

COMPARISON OF MOVING AVERAGE AND WEIGHTED ACCURACY MOVING AVERAGE AT SHIZUKA BURGER TOWER

Azzurra Rizkya Siagian¹, Neisa Aulia Safitri², Nurul Hayati³, Salwa Yuma Annisa⁴,
Shellya Virgita⁵, Yunaisyah Azzahrah⁶

^{1,2,3,4,5}Information System, Royal University

Email : nurulhayati251099@gmail.com

Abstract: Sales forecasting is an important step for small and medium-sized enterprises (SMEs) in managing production, inventory, and business strategy. Coffeeshop SEMAKIN, located in Kisaran, North Sumatra, has a best-selling product called Baccarat Chocolate whose sales figures fluctuate over time. This study applies the Single Exponential Smoothing (SES) method to predict the sales of Baccarat Chocolate using monthly data from June 2025 to May 2026 with a total of 12 data points. Nine alpha values (0.1 to 0.9) were tested and accuracy was evaluated using Mean Absolute Deviation (MAD), Mean Squared Error (MSE), and Mean Absolute Percentage Error (MAPE). The results show that $\alpha = 0.2$ produces the best accuracy with $MAD = 6.35$, $MSE = 53.3$, and $MAPE = 1.03\%$, with a forecast for June 2026 of approximately 614 units. A MAPE value below 10% indicates that the SES method is highly accurate and suitable for forecasting Baccarat Chocolate sales at Coffeeshop SEMAKIN.

Keywords: coffeeshop; forecasting; MAD; MAPE; MSE; single exponential smoothing

Abstract: Sales forecasting is an important step for micro, small, and medium enterprises (MSMEs) in managing production, raw material inventory, and future business strategies. Coffeeshop SEMAKIN, located in Kisaran, North Sumatra, has a flagship product called Baccarat Chocolate with fluctuating sales data every month. This study applies the Single Exponential Smoothing (SES) method to predict Baccarat Chocolate sales using monthly data from June 2025 to May 2026 for 12 periods. Tests were conducted on nine alpha values (0.1 to 0.9) with accuracy evaluation using Mean Absolute Deviation (MAD), Mean Squared Error (MSE), and Mean Absolute Percentage Error (MAPE). The results showed that the alpha value $= 0.2$ produced the best accuracy with $MAD = 6.3461$, $MSE = 53.2984$, and $MAPE = 1.0295\%$, and the sales prediction results for June 2026 were 614 units. The MAPE value below 10% indicates that the SES method is very accurate and suitable for forecasting Baccarat Chocolate sales at Coffeeshop SEMAKIN.

Keywords: coffee shop; forecasting; MAD; MAPE; MSE; single exponential smoothing

INTRODUCTION

The culinary and beverage industry in Indonesia continues to experience significant growth, particularly in the *coffee shop segment*, which is increasingly popular among young people. [1]. Fierce competition is driving businesses to focus not only on product quality but also on operational management efficiency, including raw material inventory management. [2]. One way to support this efficiency is through systematic, data-driven sales forecasting.

Micro, Small, and Medium Enterprises (MSMEs) in Indonesia play a strategic role in the national economy, but many MSMEs still face challenges in managing production and inventory due to the lack of a structured forecasting system[3]. A mismatch between production volume and actual demand can result in losses, either due to excess stock or product shortages during times of high demand[4]. Therefore, sales forecasting is a much-needed tool for MSMEs.

Coffeeshop SEMAKIN is a culinary MSME established on November 20, 2021, located on Jalan Maria Ulfa Sentosa, Mutiara, Kisaran, North Sumatra. This business targets the youth market segment with a comfortable *indoor* and *outdoor concept*. Baccarat Chocolate is the best-selling beverage product at Coffeeshop SEMAKIN, made from the main ingredients of *butterscotch syrup*, coffee, *whipped cream*, UHT milk, ice cubes, and palm sugar. Sales data for this product shows fluctuations from month to month, so an appropriate forecasting approach is needed to assist the owner in making production decisions[5].

