



## Factors for Selecting Honda Matic Motorcycles In Medan City With Analytical Hierarchy Process (AHP) Method

Andi Wiranto

<sup>1</sup>STMIK Pelita Nusantara, Indonesia

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### ABSTRACT

The city of Medan is the center of government, trade, education and so on in the North Sumatra region. The high mobility in the city of Medan makes the transportation system very important. The problem of transportation in the city of Medan is also a very complex problem, especially the increasing dependence on private vehicles, both cars and motorbikes. And this causes congestion to be higher in the city of Medan and has become a common thing. Along with the development of automatic motorcycle transportation, which is increasing, both in terms of motorcycle design criteria, vehicle performance, and fuel economy used. Therefore, not a few consumers have difficulty in choosing an automatic two-wheeled vehicle that suits their needs. The purpose of this study is to analyze the factors that influence the selection of Honda matic motorcycles in Medan using the AHP (analytical hierarchy process) method. The AHP method is a decision support system aimed at assisting consumers in the process of selecting a Honda matic motorcycle to be purchased according to their needs.

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### *Corresponding Author:*

Andi Wiranto,  
STMIK Pelita Nusantara, Indonesia  
Email: [wirantoandi34@gmail.com](mailto:wirantoandi34@gmail.com)

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## 1. INTRODUCTION

Motorcycle is one of the two-wheeled transportation that is widely used and needed by the majority of people in Indonesia. Motorcycles can facilitate us in our daily activities and are also considered by many people to be more practical and easy to carry anywhere. This has an impact on the increasing demand for motorcycles and many motorcycle manufacturers are competing to increase the advantages and advantages of their respective products. One type of motorcycle that is currently popular with the public is the Honda matic motorcycle.

In Indonesia, there are several types of Honda matic motorbikes, including Vario motorbikes, beat motorbikes and Scoopy motorbikes. Many people choose to use automatic motorcycles because they are easier and more practical to use.

In the selection of this Honda matic motorcycle, of course, every consumer wants to get the best results and according to their needs. So a decision support system is needed to support decisions as well as various alternatives and solutions offered. The need for a decision support system is very necessary to assist consumers in selecting Honda matic motorcycles.

Based on the background of the problem above, the researcher is interested in conducting research at PT Rosella persada Mandiri III with the title: factors for selecting Honda matic motorcycles in the city of Medan using the AHP method.

## 2. RESEARCH METHODE

### Decision support system

Decision making is the process of selecting an action among various alternatives to achieve a certain goal. Decision making involves a process of thinking about the problem according to data requirements and modeling the problem that leads to the interpretation and application of knowledge. A decision support system is an interactive information system that provides information, modeling and manipulating data that is used to help decision makers in semi-structured situations where no one knows for sure how decisions should be made.

This decision support system is used in this research as a rule that will be used in assisting decision making by utilizing certain data and models to determine the selection of Honda matic motorcycles.

### 2.2 Analytical Hierarchy Process (AHP) Method

The Analytical Hierarchy Process (AHP) method is a framework for making effective decisions from complex problems by simplifying and accelerating the decision-making process by solving the problem into its parts, arranging these parts 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 acts to influence the outcome of the situation.

The stages of the Analytical Hierarchy Process (AHP) method to solve a problem are as follows:

1. Define the problem and determine the desired solution. In this stage we try to determine the problem that we will solve in a clear, detailed and easy to understand manner.
2. Create a hierarchical structure that starts with the main goal.
3. Prioritization for each problem element in the hierarchy. This process results in the contribution of elements to the achievement of goals so that the element with the highest weight has priority in handling.
4. Perform consistency testing on comparisons between elements obtained at each level of the hierarchy.

In decision-making it is important to know how good the constituency is because we don't want a judgmental decision with low constancy. The things that must be done in this step are:

1. 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.
2. Sum each row
3. The result of the row sum divided by the corresponding relative priority element
4. Add the quotient above with the number of elements, the result is called  $\lambda max$
5. Calculate the consistency index (CI) with the formula:

$$CI = \frac{\lambda max - n}{n - 1}$$

Where :

n = number of elements based on the criteria source.

= The largest eigenvalue of a matrix of order  $n \lambda max$  Calculate the consistency ratio (CR) with the formula:

$$CR = \frac{CI}{IR}$$

Where :

CR = Consistency ratio (final result of calculation)

CI = Consistency index

IR = Index random consistency

$$CRH = \frac{M}{M}$$

6. Check the consistency of the hierarchy. If the value is more than 10% then the judgment data assessment must be corrected. However, if the consistency ratio 0.1 then the calculation results are declared correct

### 2.3 Definition of automatic motorcycle

An automatic motorcycle is a motorcycle that was created without coping and gear. Automatic motorbikes in today's era are very popular because they are very easy to use and have many enthusiasts, both parents, adults, and school children.

### 2.4 Understanding the selection criteria for automatic motorcycles

1. Motorcycle price

The price of an automatic motorbike is usually in accordance with the quality contained in the motorbike. Motorcycle prices consist of cash, credit, and even discounts.

### 2. Motorcycle design

The design of the motorcycle consists of the body of the motorcycle, the color of the motorcycle and the seat of the motorcycle. This design is very influential for consumer selection of the purchase of a motorcycle.

