How to cite: 
from unstable market conditions, the Company needs to forecast motorcycle sales in the next few years. Referring to several research journals that have been carried out, in doing a forecast using the trend analysis method [2-6]. Trend forecasting analysis can be used by PT. Astra Honda Motor to forecast motorcycle sales in the next few years.

In order to support the company in evaluating the results of sales forecasting in the coming year period, a decision support system is needed for companies in analyzing the types of motorcycles that are most in demand by consumers. Based on several research journals that have been carried out, one method that can be used in analyzing decision support systems is the Analytical Hierarchy Process (AHP) method [7-11]. This method can be applied to PT. Astra Honda Motor in analyzing decision support systems on the selection of the type of motorcycle that is most in demand by consumers.

**Literature Review**

**Forecasting**

Forecasting is a step to measure or estimate the state of the business in the future [13]. Sales forecasting is an estimate of sales that will occur in the future and under certain conditions and is made based on data that has occurred and may occur.

There are several types of forecasting as follows [14]:

1) **Economic forecasting** is about the business cycle by predicting the inflation rate, the money supply, housing development, and other indicators.

2) **Technological forecasting** is related to the level of development in technology, where technology can result in the creation of new, more attractive products that require new plants and equipment.

3) **Demand forecasting** is a projection of the demand for products or services from the company. Forecasting drives decisions so managers need fast and accurate information about actual demand levels.

**Forecasting Methods**

1) **Qualitative forecasting** is a forecasting that combines several factors such as intuition in decision making, emotions, personal experiences, and value systems.

2) **Decision of the opinion of the executive jury**, in this method the opinions of experts or a group of managers are often combined with statistical models, and then aggregated to obtain predictions of group demand.

3) **Delphi method** is a forecasting technique that uses a group process, where experts make forecasts as follows:
   - Combination or combination of sales force, this forecasting method optimizes the number of sales in a particular region, this forecast is then reviewed to ensure whether the forecast is realistic enough, then combined at regional and national levels to obtain an overall forecast.
   - Consumer market research, this forecasting method asks for input from consumers regarding their purchase plans in the future.

4) **Quantitative forecasting** is forecasting that uses one or more mathematical models with past data and causal variables to forecast demand. There are five methods in the quantitative method, namely the naive approach method, the moving average method, the exponential smoothing method, trend smoothing, and linear regression. Basically this quantitative method is divided into two:
   - Forecasting method based on time series, this model looks at what happened over a period of time using past data series to make predictions.
   - The causal methods or correlation methods, combined into variables or relationships that can affect the amount being forecasted.

**Decision Support System**

Decision support system is a system intended to support managerial decision makers in semi-structured decision situations [15]. Meanwhile, Decision support system as a system that has five main characteristics [16], namely:

- A computer-based system.
- Used to help decision makers.
- Solve complex problems that are impossible to do using manual calculations.
- Through interactive simulation.
- Data and analysis models as the main components.

In a decision support system there are three main components, namely:

- Database management is a data subsystem that has been organized in a database. The data comes from the internal and external environment. The decision support system requires data that is relevant to the problem to be solved through a simulation.
- Base model is a model that presents the problem in a quantitative format which becomes a simulation of decision making, the purpose of the problem, the associated components, and the existing constraints. This base model allows decision making in developing and comparing alternative solutions.
- The user interface is a combination of database management and model base. This user interface displays system output for users and receives input from users in a decision support system.

There are several benefits to a decision support system, namely:

- Improve the ability of decision makers in processing and processing data for users.
- Helping decision makers to solve very complex and unstructured problems.
- Produce solutions quickly and accurately.
- Can be a stimulant for decision makers in understanding the problem because it is able to present various alternative solutions to problems.

**Methods**

**Trend Analysis**

Trend analysis method is used to forecast sales at the company PT. Astra Honda Motor in the next 2 years. In conducting the analysis using the trend analysis method has the following stages [4]:

1) **Collecting Data to be Analyzed**: The data used in conducting this research is statistical data on motorcycle sales in the period 2011 to 2020 obtained from Aisi.or.id [1].

