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Application Of Double Exponential Smoothing Holt's Method For Poverty Line Forecasting: A Study Case of East Kalimantan Province

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***Abstract*— Poverty is a complex problem faced by every region, including East Kalimantan Province. The poverty line is used as an important indicator to determine the poor population, and data from the Badan Pusat Statistik of East Kalimantan Province shows an upward trend every year, for example from IDR 796,193 per capita per month in 2023 to IDR 853,997 in 2024. This study aims to forecast the poverty line for the next ten periods using Holt's Double Exponential Smoothing (DES) method, which is suitable for data with trend patterns. The data used is the time series from the first semester of 2011 to the second semester of 2024. The analysis was carried out by determining the optimal smoothing parameters, calculating the forecast values, and evaluating the model with an error measure. The results of the study show optimal parameters of α = 0.98 and β = 0.01, with a MAPE value of 4.56%. This relatively small error value indicates that Holt's DES method is effective in producing accurate forecasts. These findings are expected to provide input for local governments in formulating strategies and policies for poverty alleviation based on predictive data.**

***Index Terms*— *Poverty Line, Forecasting, Double Exponential Smoothing Holt's, East Kalimantan, MAPE*.**

I. INTRODUCTION

Poverty is one of the fundamental, complex, and multidimensional problems faced by almost all developing countries, including Indonesia. This problem is not only related to limited income, but also has implications for various aspects such as education, health, and social welfare [1]. According to the Badan Pusat Statistik of East Kalimantan Province (BPS), poverty is defined as the inability of a person to meet basic food, and non-food needs as measured by expenditure. People with a per capita monthly expenditure below the poverty line are categorized as poor [2].

The poverty line serves as an important indicator for determining the level of community welfare and measuring the number of people living in poverty. Based on data from the East Kalimantan Provincial Statistics Agency, the poverty line in the province has shown an upward trend in recent years, from IDR 790,186 per capita per month in 2023 to IDR 833,955 per capita per month in 2024 [3]. This increase indicates that the economic conditions of the community are not yet stable and that there are still economically vulnerable groups. To support the formulation of effective policies, the government needs accurate and reliable information on the poverty line. Therefore, poverty line forecasting is important in order to predict future socioeconomic conditions and assist in planning more targeted poverty alleviation programs.

In the context of economic data analysis, Holt's Double Exponential Smoothing (DES) method is one of the effective time series approaches for predicting data with linear trend patterns. This method was developed by Charles C. Holt and has the adaptive ability to update trend value estimates based on changes in historical data [4]. Several previous studies have shown the effectiveness of Holt's DES method in producing high levels of accuracy. [1] found the smallest MAPE value of 2.541% in forecasting the poverty line in South Buru Regency. [5] showed accuracy results with a MAPE value of 1.8% in the Special Region of Yogyakarta Province, while [6] found that the Holt's DES method was more accurate than ARIMA with a MAPE difference of 3.62%.

Compared to other forecasting methods, DES Holt's has a number of advantages. This method does not require a differencing process like ARIMA, making it more efficient for data that is not too long and does not contain seasonal patterns [7]. Holt-Winters, although capable of capturing seasonal components, is less relevant for data with pure linear trend patterns. Meanwhile, machine learning methods such as LSTM or hybrid ARIMA-LSTM require large amounts of data and high computational resources [8], while the Prophet model is more suitable for data with strong cyclical and seasonal variations [9]. Compared to simple linear regression, Holt's DES is superior because it can account for autocorrelation between time periods and is

dynamic to changes in data patterns, while linear regression only provides a static relationship between time and the dependent variable [10].

Based on these issues, it can be concluded that this study focuses on the development of the poverty line in East Kalimantan Province and how Holt's Double Exponential Smoothing method can be used to accurately forecast the poverty line. The objectives of this study are to analyze poverty line trends in East Kalimantan Province, apply Holt's DES method in forecasting, and evaluate the accuracy of the resulting forecasts. The results of this study are expected to contribute to the local government in providing accurate information to support decision-making and the formulation of strategic policies for poverty alleviation in East Kalimantan Province.

