

Optimization of Sales Strategies and Inventory Forecasting for Processed Banana Products Utilizing the Conceptual Framework of Economic Efficiency and Accounting Precision Based on Simple Moving Average

Zulham Sitorus^{1*}, Lia Nazliana Nasution¹, Rahima Br Purba¹, Noris Mohd Norowi², Amnisuhaila Abarahan³, Rowiyah Asengbaramae⁴, Feby Wulandari Sembirinn⁵, Mhd Ihsan Abidi⁵

¹Postgraduate, Universitas Pembangunan Panca Budi, Medan, Indonesia

²Faculty of Computer Science and Information Technology, Universiti Putra Malaysia

³Faculty of Islamic Economics and Finance, Universiti Islam Sultan Sharif Ali, Brunei

⁴Faculty of Liberal Art and Social Sciences, Fatoni University, Thailand

⁵Postgraduate, Master of Information Technology, Universitas Pembangunan Panca Budi, Medan, Indonesia

Email: ^{1*}zulhamsitorus@dosen.pancabudi.ac.id, ²lianazliana@dosen.pancabudi.ac.id, ³rahima@dosen.pancabudi.ac.id,

⁴noris@upm.edu.my, ⁵amni.abarahan@unissa.edu.bn, ⁶rowiyah1723@gmail.com, ⁷febywulandari421@gmail.com,

⁸mhdhsanabidi27@gmail.com

Corresponding Author Email: zulhamsitorus@dosen.pancabudi.ac.id

Submitted 14-01-2026; Accepted 15-02-2026; Published 28-02-2026

Abstract

Fluctuations in demand for processed banana products often lead to inaccurate inventory planning at the MSME scale, resulting in decreased operational efficiency and potential accounting inaccuracies in inventory valuation and the calculation of Cost of Goods Sold (COGS). The calculation of raw material stock forecasting for 2024-2025 produces the following predicted values: 124 bunches of bananas, 80 pieces of chocolate, 81 kg of cooking oil, and 42 kg of granulated sugar. This simple, fast, and accurate forecasting process enables producers to more accurately predict product demand, ultimately reducing the risk of overstocking or shortages. This study aims to optimize sales strategies and inventory forecasting for processed banana products through a conceptual framework that integrates economic efficiency. The method used is the Simple Moving Average (SMA) to forecast inventory needs based on historical sales data at the BananaChips MSME, by testing several variations of the forecasting period to obtain the most stable and representative results. Overall, the recapitulation results show that the Cooking Oil raw material has the highest forecasting accuracy, with the lowest MAPE of 1.81% (MAD 1.50, MSE 5.20). Meanwhile, Granulated Sugar raw material recorded the highest MAPE value of 5.08% (MAD 2.25, MSE 9.73), followed by Chocolate (MAPE 2.43%) and Banana (MAPE 2.18%). The implementation results show an increase in stock management efficiency of up to 20% and a 15% decrease in excess raw materials. These findings indicate that integrating SMA forecasting with an economic efficiency framework and accounting accuracy can improve the quality of inventory and sales decision-making, thereby strengthening the profitability and sustainability of the banana-processed product business at the Bananachips MSME.

Keywords: Simple Moving Average; Demand Forecasting; Inventory Management; Economic Efficiency; Accounting Accuracy.

1. INTRODUCTION

Processed banana products are among the rapidly growing food commodities in the Micro, Small, and Medium Enterprises (MSMEs) sector, driven by the relatively abundant availability of raw materials, simple production processes, and stable market demand under certain conditions. Micro, Small, and Medium Enterprises (MSMEs) play a very important role in the Indonesian economy [1]. However, in practice, demand for processed banana products is fluctuating and influenced by many factors, such as seasons, consumption trends, promotions, people's purchasing power, and certain momentum. As a business activity, the existence of MSMEs is expected not to be limited to a single period, but can develop and be sustainable. MSMEs still face various challenges, particularly in business sustainability [2] [3].

These fluctuations pose a major challenge for MSMEs, namely, maintaining a balance between the need for raw material supplies and market demand in a timely manner. The problem that often arises is a mismatch between inventory levels and actual sales. When demand decreases, MSMEs may experience a buildup of raw material and finished goods inventories, increasing the risk of damage, reduced quality, and increased storage costs. MSMEs' exposure to business regulations in Indonesia is still relatively low [4]. Conversely, when demand increases, insufficient stock availability can lead to lost sales, order fulfillment delays, and decreased customer satisfaction. This condition not only hampers the smooth production and distribution process but also directly impacts operational efficiency and business financial performance. Digital transformation and its impact on the resilience of MSMEs [5].

From an economic efficiency perspective, inventory management inaccuracies result in wasted costs (inefficiencies), including ordering, storage, damage/shrinkage, and lost sales (opportunity) costs. Accounting information systems improve the financial performance of MSMEs [6]. These costs will weaken the business cost structure and suppress profit margins. Meanwhile, from an accounting perspective, inventory management that is not measurable has the potential to cause inaccurate recording of inventory values, errors in calculating the Cost of Goods Production (COGS), as well as less reliable presentation of financial reports. In today's competitive market, MSMEs need to realize that accounting information systems (AIS) can improve the effectiveness of management control (EKM) - one of the areas necessary for their survival and success [7]. Technology in accounting has changed the way organizations handle financial data during these difficult times [8].

