



Decision Support System for used Car Selection Recommendations using the TOPSIS Method

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ABSTRACT

Information about used cars for sale can help consumers in buying vehicles. But sometimes people often forget, especially if the criteria are very numerous such as the price of cars, interior accessories, exterior accessories, passenger capacity and year of production so that consumers often experience mistakes in choosing used vehicles to buy. Therefore we need a system that can provide recommendations using the right method, the following is a decision support system method including Fuzzy Multiple Attribute Decision Making. One of the mechanisms to solve FMADM problems is by applying the TOPSIS (Technique For Others Reference by Similarity to Ideal Solution) method.

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1. INTRODUCTION

Computer systems are currently more recognized as being faster, more thorough and accurate than humans, this is what encourages the birth of technology in the automotive sector such as decision support systems to assist consumers in making decisions that are considered complex, such as selecting a used car that uses more than 1 criteria [1]. Information about used cars that are sold can help consumers in buying vehicles [2]. But sometimes people often forget, especially if the criteria are very many such as car prices, interior accessories, exterior accessories, passenger capacity and year of production so that consumers often experience errors, in choosing a used vehicle to buy. Therefore we need a system that can provide recommendations using the right method,

One of the mechanisms to solve FMADM problems by applying the classical MADM method, one of which is TOPSIS for ranking [3] [4]. TOPSIS (Technique For Others Reference by Similarity to Ideal Solution) is a multi-criteria decision-making method. It was first introduced by Yoon and Hwang (1981) [5] [6]. TOPSIS uses the principle that the chosen alternative must have the closest distance from the positive ideal solution and the farthest from the negative ideal solution from a geometric point of view by using Euclidean distance to determine the relative closeness of an alternative to the optimal solution [7] [8]. The positive ideal solution is defined as the sum of all the best achievable values for each attribute,

2. RESEARCH METHODS

2.1 Decision Support System

Decision Support System (DSS) is a system that is able to provide problem solving skills and communication skills for problems with semi-structured and unstructured conditions. This system is used to assist decision making in semi-structured and unstructured situations, where no one knows for sure how decisions should be made [9] [10] [11].

Basically a decision support system is a further development of a computerized management system designed in such a way that it is interactive with the user. This interactive nature is intended to facilitate the integration between various components in the decision-making process such as procedures, policies, technical, analysis, as well as experience and managerial insights in order to form a flexible decision framework [12] [13].

2.2 TOPSIS

Topsis method in principle that the chosen alternative must have the closest distance from the positive ideal solution and the farthest distance from the negative ideal solution from a geometric point of view by using the Eulidean distance to determine the relative proximity of an alternative to the optimal solution [14]. The positive ideal solution is defined as the sum of all the best attainable values for each attribute, while the negative-ideal solution consists of all the worst attainable values for each attribute [15]. TOPSIS considers both the distance to the positive ideal solution and the distance to the negative ideal solution by taking relative proximity to the positive ideal solution. Based on the comparison to the relative distance, an alternative priority arrangement can be achieved [16].

The TOPSIS method is based on the concept that the best chosen alternative not only has the shortest distance from the positive ideal solution, but also has the longest distance from the negative ideal solution. This concept is widely used in several MADM models to solve practical decision problems. This is because the concept is simple and easy to understand, and has the ability to measure the relative performance of decision alternatives in a simple mathematical form [17].

2.3 Car Selection Criteria

Buying a used car is certainly confusing how to choose a good used car. Because often used car buyers fail to pay attention to important aspects that must be considered before bringing the used car home. If you choose the wrong one, you don't get a used car that has good performance, but a used car that is in pain, which you often have to take to the repair shop. Of course, the maintenance costs for repairing used cars are quite large. Therefore, it is very important to know the criteria for buying a used car so that you can be satisfied with the used car purchased.

2.4 Researched Object

Based on the research objectives, the object under study is a recommendation for the selection of a used car using the TOPSIS method. At this stage is to identify problems in designing TOPSIS for car selection recommendations. Identification of this problem can be done by surveying the research that has been done. After that, one of the problems obtained, the problem obtained is to apply TOPSIS to the car selection recommendation. Therefore, the authors try to find solutions to these problems. Types of Research In this study, researchers used quantitative research methods. Where researchers collect data and test or prove existing hypotheses. Researchers conducted a survey to determine the frequency and percentage of their responses about the games made.

2.5 Data source

Secondary Data, namely the author will conduct searches, learn from various kinds of literature and documents that support the work of this Final Project, especially those relating to recommendations for the selection of used cars.

3. RESULTS AND DISCUSSION

In the implementation phase of this application, analysis of the needs of supporting devices is very important. This application can run well, if it meets the minimum standards of hardware (hardware) and supporting software (software) must also be available for the smooth implementation of the program. The purpose of implementation is to explain the module manual to all users who will use the application. So that the user can respond to what is displayed in the application and provide input to application makers to make improvements to make the system even better.

In making this application of course requires hardware (Hardware) and software (Software). The following is an explanation of the supporting devices used in building this application. The computer device used in building this application is a Processor, with a minimum speed of 2.0 GHZVGA with a minimum speed of 32 MB, Memory / RAM 1, minimum hard drive of 20 GB, while the software used during the development of this application has the following specifications Windows 7 Operating System ,XAMPP,Notepad++.

3.1 Analysis

To prove the correctness of the analysis results, it is necessary to prove the results of manual calculations with program results. The following are the stages of designing a car selection recommendation process with manual counting TOPSIS. For example, the reference value for each car is determined by the administrator as follows:

a. Determination of input variables

The input variable is needed to carry out the used car recommendation process and the results of the calculation are used as a reference value for each car.

Table 1. Weight Value Conversion

	C ₁	C ₂	C ₃	C ₄	C ₅	C ₆
Splash	550	5	1200	140	5	40
Brio	550	5	1200	170	7	70
Jazz	650	5	1500	230	10	80
SX4	700	5	1500	220	8	70
Avanza	500	7	1500	165	6	60
Ertiga	650	7	1400	210	7	70
Karimun	550	5	1000	100	5	30

After doing manual calculations for comparison with system calculations, different results can be obtained for the value but for ranking the results are the same between manual calculations and system calculations. The following is a comparison of manual calculations and system calculations:

Table 2. Comparison Calculation

No	Car	Mark	No	Car	Mark
1	Jazz	0.895280774	1	Jazz	0.886
2	Ertiga	0.846794303	2	Ertiga	0.848
3	SX4	0.806811151	3	SX4	0.787
4	Avanza	0.561033498	4	Avanza	0.512
5	Brio	0.498555582	5	Brio	0.487
6	Splash	0.072914658	6	Splash	0.07
7	Karimun	0.003193368	7	Karimun	0.003

Based on Table 2, it can be observed that the results of manual calculations with system calculations are slightly different with a conformity value of 90%. Where the different values are SX4. This value looks quite different between manual calculations and system calculations. Where the manual calculation has a value of 0.806811151 and the system calculation is 0.787.

TOPSIS method is used to complete practical decision making. Information about used cars is used as a criterion as input to produce a clear output as a basis for decision making. With a lot of information and can confuse buyers, it can be overcome by applying the TOPSIS method. With this decision support system it can help not to harm buyers as well as used car sellers.

4. CONCLUSION

Based on the results of testing the decision support system application, recommendations for the selection of used cars. The results of the implementation by entering the user's budget and the required attributes can help used car buyers in choosing a car that suits the user's taste.

The recommendation process uses a comparison of the default TOPSIS results for each car based on specifications with the type of car the user wants. The TOPSIS results become a reference for decision making on the results of the recommendations.

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