II. THEORY

Building on these findings, this study extends the application of Holt's Double Exponential Smoothing method specifically to East Kalimantan, aiming to evaluate its effectiveness in forecasting the poverty line within a regional context. Unlike ARIMA, which requires data stationarity and a larger sample size, Holt's DES is more suitable for short-term forecasting with a clear linear trend, making it appropriate for the poverty line data in East Kalimantan.

A. Poverty Line

The poverty line is used as a boundary to classify people as poor or not poor and can be used as a consideration in socio-economic reforms, such as welfare improvement programs and unemployment insurance [11]. People who have an average monthly per capita expenditure below the poverty line are included in the poor [12].

B. Forecasting

Forecasting is an art and knowledge to predict future events in the present [13]. Forecasting is a calculation analysis technique carried out with qualitative and quantitative approaches to estimate future events using historical data references [14]. Forecasting is an important tool in the planning and decision-making process in the future. Forecasting in this case is not always accurate, because the accuracy of the forecasting process depends on the data obtained and the methods used [15]. Forecasting has the aim of reducing errors in the forecasting process, which is generally measured using Mean Square Error, Mean Aboslute Error, and others [16].

C. Double Exponential Smoothing

Holt's DES is a method introduced by CC. Holt in 1958, used on data that has a trend pattern. Holt's DES method is a trend smoothing method that uses different parameters from the parameters used in the original data. This method uses two smoothing parameters, α (Level) and β (Trend) with values between 0 and 1 ($0 < \alpha < 1$). Holt's DES method is used to generate a new trend in the data to remove irrelevant components from the raw data, such as data subject to random fluctuations and estimate more accurate results [17]. The calculation to find the parameter α (Level) is given as equation (1) [18]:

$$S_t = \alpha X_t + (1 - \alpha)(S_{(t-1)} + T_{(t-1)}) \quad (1)$$

The calculation to find the parameter β (Trend) is given as equation (2):

$$T_t = \beta(S_t + S_{(t-1)} + (1 - \beta)T_{(t-1)}) \quad (2)$$

For the calculation to find the fitted value is given as equation (3):

$$F_t = S_{(t-1)} + T_{(t-1)} \quad (3)$$

To perform m forecasting results is given as equation (4):

$$F_{(t+m)} = S_t + T_t(m) \quad (4)$$

One way to initialize the Holt method is to set the value $S_1 = X_1$ and is given as equation (5):

$$T_1 = \frac{((X_2 - X_1) + (X_3 + X_2))}{2} \quad (5)$$

Description:

S_t = Level value at period t
α = Smoothing parameter value between 0 and 1 ($0<\alpha<1$)
β = Second parameter value for tren smoothing
X_t = Actual value at period t
T_t = Trend value at period t
F_t = Fitted value at period t
m = Forecasting period to be forecast
t = Time (1, 2, 3...)
F_{t+m} = Forecasting value at period t + m for m = 1, 2, 3, ...

D. Mean Absolute Percentage Error

In forecasting, forecasting testing is needed to determine the smallest error rate in forecasting which is commonly referred to as forecast error [19]. There are many methods that can be used, but not all methods will be suitable for the case and data used. Therefore, a method of measuring forecasting accuracy is needed to evaluate the analysis model used. In this study, the metric used is Mean Absolute Percentage Error (MAPE). Mean Absolute Percentage Error (MAPE) is calculated by dividing the absolute error of each period by the actual observed value for the current period. MAPE is used to produce the smallest error compared to other methods. In addition, MAPE is also used to determine the percentage of forecast error in the calculated forecasting results. The MAPE value can be calculated using equation (7) [20]:

$$MAPE = \frac{1}{n}\sum_{t=1}^{n} \left| \frac{X_t - F_t}{X_t} \right| \quad (7)$$

Description:

n = Number of data
X_t = Actual data in period t
F_t = Forecasted data in period t
t = Time (1, 2, 3,...)

