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Implementation of Simple Additive Weights To Determine Priorities For The Resolution of Information Technology Problems

Abstract

The Regional Secretariat of West Java Province (Setda Jabar) is a government agency within the local government environment in West Java Province. Along with the development of information technology, using technology such as computers and the internet in a government agency is very important to support work. There are times when devices and systems do not work correctly, such as internet disturbances and computer software and hardware problems handled by technicians. Technicians not only manage information technology infrastructure at the West Java Regional Secretariat but also manage information technology infrastructure in three (3) official houses. Technicians are also faced with an organizational structure with many bureaus and sections. There is yet to be a definite procedure in the complaint reporting process. There is no helpdesk system as a reporting medium. With the many bureaus, the number of information technology facilities served so that technicians find it difficult to determine the priority of the work that must be served first. Given these problems, a Decision Support System approach uses the Simple Additive Weight method by using determining criteria and weights. The criteria used include Work Units, Positions, Types of Complaints, and Official Notes. The system development method used is Object Oriented Analysis Design (OOAD). This system is expected to assist technicians in determining services that match their needs and situations.

Keywords: *Troubleshooting, Priority, Simple Additive Weight, OOAD, Helpdesk*

INRTODUCTION

The Regional Secretariat of West Java Province (Secretariat of West Java) is a government agency within the scope of local government in West Java Province. The Regional Secretariat has the main task of assisting the governor in formulating policies and coordinating regional offices, regional technical agencies, civil service police units, and other institutions within the local government.

Along with the development of information technology, the use of technology such as computers and the internet in a government agency such as the West Java Regional Secretariat is significant to support work; besides that, information technology aims to improve government service efficiency. Information technology includes desktop computers to support employees, computer network facilities, and infrastructure such as data traffic media and servers to support data storage needs.

The role of information technology in the West Java Regional Secretariat is so important; there are times when devices and systems do not work correctly, for example, internet disturbances and computer software or hardware disturbances. Therefore the West Java Regional Secretariat has a team of technicians named Sanditel who is under the General Bureau, work what the technician team is doing besides problems related to internet disruption, and software and hardware disruptions faced by technicians, there are still many tasks for technicians within the scope of the West Java Regional Secretariat such as installing new networks both wired and wireless, preparing for events such as zoom meetings and other online events.

In addition to the many information technology problems, technicians not only manage information technology infrastructure within the scope of the West Java Regional Secretariat but also have to manage information technology infrastructure in three (3) Official Houses, including the West Java Governor's Office

(Gedung Pakuan), Deputy Governor's Office for Java West, and the Office of the Regional Secretary. Technicians also face an organizational structure with many Bureaus and Sections: regional Secretaries, 3 Administrative Assistants, 9 Bureaus, and 28 Sections.

With the large number of users handled by the technician team, the complaints or complaints received have also increased, currently complaints or complaints are usually received via telephone or WhatsApp messages, so problem-solving is not based on queues or priority scales but more often based on the friendship between the user and the technician, besides that, some report their complaints directly to the technician's room. However, in this way, they are considered less efficient and effective in handling complaints. It is felt that there needs to be a systematic procedure for complaining about disturbances related to information technology. (Adam et al., 2020) Therefore, sometimes users wait a long time for problem-solving when asking technicians by telephone and WhatsApp. Furthermore, sometimes, users need clarification about whom they have to report to when the technician is busy or not at the place; reports are only limited to stored messages on WhatsApp, and reports by telephone cannot document. (Bahrudin et al., 2019)

From the previously explained obstacles, many bureaus or departments and information technology facilities serve with the division of positions. Hence, the technician team sometimes needs help determining which priority jobs should serve first. (Diansyah Putri & Syarvina, 2022) Given these problems, a Decision Support System approach use to assist technicians in determining service priorities for complaints experienced by users. (Alfian et al., 2020)

The Simple Additive Weight (SAW) method, often also known as the weighted sum method. The Simple Additive Weighting (SAW) method is often also known as the weighted sum method. The basic concept of the SAW method is to find the weighted sum of the performance ratings for each alternative on all attributes. (Ridhawati et al., 2018) The SAW method requires normalizing the decision matrix (X) to a scale that can be compared with all existing alternative ratings.