A commonly used forecasting method in the context of time series data is *Single Exponential Smoothing* (SES). This method works by giving greater weight to the most recent data and less weight to older data, making it very suitable for data that does not have a clear trend or seasonal pattern. [6]. Determining the correct smoothing

parameter or alpha (α) is the main key to producing accurate forecasts.

Several previous studies have demonstrated the effectiveness of the SES method in various contexts. Research on eyeglass optics demonstrated that SES is capable of producing sales predictions with a low error rate and can be implemented in forecasting-based information systems [7]. Other research on merchandise inventory forecasting using SES demonstrated that this method is easy to implement and produces sufficient accuracy for the operational needs of MSMEs [4].

e-commerce sales prediction where the MAPE values obtained show a high level of accuracy, making it a reliable method for digital business planning[8]. Furthermore, research using forecasting methods on digital platforms also emphasizes the importance of selecting the optimal alpha value in determining the quality of forecasting results[9].

On the other hand, research on beverage sales forecasting shows that irregular fluctuations in sales data can be handled well using a *single exponential smoothing approach* with appropriate alpha selection[10]. The use of error evaluations such as MAD, MSE, and MAPE simultaneously provides a more comprehensive picture of the accuracy of a forecasting method[11].

Based on the background above, this study aims to apply the *Single Exponential Smoothing method* in predicting Baccarat Chocolate sales at Coffeeshop SEMAKIN by testing nine alpha values ranging from 0.1 to 0.9, and evaluating the accuracy of the forecasting results using the MAD, MSE, and MAPE metrics to determine the best alpha value.

METHOD

This research is an applied quantitative approach using the *Single Exponential Smoothing* (SES) method for sales forecasting. The data used are monthly sales

data for Baccarat Chocolate products at SEMAKIN Coffeeshop, Kisaran, North Sumatra, from June 2025 to May 2026, with a total of 12 observation periods. Data were obtained directly through observation and interviews with the business owner.

Single Exponential Smoothing (SES) method is a time series forecasting technique that works by giving greater weight to the most recent data and exponentially decreasing weight to older data [6]. This method is very suitable for application to stationary data, namely data that does not have a consistent upward or downward trend pattern, or a recurring seasonal pattern [12]. The basic principle of SES is to balance the current actual value with the previous forecast value through the smoothing constant parameter alpha (α) [4].

The alpha (α) value plays an important role in determining how quickly the model responds to data changes. An α value close to 1 means the model is more sensitive to recent data changes, while an α value close to 0 means the model considers historical data more evenly [13]. Therefore, selecting the right α value is crucial for the quality of the forecasting results. In this study, testing was conducted on nine alpha values, namely 0.1; 0.2; 0.3; 0.4; 0.5; 0.6; 0.7; 0.8; and 0.9 to find the best value empirically.

The SES calculation formula used in this study is as follows:

$$F_{t+1} = F_{t-1} + \alpha(A_{t-1} - F_{t-1}) \quad (1)$$

Information:

F_{t+1} = forecast value in period t+1 (next period)

F_{t-1} = forecast value in the previous period (t-1)

A_{t-1} = actual value in the previous period (t-1)

α = smoothing constant with a value of $0 < \alpha < 1$

The initial forecast value is set at $F_1 = A_1$, which is the actual value in the first period. To measure the accuracy of the forecast results, three error evaluation metrics are used. The first metric is *the*

Mean Absolute Deviation (MAD), which measures the average absolute difference between actual and forecasted values. MAD is easy to understand because it has the same units as the original data. The smaller the MAD value, the smaller the average deviation of the model from the actual data, which means the better the forecast quality [11]. The MAD formula is as follows:

$$MAD = \frac{\sum_{t=1}^n |A_t - F_t|}{n} \quad (2)$$

Information:

