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Decision Support System To Determine The Best Selling Paint At The Asoka Building Plaza Store

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Abstract

Many ways can be used in determining the best-selling paint selection criteria in the Ashoka building plaza with the use of a decision support system so that it makes it easier for leaders to determine the type of paint that is in high demand by consumers by using a selection method that makes it easy to obtain information on a system built to manage data- data so as to provide convenience to users and can produce clear and accurate information and can produce reports that are expected to help leaders, and employees at the ASOKA BUILDING PLAZA Padang in making and making the right decisions later.

Keywords:*decision support system (SPK), type of paint.*

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PRELIMINARY

Paint is a product that is used to coat the wall surface with the aim of beautifying, strengthening, or protecting from various types of damage due to weather changes, because the paint will form a thin layer that is firmly attached to the wall surface and will dry on the wall surface. Paint can be done in many ways: rubbed, smeared, brushed, sprayed, etc. Paint is usually used to protect and give color to an object or surface by coating it with a layer.

ASOKA BUILDING PLAZA. is a paint distributor that will provide various types and brands of paint, a problem that is often found by PLAZA BANGUNAN ASOKA Coloring is a lack of knowledge about the specifications or types of paint that are good for use as cheap house wall coverings or the high cost of a paint product without prioritizing the quality of the type. paint used that can provide the right information about the best paint quality to consumers. Based on the findings of the problems above, a decision support system will be built based on the problems faced by PLAZA BANGUNAN ASOKA Tata Warna, in this study it will be developed using the Analytical Hierachy Process (AHP) method that utilizes the weight value as a basis for calculations to assist in decision making. The comparison between previous studies is to calculate each alternative criterion value using the AHP method, then the final result sorts the best values and concludes, but with the research that the author did, namely to collect and then calculate the final value of the provisions used for the best-selling paint selection value, then assign a criterion value to the alternative. then calculate using the SAW method. Determination of the best-selling paint selection alternative, by comparing the final value of the final value of the best-selling provision with the final calculated value of each alternative. but with the research that the author did, namely collecting and then calculating the final value of the provisions used for

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the value of the best-selling paint selection, then giving the criteria value on the alternative and then calculating using the SAW method. Determination of the best-selling paint selection alternative, by comparing the final value of the final value of the best-selling provision with the final calculated value of each alternative. but with the research that the author did, namely collecting and then calculating the final value of the provisions used for the value of the best-selling paint selection, then giving the criteria value on the alternative and then calculating using the SAW method. Determination of the best-selling paint selection alternative, by comparing the final value of the final value of the best-selling provision with the final calculated value of each alternative.

METHOD

Decision Support System

According to Simon (1996) decision making consists of four interrelated phases, namely:

1. *Intelligence*
   This stage is the process of tracing and detecting the scope of the problem and the process of identifying the problem. Input data is obtained, processed and tested in order to identify problems.
2. *Design*
   This stage is the process of finding and developing alternatives, this stage includes the process of understanding the problem, deriving solutions and testing the feasibility of the solution.
3. *Choice*
   At this stage, the processselection among various possible alternatives. This stage includes searching, evaluating, and making recommendations that are suitable for the model that has been made. The solution of the model is a specific value for the outcome variable in the selected alternative.
4. 😊
   The implementation stage is the implementation stage of the decisions that have been taken. At this stage, it is necessary to arrange a series of planned actions, so that the results of decisions can be monitored and adjusted if improvements are needed

AHP method

The AHP method was developed by Thomas L. Saaty, a mathematician. This method is a framework for making effective decisions on complex problems by simplifying and accelerating the decision-making process by solving the problem into its parts, arranging these parts or variables in a hierarchical arrangement, assigning numerical value to subjective judgments about the importance of each variable. and synthesize these considerations to determine which variable has the highest priority and act to influence the outcome of the situation. This AHP method helps solve complex problems by structuring a hierarchy of criteria, stakeholders, results and by drawing various considerations to develop weights or priorities. This method also combines the power of feelings and logic involved in various problems, then synthesizes various considerations into results that match our estimates intuitively as presented in the considerations that have been made. (saaty, 1993).