The simple additive weighting method recognizes the existence of two attribute criteria, namely the benefit and cost criteria. (Rachman, 2019) The fundamental difference between these two criteria is in selecting criteria when deciding. The simple additive weighting method has the advantage of being able to make a more precise assessment because it is based on predetermined criteria values and preference weights and can choose the best alternative from several existing alternatives; besides that because there is an improvement process after determining the weight value for each attribute.

From some understanding of the simple additive weighting method above, the simple additive weighting method is a weighted sum method that aims to find a decision matrix obtained from determining criteria and weights.

The steps to solving a problem using the Simple Additive Weighting method are as follows:

1. Determine the criteria used as a reference in decision-making, namely Ci.
2. Give a weight value for each criterion as W.
3. Provide a suitability rating value for each alternative on each criterion.
4. Make a decision matrix based on criteria (Ci), then normalize the matrix based on

the equation adjusted for the type of attribute (benefit attribute or cost attribute) so that a normalized matrix R is obtained.

$$R_{ij} = \begin{cases} \dfrac{x_{ij}}{max_i\, x_{ij}} \\ \dfrac{min_i\, x_{ij}}{x_{ij}} \end{cases}$$

Description of Each Criterion:

R_{ij} : normalized performance rating value.

X_{ij} : attribute value owned from

Max X_{ij} : the most significant value of each criterion.

Min X_{ij} : the smallest value of each criterion.

Benefit : if the most significant value is the best

Cost : if the smallest value is the best

5. The final results are obtained from the ranking process, namely the addition and multiplication of the normalized matrix R with the weight vector so that the most significant value is selected as the best alternative (Ai) solution.

$$Vi = \sum_{j=1}^{n} WjRij$$

Information:

V_i: ranking for each alternative

W_j: weight value of each criterion

R_{ij}: normalized performance rating value

METHOD

Using OOAD (Object-Oriented Analysis and Design) is a research methodology that offers

programmers guidance and instructions in developing applications. Object-oriented analysis and design (OOAD) facilitate the manipulation of objects and subsystems that are integral to the application.

Object-Oriented Analysis and Design (OOAD) enables the establishment of uniformity in objects, thereby promoting ease of understanding in design and mitigating potential hazards during project execution. Object decomposition allows analysts to partition complex problems into discrete and more easily manageable components.

The methodology for developing object-oriented systems has three primary features: encapsulation, inheritance, and polymorphism.

The object-oriented programming paradigm (OOP) comprises four essential principles: encapsulation, abstraction, inheritance, and polymorphism. Comprehending the overarching structure of these principles will facilitate the acquisition of fundamental programming skills.

The object-oriented methodology offers several benefits, such as enhanced productivity through the reusability of classes and objects across various problem domains and expedited development owing to the construction of robust systems.

The utilization of object-oriented analysis and design (OOAD) and the object-oriented paradigm in software development yields notable advantages, augmenting the effectiveness and efficiency of system development.

RESULT AND DISCUSSION

Business process analysis is carried out to analyze and conclude what processes are carried out to provide a clear picture and the correct assumptions with the ongoing flow of a business process. The following are the business processes that run on information technology-compliant services in the Regional Secretariat of West Java as follows:

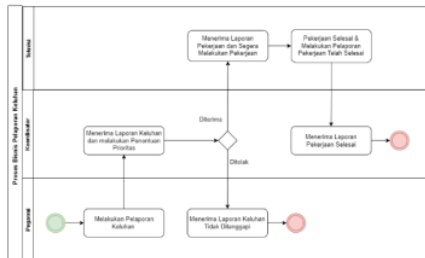1. Ongoing Grievance Reporting Business Process

Figure 1 Complaint service business processes in the Regional Secretariat of West Java

In the current business process, three (3) actors are involved, including employees reporting complaints, coordinators receiving reports and coordinating, and technicians handling complaints. First, the employee will report complaints, and the coordinator will receive the report and determine priorities and subsequent confirmation. The technician will carry out the complaint resolution process and report to the coordinator if the complaint resolution process has been completed.

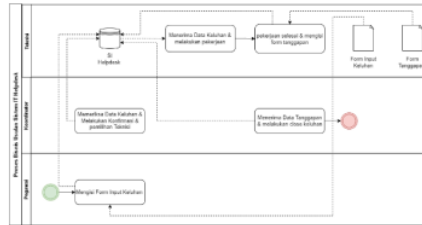2. Business Process proposed by IT Helpdesk

Figure 2 IT Helpdesk Proposed Business Process

In the proposed IT helpdesk system's business process, three (3) actors are involved, including employees who report complaints, coordinators who coordinate the complaint-handling process, and technicians who solve reported problems. First, the employee will report by inputting the complaint form, then the complaint will be stored in the system, and then the coordinator will confirm and select the technician. Then the technician will receive an assignment from the system, and the complaint-handling process will be carried out. Then, the technician will input the response form after the handling process is complete and stored in the system.