### 3. Motorcycle quality

The quality of the motorcycle consists of speed, tank capacity, and luggage volume. Usually automatic motorbikes have a larger luggage volume than other motorbikes.

## 3. RESULT AND ANALYSIS

### System analysis and planning

This study discusses a decision support system that functions to support decision making to determine the best lecturers using the AHP (Analytical Hierarchy Process) method by collecting data by distributing questionnaires to students in the fifth semester of mathematics class IV.

The criteria set by researchers in determining the best Honda matic motorcycle are:

1. Product price
2. Product design
3. Product quality

#### 4.2 Model design

For the problem of measuring and comparing the quality of the selection of Honda matic motorcycles, the dimensions used as criteria include: product price, product design and product quality. The steps of the AHP method for the selection of a Honda matic motorcycle are:

1. Determine the symbols used for each criterion, but in this study the researchers chose not to use symbols in each criterion.
2. Determine the weight of each criterion. In this study, researchers used a hierarchy to make it easier to determine each criterion weight.
3. Create a pairwise comparison matrix for each criterion.

The matrix is obtained from the weighting that has been done. After all the results of the weighting of the criteria are entered into the matrix, then the matrix is simplified by converting each number in the form of a fraction to a decimal.

Criteria	Price	Design	Quality
Price	1,000	3,272	1,380
Design	0.306	1,000	0.859
Quality	0.725	1.164	1,000
total	2.031	5,436	3,239
Column	4.062	10,872	6,478

#### Simplified pairwise comparison matrix for each criterion

##### 4. Normalize data

By dividing the elements in each column by the total number in the respective column, a normalized relative weight will be obtained. The eigenvector values are generated from the average of the relative weight values for each row.

Criteria	Price	Design	Quality	Line	Eigen vector
Price	0.492	0.602	0.426	1.52	0.507
Design	0.151	0.184	0.265	0.60	0.200

quality	0.357	0.214	0.309	0.88	0.293
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#### Normalization of the pairwise comparison matrix for each criterion

5. Calculate the eigenvalues of the vector and test its consistency

The eigenvalues of the vectors are obtained by dividing the rows and columns (matrix order). The following is the calculation of the vector eigenvalues:

Eigen vector price =  $1.52/3 = 0.507$

Design vector eigen =  $0.60/3 = 0.200$

Quality vector eigen =  $0.88/3 = 0.293$

From the eigenvectors it can be seen that:

- a. The price criteria have the highest priority, namely 0.507
- b. The design criteria have the lowest priority, namely: 0.200
- c. The quality criterion has the second criterion, namely 0.293

So we can conclude that the order of criteria for the selection of a Honda matic motorcycle is:

1. Price
2. Quality
3. Design

#### 4.3 Logical consistency

At this stage, the validity of the eigenvectors that we obtained previously will be determined:

1. Transferring unnormalized paired matrices with eigenvectors

$$\begin{bmatrix} 1,000 & 3,272 & 1,380 \\ 0,306 & 1,000 & 0,859 \\ 0,725 & 1,164 & 1,000 \end{bmatrix} \times \begin{bmatrix} 0,507 \\ 0,200 \\ 0,293 \end{bmatrix} = \begin{bmatrix} 0,507 & 0,654 & 0,404 \\ 0,155 & 0,200 & 0,252 \\ 0,368 & 0,233 & 0,293 \end{bmatrix} = \begin{bmatrix} 1,566 \\ 0,607 \\ 0,893 \end{bmatrix}$$

2. Calculation with eigenvectors

$$\begin{bmatrix} 1,566 \\ 0,607 \\ 0,893 \end{bmatrix} : \begin{bmatrix} 0,507 \\ 0,200 \\ 0,293 \end{bmatrix} = \begin{bmatrix} 3,088 \\ 3,034 \\ 3,049 \end{bmatrix}$$

3. Add up the results then divide the result of the operation by the order of the matrix = 3 and the final result will be  $\max.\lambda$   
 $(3.088 + 3.034 + 3.049) : 3 = 3.057$

4. Calculating the consistency index (CI)

$$CI = \frac{\lambda_{maks} - 1}{n - 1} = \frac{3,057 - 1}{3 - 1} = \frac{0,057}{2} = 0,029$$

5. Calculating consistency ratio (CR)

$$CR = \frac{CI}{IR} = \frac{0,029}{0,58} = 0,049$$

From the calculations carried out above, the value of CR . is obtained  $\leq 0.1$  or less than 10% then the hierarchy is consistent so that the conclusion is acceptable.

## CONCLUSION

At this time the development of motorcycle transportation has become very important for the majority of Indonesian people. And because of the many factors that influence the selection of Honda matic motorcycles, this research was conducted. In conducting research on the factors that influence the selection of a Honda matic motorcycle, the researcher uses the AHP method which is a simple and flexible method that accommodates creativity in its approach to a problem. this methodable to solve unstructured multi-criteria problems to be more structured and easier to understand with accurate results.

The criteria that influence the selection factors for Honda matic motorcycles in Medan are price being the top priority with a value of 51%, quality being the second priority with a value of 29%, and design being the last priority with a value of 20%.

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