

Analysis of Consumer Demand Forecasting of Toyota Avanza, Daihatsu Senia and Honda Brio Car Products During the Covid-19 Pandemic

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Abstract— Automotive sector has worst performance during the pandemic refers to Purchasing Manager Index (PMI) out of level 27.5 which should be at the normal level > 50. To respond this situation, the government made a policy regarding the LTV Ratio for property loans, the FTV ratio for property financing, and advances for credit or vehicle financing. Therefore, this study aims to analyze and forecast the demand of car which are represented by Toyota Avanza 1500cc, Daihatsu Xenia 1500cc and Honda Brio Satya as the most selling car in Indonesia. The forecasting technique was performed by a time series approach with the moving average, exponential smoothing and trend analysis method. Moreover, this study was performed a comparative analysis with MAD, MSE and MAPE to obtain accurate results method with the smallest error number. Afterward, this study found that the moving average method has high accuracy in forecasting for Toyota Avanza 1500cc and Daihatsu Xenia 1500cc. Meanwhile, trend analysis is well accurate forecasting for Honda Brio Satya. The results show an increase in demand for all types of cars sampled. It indicates that consumers have well respond due to government policies about vehicle financing and loans.

Keywords— demand forecasting, cars demand, moving average, trend analysis, exponential smoothing.

I. INTRODUCTION

At the end of 2019, a pandemic outbreak occurred in China that caused the death of many people, this outbreak known as COVID-19 (WHO, 2020). This pandemic leads to severe social and economic consequences (Guarner J, 2020). Many countries make policies and concentrate their budgets to overcome the spread of covid-19. Covid-19 cases were recorded in Indonesia in March 2020 when two suspected Japanese nationals entered Indonesia (Ratcliffe, 2020). In Indonesia, Covid-19 has a significant impact on many activities such as health, economy, social and politics. Economically, Statistics Indonesia (*Badan Pusat Statistik*) stated that in August Indonesia's economic growth in the second quarter of 2020 was minus 5.32%.

Indonesia has never imposed a lockdown (WHO., 2020). Companies in Indonesia are allowed to conduct their business with restrictions. So that the company faces uncertainty and has to fight hard to run a business while adapting to Indonesian policies. However, many companies collapsed during the pandemic because they were unable to deal with the situation (Ministry of Industry, 2020) one of the most affected sectors is the manufacturing sector which is the focus sector of the Indonesian economy (Kemenperin, 2020). From the current conditions, this sector contribute 19.62% to GDP and decreased as seen from the Purchasing Manager Index (PMI) to the level of 27.5 which should be at the

normal level of > 50 (Ministry of Industry, 2020). The Manufacturing Sector is focused by three sub-sectors, namely automotive, food and beverage, and electronics with a contribution up to 54.02% to the manufacturing sector and from these three sub-sectors, automotive experienced the worst performance (Kemenperin, 2020).

Whereas the Automotive sub-sector is one type of business that has a fairly rapid development in Indonesia (Gaikindo, 2019; Ministry of Industry, 2020). The increasing quantity of automotive companies is one proof that the automotive industry has attracted many investors to get involved. The largest automotive investors in Indonesia are Toyota, Daihatsu and Honda with the largest products sold as the following data.

Table Error! No text of specified style in document..
Car Sales Data in Indonesia By Brand

Tahun	Bulan	Toyota Avanza	Daihatsu Senia	Honda Brio	
2020	Mar	6,627	1,684	3,139	
	April	242	96	489	
	Mei	91	0	10	
	Juni	401	11	172	
	Juli	989	41	1,232	
	Agust	469	75	572	
	Sept	1,988	396	1,699	
	Okt	2,775	374	4,344	
	Nov	3,888	437	3,262	
	Des	3,869	180	3,79	
	2021	Jan	2,906	803	2,450
		Feb	1,919	347	3,597
Maret		7,249	1,025	4,192	
April		5,384	721	3,780	
Mai		4,672	585	1,757	

Source: Gaikindo Data (2020 -2021)

Table 1 shows the fluctuations of cars sale during the period March 2020 to May 2021. According to (Gaikindo, 2021), the car brands that sold from each brand are Avanza, Xenia and BRIO SATYA. Although, there are an increase caused by investment, the automotive and komopen sub-sectors have decreased by 7.03% since the beginning of 2020 in line with the decline in the manufacturing industry due to a decrease in demand (BEI, 2020) According to the Rural Bank (BPR Bank, 2021) the number of motor vehicle loans decreased to 103,680 billion rupiah. This reinforces evidence that people's purchasing power for motor vehicles decreased during the period March 2021 to May 2021.