The object of research is the target to obtain data according to the opinion of the object of research, the object of this research is a system analysis that aims to determine the type of best-selling paint on the plaza of the Asoka Padang building.

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problems and obstacles that occur so that a system development can be carried out.

Based on the framework in Figure 3, each step can be described as follows:

1. Doing Field Observations
   At this stage, the field study is carried out by observation, namely direct observation at the research site so that the existing problems can be clearly identified. Then conducted an interview which aims to obtain the information or data needed.

2. Data collection
   Data collection is done by direct interview techniques with the school, especially employees so that from the information obtained the author can find out the existing problems. Furthermore, it also uses documentation techniques, namely looking for data related to academics with existing problems.

3. Analyzing Data and Data Processing
   Based on the data obtained in the field study, an analysis of the data was carried out using*Unified Modeling Language*(UML)which is useful for analyzing academic information systems, then the author can determine goals based on an understanding of the existing problems. And data processing is carried out with*Unified Modeling Language*(UML) is a "language" that has become the industry standard for visualizing, designing and documenting software systems. UML offers a standard for designing models of a system. Using UML we can create models for all types of software applications, where the application is can run on any hardware, operating system and network, and written in any programming language. The UML is used in the analysis of academic information systems.

4. Implementation
   At this stage by using the system design*Unified Modeling Language*(UML) makes it easy to get information about the best-selling paint types at PLAZA BANGUNAN ASOKA Padangso that it can produce an accurate information So from this implementation can be done system testing. This test is carried out in order to determine the accuracy of an information system.

5. Final Evaluation
   Is the final result of the implementation and is useful for finding out whether the system that has been running is in accordance with the test, at this stage a review of the feasibility of the system that has been designed is carried out, whether the system is appropriate or still needs to be reviewed or refined, as well as providing solutions to problems that arise. faced.

Data analysis

Data analysis in this study with descriptive analysis. According to Selltiz et al (1976) Analyzing the result of descriptive study, the process of analysis includes: coding the interview replace, observation and tabulating the data, which means the descriptive analysis process includes providing interview answer codes, observation and tabulation of data.

Data Collection and Data Analysis Techniques

1. Literature Study, namely collecting and studying previous studies and journals related to the AHP method.
2. Observation, namely observing the running system, observing the variables and their development. Furthermore, the data that has been obtained is analyzed and then concluded the level of accuracy to determine the final result.

Data processing

From the results of research and data collection based on questionnaires at the Plaza building shop Asoka Padang Jl, By pass Padang. In processing this data, there are several criteria and alternatives that will be used to determine the type of best-selling paint consumer's choice

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based on the data obtained by distributing questionnaires to consumers who come shopping at the Asoka Padang building store Plaza, a data can be obtained based on the answers from several consumers.

In order to assess and analyze based on the results of the questionnaire processing obtained on a number of assessment components such as:

1. Paint Durability (Max 50%)
2. Quality (30% Max)
3. Color (Max 20%)

In this assessment there are criteria for the assessment component based on Paint Durability, which can be seen in table 1.

Table 1. Distribution of Respondents Based on Paint Durability

Paint Durability	**Number of people**	**Percentage**
Well	50	60.5%
Enough	35	39.3%
Not enough	5	1.2%
Total	90	100%

The criteria for the assessment component based on quality can be seen in table 2.

Table 2. Distribution of Respondents Based on Quality

Quality	**Number of people**	**Percentage**
Well	60	40%
Enough	25	40%
Not enough	5	20%
Total	90	100%

The criteria for the assessment component based on color can be seen in table 3.

Table 3. Distribution of Respondents by Color

Behavior Level	**Number of people**	**Percentage**
Well	70	70%
Enough	10	25%
Not enough	10	5%
Total	90	100

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Implementation of the Analytical Hierarchy Process (AHP) Method

For problems that are quite complex in the decision-making process so that there will be difficulties in determining policies. So to help solve this problem, you can use the Analytical Hierarchy Process (AHP) process. Decision Hierarchy Determines Decision Support System To Determine Best-selling Paint Criteria Based on Consumer Knowledge Level.
Determining the Best-selling Paint Criteria Based on Consumer Knowledge Level.