A_t = actual value at period t

F_t = forecast value in period t

n = number of data periods

t = time period index, starting from t = 1 to t = n

The second metric is *the Mean Squared Error (MSE)*, which calculates the average of the squares of the differences between the actual and forecasted values. Because errors are squared, MSE imposes a greater penalty on large errors, making it very sensitive to extreme errors or outliers. Similar to MAD, the smaller the MSE value, the better the forecasting model's performance. [11] The MSE formula is as follows:

$$MSE = \frac{\sum_{t=1}^n (A_t - F_t)^2}{n} \quad (3)$$

Information:

A_t = actual value at period t

F_t = forecast value in period t

n = number of data periods

t = time period index, starting from t = 1 to t = n

The third metric is *the Mean Absolute Percentage Error (MAPE)*, which measures the average absolute percentage error between the actual value and the forecast value. The advantage of MAPE over MAD and MSE is that its value is relative in percentage form (%), so it can be used to compare model accuracy between data with different scales. The smaller the MAPE value, the more accurate the resulting forecast model [11]. The MAPE formula is as follows:

$$MAPE = \frac{1}{n} \sum_{t=1}^n \left| \frac{A_t - F_t}{A_t} \right| \times 100\%$$

Information:

A_t = actual value at period t

F_t = forecast value in period t

n = number of data periods

t = time period index, starting from t = 1 to t = n

Interpretation of the level of accuracy of forecasting results based on MAPE values refers to the criteria put forward by Lewis (1982) in [14], as shown in Table 1 below:

Table 1. Forecasting Accuracy Criteria Based on MAPE Values

MAPE Value	Accuracy Criteria
< 10%	Very Accurate
10% – 20%	Accurate / Good
20% – 50%	Quite Accurate / Reasonable
> 50%	Not accurate

Based on Table 1, the alpha value that produces the smallest MAPE will be selected as the optimal parameter and then used to calculate sales predictions for the next period. The alpha value with the smallest MAD and MSE is also a supporting

consideration in selecting the best model, considering that these three metrics complement each other in describing the overall forecast quality [11].

RESULTS AND DISCUSSION

Data collection was conducted through direct observation and interviews with the owner of SEMAKIN Coffeeshop. The data obtained consisted of monthly sales data for Baccarat Chocolate products for 12 periods, from June 2025 to May 2026. Baccarat Chocolate sales data for 12 months shows fluctuating values between 606 units (lowest in May 2026) to 626 units (highest in March 2026), with an average sales of 616.67 units per month. The data pattern does not show a consistent upward or downward trend or a clear seasonal pattern, so the *Single Exponential Smoothing* (SES) method is very suitable to be applied to this data. Next, SES calculations are performed for each alpha value from 0.1 to 0.9 as presented in Tables 3 to 11. Interpretation of the accuracy of all calculation results refers to the Lewis (1982) criteria as listed in Table 1.

Table 3. Forecasting Results with $\alpha = 0.1$

Month	Sales	Forecasting	Error	Error	error ²	error%
June 2025	612	612.00	-	-	-	-
July 2025	618	612.00	6.00	6.00	36.00	0.97
August 2025	623	612.60	10.40	10.40	108.16	1.67
September 2025	615	613.64	1.36	1,36	1,85	0,22
Oktober 2025	619	613,78	5,22	5,22	27,29	0,84
November 2025	621	614,30	6,70	6,70	44,91	1,08
Desember 2025	617	614,97	2,03	2,03	4,13	0,33
Januari 2026	624	615,17	8,83	8,83	77,94	1,41
February 2026	611	616.05	-5.05	5.05	25.55	0.83
March 2026	626	615.55	10.45	10.45	109.22	1.67
April 2026	608	616.59	-8.59	8.59	73.86	1.41
May 2026	606	615.73	-9.73	9.73	94.77	1.61
June 2026	-	614.76	-	-	-	-
				74.38	603.67	12.05
				6.76	54.88	1.10
				MAD	MSE	MAPE