Car Sales in Indonesia Data by Brand 2020-2021



Figure Error! No text of specified style in document.. Car Sales in Indonesia Data By Brand 2020-2021
Source: Gakindo, 2021

In response to these conditions, the government provides policies on LTV Ratio for property loans, FTV ratios for property financing, and down payments for credit or motor vehicle financing (Bank Indonesia, 2021) PBI (LTV/FTV, 2021). This is an effort to encourage the purchasing power of middle and upper economic groups towards automotive products considering the contribution of automotive products to GDP is very significant. However, this policy did not get a good response from some people.

They choose to save rather than shop because people face uncertainty caused by the pandemic. People need to prepare for financial health and basic needs due to disobedience when conditions will return to normal (Jin et al., 2021). On the other hand, many people with safe financial conditions take advantage of this moment. (Kemenprin, 2021) explained that the automotive sub-sector had experienced market fluctuations and performance improvements and contributed 4.24 percent at the end of 2020. Investment value increased to reach a total of 71.35 trillion rupiah and the value of import-export on this sub-sector reached 65.99 trillion.

Market fluctuations that occur in automotive products are increasingly difficult to predict due to many macro factors such as pandemics. In the competitive industry, automotive companies must prepare themselves in

managing their resources in order to be able to keep up with market fluctuations. Calculation of the amount of inventory must be done for the fulfillment of market needs. In order to achieve this goal, the company must implement management functions, namely planning, organizing, briefing, and supervising (Rombe, 2018). Faced with the risk of uncertainty, the company must ensure that its products can meet consumer demand. Planning is needed to achieve organizational goals and business growth (John et al, 2017; Rombe, 2018). Model planning needed at this moment is how the company does product planning. This is to minimize the emergence of excess costs because of overproduction and opportunity costs due to the company cannot meet the demand because of limited stock (Suhartanti, 2009; David, 2017; Cahyadewi and Agung, 2020).

According to (Rombe, 2018) forecasting methods can be used to predict future conditions. This will help business owner or managers in making future planning, especially demand planning. Forecasting works well when it can provide benefits and reduce unnecessary losses in business activities (Render and Barry., 2011; Rombe, 2018). Demand forecasting is the rate of demand for products that will be realized for a certain period in the future. This demand forecasting will be a very important input in the company's planning and control decisions Because the operational production department is responsible for producing the products needed by consumers and production operation decisions are strongly influenced by the results of demand forecasting (Nasution and Prasetyawan, 2008).

Therefore, based on the description, this study will use forecasting techniques on the number of demand for Toyota Avanza 1500cc, Daihatsu Xenia 1500cc and Honda Brio Satya cars to predict the condition of demand for car products in the future as well as provide an idea of whether the implementation of government policies on financing and credit of motor vehicles is welcomed by the public.

[Font: Times New Roman, Size:10] Highlight a section that you want to designate with a certain style, then select the appropriate name on the style menu. The style will adjust your fonts and line spacing. Do not change the font sizes or line spacing to squeeze more text into a limited number of pages. Use italics for emphasis; do not underline.

To insert images in Word, position the cursor at the insertion point and either use Insert | Picture | From File or copy the image to the Windows clipboard and then Edit | Paste Special | Picture (with —Float over textl unchecked) (keep text wrapping top-bottom).

II. LITERATURE REVIEW

Forecasting is the art or science of predicting future events by involving historical data and projecting it into the future with a form of mathematical model according to (Heizer, 2015). Assauri (1993) explained that Forecasting is an art and science in predicting events that may be faced in the future. The essence of forecasting is the estimate of events in the future based on patterns in the past and the use of policies against projections with patterns in the past (Prasetya, 2011). Risk and uncertainty are the main of forecasting.

According to Prasetya (Prasetya 2011) states the three main types of forecasting in planning for future operations, the three main forecasting are:

1. Economic Forecasting (Economic Forecast)
2. Technology forecasting (Technological Forecast)
3. Demand Forecasting (Demmad Forecast)

Forecasting is usually classified based on the future time horizon. According to (Heizer, 2015) In relation to the forecasting time horizon is divided into 3 types, namely:

1. Short-term Forecasting (*immediate future*) is forecasting in the near future.
2. Medium-range forecasting is forecasting at a period of one or two months to one year.
3. Long-range forecast is forecasting a period longer than one year, two years or more.