Referring to the accuracy value based on the MAPE equation, forecasting results are said to be good if they meet one of the following criteria:

TABLE 1 MAPE CATEGORY

MAPE Value	Category
<10%	Very Good
10% - 20%	Good
20% - 50%	Enough
>50%	Not Enough

III. METHOD

In general, the stages in the research method used in conducting research are organized systematically to achieve the desired result. The stages of this research can be seen as shown in Fig. 1.

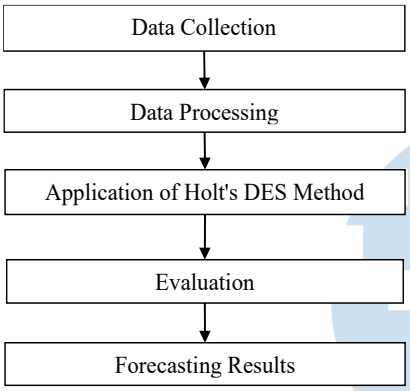

Fig. 1 Methodology

A. Data Collection

This study uses secondary data in the form of poverty line data for East Kalimantan Province obtained from official publications by the East Kalimantan Provincial Statistics Agency (BPS). The data used is semester data (twice a year), starting from Semester I of 2011 to Semester II of 2024, resulting in a total of 28 observations. Data searches are also carried out on the internet through the official website (https://kaltim.bps.go.id/id/query-builder) of the Badan Pusat Statistik of East Kalimantan Province (BPS) to complement it. The form of research data is semi-annual data with quantitative data types and based on the source is secondary data.

The data was taken directly from the publication Statistics on People's Welfare and Poverty Profile in Indonesia by Province published by BPS without any transformation or smoothing (raw data). Before being used in the analysis, the data was checked to ensure that there were no missing values, anomalies, or inconsistencies between periods. This check was carried out to ensure the reliability and validity of the data so that the forecasting results obtained could represent the actual conditions of the poverty line in East Kalimantan Province.

Semester data was selected to capture the relatively rapid dynamics of changes in the poverty line compared to annual data, while still being stable enough to be analyzed using time series forecasting methods.

B. Data Processing

With the collection of data needed in the research, the next stage is data processing to get accurate forecasting analysis results. The data will be processed using Holt's DES method with the help of Google Colab tools. The goal is for researchers to know the forecasting of the poverty line for the next ten periods, namely from the first semester (September) 2024 to the second semester (March) 2029. In addition to forecasting for the next few periods, the analysis is also carried out to find out whether the data has increased or decreased or fluctuated during that period. Then, the results of the analysis that has been carried out will be compared with historical data obtained from BPS East Kalimantan Province.

C. Application of Holt's DES Method

The analytical method applied in this study to forecast the poverty line of East Kalimantan Province is the Holt's Double Exponential Smoothing (DES) method. This method is particularly appropriate for data that exhibit a linear trend pattern, as it incorporates both the level and trend components in its forecasting process. The linear trend can be represented through a straight-line equation derived from the scatter diagram of the observed data over a given period.

Holt's DES method is widely recognized for its high forecasting accuracy across short-, medium-, and long-term horizons. In general, it is capable of predicting up to 4 periods (1–2 years), 6–10 periods (3–5 years), and even 20 periods (around 10 years) ahead with reliable results. Considering that the poverty line data in East Kalimantan Province displays a consistent upward trend over time, this method is deemed suitable for the present study.

To ensure optimal model performance, the selection of the smoothing parameters (α and β) was conducted through an optimization process based on minimizing forecasting errors. A grid search approach was implemented by testing combinations of α and β values ranging from 0.1 to 0.9 with 0.01 intervals. The parameter pair yielding the lowest Mean Absolute Percentage Error (MAPE) value was chosen as the optimal configuration for the model.

This optimization process aims to minimize forecasting errors and enhance the model's accuracy in capturing the trend behavior of the poverty line in East Kalimantan. All computations and model estimations were performed using Python software (Statsmodels), specifically utilizing the holt() function from the statsmodels.tsa.holtwinters library. The final model, calibrated with optimal parameters, was subsequently used to generate fitted values, evaluate model performance through error metrics (MAPE), and

forecast the poverty line for the next 10 periods, extending up to Semester II of 2029.

