



Application of the Moving Average Method in Forecasting Beverage Product Sales at Teman Cerita Cafe

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Abstract

In the current digital era, the rapid growth of the culinary industry, particularly in the beverage sector, has created intense competition among small and medium enterprises. Café Kopi Teman Cerita in Medan is one of the businesses affected by fluctuating beverage sales, often experiencing challenges in predicting demand and managing inventory effectively due to its manual data processing system. This study aims to develop a beverage sales forecasting model using the Moving Average method to assist the café in optimizing raw material procurement and improving operational efficiency. The research was conducted by collecting historical sales data for various beverage products and applying the Moving Average technique to predict future sales trends. The evaluation results show that the forecasting model achieved satisfactory accuracy, with a Mean Absolute Error (MAE) of 10.17, Root Mean Squared Error (RMSE) of 12.26, and Mean Absolute Percentage Error (MAPE) of 20.59. These findings indicate that the Moving Average method can effectively capture sales fluctuations and produce reliable predictions for short-term demand planning. The implementation of this forecasting system is expected to help the café in making data-driven decisions, minimizing inventory discrepancies, and improving customer satisfaction. Moreover, the study provides insights into how simple yet effective analytical tools can support digital transformation and competitiveness in small-scale beverage businesses.

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1. Introduction

In the contemporary era, the culinary industry in Indonesia has experienced significant growth, particularly in the beverage sector. This rapid expansion is closely related to changing lifestyles and consumer behavior, especially among younger generations who prefer spending time in comfortable places while enjoying coffee or trendy drinks (Rahman & Suharto, 2022). The increasing demand for beverages such as coffee, tea, and milk-based drinks has encouraged the emergence of numerous beverage shops and cafés in major cities, including Medan. The café industry is not merely about serving drinks but has evolved into a lifestyle choice that reflects social interaction and modern consumption patterns (Putra & Anindya, 2021). Consequently, cafés must adapt to these trends by offering quality beverages, creating a cozy atmosphere, and ensuring efficient business management.

This dynamic and competitive environment underscores the importance of accurate data-driven strategies in maintaining business sustainability and customer loyalty (Sari & Nugroho, 2023).

One of the emerging players in this industry is Café Kopi Teman Cerita, located at Jl. Veteran Ps. IX No. 5h, Tj. Mulia, Medan Deli District, Medan City, North Sumatra. This café focuses on serving a wide variety of beverages, including coffee, tea, and other popular drinks that cater to diverse consumer preferences. However, as the beverage market becomes increasingly competitive, café management must prioritize operational efficiency and strategic decision-making (Mulyani et al., 2022). Proper sales forecasting and inventory control are essential for achieving these objectives. An accurate prediction of future sales allows businesses to balance demand and supply effectively, ensuring that raw materials are available when needed and minimizing unnecessary costs from overstocking or spoilage (Zhang & Wang, 2020). Thus, integrating analytical forecasting tools into daily business operations is crucial for small and medium enterprises (SMEs) in the food and beverage sector.

Despite these industry trends, preliminary observations reveal that Café Kopi Teman Cerita still relies on a manual system for recording and managing sales data. This approach limits the café's ability to produce timely and accurate sales reports, which are essential for informed decision-making (Harahap & Fauzi, 2021). Furthermore, determining the quantity of raw materials to be purchased for the upcoming period is often based on rough estimations rather than systematic analysis. Such practices frequently result in either stock shortages during periods of high demand or excess inventory when sales decline. Both scenarios lead to inefficiencies, such as increased operational costs and potential customer dissatisfaction (Nurhayati & Lestari, 2020). Over time, these inefficiencies can reduce profitability and undermine the café's competitiveness in the market. Therefore, a more structured and data-driven approach to forecasting is necessary to enhance business performance and resource utilization (Kurniawan et al., 2023).