III. RESEARCH METHODOLOGY

The research method used in this study is a descriptive quantitative method (Suliyanto, 2018) which limits the research subject to three types of cars as representatives of the most sold vehicles in Indonesia in 2020-2021. The car brands are Toyota Avanza 1500cc, Daihatsu Xenia 1500cc and Honda Brio Satya. The focus of this research is the number of car demand in period during March 2020 to May 2021 in Indonesia. The data used in this study is secondary data sourced from the Indonesian Motor Vehicle Industry Association (GAIKINDO) in 2020-2021. The analysis technique used in this study is medium-term demand forecasting analysis with a time series model using Standard Query Language (SQL) software. The time series model only needs the historical value of a variable to create a basis for predicting the future value of that variable. Time series models are widely applied to demand demand in industry (Morzuch, 2005). Researcher applies the time series forecasting method using the approach of forecasting moving averages, trends, and exponential smoothing. Researcher uses comparative analysis of forecasting methods, namely the mean absolute deviation (MAD), mean square error (MSE) and mean square percentage

error (MAPE) methods to obtain accurate results with the smallest error rate (Koehler, 2004; Heizer, Render, Barry, 2011)

Description of Car Observation Sales in Indonesia

The manufacturing sector is the focus of the Indonesian economy in terms of current conditions with a contribution of 19.62% to GDP (Kemenperin, 2020). However, the pace of the manufacturing sector during the pandemic has regressed, judging from the Purchasing Manager Index (PMI) to the level of 27.5, far below the normal level of > level 50. The manufacturing sub-sector that has been most adversely affected is the automotive sub-sector (Kemenperin, 2020). Even though the Automotive sub-sector is one of the sub-sectors that has a fairly rapid development in Indonesia (Gaikindo, 2019); (Kementrian Perindustrian, 2020). In Indonesia there are 3 largest automotive companies, namely Toyota, Daihatsu, and Honda, with the largest sold products namely Avanza, Xenia and Brio as the following data shows:

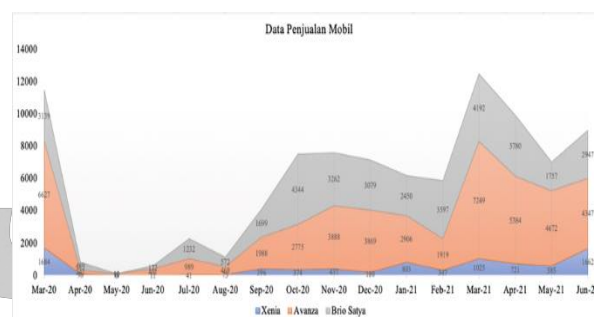


Figure 2. Xenia, Avanza and Brio Satya Car Sales Data in Indonesia for the Period of March 2020 to June 2021
Source: Secondary Data Processed 2021

Based on the chart in Picture 2 above shows that Avanza sales have highest sales level value followed by Brio and Xenia judging from the size of the area. But, there was a significant decrease in car sales from March to April 2020. The decrease occurred when the Covid-19 pandemic began to hit Indonesia. As is known, covid-19 cases began to be recorded in Indonesia in March 2020 when two suspected Japanese nationals entered Indonesia (Ratcliffe, 2020). Furthermore, the lowest level of car sales occurred in the May 2020 period where Xenia sales reached the 0-unit point in that period as shown in Table 2.

Table 2. Description of Xenia, Avanza and Brio Satya Car Sales in Indonesia

	Xenia	Avanza	Brio Satya
Min	0	91	10
Max	1684	7249	4344
Mean	527.31	2988.50	2295.05

Source: Secondary data processed, 2021.

In may 2020, Xenia was the lowest sales car throughout the observation period followed by Brio Satya with 10 units and Avanza with 91 units.

However, judging from Picture 2, these worst conditions did not last long. The car sales began to increase in fluctuatively in the next period.

This condition is gradually recovering considering that the Indonesian government began to impose the new normal era of Covid-19 in May (WHO, 2020).

The implementation of the new normal is carried out as a step to accelerate the handling of Covid-19 in the economic, health, and social fields.

Economic and social activities in the community began to run with strict health protocols in the midst of the Covid-19 pandemic situation.

The change in the situation towards normalcy is good news for car sales. Until March 2021, Avanza and Brio car sales can reach the highest peak with sales units of 7,249 and 4,344 units. Even, the sales of new Xenia cars can reach the highest selling unit in the June 2021 period.

The occure of high fluctuations in car sales in the observation period becomes something understandable. This is because observations were made at the same time as the Covid-19 pandemic occurred.

The current situation is a huge disaster that swept the entire world. Bringing major impacts and changes to consumer behavior, supply chains, economic systems, health and social.

