district election committee, whose members are the village-level committee, especially the general election committee (Polling Organizing Group) (Rismanto & Akbar, 2021). The general election committee is the front guard in making the election a success, because according to Law Number 15 of 2011 Article 47 paragraph g, it is regulated that the main task of the general election committee is to record vote acquisition as well as carry out voting and vote counting. Based on the results of interviews with the general logistics

department, the recruitment process for members of the general election committee carried out by the voting committee in Pulo Bandring Village, Pulo Bandring District, Asahan Regency has not yet implemented an analytical method to identify members of the general election committee who meet the criteria for election organizers according to General Election Department regulations (Arief et al., 2021).

Currently, the selection of members of the general election committee is carried out by the general election committee in coordination with regional leaders by directly selecting members of the general election committee to fulfill the membership status of the general election committee at each polling station without paying attention to the criteria for support to help. holding elections (Sudiarjo & Ruuhwan, 2020). This is a problem that greatly affects the implementation of elections, especially members of the general election committee who do not have the necessary capacity, which results in the process of counting votes at each polling station taking a long time. To realize the implementation of effective and efficient elections (Anju et al., 2018), members of the election management team (General Election Committee) must of course have competence by the requirements stipulated in the implementation of election activities (Faozan, 2023). Therefore, a decision support system for recruiting members of the general election committee is needed, which aims to assist the general election committee in recruiting members of the general election committee (Wahyuni & Wisjhnuadji, 2019) so that members of the general election committee are obtained to meet the needs of organizing the election. The system starts from the process of registering candidate members of the general election committee using an online system through a data verification and validation process to administrative selection and then-candidate (Samsir et al., 2020) members of the general election committee who pass the administration will be selected using analytical techniques including the use of Simple Additive Weighting (Simanullang & Simorangkir, 2021). The way the ranking process is carried out is based on all the criteria fulfilled by prospective members of the general election committee, including the use of criteria based on eligibility criteria (Devia, 2021), especially age, health, management, and education. Systematic decision support system. From these problems, a collection of evidence determines the decision criteria for selecting alternatives as decision solutions (Klara et al., 2021).

This system is used to support decision making, both semi-structured and unstructured when it is not clear how a decision should be taken (Felicia & Badrul, 2022). This research aims to build a decision-making system that is able to determine recruitment decisions for the committee serving in Pulo Bandring District (Siagian et al., 2022). Research that was carried out by (Apriadi & Alfiarini, 2023) examined the election of voting committees at the sub-district level which required 3 people in each sub-district, but what the author carried out was the selection of committees at each polling place which required a total of 7 committee members to be selected. From this condition, the system that the author builds has more attributes and alternatives (Apriadi & Alfiarini, 2023) also analyzed the data using the AHP method, while the author used the SAW method (Apriadi & Alfiarini, 2023). The method used by the author is better than the method used previously (Nardiono, 2017), this shows that the use of a simple additive weighting method can provide convenience, speed and cost effectiveness in recruiting members of the general election committee (Amalia & Akbar, 2022).

Previous research has used additive weighting methods in decision-making systems with many attributes. This method has been applied in various decision support systems, such as selecting the best teacher (Norman et al., 2020), identifying disaster locations, and identifying scholarship recipients (Elba & Sukisno, 2020). These studies are different from the research we are building because we use a type of development research (Research & Development) with prototype model type model development. With this method, developers and customers can interact with each other during the system creation process. The simple additive weighting method can be used to give weights to the attributes of each criterion (Juhardi et al., 2022). By

using the simple additive weighting method, it can be calculated the total weight of the performance assessment for each attribute owned by each alternative member (Suprapto et al., 2024). This research aims to build a decision support system-based application that is able to make decisions in the selection of prospective voting committee members at the Pulo Bandring sub-district general election committee. And this research is important to do so that in the future the committee can determine prospective members of the voting committee at the village level appropriately so that the general election is carried out properly. The simple additive weighting method assigns an assessment score to each member based on the attributes of the voting committee.