D. Evaluation

Forecasting accuracy testing is carried out with the aim of knowing the level of accuracy of the method in forecasting data. Thus, the results of this forecasting accuracy test are expected to show that the model used is accurate and valid. Testing the forecasting accuracy of this research will use the MAPE method. This method is used to test forecasting accuracy because it has advantages. The advantage of this method is that it can provide information about the level of error size in forecasting which can make it easier if the forecasting error size level is too low or too high, so that the results obtained are more accurate.

E. Forecasting Results

At this stage, the forecasting results are obtained by forecasting the value of the poverty line of East Kalimantan Province for the next 10 periods using the optimal Holt's DES method. The results of the forecasting analysis will be made a data visualization in the form of a dashboard in the form of a graph of the results of forecasting the poverty line of East Kalimantan Province from semester I (September) 2024 to semester II (March) 2029 using the Looker Studio application. Data visualization aims to be able to see patterns and trends in forecasting results against the results of accuracy tests using the MAPE metric to compare with historical data.

IV. Result and Discussions

A. Poverty Line Data

Based on the results of the research that has been conducted, several results can be summarized into several sections, starting with the data collection and processing stages, the application of the methods used to the results in the form of forecasting. The first stage is the collection of data on the poverty line of East Kalimantan Province for the last 13 years (2011-2024) from the official website of the Central Bureau of Statistics (BPS) of East Kalimantan Province. Table 2 shows the poverty line data of East Kalimantan Province in tabular form.

Table 2 East Kalimantan Poverty Line Data

Year	Semester I	Semester II
	March	September
2011	316.819	336.019
2012	347.577	363.887
2013	381.706	417.902
2014	431.560	444.248
2015	473.710	494.207
2016	511.205	526.686
2017	548.094	561.868
2018	574.704	598.200
2019	609.155	638.690
2020	662.302	669.622
2021	689.035	703.223
2022	728.208	768.120
2023	790.186	833.955
2024	833.955	853.997

Based on Table 3, the poverty line data of East Kalimantan from the first semester (March) 2011 to the second semester (September) 2024 is visualized in the form of a graph as shown in Figure 2.

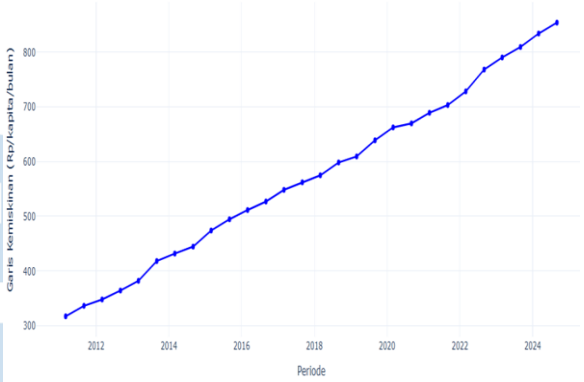

Fig. 2 Plot Data on Poverty Line in East Kalimantan Province 2011-2024

Fig. 2 shows a consistent upward trend from year to year. The poverty line in East Kalimantan has increased significantly from IDR 316,819 in the first semester of 2011 to IDR 853,997 in the second semester of 2024. This increase indicates a change in the minimum cost of living required by the population to fulfill basic needs over the past decade. Visualization not only shows the growth of the poverty line value, but also shows a stable trend pattern, which then becomes the basis for applying the forecasting method. The application of Holt's DES forecasting method is used to predict the value of the poverty line for the next 10 periods, so that the results of this study can provide an overview for future social and economic policy planning.

B. Application of Holt's DES Method

The forecasting method used for forecasting East Kalimantan poverty line data for the next 10 periods in this study is Holt's Double Exponential Smoothing (DES) method. The DES Holt's method was chosen because based on previous research, the DES Holt's method is an easy forecasting method and has proven to be effective and accurate so that it can be used in forecasting data that has a trend pattern. Forecasting using Holt's DES method consists of several sequential steps with the following explanation.

C. Input Data

In this study, the data taken for analysis is secondary data, namely the poverty line data for the province of East Kalimantan from the first semester (March) 2011 to the second semester (September) 2024. The following is the poverty line data for the province of East Kalimantan during this period, which is presented in Table 3.