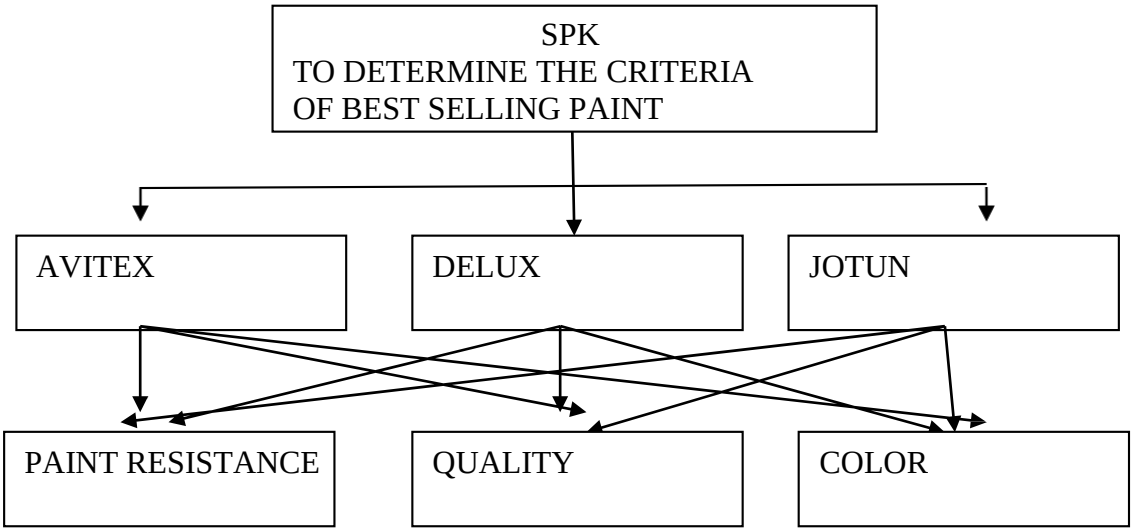

Image 1. The Decision Hierarchy Determines the Best Selling Paint Criteria

From the decision hierarchy picture above, the objectives of the problem are described to describe the main objectives to be achieved in this study, which have three criteria and three alternatives.

Matrix Comparison

Due to problems in determining the weights or priorities that often change, pairwise comparisons that use data, knowledge, and experience to obtain priorities are used. This principle means making judgments regarding the relative importance of one element to another. This assessment is the core of the AHP, because it will affect the priority of the elements. The results of this assessment are presented in the form of a matrix called a pairwise comparison matrix.

Consistency Value

AHP conducts consistency testing oncomparison between elements obtained at each level of the hierarchy. The consistency of comparisons is reviewed from a comparison matrix and the entire hierarchy to ensure that the resulting priority order is obtained from a series of comparisons that are still within the limits of logical preferences. After calculating the element weights, the next step is to test the consistency of the matrix. To perform this calculation, a Random Index (RI) table is needed whose values for each matrix order can be seen in table 4.

Table 4.*Random Index*(RI)

Urutan Matriks	1	2	3	4	5	6	7	8	9	10
(RI)	0,00	0,00	0,58	0,90	1,12	1,24	1,32	1,41	1,45	1,49

RESULTS AND DISCUSSION

Pairwise Comparison Matrix Between Goals and Criteria

Generally for paired matrix comparisons the number 1 can be placed diagonally in the upper left corner to the lower right corner, because it means that the comparison of the same two things is 1 or equally preferred.

Table 5. Pairwise Comparison Matrix

	Avitex	Deluxe	Jotun
Avitex	1	**1/7**	**1/6**
Deluxe	**7/1**	**1**	**3/1**
Jotun	**6/1**	**1/3**	**1**

(source: questionnaire data)

The next step begins to calculate the evaluation for Goals and criteria. To make it easier to calculate the numbers in the pairwise comparison matrix, they are converted into decimal form.