METHODE

This type of research is development using a prototype model presented in Figure 1. With this method, developers and customers can interact with each other during the system creation process. Stage 1 is Requirement Gathering and Analysis which is the initial stage of creating a prototype model. At this stage, system requirements are defined in detail. In the process, the client and we will meet to discuss the details of the system that can carry out the selection of voting committee members. Stage 2 is Quick Design to create a program page display design that provides a brief overview of the voting committee member selection system. The third stage is the Build Prototype, namely the actual construction of a prototype which will be used as a reference for the programming team in creating program code or decision support system applications for determining the selection of voting committee members. Stage 4 is User Evaluation. At this stage the system that has been created in prototype form is presented to the client or user for evaluation. Next, the client will provide comments and suggestions on what has been created. Evaluation model with program certification, which provides information about the value or use of the program, whether it is successful in meeting program needs. Stage 5 is Product Implementation and Maintenance where the product will immediately be created by the programmer based on the final prototype, then the system will be tested using a black box testing model and handed over to the client. Next is the maintenance stage so that the system runs smoothly without problems. In this process, the client is the voting committee at the Pulo Bandring District level, Asahan Regency.
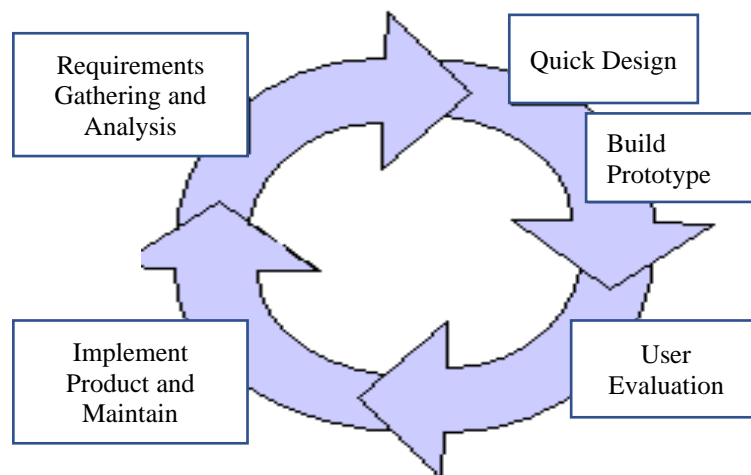

Figure 1. Model prototype

The data collection technique is carried out through stages starting from the literature study. A literature study is carried out on references related to decision-making systems. A literature study was also carried out to collect data regarding candidates' eligibility as members of the voting committee. Then interviews were conducted with people related to the decision-

making system for data to support system development. Data obtained from interviews consist of the behavior, performance, and responsibilities of election committee members regarding their work in the voting process. This data collection was taken from the committee office at the Pulo Bandring sub-district level, Asahan Regency. The data that will be taken is the administration and health certificates of the prospective committee members who will be selected.

RESULTS AND DISCUSSION
Results

The decision-making process is determined by data analysis using the best criteria determined by the selection committee for voting members. Then the weighting and assessment of the criteria is carried out, then the weighting is added up, then the total of all the criteria for each selected candidate is obtained so that 7 people are selected from the total number of people who took part in the selection. Data analysis can be explained by the following steps with to identify the criteria that cause problems and their importance. Criteria are parameters set to determine the selection activities of general election committee members. There are 4 (four) criteria used. Table 1 is a complete table of criteria applied and their weight value. Where the criteria include age, administrative, education, and health.

Table 1. Criteria data

Code	Criteria Name	Weight	Description
K1	Age	0,3	Cost
K2	Administration	0,3	Benefit
K3	Education	0,2	Benefit
K4	Health	0,2	Benefit

Table 2. Alternative data

Code	Alternative Name
A01	Endang S
A02	Fajar Ashari
A03	Fikri H
A04	Fintia Sari
A05	Fitria Agustina
A06	Harini Lestari
A07	Hartoyo F
A08	Imam S
A09	Indah Februari
A10	Indah Pratiwi

Determining alternatives for assessment. An alternative is the determination of the village where the prospective general election committee member will serve. In table 2, the names of the 10 selected alternatives are a list of names of prospective committee members who registered. Determine the initial data because some variables that become input parameters must be met before performing calculations. Table 3 is general election committee candidate member data of the selection of candidates for general election committee members in the district election committee Pulo Bandring District, Asahan Regency.

Table 3. General election committee candidate member data

Member Candidate	Age	Administration	Education	Health
Endang S	40-55	Complete	Bachelor	Less healthy
Fajar Ashari	17-30	Complete	High School	Healthy
Fikri H	17-30	Complete	Senior High	Healthy
Fintia Sari	40-55	Complete	Bachelor	Healthy
Fitria Agustina	31-39	Complete	Bachelor	Healthy
Harini Lestari	40-55	Complete	High School	Less Healthy
Hartoyo F	40-55	Less Complete	High School	Less Healthy
Imam S	17-30	Complete	High School	Unhealthy
Indah Februari	17-30	Less Complete	High School	Unhealthy
Indah Pratiwi	31-39	Complete	Bachelor	Healthy

Table 3 displays data from 10 candidates, determining rankings based on the results of the analysis of the selection calculation of prospective general election committee members of Pulo Bandring Subdistrict, Asahan Regency. Table 4 displays the results of data analysis from 10 prospective candidates so that 7 people passed based on predetermined criteria. The results are alternatives, value, ranking and position. Rank 1 can be chairman of the committee and those below him can be members.