The situation is increasingly dynamic and moving fast uncertainly making it difficult to predict (Accenture, 2021; Banks, 2020; venette, 2003).

However, this research still parses and explains in detail the predictions of Avanza, Xenia and Brio Satya car sales even though the situation is moving dynamically

IV. DISCUSSION AND RESULTS OF RESEARCH

Trend Analysis

The Trend method using the least square method can obtain the magnitude of the value used at the midpoint, then the constant prices of a and b are obtained from the equation. The results of forecasting analysis with the trend method are as follows:

Xenia Car Sales

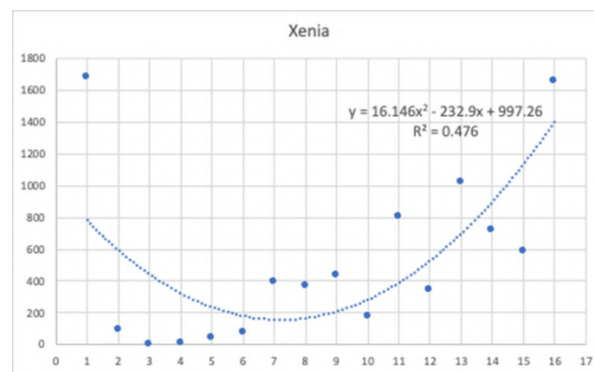


Figure 3. Equation of Forecasting of Xenia Car Sales Using the Trend Method

Sumber: Data Sekunder Diproses 2021

Based on the results of forecasting analysis using the trend method, it can be seen that the forecasting equation formed is $Y = 16.146x^2 - 232.9x + 997.26$. The equations made from trend analysis will be used as the basis for forecasting in this research, so that forecasting data are obtained as follows:

	Month to day	Period	Xenia Sales
Forecasting Results	17	Jul-21	1471
	18	Aug-21	1803
	19	Sep-21	2168
	20	Oct-21	2565
	21	Nov-21	2994
	22	Dec-21	3455
	23	Jan-22	3949
	24	Feb-22	4475
	25	Mar-22	5033

Table 3 Results of Xenia Car Sales Forecasting Analysis Using the Trend Method

Source: Secondary Data Processed 2021

To make easier to understand table above, Researcher illustrates it through a graph as follows:

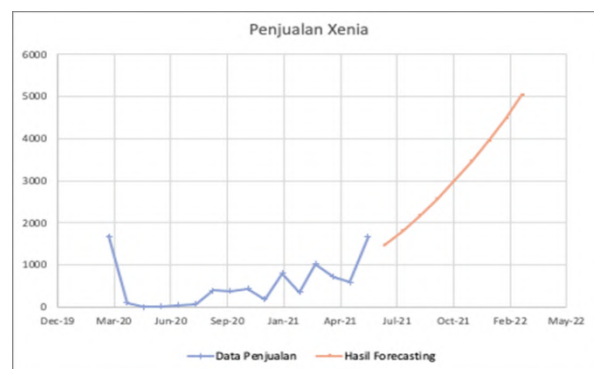


Figure 4. Results of Xenia Car Sales Forecasting Analysis Using the Trend Method

Source: Secondary data processed, 2021

Based on the results from forecasting analysis using the trend method, it concluded that there will be a projection

on the increase in Xenia car sales in July-21 to May-22 with car sales units reaching 5,033 units.

Avanza Car Sales

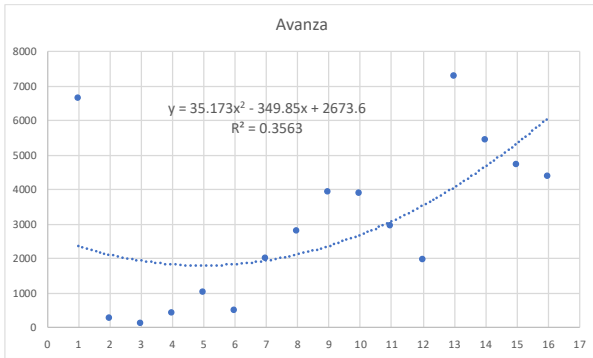


Figure 5. Equation of Forecasting of Avanza Car Sales Using the Trend Method
 Source: Secondary data processed, 2021

Based on the results of forecasting analysis using the trend method, it can be seen that the forecasting equation formed is $Y = 35.173x^2 - 349.85x + 2673.6$. The equations made from trend analysis will be used as the basis for forecasting in this research, so that forecasting data are obtained as follows