2) **Calculating Linear Trend Analysis**: In performing linear trend analysis calculations, it has the following formula [2,3]:

\[ Y_t = a + bt \]  \hspace{1cm} (1)

With the values \( a \) and \( b \) obtained from the formula:

\[
a = \frac{\sum Y}{n}
\]
\[
b = \frac{\sum tY}{\sum t^2}
\]  \hspace{1cm} (2)

3) **Calculating Quadratic Trend Analysis**: In performing the calculation of quadratic trend analysis has the following formula or formula:

\[ Y_t = a + bt + ct^2 \]  \hspace{1cm} (3)

With values \( a, b, \) and \( c \) obtained from:

\[
a = \frac{\sum Y - c \sum t^2}{n}
\]
\[
b = \frac{\sum tY}{\sum t^2}
\]  \hspace{1cm} (4)
\[
c = \frac{n \sum t^2Y - \sum t^2 \sum Y}{n \sum t^4 - (\sum t^2)^2}
\]

4) **Calculating Exponential Trend Analysis**: In calculating the exponential trend analysis has the following formula or formula:

\[ Y_t = a - b^t \]  \hspace{1cm} (5)

But to make it easier to find the values of \( a \) and \( b \), the above equation can be converted into semi log form as follows:

\[
\log Y = \log a + \log b
\]

\[
\rightarrow a = \text{anti log} \left[ \frac{\sum \log Y}{n} \right]
\]
\[
\rightarrow b = \text{anti log} \left[ \frac{\sum t \log Y}{\sum t^2} \right]
\]  \hspace{1cm} (6)

5) **Choosing the Best Trend Analysis**: In determining the best forecasting analysis results, the method used is the Mean Square Error (MSE) method. Mean Square Error
MSE calculation has the following formula [2]:

\[ MSE = \frac{\sum e^2}{n} \]  

(7)

6) Conduct Evaluation

**Analytical Hierarchy Process (AHP) Analysis**

Analytical Hierarchy Process (AHP) is a method of decision making developed by Thomas Saaty in the 1970s [12]. The Analytical Hierarchy Process (AHP) analysis method is used to analyze the decision support system in selecting the type of motorcycle that is most in demand by consumers. The results of the analysis can be used in supporting decisions for the company PT. Astra Honda Motor in determining the products to be produced and distributed in the market. In conducting the analysis using the Analytical Hierarchy Process (AHP) analysis method, it has the following stages [7-9, 11]:

1) Defining Problems and Goals: After knowing the results of the analysis of sales forecasting in the coming year period, the company PT. Astra Honda Motor needs to know the products that will be produced and distributed to the market, so that the company can obtain the maximum level of sales and profits, so that from these problems it can be determined that the goal to be achieved by using the Analytical Hierarchy Process (AHP) analysis method is the selection types of motorcycles that are most in demand by consumers.

2) Creating a Hierarchical Structure: Based on the identification of existing problems and predetermined goals, the hierarchical structure is as shown in Fig. 1 below:

![Figure 1. AHP Hierarchical Structure in Motorcycle Type Selection](Source: Thomas Saaty, 2021)

3) Create a Pairwise Comparison Matrix: Each criterion will be made a pairwise comparison matrix with other criteria, for example, the price criteria will be compared with the criteria for use, model and design, fuel consumption, and so on. Each alternative will also be made a pairwise comparison matrix with other alternatives, the comparison of these alternatives is carried out according to each predetermined criterion.

4) Setting the Priority of Elements: In determining the priority of each of these elements, it is determined based on the results of the questionnaire data, where the weight of the element values is obtained from the results of the answers of the respondents (customers and prospective consumers of Honda products) that have been processed.

5) Synthesizing Priorities: The results of the pairwise comparison of each criterion and
alternative will be prioritized by adding up the values of each column in the matrix, then normalizing the matrix by dividing each value from the column by the total column concerned, after that get the average value by adding up the values of each row and dividing by the number of elements.

7) Measuring Consistency: After synthesizing priorities, the next step is to measure the level of consistency by multiplying each value in each column by the relative priority of the respective element, then adding up each row, then dividing the result from the sum of the rows by the priority element the relative concerned, the last step is to add up the quotient above with the number of elements that exist, the result must be maximum.

8) Calculating Consistency Index (CI): Performing the calculation of Consistency Index using the formula:

\[
CI = \frac{\lambda - n}{n - 1}
\]  \hspace{1cm} (8)

Where \(n\) is the number of elements.

9) Calculating Consistency Ratio (CR): Performing the calculation of Consistency Ratio using the formula:

\[
CR = \frac{CI}{IR}
\]  \hspace{1cm} (9)

10) With \(CR\) is the consistency ratio, \(CI\) is the consistency index, and \(IR\) is the random consistency index.

11) Checking Hierarchical Consistency: Re-checking all calculation results provided that the consistency ratio must be less than or equal to 0.1.

12) Obtaining Analysis Results and Conducting Evaluations.

Software Tools Used

In conducting this research, to conduct analysis with trend analysis method using a tool (Software Tool), namely Microsoft Excel. Software tools are needed to speed up and avoid errors in calculating formulas. The stages in using Microsoft Excel software are as follows:

- open the microsoft excel application
- displaying statistical data on motorcycle sales to be analyzed
- perform analysis using linear trend analysis method
- perform analysis using the quadratic trend analysis method
- perform analysis using the exponential trend analysis method
- perform analysis on the results of forecasting calculations using the linear trend, quadratic trend, and exponential trend method using the mean square error method
- choose the trend method that has the lowest error rate as the best trend method.