TABLE 3 EAST KALIMANTAN POVERTY LINE

Period	Poverty Line (IDR/Capita/Month)
2011-03	316.819
2011-09	336.019
2012-03	347.577
2012-09	363.887
2013-03	381.706
…	…
2022-09	768.120
2023-03	790.186
2023-09	809.418
2024-03	833.955
2024-09	853.997

Based on the data in Table 3, the poverty line of East Kalimantan Province during the period, in the forecasting process using Holt's DES method, the data normalization process is not carried out. This is because the poverty line data is already in the original units, namely rupiah per capita per month, so it does not require rescaling. Holt's DES method uses the original values in the time series data without requiring a transformation or scale adjustment process. The normalization process is usually required in certain statistical methods or machine learning algorithms that are sensitive to scale differences between variables, such as Linear Regression, Clustering, and Classification. However, in univariate time series forecasting which only focuses on the patterns, trends, and behavior of one type of data over time, the authenticity of the data values is very important so that the forecasting results match the real conditions and are easily understood in an economic context.

D. Descriptive Statistics

Based on the secondary data that has been collected; to obtain an overview of the poverty line data of East Kalimantan Province for the first semester (March) 2011 to the second semester (September) 2024, descriptive statistical analysis was conducted with the help of Google Colab tools. The following is a descriptive statistical display of the poverty line data of East Kalimantan Province during the period presented in Table 4.

TABLE 4 DESCRIPTIVE STATISTIC

Maximum	316.819
Q1	441.076
Median	568.286
Mean	574.439
Q3	692.582
Maximum	853.997

Based on Table 4.3, the poverty line data for East Kalimantan Province from the first semester (March) 2011 to the second semester (September) 2024 shows that the lowest value occurred at the beginning of the period, in March 2011 at IDR 316,819 per capita per month. Meanwhile, the highest value occurred at the end of the period, namely September 2024 at IDR 853,997 per capita per month. This indicates a significant increase in the cost of living from 2011 to 2024. The median value of IDR 568,286 per capita per month explains that half of the poverty line data falls below this value, which occurred around 2017 to 2018. The mean (average) poverty line value of IDR 574,439 per capita per month is slightly higher than the median. This can be explained by the fact that the poverty line value over the last 13 years has increased quite a lot, indicating a slight skewness to the right. The value of quartile 1 (Q1) is the lower quartile which means the middle value between the smallest value and the median of the data and obtained a value of IDR 441,076 per capita per month while quartile 3 (Q3) which means the middle value between the median and the highest value of the data and obtained a value of IDR 629,582 per capita per month. The Q1 and Q3 values show that 50% of the poverty line values are within the range of IDR 411,076 - IDR 692,582 per capita per month, which covers the middle period, namely 2014 - 2021.

E. Identification Data

From Figure 3, the poverty line data for East Kalimantan from Semester I (March) 2011 to Semester II (September) 2024 tends to increase every year.

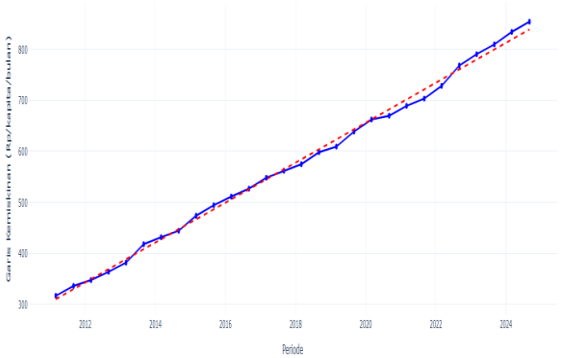

Fig. 3 Trend Pattern Plot of Poverty Line Data of East Kalimantan Province

Based on the pattern of poverty line data in East Kalimantan Province from Semester I (March) 2011 to Semester II (September) 2024, which shows an upward trend pattern in each semester, the DES Holt's forecasting method can be used to forecast the poverty line for the next ten periods. This method can adjust the linear trend pattern found in the data, so the forecasting results are expected to accurately represent the development of the poverty line.