The result of multiplying the matrix above is squaredagain to get the eigenvalues whose results are close to or must be the same between the first matrix and the second matrix or the second matrix with the third matrix and so on. If the results are close to or equal, then the matrix multiplication is stopped, because the eigenvalues sought have been obtained based on the same eigenvalues marked with brackets in the multiplication.

The priority scale is obtained for each criterion in the first row for the Avitex Cat type 0.076 with a value of 76%, the second row for the Cat Delux type with a value of 0.641 or 64%, the third row for the Jotun Cat type 0.293 with a value of 29%.

Table 6. The Weight of Each Criterion

CRITERIA	AMOUNT	WEIGHT
Avitex	0.076	7%
Deluxe	0.641	64%
Jotun	0.293	29%
Amount	1000	100%

Furthermore, the maximum Eigen value (λmaximum) is obtained by adding up the result of multiplying the Eigen value by the number of columns. The maximum eigenvalues that can be obtained are:

μαξιμυμ =(14,000*0.76)+(1.476*0.641)+(4.167*0.239)
= 0.935+ 0.946+ 1.219 = 3.100

Because the matrix is of order 3 (which consists of 63 criteria), the consistency index (CI) value with the formula number (I) is obtained:

$$CI = \frac{3{,}100 - 3}{3 - 1} = \frac{0.100}{2} = 0.050$$

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For n = 3, RI (random index) = 0.58 (saaty table), the consistency ratio (CR) value can be obtained with the formula no (II) as follows:

$$CR = \frac{0.050}{0.58} = 0.086 < 0.100$$

Therefore, because CR < 0.100, it means that the respondent's preference is consistent.

Table 7. Avitex and Altenative Paint Types

Avitex	Paint Durability	quality	Color
Paint Durability	1	6/1	5/1
Quality	1/6	1	1/2
Color	1/5	2/1	1

(source: questionnaire data)

Table 8. Dulux and Alternative Paint Types

Dulux	Paint Durability	Quality	Color
Paint Durability	1	7/1	3/1
Quality	1/7	1	1/4
Color	1/3	4/1	1

(source: questionnaire data)

Table 9. Jotun and Alternative Paint Types

Jotun	Paint Durability	Quality	Color
Paint Durability	1	3/1	6/1
Quality	1/3	1	4/1
Color	1/6	1/4	1

(source: questionnaire data)

The next step is to start calculating evaluations for the criteria and alternatives. To simplify the calculation, the numbers in the pairwise comparison matrix are converted into decimal form.

1,000	6,000	5,000		1,000	6,000	5,000		3,000	22,000	13,000		38,000	0,728
0,167	1,000	0,500	x	0,167	1,000	0,500		0,433	3,000	1,833		5,267	0,101
0,200	2,000	1,000		0,200	2,000	1,000		0,733	5,200	3,000		8,933	0,171
												52,200	1,000
3,000	22,000	13,000		3,000	22,000	13,000		28,067	199,600	118,333		346,000	0,726
0,433	3,000	1,833	x	0,433	3,000	1,833		3,944	28,067	16,633		48,644	0,102
0,733	5,200	3,000		0,733	5,200	3,000		6,653	47,333	28,067		82,053	0,172
												476,698	1,000
28,067	199,600	118,333		28,067	199,600	118,333		2362,360	16805,324	9962,458		29130,142	0,726
3,944	28,067	16,633	x	3,944	28,067	16,633		332,082	2362,360	1400,444		4094,886	0,102
6,653	47,333	28,067		6,653	47,333	28,067		560,177	3984,983	2362,360		6907,521	0,172
												40132,548	1,000

The result of multiplying the matrix above is squaredagain to get the eigenvalues whose results are close to or must be the same between the first matrix and the second matrix or the second matrix with the third matrix and so on. If the results are close to or equal, then the matrix multiplication is stopped, because the eigenvalues sought have been obtained based on the same eigenvalues marked with brackets in the multiplication.