In addition, to perform analysis using the Analytical Hierarchy Process (AHP) method using Super Decision software [10]. The stages in using this Super Decision software are as follows:

- open the super decision app
- create a new cluster according to a pre-defined hierarchical structure,
- inserting nodes or elements in each cluster
- connect each element in each cluster
- carry out an assessment or weighting according to the results of the questionnaire
- display the results of the analysis.

Results and Discussion

Forecasting Analysis Trend Method

In conducting sales forecasting analysis using the trend method, the data used is secondary data, namely statistical data on motorcycle sales at PT. Astra Honda Motor in the period 2011 to 2020. The statistical data has been processed and can be presented briefly in Table 1 below.
Table 1. Motorcycle Sales Statistics PT. AHM

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales Volume of PT. AHM (Unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>4,275,212</td>
</tr>
<tr>
<td>2012</td>
<td>4,092,693</td>
</tr>
<tr>
<td>2013</td>
<td>4,696,999</td>
</tr>
<tr>
<td>2014</td>
<td>5,051,100</td>
</tr>
<tr>
<td>2015</td>
<td>4,453,888</td>
</tr>
<tr>
<td>2016</td>
<td>4,380,888</td>
</tr>
<tr>
<td>2017</td>
<td>4,385,888</td>
</tr>
<tr>
<td>2018</td>
<td>4,759,202</td>
</tr>
<tr>
<td>2019</td>
<td>4,910,688</td>
</tr>
<tr>
<td>2020</td>
<td>2,892,168</td>
</tr>
<tr>
<td>Total</td>
<td>43,898,726</td>
</tr>
</tbody>
</table>


Based on the data in Table 1 above, the results of the calculation of linear trend analysis at PT. Astra Honda Motor using Microsoft Excel software are as follows:

Based on Fig. 2 above, the results of the calculation of linear trend analysis using Microsoft Excel software, in 2021 PT. Astra Honda Motor has forecast sales of 3,855,148 units, while in 2022 PT. Astra Honda Motor has forecast sales of 3,906,536 units.

Based on Fig. 3 above, the calculation results of quadratic trend analysis using Microsoft Excel software, in 2021 PT. Astra Honda Motor has a sales forecast of 17,071,335,585 units, while in 2022 PT. Astra Honda Motor has a sales forecast of 17,086,105,540 units.
Based on Fig. 4 above, the results of the calculation of the exponential trend analysis using Microsoft Excel software, in 2021 PT. Astra Honda Motor has forecast sales of 2,715,032 units, while in 2022 PT. Astra Honda Motor has forecast sales of 2,671,937 units.
Based on Figure 5 above, the results of the calculation of the mean square error analysis using Microsoft Excel software, it is known that the error value of the linear trend method is $4,564,388,251,618,850 \times 10^{14}$, the error value of the quadratic trend method is $372,305,228,797,516,000,000 \times 10^{19}$, and the error value of the exponential trend method is $656,871,171,054 \times 10^{11}$, so that the exponential trend analysis method is the best method to choose as an analytical method in sales forecasting PT. Astra Honda Motor.

Analysis of Decision Support System AHP Method

In analyzing the decision support system using the Analytical Hierarchy Process (AHP) method, the data used are primary data, namely questionnaire data distributed to consumers and potential customers of PT. Astra Honda Motor. The data has been processed and presented in the following Table 2.

Table 2. Geomean Value of Questionnaire Data

<table>
<thead>
<tr>
<th>Geomean Values</th>
<th>Criteria Comparison</th>
<th>Price vs Usability</th>
<th>0.49</th>
<th>Price vs Model &amp; Design</th>
<th>0.78</th>
<th>Price vs Fuel Consumption</th>
<th>0.37</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Usability vs Model &amp; Design</td>
<td>2.22</td>
<td></td>
<td>Usability vs Fuel Consumption</td>
<td>1.09</td>
<td></td>
<td>Model &amp; Design vs Fuel Consumption</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Alternative Comparison</th>
<th>Based on Price Criteria</th>
<th>Matic vs Sport</th>
<th>5.41</th>
<th>Matic vs Underbone</th>
<th>3.15</th>
<th>Sport vs Underbone</th>
<th>0.52</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Matic vs Sport</td>
<td>5.47</td>
<td></td>
<td>Matic vs Underbone</td>
<td>3.77</td>
<td></td>
<td>Sport vs Underbone</td>
</tr>
<tr>
<td>Based on Model &amp; Design Criteria</td>
<td>Based on Fuel Consumption Criteria</td>
<td>Matic vs Sport</td>
<td>1.84</td>
<td>Matic vs Underbone</td>
<td>3.88</td>
<td>Sport vs Underbone</td>
<td>1.35</td>
</tr>
<tr>
<td></td>
<td>Matic vs Sport</td>
<td>4.62</td>
<td></td>
<td>Matic vs Underbone</td>
<td>2.11</td>
<td></td>
<td>Sport vs Underbone</td>
</tr>
</tbody>
</table>