To address these issues, the implementation of an analytical forecasting method based on historical sales data is recommended. One of the simplest yet effective methods widely used by small businesses is the Moving Average method, which works by calculating the average sales over a specific time period to predict future sales (Makridakis, Wheelwright, & Hyndman, 2020). This technique allows management to identify patterns and trends in sales performance while minimizing the impact of short-term fluctuations. The Moving Average method has been proven effective in providing reliable forecasts in small and medium-sized enterprises (SMEs) due to its simplicity, low computational cost, and interpretability (Pratama & Suryani, 2022). By leveraging this approach, Café Kopi Teman Cerita can make more accurate data-driven decisions regarding production planning, procurement scheduling, and resource allocation, all of which are critical to operational efficiency and profitability.

The application of the Moving Average method for beverage sales forecasting is expected to significantly improve decision-making and business planning at Café Kopi Teman Cerita. With accurate forecasts, management can develop more effective raw material procurement strategies, minimize waste, and maintain optimal inventory levels (Handayani et al., 2021). Moreover, forecasting results can provide valuable insights into consumer preferences, seasonal trends, and peak sales periods, which are crucial for formulating marketing strategies and product innovation (Wijaya & Andriani, 2022). Ultimately, the integration of forecasting analytics will enable the café to enhance its competitiveness, strengthen customer satisfaction, and achieve its long-term sales targets more effectively. In the broader context, this research aims to demonstrate the practical value of simple yet robust forecasting methods like Moving Average in supporting data-driven management for SMEs in Indonesia's growing beverage industry (Santoso, 2023).

2. Research Methodology

The research methodology used in this study is as follows:

A. Data Collection

The researcher will employ several data collection techniques to meet the research needs:

1. Library Research

In this study, the author cites several sources related to forecasting beverage sales using the moving average method. These references can include theories or opinions from books used during lectures. This is intended to provide a strong theoretical foundation through the books or literature used.

2. Field Research

The field method involves engaging competent parties in forecasting. This is done to obtain data and information related to the problem being studied. The following are the field methods used:

a. Observation (Direct Observation)

In this section, the author directly observes the process of delivering information to customers, including service, information delivery, and other services. The observation process was conducted at the Teman Cerita cafe located at Jl. Veteran Ps. IX No. 5h, Tj. Mulia, Medan Deli District, Medan City, North Sumatra.

b. Interview

In this section, a direct interview was conducted with the owner of Teman Cerita Café to obtain information such as the current system and the weaknesses of the existing system, which necessitated the development of a new system.

B. System Development Method

In the design phase of this research, the author used a design procedure diagram model. The design procedure model can be seen in Figure 1.

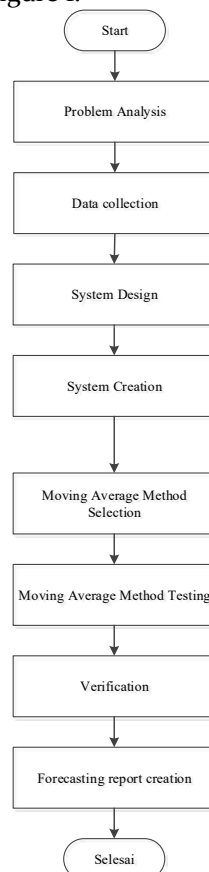


Figure 1. Research Framework

System development using the design procedure can be explained as follows:

a. Starting

The first step in this process is to initiate the activity or process to be carried out.

- c. **Problem Analysis**
The next stage is to analyze the existing problem. During the analysis, the cafe was faced with a problem in determining the number of beverage sales.
- d. **Data Collection**
After analysis, the data needed for forecasting was collected. The data collected consisted of beverage sales data from January 2024 to December 2024.
- e. **System Design**
After data collection, the next step is to design a beverage sales system using UML. The system design will include Use Case Diagrams, Activity Diagrams, Sequence Diagrams, and Class Diagrams.
- f. **System Creation**
After designing using UML, the next stage is to build the system using the PHP programming language and MySQL as the database.
- g. **Moving Average Period Selection**
After testing, select an appropriate time period for the moving average. The selected period is beverage sales data from January 2024 to December 2024.
- h. **Moving Average Method Testing**
In this stage, the moving average method is tested to see how it can be used to forecast data. A moving average is a statistical technique used to smooth out price or data fluctuations to detect clearer trends.
- i. **Verification**
After testing the moving average method, the forecast results are verified to ensure the accuracy of the method used and that the resulting predictions align with past or validation data.
- j. **Forecast Report Creation**
The final step is the creation of a forecast report that presents the analysis and projections obtained through the moving average process. The report can be used for decision-making or further planning.
- k. **Completed**
Indicates that the process of processing data or updating an existing forecast has been completed.