Obtained a priority scale for each criterionin the first line for Paint Durability 0.726 with a value of 72%, the second line for Quality with a value of 0.102 or 10%, the third line for Color 0.172 with a value of 18%

Table 10. Weight of Each Alternative

Alternative	Amoun t	Weight
Paint Durability	0.726	72%
Quality	0.102	10%
Color	0.172	18&
Amount	1000	100%

Furthermore, the maximum Eigen value (λmaximum) is obtained by adding up the result of multiplying the Eigen value by the number of columns. The maximum eigenvalues that can be obtained are:

μαξιμυμ =(1.367*0.726)+(9,000*0.102)+(6,500*0.172)
= 0.992+ 0.918+ 1.119 = 3.029

Because the matrix is of order 3 (which consists of 63 criteria), the consistency index (CI) value with the formula number (I) is obtained:

For n = 3, RI (random index) = 0.58 (saaty table), the consistency ratio (CR) value can be obtained

with the formula no (II) as follows:

$$CR = \frac{0.015}{0.58} = 0.025 < 0.100$$

Therefore, because CR < 0.100, it means that the respondent's preference is consistent.

Implementation Using Software

To connect using “Make Connection”  *icons*,left clickon the icon to press, display the connection mode, then left click on the source node and right click on each connected node. To activate the connection mode, right-click the repeat process icon to suppress the process. To disconnect, left-click on a node and right-click on one of the nodes.

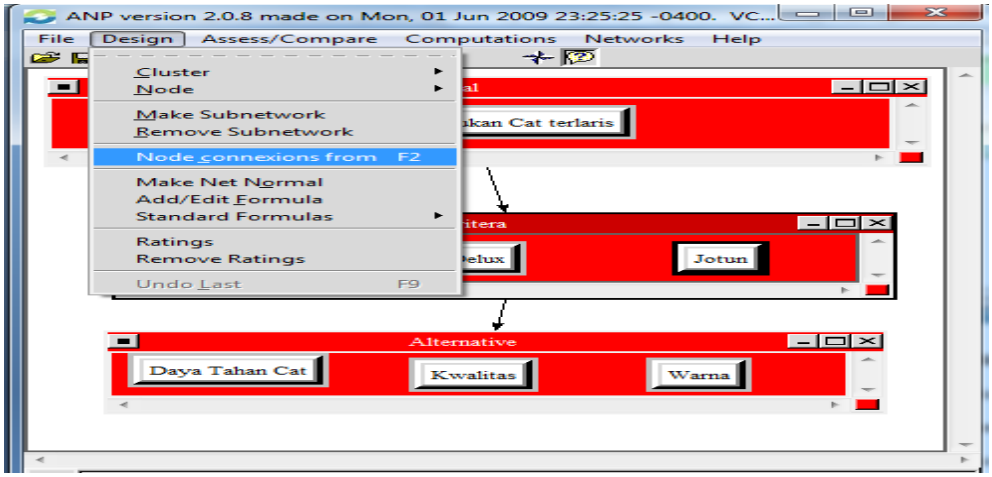
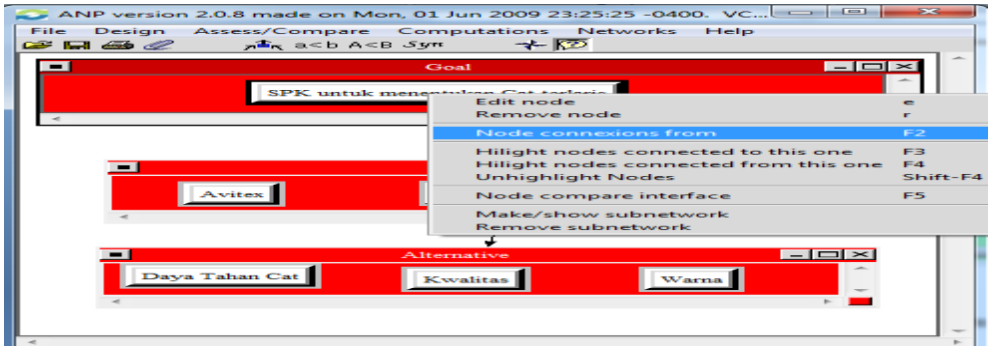


Figure 8. Connecting Each Cluster

After all clusters and nodes are formed,The next process connects the nodes in the criteria cluster with the nodes in the cluster of land area, building area, convenience, location, price, and design, with nodes in the alternative cluster.



