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Decision Making System for Preparation of Village Annual Work Plans and Budgets Using the AHP Method

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ABSTRACT

This research is a Decision Making System for the preparation of work plans and annual village budget with the AHP method. The AHP method is used for the preparation of the work plan and annual village budget which is determined based on the criteria of time, funds, jlh / vol in determining the best alternative. This Decision Making System was built with the Visual Studio 2010 application as a tool in the preparation of the annual village work plan and budget and using MYSQL as a database. The outcome of the Decision Making System is the Taking System. Decision on the preparation of the work plan and the annual village budget helps the village apparatus in submitting the work plan and annual village budget.

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1. INTRODUCTION

Along with the development of information technology that is growing rapidly, the use of computers at this time is a necessity for agencies. The progress of an agency can be seen from how to use computer technology, as a tool in solving problems or work. This is very helpful in improving the performance of an agency, including in the Preparation of Village Work Plans and Budgets.

According to Law Number 6 of 2014 concerning Regional Government, Village Development is an effort to improve the quality of life and life for the greatest welfare of the village community, then the Village is a legal community unit that has territorial boundaries that are authorized to regulate and manage government affairs, the interests of the local community based on community initiatives, origin rights, and/or traditional rights recognized in the government system of the Unitary State of the Republic of Indonesia [1] [2]. Administratively, the village is the smallest form of government led by the Village Head from a direct popular election through general elections or commonly referred to as PILKADES. In running a government in the village, the Village Head is assisted by his village staff [3].

With the granting of the authority of the village head, the village should be more open (transparent), accountable, participatory and orderly and budgetary discipline [4] . However, in reality on the ground, there are potential problems with financial management, namely potential

problems in management. Such as the delay in the approval of the APBDes which has an impact on the performance of village development. This is because information from the city government is related to the development plan in the village. APBDes (Village Revenue and Expenditure Budget) is the annual financial plan of the Village government. For the realization of the APBDes itself, the plan for the use and accountability of the APBDes turned out to be less transparent, where the problem was due to the absence of media to inform the realization of the APBDes that could be easily accessed by the public [5]. In addition, the substance of the report made by the Village does not follow the standard and is also still prone to manipulation, where the use of money is often not included in the report.

So far, the priority decisions of work programs in Susuk Village have been taken through BPD meetings without considering the determining criteria. With the many assumptions proposed, determining the priority of work programs results in village financial problems. So it can be concluded that the problem that occurs is how to determine the priority of the village income budget work program that will be carried out according to the specified criteria.

The source of the complexity of decision problems is not only due to uncertainty factors or imperfect information. However, there are still other causes, such as the many factors that influence the choices available, with various criteria. In the Multi Criteria Decision Making (MCDM) problem, the decision maker assesses a set of decision alternatives based on the criteria [6] [7]. One approach that is often used to solve this MCDM problem is the Analytic Hierarchy Process (AHP) method.

AHP is a decision support model developed by Thomas L. Saaty. This decision support model will describe complex multi-factor or multi-criteria problems into a hierarchy, according to Saaty (1993), hierarchy is defined as a representation of a complex problem in a multi-level structure where the first level is the goal, followed by the factor level, criteria, sub-criteria, and so on down to the last level of alternatives [8] [9] [10]. With a hierarchy, a complex problem can be broken down into groups which are then arranged into a hierarchical form so that the problem will appear more structured and systematic.

MySQL is a SQL database management system software or known as a DBMS (database management system), this database is multithreaded, multiuser [11] [12]. MySQL is a Relational Database Management System (RDMS) which is distributed free of charge under the GPL (General Public License). Where everyone is free to use MySQL [13] [14].

2. RESEARCH METHODS

2.1. Description of the Anatytical Hierarchy Process (AHP)

AHP is a comprehensive decision-making model. AHP has the ability to solve multi-objective and multi-criteria problems based on the comparison of preferences of each element in the hierarchy. Basically, the procedure or steps in the AHP method include [15] [16]:

a. Define the problem and determine the desired solution, then arrange a hierarchy of the problems encountered.Hierarchy is to set goals that are the goals of the system as a whole at the top level.
b. Specifies the priority of the element.The first step in determining the priority of elements is to make a pair comparison, which is to compare elements in pairs according to the given criteria. The pairwise comparison matrix is filled in using numbers to represent the relative importance of an element to other elements.
c. Synthesis.The considerations for pairwise comparisons are synthesized to obtain overall priorities. The things that are done in this step are: Adding the values of each column in the matrix, dividing each value of the column by the total column in question to obtain a normalized matrix, and adding up the values of each row and dividing by the number of elements to get average value.
d. Measuring Consistency.In decision making, it is important to know how good the consistency is because we don't want a judgmental decision with low consistency. The things that are done in this step are: Multiply each value in the first column by the relative priority

of the first element, the value in the second column by the relative priority of the second element, and so on, add up each row, the result of the row sum divided by the corresponding relative priority element. , and add the quotient above with the number of elements, the result is called max.