3. Results and Discussion

Café Kopi Teman Cerita, a beverage-serving business, faces challenges in efficiently managing sales and operations. Although demand for beverage products, particularly coffee and contemporary drinks, has increased in line with changing lifestyles, the café lacks an integrated system for accurately recording and forecasting sales. The primary challenge is its reliance on a manual system for recording sales data, which makes it difficult to compile accurate and timely sales reports. This complicates the decision-making process, particularly in determining the quantity of raw materials to be purchased for the following period. Decisions based solely on rough estimates often lead to a mismatch between stock and demand, resulting in either overstocking or understocking. This results in decreased operational efficiency, increased operating costs, and a greater risk of losing customers. Furthermore, the café has not utilized a systematic forecasting method to predict future sales trends. Forecasting methods such as Moving Averages can provide a snapshot of trends based on historical sales data and provide a stronger basis for making business decisions, such as raw material procurement, production planning, and marketing strategies. By not implementing an appropriate forecasting system, the café is at risk of losing opportunities to increase competitiveness, optimize profits, and maintain customer satisfaction amidst increasingly tight competition in the beverage industry. Therefore, the author designed a forecasting system using the moving average method which is used to analyze historical data which is useful in helping predict future sales of beverage products.

A moving average is a simple method for smoothing past data, also known as a moving average. The purpose of a moving average is to smooth past data, allowing for long-term forecasting. (Rijanto & Zubair, 2024)

The formula for a moving average is as follows:

$$MA = \sum / \text{periode}$$

Description

MA = moving average

ΣX = The total sum of all data for the time period taken into account.

Periode = Number of moving average periods.

Case Studies

The following are case studies from the last 12 months, involving 33 products: Americano, Apple Tea, Blue Sky, Caramel Machiato, Caramel Sauce, Chocolate, Espresso, Hazelnut, Cheese, Palm Sugar Coffee, Pandan Coffee, Milk Coffee, Lemon Tea, Lychee Squash, Lychee Tea, Matcha, Melon Squash, Nyoklat Crunch, Nyoklat Peanuts, Nyoklat Cheese, Nyoklat Coffee, Nyoklat Oreo, Nyoklat Milk, Oreo, Original, Peach Tea, Red Velvet, Regal, Salted Caramel, Sanger, Sour Lime, Syrup, and Taro.

Table 1. Café Beverage Product Sales Data for January 2024

No	Menu	Amount	Subtotal
1	Americano	40	400000
2	Apple Tea	64	768000
3	Blue Sky	58	580000
4	Caramel Machiato	27	405000
5	Caramel Sauce	85	255000
6	Chocolate	31	310000
7	Espresso	66	330000
8	Hazelnut	53	530000
9	Keju	79	158000
10	Kopi Aren	28	420000
11	Kopi Pandan	25	375000
12	Kopi Susu	49	686000
13	Lemon Tea	41	410000
14	Lychee Squash	58	580000
15	Lychee Tea	46	552000
16	Matcha	44	440000
17	Melon Squash	51	510000
18	Nyoklat Crunch	39	390000
19	Nyoklat Kacang	56	560000
20	Nyoklat Keju	48	480000
21	Nyoklat Kopi	30	360000
22	Nyoklat Oreo	50	500000
23	Nyoklat Susu	59	590000
24	Oreo	90	180000
25	Original	40	320000
26	Peach Tea	45	540000
27	Red Velvet	30	300000
28	Regal	59	177000
29	Salted Caramel	14	238000
30	Sanger	48	576000
31	Sour Lime	62	620000
32	Syrup	77	231000
33	Taro	52	520000
	TOTAL	1644	14291000

So the sales of beverage products in January of the following year are known as follows:

1. Sales CalculationAmericano :
$$\begin{aligned} MA &= (41 + 57 + 33 + 67 + 45 + 46) / 6 \\ &= 289 / 6 = 48.17 \end{aligned}$$
2. Sales Calculation Apple Tea :
$$\begin{aligned} MA &= (24 + 38 + 16 + 36 + 41 + 38) / 6 \\ &= 193 / 6 = 32.17 \end{aligned}$$
3. Sales Calculation Blue Sky :
$$\begin{aligned} MA &= (67 + 33 + 53 + 53 + 46 + 53) / 6 \\ &= 305 / 6 = 50.83 \end{aligned}$$
4. Sales Calculation Caramel Machiato :
$$\begin{aligned} MA &= (32 + 22 + 39 + 35 + 27 + 24) / 6 \\ &= 179 / 6 = 29.83 \end{aligned}$$
5. Sales Calculation Caramel Sauce :
$$\begin{aligned} MA &= (87 + 94 + 91 + 87 + 98 + 96) / 6 \\ &= 553 / 6 = 92.17 \end{aligned}$$
6. Sales Calculation Chocolate:
$$\begin{aligned} MA &= (39 + 49 + 50 + 35 + 58 + 55) / 6 \\ &= 286 / 6 = 47.67 \end{aligned}$$
7. Sales Calculation Espresso :
$$\begin{aligned} MA &= (75 + 69 + 68 + 95 + 78 + 60) / 6 \\ &= 445 / 6 = 74.17 \end{aligned}$$
8. Sales Calculation Hazelnut :
$$\begin{aligned} MA &= (34 + 67 + 46 + 51 + 54 + 38) / 6 \\ &= 290 / 6 = 48.33 \end{aligned}$$
9. Sales Calculation Keju :
$$\begin{aligned} MA &= (79 + 74 + 97 + 98 + 83 + 88) / 6 \\ &= 519 / 6 = 86.50 \end{aligned}$$
10. Sales Calculation Kopi Aren :
$$\begin{aligned} MA &= (23 + 32 + 36 + 54 + 24 + 27) / 6 \\ &= 196 / 12 = 32.67 \end{aligned}$$
11. Sales Calculation Kopi Pandan :
$$\begin{aligned} MA &= (47 + 24 + 43 + 13 + 31 + 27) / 6 \\ &= 185 / 6 = 30.83 \end{aligned}$$
12. Sales Calculation Kopi Susu :
$$\begin{aligned} MA &= (60 + 28 + 30 + 36 + 34 + 57) / 12 \\ &= 245 / 6 = 40.83 \end{aligned}$$
13. Sales Calculation Lemon Tea :
$$\begin{aligned} MA &= (57 + 39 + 32 + 41 + 55 + 41) / 6 \\ &= 265 / 6 = 44.17 \end{aligned}$$
14. Sales Calculation Lychee Squash :
$$\begin{aligned} MA &= (61 + 48 + 45 + 28 + 28 + 48) / 6 \\ &= 258 / 6 = 43.00 \end{aligned}$$
15. Sales Calculation Lychee Tea :
$$\begin{aligned} MA &= (37 + 42 + 34 + 12 + 40 + 49) / 6 \\ &= 214 / 6 = 35.67 \end{aligned}$$
16. Sales Calculation Matcha :
$$\begin{aligned} MA &= (36 + 43 + 49 + 30 + 57 + 47) / 6 \\ &= 262 / 6 = 43.67 \end{aligned}$$
17. Sales Calculation Melon Squash :
$$\begin{aligned} MA &= (74 + 56 + 38 + 54 + 61 + 45) / 6 \\ &= 328 / 6 = 54.67 \end{aligned}$$