GFigure 9.*Cluster*Connected

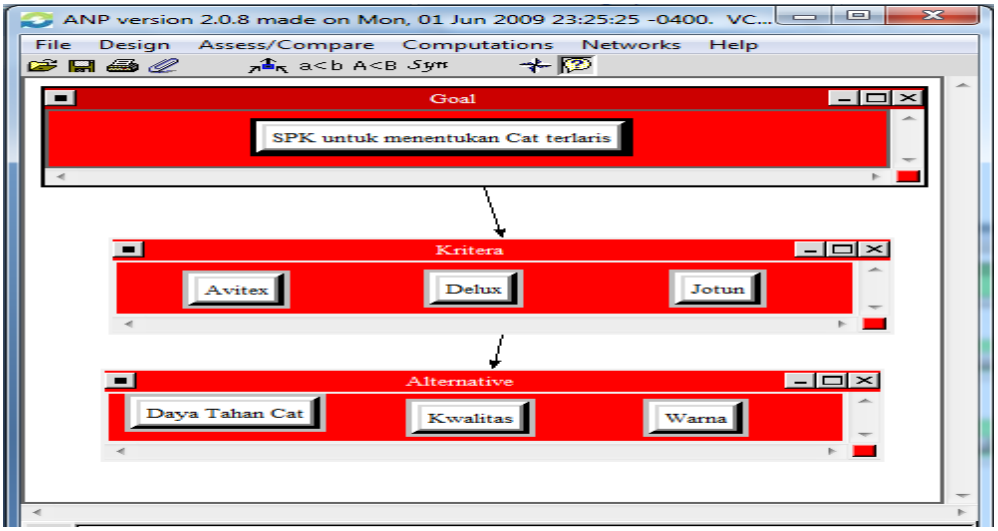


Figure 10. All Cluster Connection

Paired Matrix Comparison Test Select the access/compare, comparison node to start the comparison process. If the node has been selected by clicking on it.

Click on the DO Comporation button to start the comparison process.
Pairwise comparison process beginsin the last used mode, or in the Questionnaire mode the first time. There are four modes of pair comparison scoring. To switch from one node to another, by clicking on the tab at the top. When a rating is entered in a mode it is recorded in a node. Calculations are based on numbers in the mode and matrix (in the mode the questionnaire always consists of integers and no number is displayed in the graphical and verbal mode).

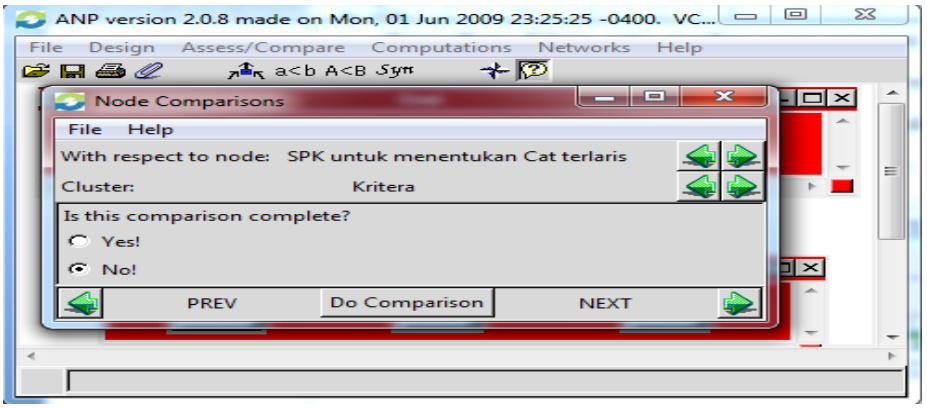


Figure 11. Comparison Menu

Overall Priority Comparison Results
Based on the established criteria can be implementedin calculations using Super Decision Software, the highest matrix calculation is Avitex with a priority value of 1.0000 then Delux with a value of 0.140572, following Jotun with a value of 0.237127