e. Calculate Consistency Index (CI),with the formula:

$$CI = (\lambda \text{ max-n})/n \quad \ldots\ldots (1)$$

where : n = number of elements.

f. Calculate Consistency Ratio (CR), with the formula:

$$CR = CI/RC \quad \ldots\ldots (2)$$

where:

CR = Consistency Ratio
CI = Consistency Index
IR = Random Consistency Index

g. Check hierarchy consistency.If the value is more than 10%, then the data judgment assessment must be corrected. However, if the consistency ratio (CI/RI) is less or equal to 0.1, then the calculation results can be declared correct.

3. RESULTS AND DISCUSSION

3.1. System Implementation

Implementation is the application or procedure that must be carried out to complete the existing system design in the approved system design document, as well as test and start a new system. System implementation is the stage of implementing the system that will be carried out if the system is approved, including programs that have been made at the system design stage so that it is ready for operation.

3.2. System Implementation Stages

System implementation is the stage of implementing the system that will be carried out if the system is approved, including programs that have been made at the system design stage so that it is ready for operation. The stages are as follows:

a. Login form

In the login form, the admin enters the user and password and is validated into the database. The implementation of the login form design of the problematic student decision-making system application can be seen in the following.

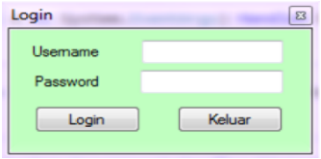


Figure 1. Login Form

The login screen above is the display that will appear if an admin wants to enter the administrator's home page.

b. Main Menu Form

In this main menu form, where the admin chooses the tools to be used based on the development of this application. In this main menu, the admin chooses the support for the built-in application. The implementation of the main menu form of the decision-making system application for the preparation of village work plans and annual budgets can be seen in the following figure:

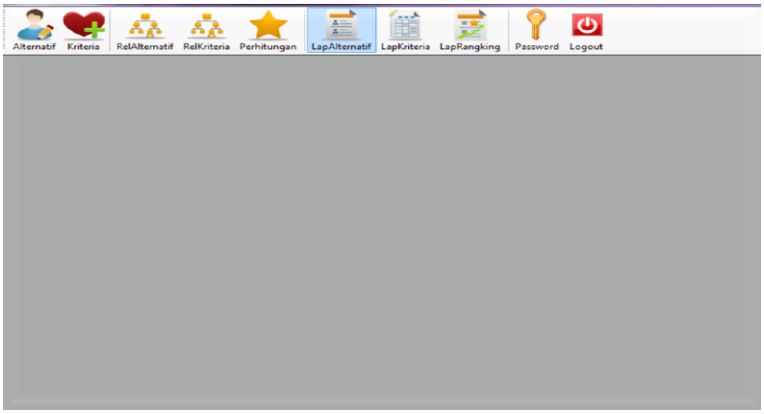


Figure 2. Main Menu Form

The display above is the main menu display in the decision-making system for the preparation of the village work plan and annual budget.

c. Alternative Work Plan Data Input Form

In this alternative work plan data input form, where the admin inputs one by one alternative work plans that are declared feasible. with the number, field of activity, type of activity, location, K1, K2, K3 which are directly stored in the database. The implementation of the alternative work plan data input form can be seen in the following figure.

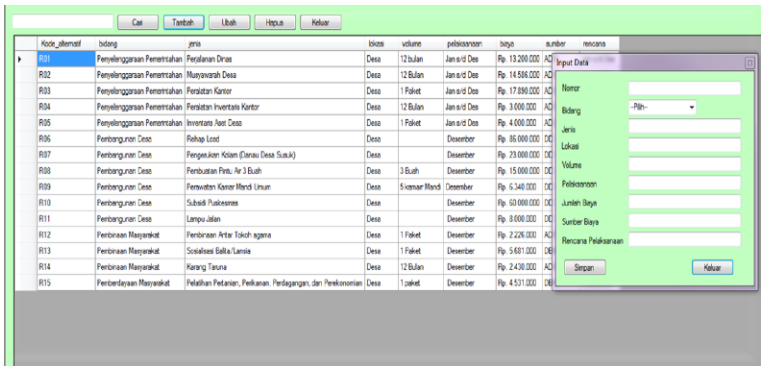


Figure 3. Alternative Data Input Form

In the display above is the menu display for the alternative data input form of the village work plan and annual budget.

d. Criteria Value Data Form Menu

In the menu for calculating the value of this criterion, it will display the criteria, the order of criteria and information which is then entered in the next process. The implementation of the form for calculating the value of the criteria for this system can be seen in the following figure.