Table 4. The Result of Avanza Car Sales Forecasting Analysis Using trend method

Month to day	Period	Avanza
17	Jul-21	6541
18	Aug-21	7423
19	Sep-21	8374
20	Oct-21	9396
21	Nov-21	10488
22	Dec-21	11651
23	Jan-22	12884
24	Feb-22	14187
25	Mar-22	15561

Source: Secondary data processed, 2021

To make easier to understand table above, Researcher illustrates it through a graph as follows:

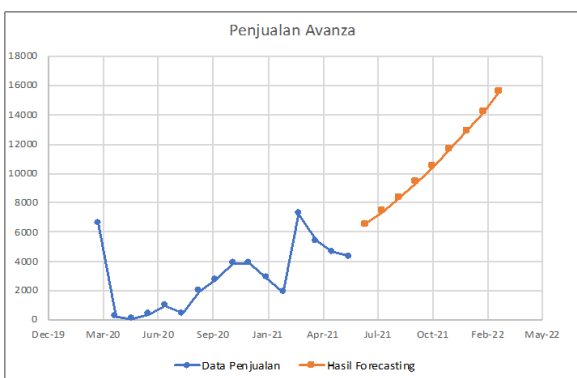


Figure 6. The Result of Avanza Car Sales Forecasting Analysis Using the Trend Method
 Sumber: Data sekunder diproses, 2021

Based on the results from forecasting analysis using the trend method, it concluded that there will be a projection on the increase in Avanza in July-21 to May-22 it reached 15,561 units.

Brio Satya Car Sales

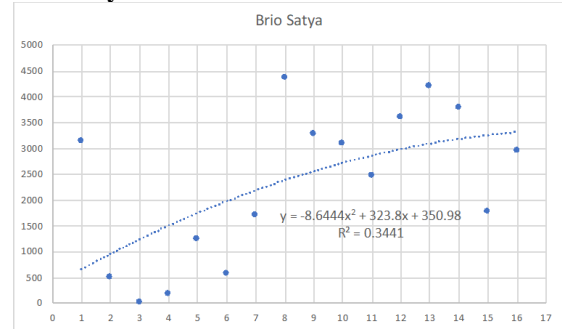


Figure 7. Equation of Forecasting of Brio Satya Car Sales Using the Trend Method
 Sumber: Data sekunder diproses, 2021

Based on the results of forecasting analysis using the trend method, it can be seen that the forecasting equation formed is $Y = -8.6444x^2 + 323.8x + 350.98$. The equations made from trend analysis will be used as the basis for forecasting in this research, so that forecasting data are obtained as follows:

Table 5. The Result of Brio Satya Car Sales Forecasting Analysis Using trend method

No	Period	Brio Satya
17	Jul-21	3681
18	Aug-21	3702
19	Sep-21	3706
20	Oct-21	3693
21	Nov-21	3662
22	Dec-21	3614
23	Jan-22	3549
24	Feb-22	3467
25	Mar-22	3367

Source: Secondary data processed, 2021.

To make easier to understand table above, Researcher illustrates it through a graph as follows:

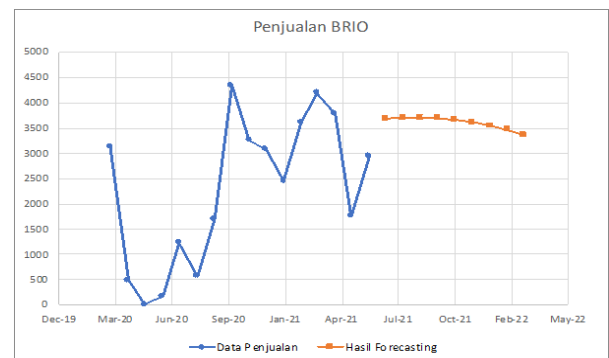


Figure 8. The Result of Brio Satya Car Sales Forecasting Analysis Using the Trend Method
 Source: Secondary Data Processed

Based on the result of forecasting using the trend method, it can be concluded that there will be a decreased slopingly in brio car sales in July-21 to May-22 to reach 3,367 units. Furthermore, to see the level of error that may occur in the result of this analysis trend, it can be seen from the MAPE value. If the MAPE value shows a small percentage, it indicates that the probability of errors that may occur is small as follows:

Table 6. Trend Method Forecasting Error Rate

	Xenia	Avanza	Brio
MAD	2461.19	2025.82	744.15
MSE	9423412.81	5928613.62	793686.47
MAPE	9.03	2.03	0.31

Secondary Data Sources Processed 2021

Table 6 shows that the error rate that may occur in forecasting sales using the trend method in Xenia sales is 9.03%, Avanza is 2.03% and Brio is 0.31%.