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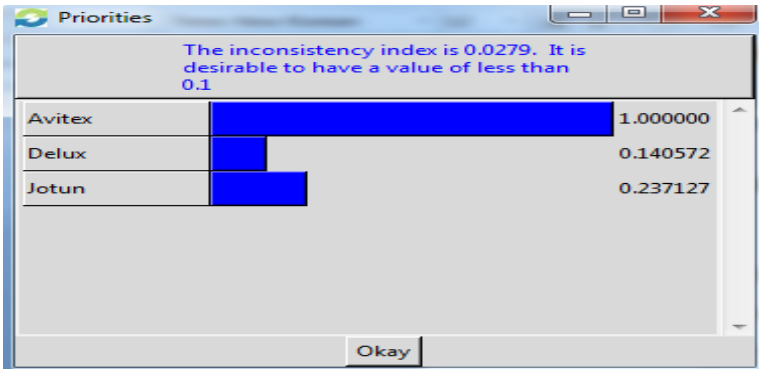

Figure 12. Priority Criteria

After all the values are inputted, the next step is to compute the matrix. That is by clicking the computations menu, synthesize.

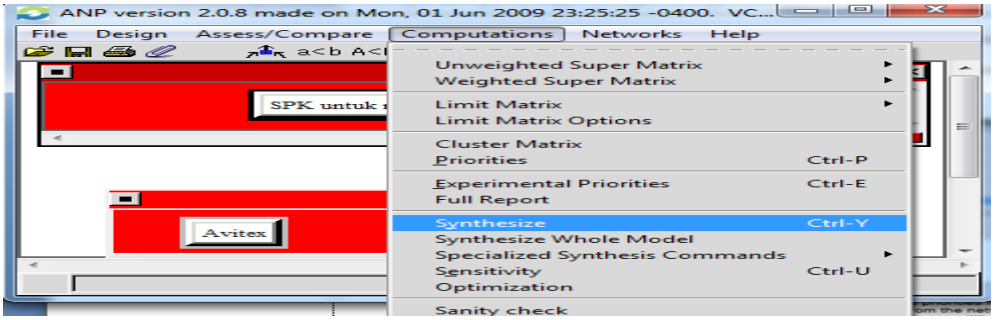

Figure 13. Overall Priority Calculation Results

Main structure of toplevel network

What follows a brief recap of this network.

If you would like to, you can return to the main menu.

Alternative(s) in it:	• Daya Tahan Cat • Kwalitas • Warna
Network Type:	Bottom level
Formula:	Not applicable

Clusters/Nodes	• **Alternative:** *description*
	  ○ **Daya Tahan Cat:** *description*
	  ○ **Kwalitas:** *description*
	  ○ **Warna:** *description*
	• **Goal:** *sistem Pendukung Keputusan Untuk menentukan Kriteria Cat Terlaris*
	  ○ **SPK untuk menentukan Cat terlaris:**
	• **Kritera:** *description*
	  ○ **Avitex:** *description*
	  ○ **Delux:** *description*
	  ○ **Jotun:** *description*

Alternative Rankings

Graphic	Alternatives	Total	Normal	Ideal	Ranking
	Daya Tahan Cat	0.1667	0.3333	1.0000	3
	Kwalitas	0.1667	0.3333	1.0000	1
	Warna	0.1667	0.3333	1.0000	2

Figure 14. Complete Report of All Analysis

The results obtained in Figure 14 are the largest overall priority chosen by namely Paint Durability, Quality, and Color.

CONCLUSION

Based on the results of the analysis conducted at the Asoka Building Plaza, it can be concluded as follows: The decision-making process is more optimal by using a Decision Support System by applying the Analytical Hierarchy Process (AHP) method because it can facilitate the process of a Decision Support System to find out the best-selling paint criteria by The information generated by the Analytical Hierarchy Process (AHP) method provides an overview of the Best Selling Paint Criteria. Decision Support Systems can provide benchmarks in determining the intensity of different interests and needs so that they can provide solutions or results that are more in line with the wishes of the decision maker.

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