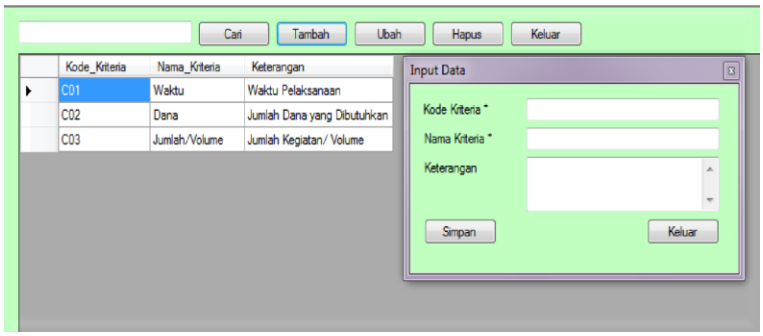


Figure 4. Criteria Data Form

In the display above is the display of the criteria data form that displays the criteria in the preparation of the work plan.

e. Menu Form Relative

In this relative data menu, it will display the value of the alternative work plan which is then entered in the next process. The implementation of the relevant data form of the system made can be seen in the following pictures.

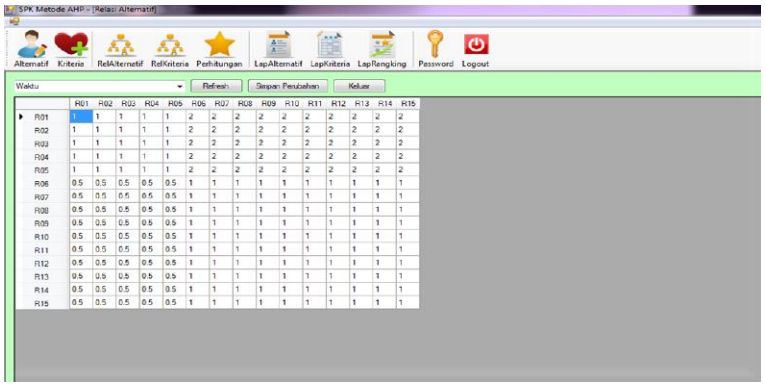


Figure 5. Time Relative Form

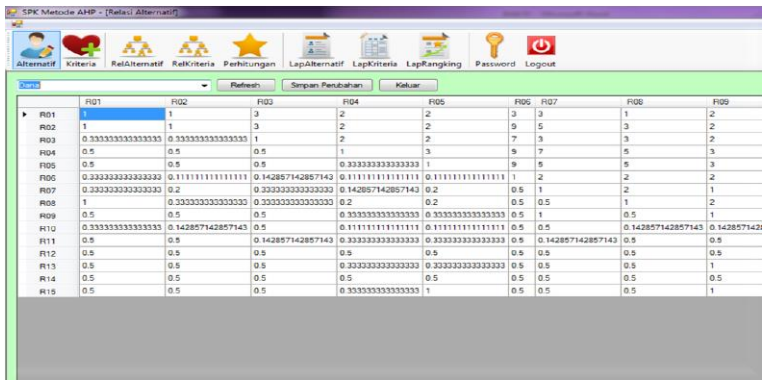


Figure 6. Fund Alternative Form

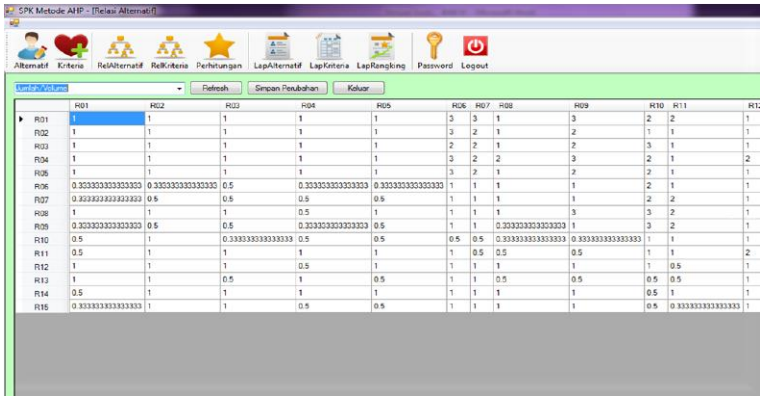


Figure 7. Relative Form Amount/volume

f. Menu Form Relcriteria

In this criteria menu, it will display the value of the comparison between the three criteria which is then entered in the next process. The implementation of the criteria form of the system created can be seen in the following figure.

Figure 8. Form Relriteria

In the display above is the display of the criteria form generated from the paired comparison rating scale.

g. Criteria Consistency Form Menu.

In this criteria consistency menu, it will display the value of the consistency of the criteria and alternatives that have been added up using the formula in the preparation of the work plan which is then entered in the next process. The implementation of the consistency criteria form of the system created can be seen in the following figure.