Table 4. Forecasting Results with $\alpha = 0.2$

Month	Sale	Forecasting	Error	Error	error ²	error%
June 2025	612	612.00	-	-	-	-
July 2025	618	612,00	6,00	6,00	36,00	0,97087
Agustus 2025	623	613,20	9,80	9,80	96,04	1,57303
September 2025	615	615,16	-0,16	0,16	0,03	0,02602
Oktober 2025	619	615,13	3,87	3,87	14,99	0,62553
November 2025	621	615,90	5,10	5,10	25,99	0,82087
Desember 2025	617	616,92	0,08	0,08	0,01	0,01265
Januari 2026	624	616,94	7,06	7,06	49,88	1,13181
Februari 2026	611	618,35	-7,35	7,35	54,02	1,20295
Maret 2026	626	616,88	9,12	9,12	83,17	1,45687
April 2026	608	618,70	-10,70	10,70	114,58	1,76053
May 2026	606	616,56	-10,56	10,56	111,58	1,7431
June 2026	-	614.45	-	-	-	-
				69.81	586,28	11,3242
				6.35	53.30	1,036
				MAD	MSE	MAPE

Based on Table 4, the SES calculation with an alpha value of 0.2 yields a MAD value of 6.35, an MSE of 53.30, and a

MAPE of 1.036%. The predicted sales of Baccarat Chocolate for June 2026 with an alpha value of 0.2 is 614.45 units.

Table 5. Forecasting Results with $\alpha = 0.3$

Month	Sale	Forecasting	Error	Error	error ²	error%
June 2025	612	612	-	-	-	-
July 2025	618	612.00	6,00	6,00	36,00	0,97
Agustus 2025	623	613,80	9,20	9,20	84,64	1,48
September 2025	615	616,56	-1,56	1,56	2,43	0,25
Oktober 2025	619	616,09	2,91	2,91	8,46	0,47
November 2025	621	616,96	4,04	4,04	16,29	0,65
Desember 2025	617	618,18	-1,18	1,18	1,38	0,19
Januari 2026	624	617,82	6,18	6,18	38,16	0,99
Februari 2026	611	619,68	-8,68	8,68	75,27	1,42
Maret 2026	626	617,07	8,93	8,93	79,69	1,43
April 2026	608	619,75	-11,75	11,75	138,09	1,93
May 2026	606	616,23	-10,23	10,23	104,57	1,69
June 2026	-	613.16	-	-	-	-
				70.64	584.97	11.47
				6.42	53.18	1.04
				MAD	MSE	MAP

Based on Table 5, the SES calculation with an alpha value of 0.3 yields a MAD value of 6.42, an MSE of 53.18, and a

MAPE of 1.04%. The predicted sales of Baccarat Chocolate for June 2026 with an alpha value of 0.3 is 613.16 units.

Table 6. Forecasting Results with $\alpha = 0.4$

Month	Sale	Forecasting	Error	Error	error ²	error%
June 2025	612	612	-	-	-	-
July 2025	618	612.00	6,00	6,00	36,00	0,97
Agustus 2025	623	614,40	8,60	8,60	73,96	1,38
September 2025	615	617,84	-2,84	2,84	8,07	0,46
Oktober 2025	619	616,70	2,30	2,30	5,27	0,37
November 2025	621	617,62	3,38	3,38	11,41	0,54
Desember 2025	617	618,97	-1,97	1,97	3,89	0,32
Januari 2026	624	618,18	5,82	5,82	33,83	0,93
Februari 2026	611	620,51	-9,51	9,51	90,45	1,56
Maret 2026	626	616,71	9,29	9,29	86,37	1,48
April 2026	608	620,42	-12,42	12,42	154,35	2,04
May 2026	606	615,45	-9,45	9,45	89,38	1,56
June 2026	-	611.67	-	-	-	-
				71.59	592.98	11.62
				6.51	53.91	1.06
				MAD	MSE	MAP

Based on Table 6, the SES calculation with an alpha value of 0.4 yields a MAD value of 6.51, an MSE of 53.91, and a

MAPE of 1.06%. The predicted sales of Baccarat Chocolate for June 2026 with an alpha value of 0.4 is 611.67 units.