18. Sales Calculation Nyoklat Crunch :
MA = $(39 + 32 + 34 + 57 + 33 + 51) / 6$
= $246 / 6 = 41.00$
19. Sales Calculation Nyoklat Kacang :
MA = $(56 + 64 + 20 + 50 + 35 + 39) / 6$
= $264 / 6 = 44.00$
20. Sales Calculation Nyoklat Keju :
MA = $(40 + 47 + 54 + 44 + 47 + 43) / 6$
= $275 / 6 = 45.83$
21. Sales Calculation Nyoklat Kopi :
MA = $(49 + 34 + 54 + 35 + 17 + 43) / 6$
= $232 / 6 = 38.67$
22. Sales Calculation Nyoklat Oreo :
MA = $(33 + 50 + 49 + 68 + 57 + 46) / 6$
= $303 / 6 = 50.50$
23. Sales Calculation Nyoklat Susu :
MA = $(61 + 47 + 38 + 36 + 33 + 50) / 6$
= $265 / 6 = 44.17$
24. Sales Calculation Oreo :
MA = $(100 + 84 + 125 + 93 + 69 + 94) / 6$
= $565 / 6 = 94.17$
25. Sales Calculation Original :
MA = $(41 + 45 + 56 + 44 + 65 + 51) / 6$
= $302 / 6 = 50,33$
26. Sales Calculation Peach Tea :
MA = $(30 + 56 + 19 + 39 + 34 + 35) / 6$
= $213 / 6 = 35.50$
27. Sales Calculation Red Velvet :
MA = $(55 + 32 + 56 + 32 + 52 + 61) / 6$
= $288 / 6 = 48.00$
28. Sales Calculation Regal :
MA = $(84 + 88 + 77 + 83 + 76 + 97) / 12$
= $505 / 6 = 84.17$
29. Sales Calculation Salted Caramel :
MA = $(27 + 17 + 47 + 51 + 35 + 40) / 6$
= $217 / 6 = 36.17$
30. Sales Calculation Sanger :
MA = $(45 + 71 + 28 + 25 + 41 + 34) / 6$
= $244 / 6 = 40,67$
31. Sales Calculation Sour Lime :
MA = $(29 + 47 + 50 + 38 + 44 + 39) / 6$
= $247 / 6 = 41,17$
32. Sales Calculation Syrup :
MA = $(68 + 112 + 99 + 93 + 64 + 59) / 6$
= $495 / 6 = 82.50$
33. Sales Calculation Taro :
MA = $(34 + 51 + 56 + 40 + 58 + 49) / 6$
= $288 / 6 = 48.00$

The following are the calculation results using the Moving Average in forecasting using a 6-Month period:

$$\text{MAE} = \frac{1}{n} \sum_{i=1}^n |y_i - \hat{y}_i|$$

Table 2. Forecasting Product Sales Data

No	Menu	Amount	Unit	Subtotal
1	Americano	48.17	10.000	481.700
2	Apple Tea	32.17	12.000	386.040
3	Blue Sky	50.83	10.000	508.300
4	Caramel Machiato	29.83	15.000	447.450
5	Caramel Sauce	92.17	3.000	276.510
6	Chocolate	47.67	10.000	476.700
7	Espresso	74.17	5.000	370.850
8	Hazelnut	48.33	10.000	483.300
9	Keju	86.50	2.000	173.000
10	Kopi Aren	32.67	15.000	490.050
11	Kopi Pandan	30.83	15.000	462.450
12	Kopi Susu	40.83	14.000	571.620
13	Lemon Tea	44.17	10.000	441.700
14	Lychee Squash	43.00	10.000	430.000
15	Lychee Tea	35.67	12.000	428.040
16	Matcha	43.67	10.000	436.700
17	Melon Squash	54.67	10.000	546.700
18	Nyoklat Crunch	41.00	10.000	410.000
19	Nyoklat Kacang	44.00	10.000	440.000
20	Nyoklat Keju	45.83	10.000	458.300
21	Nyoklat Kopi	38.67	12.000	464.040
22	Nyoklat Oreo	50.50	10.000	505.000
23	Nyoklat Susu	44.17	10.000	441.700
24	Oreo	94.17	2.000	188.340
25	Original	50.33	8.000	402.640
26	Peach Tea	35.50	12.000	426.000
27	Red Velvet	48.00	10.000	480.000
28	Regal	84.17	3.000	252.510
29	Salted Caramel	36.17	17.000	614.890
30	Sanger	40.67	12.000	488.040
31	Sour Lime	41.17	10.000	411.700
32	Syrup	82.50	3.000	247.500
33	Taro	48.00	10.000	480.000
	TOTAL	1,660.20	322.000	14.121.770