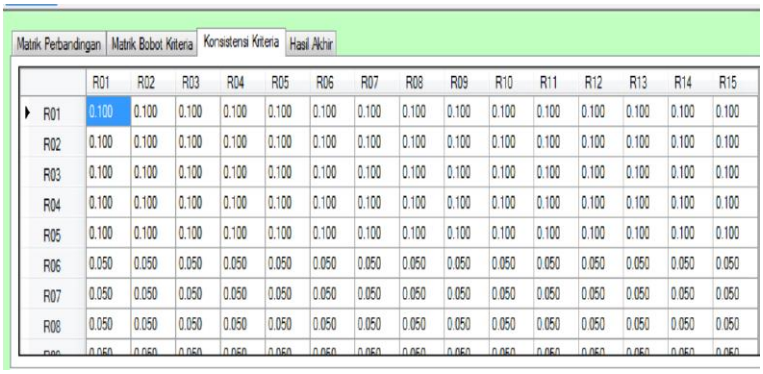


Figure 9. Priority Assessment Form

The display above shows the consistency of the criteria for the work plan and village annual budget.

h. Comparison Matrix Form Menu

In this comparison matrix menu, it will display the value of the comparison matrix between each alternative and will get the final result for the preparation of the work plan and annual budget of the implant village. The implementation of the comparison matrix form of the system created can be seen in the following figure.

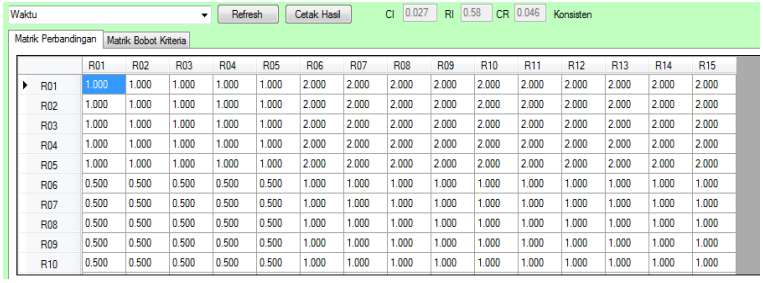


Figure 10. Comparison Matrix Form

i. Criteria Weighted Matrix Form Menu.

In this criteria weight matrix form menu, it will display the weight values in the work plan matrix and the village annual budget using the AHP calculation. The implementation of the criteria weight matrix form of the system created can be seen in the following figure.

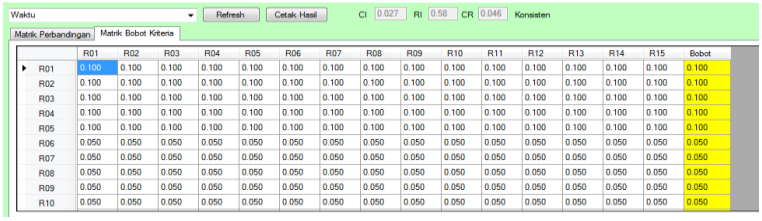


Figure 11. Criteria Weight Matrix Form

j. Final Result Form Menu

In the form menu, the final result will display the sorted values of C01, C02, C03 using AHP calculations. The implementation of the criteria weight matrix form of the system created can be seen in the following figure.