Table 7. Forecasting Results with $\alpha = 0.5$

Month	Sale	Forecasting	Error	Error	error ²	error%
June 2025	612	612	-	-	-	-
July 2025	618	612.00	6,00	6,00	36,00	0,97
Agustus 2025	623	615,00	8,00	8,00	64,00	1,28
September 2025	615	619,00	-4,00	4,00	16,00	0,65
Oktober 2025	619	617,00	2,00	2,00	4,00	0,32
November 2025	621	618,00	3,00	3,00	9,00	0,48
Desember 2025	617	619,50	-2,50	2,50	6,25	0,41
Januari 2026	624	618,25	5,75	5,75	33,06	0,92
Februari 2026	611	621,13	-10,13	10,13	102,52	1,66
Maret 2026	626	616,06	9,94	9,94	98,75	1,59
April 2026	608	621,03	-13,03	13,03	169,81	2,14
Mei 2026	606	614,52	-8,52	8,52	72,52	1,41
Juni 2026	-	610,26	-	-	-	-
				72,86	611,91	11,83
				6,62	55,63	1,08
				MAD	MSE	MAPE

Based on Table 7, the SES calculation with an alpha value of 0.5 yields a MAD value of 6.62, an MSE of 55.63, and a MAPE of 1.08%. The predicted sales of Baccarat Chocolate for June 2026 with an alpha value of 0.5 is 610.26 units.

The SES calculation with an alpha value of 0.6 yields a MAD value of 6.78, an MSE of 58.47, and a MAPE of 1.10%. The predicted sales of Baccarat Chocolate for June 2026 with an alpha value of 0.6 is 608.99 units.

Table 11. Forecasting Results with $\alpha = 0.9$

Month	Sale	Forecasting	Error	Error	error ²	error%
June 2025	612	612	-	-	-	-
July 2025	618	612.00	6,00	6,00	36,00	0,97
Agustus 2025	623	617,40	5,60	5,60	31,36	0,90
September 2025	615	622,44	-7,44	7,44	55,35	1,21
Oktober 2025	619	615,74	3,26	3,26	10,60	0,53
November 2025	621	618,67	2,33	2,33	5,41	0,37
Desember 2025	617	620,77	-3,77	3,77	14,19	0,61
Januari 2026	624	617,38	6,62	6,62	43,87	1,06
Februari 2026	611	623,34	-12,34	12,34	152,22	2,02
Maret 2026	626	612,23	13,77	13,77	189,51	2,20
April 2026	608	624,62	-16,62	16,62	276,34	2,73
Mei 2026	606	609,66	-3,66	3,66	13,41	0,60
Juni 2026	-	606,37	-	-	-	-
				81,40	828,26	13,21
				7,40	75,30	1,20
				MAD	MSE	MAPE

Based on Table 11, the SES calculation with an alpha value of 0.9 yields a MAD value of 7.40, an MSE of 75.30, and a MAPE of 1.20%. The predicted sales of Baccarat Chocolate for June 2026 with an alpha value of 0.9 is 606.37 units.

After calculating the SES for all alpha values, the results of the comparison of the MAD, MSE, and MAPE values for each alpha are summarized in Table 12 below.

Table 12. Comparison of MAD, MSE, and MAPE Values for Each Alpha Value

Alpha (α)	MAD	MSE	MAPE	June 2026 Prediction
0.1	6.76	54.88	1.1	614.76
0,2	6,35	53,3	1,03	614,45
0,3	6,42	53,18	1,04	613,16
0,4	6,51	53,91	1,06	611,67
0,5	6,62	55,63	1,08	610,26
0,6	6,78	58,47	1,1	608,99
0,7	6,96	62,55	1,13	607,91
0,8	7,17	68,06	1,16	607,02
0.9	7.4	75.3	1.2	606.37

Based on Table 12, the best alpha value is $\alpha = 0.2$ because it produces the smallest MAPE value of 1.03%, followed by MAD of 6.35 and MSE of 53.3. This indicates that a model with a small smoothing weight is more suitable for Baccarat Chocolate sales data, which tends to be stable. Large alpha values (e.g., 0.8 or 0.9) produce higher errors because they are too reactive to recent data changes.