SWOT analysis

SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) is a valuable strategic planning technique for evaluating Strengths, Weaknesses, Opportunities, and Threats in an information system project being built.

Table 3. 1 SWOT analysis

(*Strength*)	(*Weakness*)	(*Opportunities*)	(*Threaths*)
The technician already has the experience, and the reporting system runs using the WhatsApp application and the available	Filing complaints still uses WhatsApp and telephone applications, so determining priorities becomes difficult.	The progress in information systems provides an opportunity to build a helpdesk system to facilitate reporting complaints.	Employees are forced to get used to the system; besides that, there is a threat of damage to the helpdesk system.

hardware.			

	Manage Grievance Status	Provides complaint status data update facility
K10		
K11	Monthly Complaint Monitoring	Provide a complaint report facility based on the monthly period
K12	Logout	As access out of the system

System Requirements Analysis

System requirements analysis is needed to determine the requirements specifications for the system to be built. This specification includes several components needed for the system to be built up to the implementation stage.

Tabel 1 System Requirements Analysis

No Req	Need	Description
	Need	**Description**
K1	Login	As the first method to enter into the system as system security
K2	Display Dashboard	Displays the main page
K3	Manage User data	Provides storage, delete, edit, and User data facilities
K4	Manage Bureau data	Provides storage, delete, edit, and Bureau data facilities
K5	Manage Position data	Provides storage, delete, edit, and position data facilities
K6	Manage Complaints data	Provides additional facilities, responds, deletes complaint data and details of complaints
K7	Generate PDF Complaint Reports	Provides a complaint report facility in PDF format
K8	Managing Types of Complaints	Provides facilities for storing, deleting, and editing complaint type data
K9	Manage Official Note Level	Provides facility for updating official Note Level data

Analysis of Use Case Diagrams

Use a case diagram of the IT Helpdesk information system using the Simple Additive Weight method consisting of three actors: Super Admin, Technician, and Employee. Each actor has different access rights, which can be seen in the following figure:
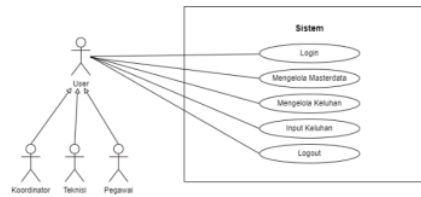

Figure 3 Helpdesk use case diagrams

The use case diagram above presents the interaction between use cases and actors.

Table 2 Definition of actors

No.	Actor	Description
1	Coordinator	Manage system access rights, employee account management, overall Ticket management, and comprehensive reports.
2.	Technician	Respond to employee complaints and make a report recap, usually done monthly.
3.	Employee	Reporting of complaints that occur

Table 3 Usecase definition

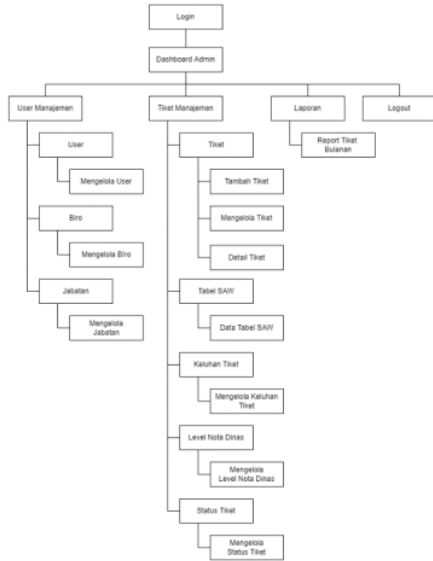| No.	Usecase	Description
1.	Login	This use case serves to enter into the system
2.	Manage Master data	This use case is a form of generalization process that includes managing user data, bureaus,

		positions, ticket status, types of complaints, and official memos.
3.	Manage Complaints	This use case is a form of generalization process that includes managing complaint data such as viewing, changing data, inputting data, confirming, responding, closing, and deleting complaints.
4.	Ticket entry	This use case is a form of generalization process of the process of adding ticket data carried out by employees.
5.	Logout	This use case serves to exit the system.