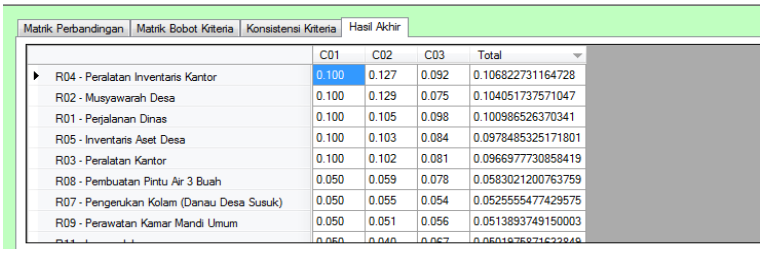
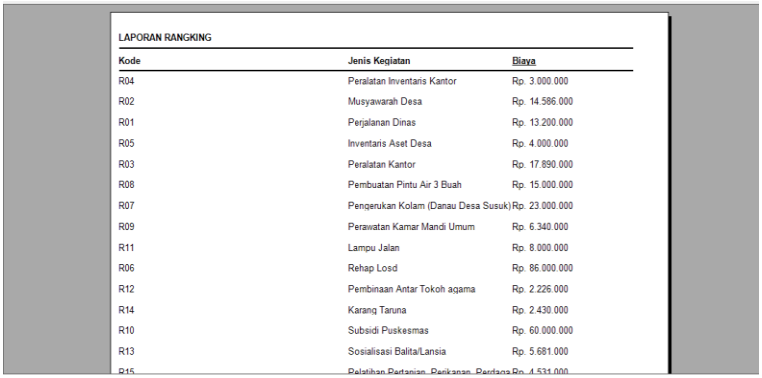


Figure 12. Final Result Form

k. Menu Form Ranking Report Results

In the form menu, the ranking report will display the work plans and annual village budgets that have been sorted starting with the highest ranking using AHP calculations. The implementation of the criteria weight matrix form of the system created can be seen in the following figure.



LAPORAN RANGKING

Kode	Jenis Kegiatan	Biaya
R04	Peralatan Inventaris Kantor	Rp. 3.000.000
R02	Musyawarah Desa	Rp. 14.586.000
R01	Perjalanan Dinas	Rp. 13.200.000
R05	Inventaris Aset Desa	Rp. 4.000.000
R03	Peralatan Kantor	Rp. 17.890.000
R08	Pembuatan Pintu Air 3 Buah	Rp. 15.000.000
R07	Pengerukan Kolam (Danau Desa Susuk)	Rp. 23.000.000
R09	Perawatan Kamar Mandi Umum	Rp. 6.340.000
R11	Lampu Jalan	Rp. 8.000.000
R06	Rehap Losd	Rp. 86.000.000
R12	Pembinaan Antar Tokoh agama	Rp. 2.226.000
R14	Karang Taruna	Rp. 2.430.000
R10	Subsidi Puskesmas	Rp. 60.000.000
R13	Sosialisasi Balita/Lansia	Rp. 5.681.000
R15	Pelatihan Pertanian, Perikanan, Perdaga	Rp. 4.531.000

Figure 13. Ranking Report Form

The results report is a testing method that uses the control structure of the design tests to be run on all internals of the software to ensure they operate according to specifications and designs.

Table 1. Test result

Functions that Tested	Test Method	Expected results	Test result
Login Form	On the SPK Application displays a login form to enter the system.	Showing the form *login*and it worked Go to page Application	ok
Data Form Village Annual Work Plan and Budget	Select the data menu. Then can add, edit, and save data.	Displays the village's annual work plan and budget data form and can be added, edited or saved.	ok
Main Form	Choose a menu that has been provided, and various applications support it.	Showing the form main menu and can function properly.	ok
Form logout	Choose the logout menu and then choose app login.	Showing the form *logout*and choose login permissions.	ok

4. CONCLUSION

The following are some conclusions from the implementation and research that have been made, namely; Design and manufacture of Decision Making System applications. Village annual work plans and budgets use UML (Unifield Method Language) with Visual Basic 2010 programming language and MySQL database, and the method used is the AHP (Analytical Hierarchy Process) method to determine the ranking results in the preparation of work plans and the annual village budget.

The application of the AHP (Analytical Hierarchy Process) method in making a Decision Making System application for the preparation of village work plans and annual budgets that have been successfully implemented by determining the criteria used as a reference for decision making, rating the suitability of each alternative on each criterion, giving weight to each criterion , carry out a priority assessment and the final process is to rank each alternative on each criterion to find the greatest value from each alternative for the preparation of the village work plan and annual budget.

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