F. Optimal Parameters

Research on poverty line data of East Kalimantan Province Semester I (March) to Semester II (September) 2024 was analyzed using Holt's DES method. The analysis is carried out by smoothing twice, namely smoothing the level and trend values. Before smoothing, the values of α and β parameters for level and trend smoothing must be determined first. Alpha and beta parameters are determined through trial-and-error approach. The following are the results of the α and β parameters presented in Table 5.

TABLE 5 PARAMETER VALUE

α (Level)	β (Tren)
0,98	0,01

Based on Table 5, the optimal alpha value is 0.98 and the optimal beta value is 0.01. Calculations are carried out systematically using the grid search method, which tries various combinations of α and β values in the range of 0.1 to 0.99 with multiples of 0.01 to obtain the most optimal combination of parameters in producing accurate forecasts. Each combination is tested by comparing the resulting forecasting results against the actual data, using the smallest error measure, MAPE. The combination of parameters α and β that produce the smallest error value is selected as the optimal value and then used in the final model to forecast the poverty line.

G. Fitted Value

Fitted values are obtained through the process of calculating level and trend values. Level and trend start from the second year, so the first forecasting results will be obtained starting from the third year. Analysis in the first row, the level and trend values are empty because there is no previous data as a reference. Therefore, the calculation starts from the second row, where the level value is assumed to be the same as the poverty line value in that period, while the trend value is calculated based on the difference between the level value and the poverty line in the previous period. The fitted value is obtained from the sum of the level and trend values, and the result is placed in the third year. The fitted value is the predicted value of the conjecture obtained from the actual data. The fitted value is used to assist in forecasting for the next few periods.

TABLE 6 FIITED VALUE

Year/Semester	Actual Data	Level	Trend	Fitted Value
2011-03	316.819	316.819	19.200	-
2011-09	336.019	336.019	19.200	-
2012-03	347.577	347.730	19.125	355.219
2012-09	363.887	363.946	19.096	366.855
2013-03	381.706	381.733	19.083	383.042
2013-09	417.902	417.560	19.250	400.816
…	…	…	…	…
2022-09	768.120	767.701	19.304	747.190
2023-03	790.186	790.122	19.335	787.005
2023-09	809.418	809.419	19.334	809.457
2024-03	833.955	833.851	19.385	828.753
2024-09	853.997	853.982	19.393	853.236

Table 6 shows the predicted value of the actual data. The fitted value starts from 2012 (March) because according to the formula, the first two rows are not included in the forecasting calculation so that the poverty line forecast in East Kalimantan Province in 2012 (March) is IDR 355,219 per capita per month, 2012 (September) is IDR 366,855 per capita per month, 2013 (March) is IDR 383,042, and so on until 2024 (September) is IDR 853,236 per capita per month.

H. Forecasting Accuracy Testing

Forecasting accuracy testing in this study was carried out using the MAPE metric. Calculation of the accuracy test using the MAPE metric with the optimal α parameter of 0.98 and the optimal β of 0.01, the MAPE value of 4.56% is obtained, indicating that the MAPE value is less than 10% based on the MAPE Category Table, the smaller the MAPE value, the more accurate a model is, so it can be said that the forecasting model using the Holt's DES method has a very good level of forecasting accuracy. From the accurate test results, the metric value produces a relatively small error size value so that the forecasting model using the Holt's DES method used is stable, neither overfitting nor underfitting, and very accurate in forecasting poverty line data.

I. Forecasting Results

The calculation of forecasting data for the poverty line of East Kalimantan Province for the next ten periods using Holt's DES method with optimal parameters α of 0.98 and β of 0.01 using equation 4 can be seen in Table 7 as follows.