Table 4. Results with simple additive weighting method

No	Alternative	Value	Rank	Description
1	Fintia Sari	1	1	Chair
2	Fitria Agustina	0.9	2	Member
3	Indah Pratiwi	0.9	3	Member
4	Endang	0.9	4	Member
5	Harini Lestari	0.75	5	Member
6	Fajar Ashari	0.717	6	Member
7	Fikri	0.717	7	Member

After the system is analyzed and designed in detail, the system will enter the implementation stage. Deployment is the stage of setting up the system so that it is ready to operate. The implementation is intended to validate the design module so that users can provide input to system developers. Design with Unifed modeling Language (UML) is done with a use case diagram where there are 2 actors, namely Admin and Committee Chair. Figure 2 is a scenario of each actor.

Interface implementation is done with each page of the program created and its coding in the form of a program file. The main page of the system has 6 (six) menus that will display other pages according to their respective functions. Figure 3 displays the main page of the system for determining majors based on the recruitment criteria for general election committee members at the district election committee Pulo Bandring Regency.
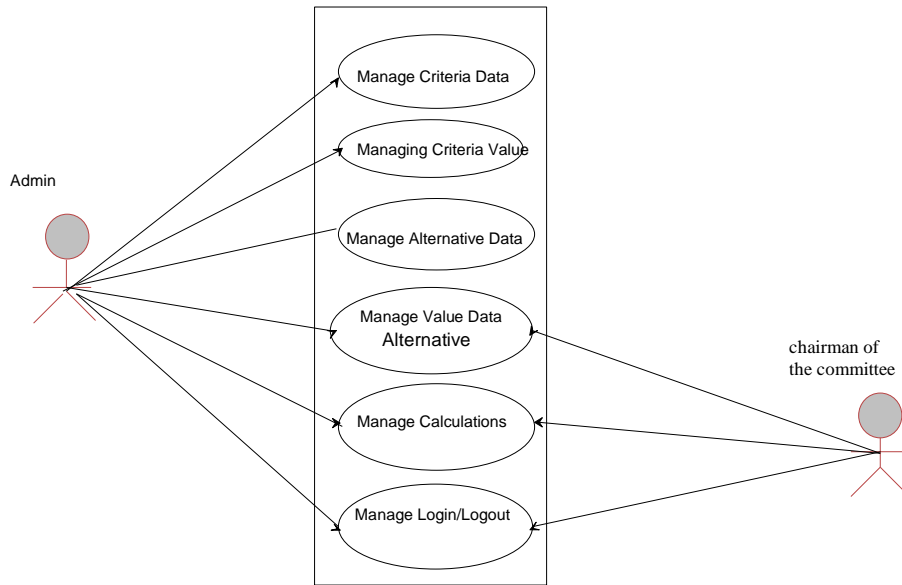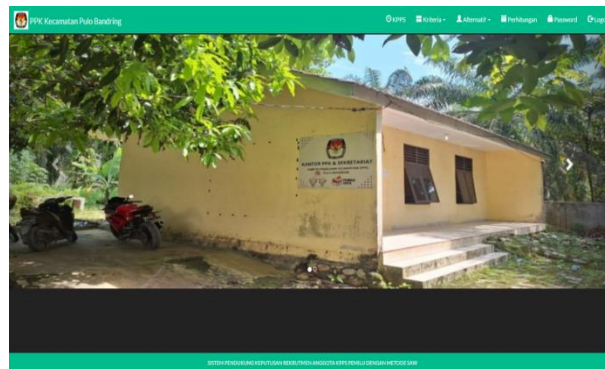
Figure 2. *Use case* diagram

Figure 3. System main page display

Figure 4. Calculation page display

The criteria page is a page that displays the criteria data entered by employees into the system. The data obtained on the criteria page is in the form of codes, criteria names, and weights. The calculation page displays the results of the rating calculation after being processed by the Simple Additive Weighting method. The calculation results to get the ranking can be seen in Figure 4. The calculation results print page displays the results of calculations using the simple additive weighting method. Figure 6 is a printed page that shows the results of the calculation of the recruitment of general election committee members in the district election

committee Pulo Bandring Regency.

Testing is the most important thing that aims to find errors or deficiencies in the software to be tested. Testing aims to determine whether the software created meets the criteria of the software design objectives. Language errors (language errors) are errors caused by writing in syntax. Process time error (runtime error), is an error that occurs when the program is executed. This error will cause the program process to stop before it is time to stop. Logical errors (logical errors), are errors caused by the logic of the program being created. This error is difficult to find because there is no notification of where the error is.