Activity Diagram Add Complaints

Figure 4 Activity Diagram Add Complaints

Sequence Diagram **Add Complaints**

Figure 5 Sequence Diagram Add Complaints

Activity Diagram The class Diagram explains the class analysis used, especially in the entity class. The Class Diagram in this application describes the instantiation of objects from existing classes.

Figure 6 Class Diagram

The following is a picture of the menu structure design contained in the Information System IT Helpdesk Regional Secretariat of West Java Province:

Coordinator Menu Structure Design

Figure 7 Coordinator Menu Structure

The following is the interface design for the IT Helpdesk Information System at the Regional Secretariat of West Java Province:

Admin Dashboard Page Design
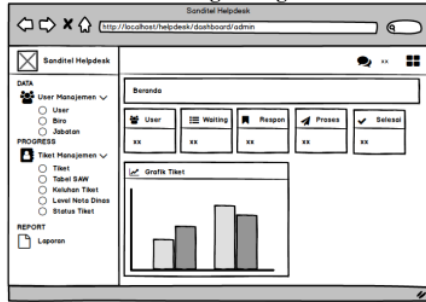
Figure 8 Admin Dashboard Page Design

Admin Dashboard Page Implementation

Interface implementation is an explanation of the page display of the program that has been successfully created based on the design results described in the previous chapter. Moreover, the following is a display of the interface implementation of the IT Helpdesk Information System Design at the Regional Secretariat of West Java Province using the Simple Additive Weight Method as follows:

Login Page Implementation

The Login page is the opening page of the system for the user. To be able to enter the system and be able to proceed to the next stage, the user must first fill in his email and password.
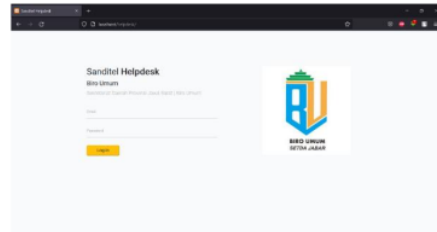
Figure 9 Login Page Implementation

Admin Dashboard Page Implementation

The admin dashboard page is a program display with super admin login access rights. The admin dashboard consists of management features for all the features in this helpdesk application.
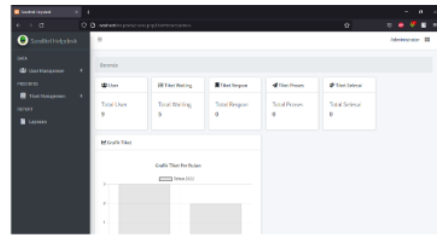

Figure 10 Admin Dashboard Page Implementation

Implementation of Technician Dashboard Pages

The technician dashboard page is a program display with technician login access rights, functioning as ticket management for technicians.
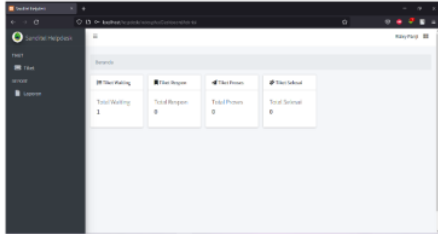
Figure 11 Implementation of Technician Dashboard Pages

Implementation of Employee Dashboard Pages

The employee dashboard page is a program display with employee login access rights, functioning as a menu for making ticket complaints.
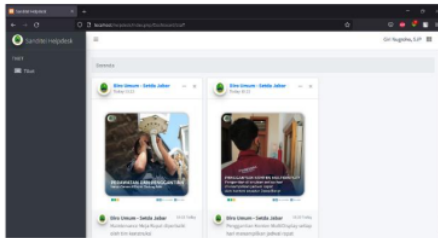

Figure 11 Implementasi Halaman Dashboard Pegawai

CONCLUSION

Based on the results of the research and discussion that has been carried out, the following conclusions can be drawn:

Implementing the website-based IT Helpdesk system application using the Simple Additive Weight method allows the complaint procedure to be centralized and adequately recorded.

The process of handling complaints with many users and bureaus or work units, as well as the many types of complaints that exist, becomes more effective, controlled, organized, and integrated because determining service priorities is carried out using the Simple Additive Weight method.

The Decision Support System with the Simple Additive Weight method has been successfully implemented to facilitate the determination of service priorities. It expects to assist technicians in determining suitable services according to their needs.

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