Based on Table 4 (calculation with $\alpha = 0.2$), the forecast value for June 2026 is 614.45 or rounded to 614 units.

The MAPE value of 1.03 % is well below the 10% threshold, which according to the forecasting evaluation criteria indicates that the SES model with $\alpha = 0.2$ is highly accurate. This finding is in line with research conducted on *e-commerce sales forecasting* which also found that SES with

a small alpha value produces minimal error on data with low fluctuations [8]. Similarly, research on merchandise inventory forecasting found that selecting the optimal alpha value significantly improves the accuracy of forecasting results [4].

The MAD value = 6.35 indicates that the average absolute deviation between the actual value and the forecast value is only around 6 units, which is relatively small compared to the sales scale which is around 600 units per month. The MSE value = 53.3 reflects that the mean squared error is also within acceptable limits. Overall, the three error evaluation metrics consistently indicate that $\alpha = 0.2$ is the best parameter for modeling Baccarat Chocolate sales at Coffeeshop SEMAKIN.

The results of this study provide useful information for the owner of SEMAKIN Coffeeshop to prepare a stock of approximately 614 units of Baccarat Chocolate raw materials by June 2026. With this prediction, the owner can minimize the risk of raw material shortages and avoid waste due to overproduction.

CONCLUSION

This study successfully applied the *Single Exponential Smoothing* (SES) method to predict Baccarat Chocolate sales at SEMAKIN Coffeeshop, Kisaran, North Sumatra. From testing nine alpha values (0.1 to 0.9), it was concluded that the optimal alpha value was $\alpha = 0.2$ with the smallest error values, namely MAD = 6.35; MSE = 53.3; and MAPE = 1.03%. The MAPE value, which is well below 10%, proves that the SES method is very accurate in predicting sales of this product. Based on forecast results, Baccarat Chocolate sales in June 2026 are estimated to reach 614 units.

The results of this study can serve as a reference for business owners in planning production and raw material procurement more efficiently. For further research, it is recommended to compare the SES method

with other forecasting methods such as *Double Exponential Smoothing* or *Winter's Method* to obtain a more comprehensive forecasting model, especially if sales data begins to show trends or seasonal patterns in the future.

BIBLIOGRAPHY

- [1] A. Meilani and C. Nugroho, "COFFEE SHOP MARKETING STRATEGY IN FACING COMPETITION IN BEKASI CITY," *Syntax Lit. J. Ilm. Indones.* , vol. 8, no. 1 , pp. 732–743, 2023, [Online]. Available: <https://journal.syntaxliterate.co.id/index.php/syntaxliterate/article/view/11281/6716>
- [2] FD Ramadhani and M. Ardhiansyah, "Comparative Analysis of Single Exponential Smoothing and Parabolic Trend Methods for Beverage Sales Prediction (Case Study: CV. Al Barokah) ," *Sci. Sacra J. Science, Technology and Society* , vol. 2, no. 3, pp. 349–358, 2022, [Online]. Available: <https://jurnal.syntaxliterate.co.id/index.php/syntaxliterate/article/view/11281/6716>
- [3] WH Sutiyono and W. Setiafindari, "Analysis of the Application of Sales Forecasting to Determine the Effective Number of Workers for Mocaf Flour Production at XYZ MSMEs in the Future Systematically Using Historical Data. The Method is Aimed at the Future . Benefits of forecasting," *Jupiter Publ. Ind. Engineering Science, Electrical and Inform.* , vol. 2, no. 4, pp. 182–194, 2024, doi: <https://doi.org/10.61132/jupiter.v2i4.423>.
- [4] SN Budiman, "Forecasting Merchandise Stock Using the Single Exponential Smoothing Method," *J. Teknol. dan Manaj. Inform.* , vol. 7, no. 2, pp. 113–121, 2021, doi:

- <https://doi.org/10.26905/jtmi.v7i2.6727>.
- [5] A. Lusiana and P. Yuliarty, "APPLICATION OF FORECASTING METHODS ON ROOF DEMAND AT PT X," *Ind. Inov. - J. Tek. Ind. ITN Malang*, vol. 10, no. 1, pp. 11–20, 2020, doi: <https://doi.org/10.36040/industri.v10i1.2530>.
- [6] MF S and SSM M, "Comparison of ARIMA and Single Exponential Smoothing Methods in Forecasting Indonesian Cocoa Export Value," *VARIANSI J. Stat. Its Appl. Teach. Res.*, vol. 5, no. 3, pp. 163–176, 2023, doi: 10.35580/variasiunm193.
- [7] A. Rizka, G. Kurniawan, A. Ageva, and A. Pinem, "Application of Single Exponential Smoothing Method for Eyeglass Sales Prediction," *Bull. Inf. Technol.*, vol. 7, no. 1, pp. 92–102, 2026, doi: 10.47065/bit.v5i2.2621.
- [8] A. Mardiana and MI Assegaf, "IMPLEMENTATION OF EXPONENTIAL SMOOTHING ALGORITHM FOR SALES PREDICTION ON E-COMMERCE PLATFORMS," *INFOTECH J.*, vol. 9, no. 1, pp. 97–103, 2023, doi: <https://doi.org/10.31949/infotech.v9i1.5054> INFOTECH.
- [9] I. Jubaidah, D. Pratiwi, and T. Siswanto, "FORECASTING SALES DATA ON E-COMMERCE USING SINGLE EXPONENTIAL SMOOTHING METHODS," *J. Teknol. Inf. J. Keilmuan dan Apl. Bid. Tech. Inform.*, vol. 17, no. 2, pp. 111–124, 2023, [Online]. Available: <https://ejournal.upr.ac.id/index.php/JTI/article/view/9156/5019>
- [10] R. Yuniarti, "ANALYSIS OF SINGLE EXPONENTIAL SMOOTHING METHOD AS (CASE STUDY: LOKATARA DIMSUM)," *Aliansi J. Manaj. Bisnis*, vol. 15, no. 2, pp. 29–34, 2020, doi: <https://doi.org/10.46975/aliansi.v15i12.63>.
- [11] A. Anindityo and M. Safitri, "Comparison of Single Exponential Smoothing and Holt's Linear Methods in Import Volume Forecasting," *SATIN - Science and Technology. Inf.*, vol. 9, no. 1, pp. 199–208, 2023, doi: 10.33372/stn.v9i1.959.
- [12] TT Anita, S. Putri Agustini Alkadri, and PY Utami, "ALO VERA SALES PREDICTION SYSTEM USING THE SINGLE EXPONENTIAL SMOOTHING METHOD AT UPT AGRIBUSINESS Tiara," *J. Educator. Inform. and Science*, vol. 12, no. July 2022, pp. 89–100, 2022, doi: 10.31571/saintek.v12i1.5731.
- [13] MF Almaliki, Isnawaty, M. Satyadharma, and Hado, "Comparison of Exponential Smoothing and Moving Average Methods on Unloading Goods Flow," *J. Manaj. Inform.*, vol. 14, no. 2, pp. 125–134, 2024, doi: <https://doi.org/10.34010/jamika.v14i2.12828>.
- [14] IR Amalia, T. Widiharih, and Tarno, "Holt winters exponential smoothing for forecasting gross domestic product in Indonesia," *J. GAUSSIAN*, vol. 13, no. 2010, pp. 219–229, 2024, doi: 10.14710/j.gauss.13.1.219-229.