Source: Google Form and Microsoft Excel, 2021.
1) Validity Test
In analyzing the decision support system, the questionnaire data used needs to be tested for validity first. This is done to determine the accuracy and accuracy of an instrument or question data given. Testing is done by using SPSS software. The results of the validity test of the questionnaire data can be seen in Table 3 below.

Table 3. Validity Test Results

<table>
<thead>
<tr>
<th>Pair Comparison</th>
<th>R Count (Pearson Correlation)</th>
<th>R Table (Coefficient 0.05)</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.303</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>2</td>
<td>0.300</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>3</td>
<td>0.349</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>4</td>
<td>0.288</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>5</td>
<td>0.377</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>6</td>
<td>0.254</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>7</td>
<td>0.625</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>8</td>
<td>0.669</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>9</td>
<td>0.456</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>10</td>
<td>0.617</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>11</td>
<td>0.684</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>12</td>
<td>0.451</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>13</td>
<td>0.511</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>14</td>
<td>0.669</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>15</td>
<td>0.400</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>16</td>
<td>0.586</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>17</td>
<td>0.654</td>
<td>0.132</td>
<td>Valid</td>
</tr>
<tr>
<td>18</td>
<td>0.465</td>
<td>0.132</td>
<td>Valid</td>
</tr>
</tbody>
</table>


Based on the results of the validity test in Table 3 above, it is known that the calculated r value in all comparisons from pairwise comparisons 1 to 18 has a value greater than the value of r table (0.132), so that all questionnaire data instruments can be declared valid and ready to be used. analysis was carried out.

2) Reliability Test
In analyzing the decision support system, in addition to testing the validity, the questionnaire data used also needs to be tested for reliability first. This is done to show the consistency of a measuring instrument and the measurement results can be trusted. Testing is done by using SPSS software. The results of the questionnaire data reliability test can be seen in Table 4 below.

Table 4. Reliability Test Results

<table>
<thead>
<tr>
<th>Reliability Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cronbach’s Alpha</td>
</tr>
<tr>
<td>R Table (Coefficient 0.05)</td>
</tr>
<tr>
<td>0.797</td>
</tr>
</tbody>
</table>

Source: SPSS Software, 2021
Based on the results of the reliability test in Table 4 above, it is known that the Cronbach’s Alpha value is 0.797, this value is greater than the r table value (0.132) and the Cronbach’s Alpha Standardized value (0.6), so that all questionnaire data instruments can be declared reliable and ready for analysis.

3) Analytical Hierarchy Process (AHP) Analysis
In analyzing the Analytical Hierarchy Process (AHP) using processed questionnaire data, namely the data in Table II, the calculations are carried out using the Super Decision software. The results of the calculations are as follows:

![Figure 6. AHP Method Analysis Results](source: Super Decision Software, 2021)

Based on Fig. 6 above, the results of the Analytical Hierarchy Process (AHP) analysis using Super Decision software, it is known that the price criterion has a priority value of 0.07 (15%), the usability criterion has a priority value of 0.16 (33%), the model & design criteria have a priority value of 0.08 (16%), the fuel consumption criterion has a priority value of 0.18 (36%), while the motor matic alternative has a priority value of 0.32 (63%), the sport motorbike alternative has a priority value of 0.07 (14%), and the duck motorbike alternative has a priority value of 0.12 (23%).

Conclusion
In this study, in analyzing the company’s sales forecasting PT. Astra Honda Motor uses three trend forecasting analysis methods, namely linear trend, quadratic trend, and exponential trend. Based on the calculation of the mean square error analysis, the trend analysis method that has the smallest error value is the exponential trend method, so that method is chosen as the best trend analysis method for forecasting sales.

Based on the results of the analysis of the decision support system using the Analytical Hierarchy Process (AHP) method, the type of motorcycle that is most in demand by consumers is the automatic motorcycle. The criteria for motorcycles that are needed by consumers are aspects of fuel consumption.

Acknowledgment
On this occasion, I would like to thank the director of the Indonesian Motorcycle Industry Association (AISI) and also to PT. Astra Honda Motor for providing support so that this research can be carried out properly.

References