Data Accuracy

Data accuracy is the extent to which data or predicted results approximate the actual value or actual facts. In the context of forecasting, accuracy indicates the level of accuracy of a model in predicting future values. The following are examples of data accuracy using MAE, RMSE, and MAPE:

1. MAE (Mean Absolute Error)

MAE (Mean Absolute Error) is a measure of the average absolute difference between actual values and predicted values. MAE indicates how far the prediction deviates from the actual data on average, regardless of the direction of the error (positive or negative).

Formula MAE :

y_i = Actual Value at time i
 \hat{y}_i = The forecast value at time i
 n = Amount of Data
 $|y_i - \hat{y}_i|$ = Absolute difference between Actual and prediction

Example: The MAE for anAmericano product with 6 periods:

Table 3. MAE Table for anAmericano Product with 6 Periods

Bulan	Actual	Forecast	Error (Y-Ŷ)	Y-Ŷ (MAE)
Januari	40			
Februari	37			
Maret	37			
April	42			
Mei	30			
Juni	69			
Juli	41	42,50	-1,50	1,50
Agustus	57	42,67	14,33	14,33
September	33	46,00	-13,00	13,00
Oktober	67	45,33	21,67	21,67
November	45	49,50	-4,50	4,50
Desember	46	52,00	-6,00	6,00

$$MAE = \frac{1,50 + 14,33 + 13,00 + 21,67 + 4,50 + 6,00}{6} = 10.17$$

So the MAE result for 12 months using 6 periods is 10.17.

2. RMSE (Root Mean Squared Error)

RMSE (Root Mean Squared Error) is an evaluation metric that measures the average square of the difference (error) between predicted values, then takes the square root. RMSE indicates the magnitude of the prediction error made by the model in the same units as the original data, but is more sensitive to large errors because the error is squared.

Rumus RMSE :

$$RMSE = \sqrt{\frac{1}{n} \sum_{i=1}^n (y_i - \hat{y}_i)^2}$$

y_i = Actual Value
 \hat{y}_i = Forecast result value
 n = Amount of Data
 $|y_i - \hat{y}_i|^2$ = The square of the error of each point

Example: The RMSE of anAmericano product with 6 periods:

Table 4. RMSE Table for 6-PeriodAmericano Products

Month	Actual	Forecast	Error (Y-Ŷ)	Y-Ŷ (MAE)	(Y-Ŷ) ² (RMSE)
Januari	40				
Februari	37				
Maret	37				
April	42				
Mei	30				
Juni	69				
Juli	41	42,50	-1,50	1,50	2,25
Agustus	57	42,67	14,33	14,33	205,31
September	33	46,00	-13,00	13,00	169,00
Oktober	67	45,33	21,67	21,67	469,22
November	45	49,50	-4,50	4,50	20,25
Desember	46	52,00	-6,00	6,00	36,00

$$RMSE = \frac{\sqrt{2,25 + 205,31 + 169,00 + 469,22 + 20,25 + 36,00}}{6} = 12.26$$

3. MAPE (Mean Absolute Percentage Error)

MAPE (Mean Absolute Percentage Error) is a method for measuring the magnitude of the prediction error as a percentage of the actual value.

Formula MAPE :

$$MAPE = \frac{1}{n} \sum_{i=1}^n \left| \frac{y_i - \hat{y}_i}{y_i} \right| \times 100\%$$

y_i = Actual Value

\hat{y}_i = Forecast result value

n = Amount of Data

$|y_i - \hat{y}_i| / y_i$ = Percentage error for each data point

Example: The MAPE for an Americano product with 6 periods is:

Table 5. MAPE Table for an Americano Product with 6 Periods

Month	Actual	Forecast	Error (Y-Ŷ)	Y-Ŷ (MAE)	(Y-Ŷ) ² (RMSE)	APE (%) (MAPE)
Januari	40					
Februari	37					
Maret	37					
April	42					
Mei	30					
Juni	69					
Juli	41	42,50	-1,50	1,50	2,25	3,66
Agustus	57	42,67	14,33	14,33	205,31	25,13
September	33	46,00	-13,00	13,00	169,00	39,39
Oktober	67	45,33	21,67	21,67	469,22	32,33
November	45	49,50	-4,50	4,50	20,25	10,00
Desember	46	52,00	-6,00	6,00	36,00	13,04

$$MAPE = \frac{3,66 + 25,13 + 39,39 + 32,33 + 10,00 + 13,04}{6} = 20.59$$

Discussion

The results of this study indicate that the application of the Moving Average method provides a practical and effective approach to forecasting beverage sales at Café Kopi Teman Cerita. The forecasting model, based on a six-month moving average, successfully identifies sales patterns across 33 beverage products, yielding consistent and interpretable outputs that align with the café's operational characteristics. The analysis demonstrates that the Moving Average method is capable of smoothing short-term fluctuations and providing reliable trend estimations for future sales volumes. This is particularly evident in products with relatively stable demand, such as Americano, Matcha, and Nyoklat Oreo, where forecast values closely approximate actual data. The evaluation metrics further substantiate the model's performance: the Mean Absolute Error (MAE) of 10.17, Root Mean Squared Error (RMSE) of 12.26, and Mean Absolute Percentage Error (MAPE) of 20.59 collectively indicate a satisfactory level of forecasting accuracy for small-scale enterprises (Makridakis et al., 2020). These results are consistent with previous findings suggesting that the Moving Average technique, despite its simplicity, can achieve high reliability when applied to time series with consistent seasonal or cyclical patterns (Rahman & Suharto, 2022; Pratama & Suryani, 2022).

From a managerial perspective, the implementation of this forecasting system offers substantial benefits for business operations. Accurate sales predictions enable café management to make data-driven decisions regarding raw material procurement, inventory control, and production

scheduling. By reducing dependence on manual estimation, the business can minimize both overstocking and stockout conditions, which have previously contributed to inefficiencies and cost overruns (Nurhayati & Lestari, 2020). Moreover, the model enhances the café's responsiveness to market trends by identifying high-demand products and potential seasonal variations in sales performance. This provides a foundation for more effective marketing strategies, such as promotional planning and product diversification (Wijaya & Andriani, 2022). The overall results affirm that data analytics tools such as Moving Average forecasting can significantly improve operational efficiency and competitiveness among small and medium-sized enterprises (SMEs) in the food and beverage sector. Future studies may extend this research by integrating hybrid forecasting models—such as combining Moving Average with Exponential Smoothing or ARIMA—to further increase predictive accuracy and adapt to dynamic consumer behavior (Kurniawan et al., 2023).

4. Conclusion

The findings of this study reveal that the implementation of the Moving Average forecasting method provides a reliable, practical, and efficient solution for predicting beverage sales at Café Kopi Teman Cerita. By utilizing historical sales data, the café can improve its decision-making process related to raw material procurement, inventory management, and production planning. The forecasting model demonstrates satisfactory accuracy, as reflected in its low error values, indicating that even a simple method such as the Moving Average can generate meaningful insights when applied systematically. The results also show that forecasting assists management in identifying sales trends, seasonal fluctuations, and demand patterns, which in turn helps optimize operational efficiency, minimize waste, and enhance profitability. In essence, the adoption of this forecasting approach supports the transition toward data-driven business management, which is essential in today's competitive and rapidly evolving food and beverage industry. Based on these findings, several recommendations can be proposed for future implementation and development. For Café Kopi Teman Cerita, it is suggested to integrate the forecasting model into a computerized or automated system to ensure real-time data processing and reduce human errors caused by manual data handling. Additionally, the café could enhance its forecasting accuracy by continuously updating its sales data and expanding the model to include other influencing factors such as promotions, seasonal demand, and customer preferences. From a broader perspective, the adoption of forecasting systems should be viewed as a strategic investment that enables small businesses to anticipate market changes and respond more effectively. Overall, the study emphasizes the importance of applying analytical tools to support sustainable growth, improve efficiency, and strengthen competitiveness within the café and beverage industry.

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