If the alpha used is 0.1 then all forecasting results are significant even though Brio has the strongest level of significance, which is 0.0031

Moving Average Analysis

Forecasting analysis through the moving average method in this study used historical data for 3 months or known as MA-60 (Montgomery, D.C, Jennings, C. L., 2015).

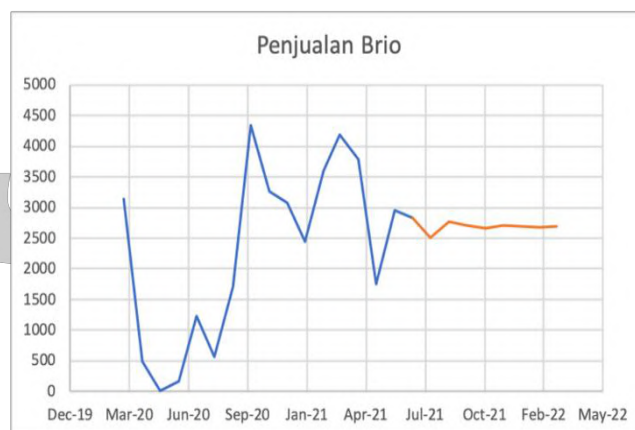
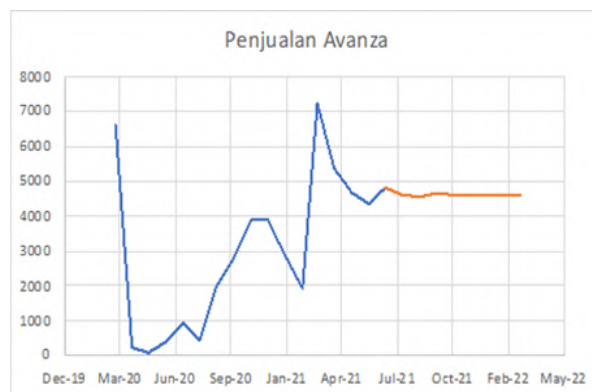
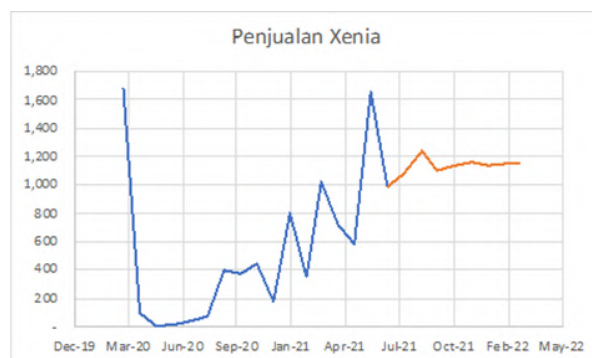
Based on the result of forecasting analysis using the moving average method, the following results are obtained:

Table 7. The Result of Car Sales Forecasting Analysis Using Moving Average Method 60

	Month to Day	Period	Xenia		Avanza		BRIO	
			MA60	MA60	MA60	MA60		
Forecasting Result	17	Jul-21	989	989	4801	4801	2828	2828
	18	Aug-21	1079	1079	4607	4607	2511	2511
	19	Sep-21	1243	1243	4585	4585	2762	2762
	20	Oct-21	1104	1104	4664	4664	2700	2700
	21	Nov-21	1142	1142	4619	4619	2658	2658
	22	Dec-21	1163	1163	4623	4623	2707	2707
	23	Jan-22	1136	1136	4635	4635	2688	2688
	24	Feb-22	1147	1147	4625	4625	2684	2684
	25	Mar-22	1149	1149	4628	4628	2693	2693

Source: Secondary data processed, 2021

To make easier to understand the result of the forecasting analysis using MA-60, the researcher illustrates it through a graph as follows:



Source: Secondary Data processed 2021

Figure 9. The Result of Car Sales Forecasting Analysis Using the Moving Average Method 60

Table 7 shows that all sales on Xenia, Avanza and Brio car vehicle types experienced very high fluctuations during the period from March 2020 to May June 2021. This could be caused by the Covid-19 pandemic which has had many impacts on the business sector such as supply chain shock, closing borders, customer change behavior (Accenture, 2020). However, based on the result of the analysis using the Moving average of 60, it is known that sales of Xenia, Avanza and Brio car vehicles will tend to be stable in the coming period. However, Xenia car sales still experienced slight fluctuations in the period from July to October 2021. Furthermore, to see the level of error that may occur in the result of this moving average analysis, it can be seen from the MAPE value. If the MAPE value shows a small

percentage, it indicates that the probability of errors that may occur is small as follows:

Tabel 8 Tingkat Kesalahan Peramalan Metode Moving Average

	Xenia	Avanza	Brio
MAD	289.41	1412.49	1010.51
MSE	150468.91	3091780.83	1694712.26
MAPE	4.55	0.77	0.85

Source: Secondary Data Processed 2021

Table 8 shows the error rate that may occur in forecasting sales using the moving average method on Xenia car sales is 4.55%, Avanza car is 0.77% and Brio car is 0.85%. If the Alpha used is 0.1 then all forecasting results are significant and Avanza has the strongest level of significance, which is 0.0077.

Exponential Smoothing Analysis

Any method of quantifiable forecasting requires adjustments to fluctuations that occur. In exponential smoothing this study added a factor called smoothing constant and given the alpha symbol (Montgomery, D. C, Jennings, C. L., 2015). The addition factor is directly related to the latest sales data. The alpha value used in exponential smoothing analysis is 0.2 (Ravinder, 2013). In the analysis using this method, it only produces forecasting for the next 1 month. This is because forecasting on exponential smoothing only uses historical data for the previous 1 month. The result of the exponential smoothing analysis are as follows:

Table 9. The Result of Car Sales Forecasting Analysis Using Exponential Smoothing Method

Month to day	Period	Xenia Forecast	Avanza Forecast	Brio Forecast
Forecast	17 Jul-21	818	4177	2879
Alpha				0.2

Source: Data secondary processed, 2021.

To make easier to understand the result of forecasting analysis using the exponential smoothing method, the researcher illustrates it in form of a graph as follows

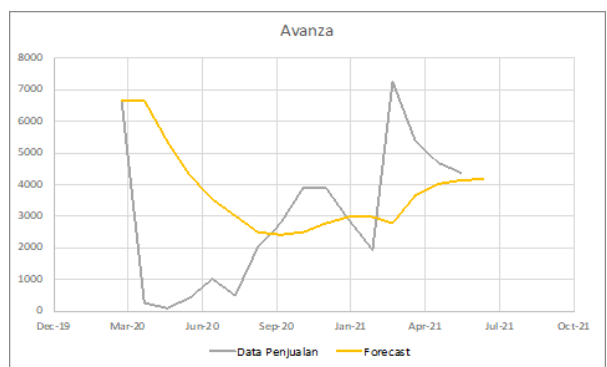
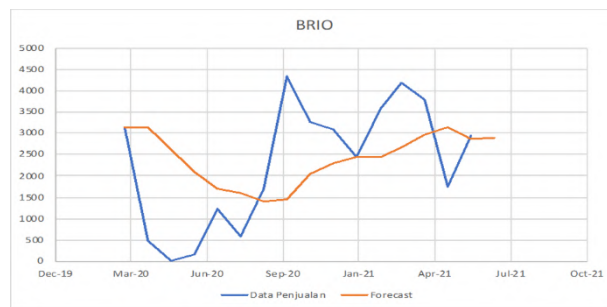
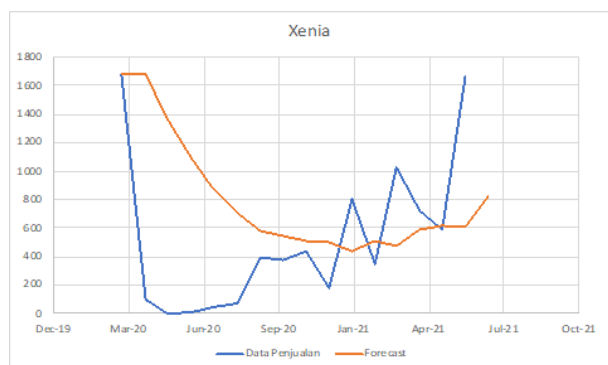


Figure 10. The Result of Car Sales Forecasting Analysis Using Exponential Smoothing Method
Source: Secondary Data Processed, 2021

Based on the graph in Figure 10 above, it is known that exponential smoothing analysis can illustrate sales predictions using only historical data from the previous 1 month. However, for data in a certain month, the results of forecasting with forecasting analysis with exponential smoothing have significant differences with the original sales data. But, looking at the forecasting results in July 2021, it is stated that sales forecasting for Avanza and Brio car vehicles will tend to be stable at 4,177 and 2,879 units. Another case with Xenia, the sale of this car will experience a significant increase when compared to the previous month. Furthermore, to see the level of error that may occur in the result of this exponential smoothing analysis, it can be seen from the MAPE value. If the MAPE value shows a small percentage, it indicates that the probability of errors that may occur is small as follows:

Table 10 Error Rates of Exponential Smoothing Methods

	Xenia	Avanza	Brio
MAD	1156.69	3716.25	1278.94
MSE	1610662.06	18149311.1	2721105.31
MAPE	17.13	8.92	21.53

Source: Data Sekunder Processed, 2021

Table 10 shows the error rate that may occur in conducting sales forecasting using the exponential smoothing method for Xenia car sales is 17.13%, Avanza car is 8.92% and Brio car is 21.53%. So if the

alpha used is 0.1, it can be confirmed that only Avanza's sales forecasting is significant i.e 8.92% or 0.089.

Model Evaluation

Table 11. The Results of Model Evaluation among Trend Method, Moving Average Method, and Exponential Smoothing Method.

	Xenia	Avanza	Brio
Trend	2461.19	2025.82	744.15
Moving Average	289.41	1412.49	1010.51
Exponential	1156.69	3716.25	1278.94
MSE			
	Xenia	Avanza	Brio
Trend	9423412.81	5928613.62	793686.47
Moving Average	150468.91	3091780.83	1694712.26
Exponential	1610662.06	18149311.13	2721105.31
MAPE			
	Xenia	Avanza	Brio
Trend	9.03	2.03	0.31
Moving Average	4.55	0.77	0.85
Exponential	17.13	8.92	21.53

Source: Secondary data processed, 2021.

MAD, MSE and MAPE are ways to evaluate and decide which forecasting method is the most accurate so that it can be used as a basis for decision making (Montgomery et al, 2015). If the values of MAD, MSE and MAPE are the smallest when compared to others, it can be concluded that the method has better accuracy (Montgomery and Jennings, 2015; Hyndman and Athanasopoulos, 2018).

Therefore, based on the analysis of model evaluation. It is known that the most accurate method for forecasting the sales of Xenia and Avanza cars is the moving average forecasting analysis method, while the most accurate method for forecasting Brio car sales is the trend forecasting method. So based on the results of the study, stakeholders can refer to the data peraftof Xenia and Avanza car sales produced by the moving average method as a consideration in making decisions, while for Brio car sales can refer to the forecasting data generated by the trend method.

The results of research on the moving average method which has a level of accuracy for sales forecasting are in line with previous research conducted by Kusyanto et al (2020) and Khamaludin (2019) who conducted sales forecasting where the moving average method showed more accurate results compared to other methods. In addition, the results show that the trend method can be used for forecasting sales, this is in line with previous

research conducted by Mulyani (2021) and Wardah & Iskandar (2016). Furthermore, this study confirms that moving averages and trends have a low error rate. This statement is also supported by many previous studies as previously explained. Based on this consideration, for similar cases, namely sales forecasting, especially the sale of automotive goods, it can use the moving average method and trend method.

V. CONCLUSION

Based on the results and discussions carried out in this study, it can be concluded that:

1. The forecasting method using the moving average method becomes the most accurate for forecasting the sales of Xenia cars. This can be seen from the analysis of moving averages, Xenia car sales experienced an increasing trend in the September 2021 period and fell steadily at 1,100 units for the coming period.
2. The forecasting method using the moving average method becomes the most accurate for forecasting the sales of Avanza cars. This can be seen from the analysis of moving averages, Avanza car sales in the future will tend to be stabled at 2,700 units and even have almost no upward or downward trend.
3. The trend forecasting method becomes the most accurate for forecasting the sales of Brio Satya cars. Based on the result of trend analysis, Brio Satya car sales in the future will slowly decreased by 8.53% from 3,681 to 3,367 units.
4. Government policy to stimulate the increase in public consumption on vehicles, especially cars, has been successful, this is seen from the increase in car sales for Avanza and Xenia. However, there was a different response to public consumption in the purchase of Honda Brio brand cars, where there was a decrease in sales of the car brand.

Futher Research Advice

This research was conducted using time series assumptions to predict car sales in the future. However, this study does not consider other factors in forecasting. Therefore, the future research can forecast car sales using the regression method, so factors that affect car sales can be carried out.

This study only conducted medium-term observations for 16 months. This makes historical data scanty even though this data is the basis for forecasting. Therefore, future research can carry out long, medium and short-term forecasting so that they can see more detailed forecasting results because they assume different scenarios.

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