TABLE 7 EAST KALIMANTAN POVERTY LINE FORECASTING RESULTS

Period	Year/Semester	Result of Forecasting (IDR/Capita/Month)
1	2025-03	873.374
2	2025-09	892.767
3	2026-03	892.767
4	2026-09	912.160
5	2027-03	931.553
6	2027-09	950.945
7	2028-03	989.731
8	2028-09	1009.124
9	2029-03	1028.517

Based on Table 7, the results of forecasting the poverty line data of East Kalimantan Province from the first semester (March) 2025 to the second semester (September) 2029 using Holt's DES method with optimal parameters show that the value of the poverty line during this period has increased every semester. In 2025 (September), the poverty line value increased to IDR 892,767 compared to IDR 873,374 in 2025

(March) and continued to increase until it reached IDR 1,047,910 in 2029 (September).

To present the poverty line data of East Kalimantan Province in a complete and interactive manner, a visualization dashboard was created. The aim is to facilitate the analysis of poverty line trends from 2011 to 2029. The dashboard displays three main types of data; namely actual data obtained from the website of BPS East Kalimantan Province in the form of secondary data every semester (Semester I March 2011-Semester II September 2024). In the main graph, the actual data is displayed in the form of a blue line that illustrates the growth of the poverty line, while the forecasting results are visualized with a red dotted line that shows an upward trend in the future.

Fig. 4 East Kalimantan Poverty Line Forecasting Dashboard

Figure 4 illustrates the results of the Double Exponential Smoothing Holt's method applied to the poverty line data of East Kalimantan Province from Semester I of 2011 to Semester II of 2029. The blue line represents the actual data obtained from BPS, while the red line indicates the fitted and forecasted values generated by the model. From the figure, it can be observed that the fitted values closely follow the actual data trend, suggesting that the Holt's DES model effectively captures the linear upward trend of the poverty line.

The forecasting line shows a consistent increase over the next 10 periods, implying that the cost of living and basic needs in East Kalimantan will continue to rise gradually. This trend aligns with the socioeconomic dynamics in the region, including urban development, changes in consumption patterns, and inflationary pressures on essential goods. The relatively small forecasting error values (as indicated by MAPE) demonstrate the reliability of the model in projecting future poverty line movements.

Furthermore, this visualization strengthens the argument that Holt's DES is suitable for datasets exhibiting a linear trend without seasonal components. Compared to regression-based or ARIMA approaches, Holt's DES provides a more adaptive mechanism in responding to short-term fluctuations while maintaining long-term trend accuracy. These findings support the conclusion that the model can serve as a robust analytical tool for policymakers to anticipate socioeconomic challenges and design targeted poverty reduction strategies in East Kalimantan Province.

V. CONCLUSION

Based on the forecasting of the poverty line of East Kalimantan Province using Holt's Double Exponential Smoothing (DES) method for the next ten periods, namely from Semester I (March) 2025 to Semester II (September) 2029, it can be concluded that this method is effective in modeling and forecasting the poverty line based on semesterly data from 2011-2024. The method is able to capture a trend pattern that increases consistently over time with optimal parameters alpha (α) = 0.98 and beta (β) = 0.01, which reflects the model's ability to adjust the current level value with a fast response while still maintaining the stability of the long-term trend direction. The forecasting results show that the poverty line is predicted to increase by 19.98%, from IDR 873,374 in the first semester of 2025 to IDR 1,047,910 in the second semester of 2029, reflecting the increasing trend of minimum living needs from year to year. Evaluation of the model's accuracy resulted in a MAPE value of 4.56%, which is below 10%, indicating that the Holt's DES model has a very good level of forecasting accuracy. Therefore, the results of this study can be used as recommendations in policy making related to the poverty line in East Kalimantan Province as well as a reference for future research.

The evaluation results show that the model achieves a MAPE value of 4.56%, indicating a high level of forecasting accuracy (below the 10% threshold). This demonstrates that Holt's DES method provides a reliable tool for analyzing and predicting poverty line dynamics in East Kalimantan. Furthermore, this study highlights that accurate forecasting of the poverty line can serve as a strategic foundation for formulating evidence-based social and economic policies. By anticipating future trends, policymakers can design more effective poverty alleviation programs, ensure better resource allocation, and strengthen regional economic resilience. Therefore, the findings of this research not only contribute methodologically but also provide valuable insights for sustainable development planning in East Kalimantan Province.

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