At the application testing stage, the Black Box method is used, which is a method used to find errors and demonstrate the functionality of the application when it is operated, whether the input is received correctly and the output produced is as expected. The following are the results of testing for the selection of members of the general election committee in Pulo Bandring District, Asahan Regency, which was designed and built using Black Box Testing:

The system should be evaluated by users such as the prototype model stage. Evaluate the login page, you need to log in using validation of the username and password data and access rights entered. Table 5 is an activity for evaluating the login page. If you click the login button, the login page will appear, then enter your username and password, then the application will be logged in successfully.

Table 5. Login page test results

Activities	Testing Process	Results
Click Button	Login button.	Succeed
Input Data	Username.	Succeed
	Passwords.	Succeed

Criteria page testing is a test carried out to find out whether the buttons on the criteria page function properly. Table 6 is an activity for evaluating the criteria page. If you click the add button, the criteria will be added to the criteria page, if you click the print button the criteria printing process will appear, if you click the edit button the criteria can be changed, if you click delete then the criteria will be deleted, if you click save then the criteria will be saved in the database.

Table 6. Criteria page testing

Activities	Testing Process	Results
Click Button	Add	Succeed
	Print	Succeed
	Edit	Succeed
	Delete	Succeed
	Save	Succeed
	Return	Succeed
Input Data	Code	Succeed
	Criteria Name	Succeed
	Weight	Succeed

Calculation page testing is a test carried out to find out whether the buttons on the calculation page function properly. Table 7 is an activity for evaluating the calculation page. If you click the select alternative button, the assessment page will select the selected alternative. If you click the calculation button, the calculation results will be displayed. If you click the print button, the calculation results will be printed. Evaluation model with program certification, which provides information about the value or use of the program, whether it is

successful in meeting program needs. Se After carrying out the evaluation, the conclusion is drawn that the application is suitable for use to determine members of the voting committee.

Table 7. Calculation page test

Activities	Testing Process	Results
Click Button	Alternative Select.	Succeed
	Calculation.	Succeed
	Print.	Succeed

Discussion

This research builds applications by applying the SAW method used to select voting committee members faster because the analysis process includes the summation of normalized weights. Testing needs to be done to be able to evaluate the system whether it is feasible to use in determining the voting committee members who will be elected. The purpose of using the voting committee member determination system at the Pulo Bandring Kecamtaan General Election Committee is to facilitate the leadership or committee chairman in determining whether it is feasible to become a member of the voting committee committee. The process of research performance procedures has been carried out properly in this study, by obtaining data and criteria values from each prospective committee member. The computer application-based system that has been created uses a decision support system that can select prospective voting committee members. Collecting data from files submitted by prospective voting committee members and then inputting the data into the application system that has been created. Testing is carried out on each button and display that is built then the test results are evaluated to see if they are in accordance with the expected results. With the aim that the application run can determine candidates who deserve to be voting members using the SAW method applied in the application.

The SAW method can produce the best decision because the SAW method determines a more precise and accurate calculation compared to other methods. With system testing, black box testing has been carried out where the test runs smoothly because the tester does not have to know the programming language and the tester does not need to check the code. This research will produce an application that can select the voting committee according to the criteria and also weight the quality level of each criterion. Similar research already exists, such as that conducted by (Alfilia, 2024) which discusses the pattern of selecting a small committee and voting committee in the 2024 election. Alfilia still makes a pattern of how the technique of selecting a small committee and voting committee can be done quickly From here, it means that the research we are building is no longer a pattern but a system in the form of a computer-based application using a decision support system by applying the SAW method to be able to determine the name of prospective voting committee members who have registered with the voting committee.

The application is completed, then system testing is carried out using the Black Box method which is a method used to find errors and demonstrate the functionality of the application when operated, whether the input is received correctly and the resulting output is in accordance with the expected black box testing is carried out by observing the results of application input and output. This test also has advantages, for example, testers do not have to understand programming languages to build software. In addition, testers also do not have to check the entire code. However, this test also has disadvantages. Because testers do not need to know and examine the code, there is a chance that there are undetected errors in the code section. The system evaluation has also been carried out so that in the design process there are also errors but they have been corrected before the application is implemented. Similar research has been done by (Apriadi & Alfiarini, 2023) by determining the selection of voting committees

and has been successful but there are differences because we use the SAW method with weighting summation while the existing ones use the AHP method with a hierarchical system. Also what made was still in a few attributes while we made with many attributes and used software development with a prototype model.

CONCLUSIONS

The process of recruiting voting committee members can conclude several candidates who deserve to be actual voting committee members. Applying the SAW (Simple Additive Weighting) method in a Decision Support System starts from determining criteria, giving weight values, performing normalization processes, ranking and selecting the highest final value. In making a new system, it can be seen that to compile a good decision support system, the steps that need to be taken are to study the existing system, then design a system that can solve problems and implement the developed system.

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