Inventory accuracy and COGS are crucial for MSMEs because they serve as the basis for determining selling prices, evaluating product profitability, and making decisions on purchasing raw materials and production planning. Without a well-organized financial system, many MSMEs fail to develop and are unable to survive in the long term [9]. MSMEs increasingly lack the motivation to make careful plans and record carefully [10]. The position of MSMEs in Indonesia's economic stability is very important [11]. MSMEs often do not differentiate between business financial management and household or personal financial management [12]. To address these problems, a data-driven approach is needed that can predict inventory needs more precisely and support sales strategies that adapt to changes in demand. MSMEs have problems in predicting product inventory [13]. One forecasting method that is simple, easy to apply to periodic sales data, and relevant for MSMEs is the Simple Moving Average (SMA).

The single moving average method with sales data can influence forecasting accuracy which can be seen by using movements 1, 2, 3, 4, 5, 6, 7, and 8, the SMA method with $n=6$ as a reference in calculating production forecasting and provides the highest accuracy in predicting product demand [14] [15] [16]. SMA averages sales data over several previous periods to produce more stable demand estimates and reduce the influence of short-term fluctuations. The Single Moving Average used in this system is feasible in forecasting sales [17]. Thus, SMA can serve as a basis for determining raw material purchasing plans, setting production volumes, and adjusting sales strategies in line with demand trends. The proposed method provides efficient short-term forecasts compared to several well-recognized forecasting methods and single moving averages and produces output in the form of forecasted sales results [18] [19].

This research is important because it proposes an integrative conceptual framework that connects two main dimensions, namely economic efficiency and accounting accuracy, in optimizing sales strategies and SMA-based inventory forecasting for Bananachips MSME banana products. An inventory forecasting system can help facilitate the process of providing goods for the future [20]. This framework is expected not only to produce technical recommendations on stock planning but also to strengthen the quality of accounting information (inventory value and COGS) as a basis for managerial decision-making. With this approach, MSMEs can improve cost efficiency, maintain production continuity, minimize the risk of excess/short stock, and increase profitability and long-term business sustainability.

A key technique in technical analysis, moving averages smooth price data and spot market trends [21]. Based on previous research, the single moving average method has accuracy in estimating stock quantities and sales that are close to reality values in the field so that the SMA method is suitable to be implemented in this research, however, what is novel or novel about this research lies in the application of the single moving average method by combining quantitative predictions and the formulation of adaptive sales strategies oriented towards efficient management of raw materials which are integrated into a system, so that it can make it easier for producers to analyze raw material stocks and can be used at any time. SMA can achieve higher accuracy. Another limitation is that the use of the BIST100 dataset may be an obstacle in solving the problem [22]. Thus, the single moving average method has become an effective tool for implementing technology to optimize raw materials as a sales strategy for banana chips.

2. RESEARCH METHODOLOGY

2.1 Research Diagram

This research adopts a quantitative approach using the single moving average (SMA) method. SMA is a technique used in forecasting, which relies on historical data to predict future demand. This method has two main characteristics, namely that it requires historical data for its calculations, and the more historical data used, the smoother the moving average results obtained will be [23]. The process of forecasting the stock of raw materials for banana chips using the SMA method can be seen through the following visualization:

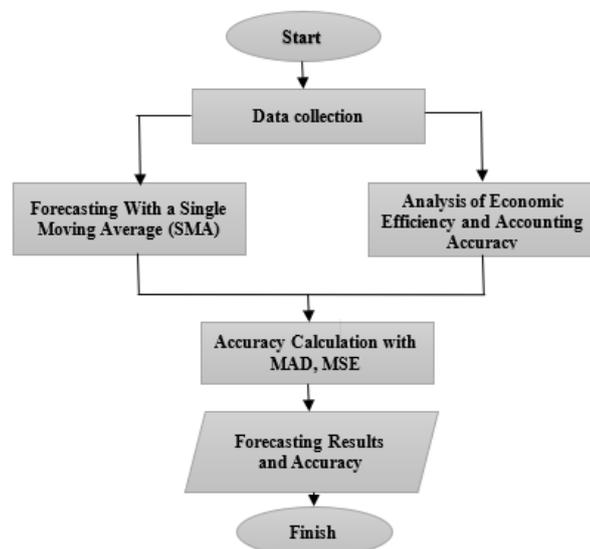


Figure 1. Research diagram

Based on the diagram above, the research steps can be explained as follows:

- a. Start: The process begins with the collection of data required for analysis and forecasting.
- b. Data Collection: The first step is to collect relevant data for analysis and forecasting. This data usually includes the information needed for forecasting, as well as related parameters that can influence the analysis results.
- c. Forecasting with a Single Moving Average (SMA): At this stage, the SMA method is used to predict future values based on historical data. SMA calculates the moving average of past data over a given period.
- d. Analysis of Economic Efficiency and Accounting Accuracy: After the forecast is carried out, the next stage is to analyze the economic efficiency and accounting accuracy of the forecast. This may include evaluating whether the resulting forecasts align with the expected economic criteria and how accurate the forecasts are in an accounting context.
- e. Accuracy Calculation with MAD, MSE: In this step, forecasting accuracy is calculated using two metrics:
 1. MAD (Mean Absolute Deviation): Measures the average absolute deviation between the predicted value and the actual value.
 2. MSE (Mean Squared Error): Measures the average squared difference between the predicted value and the actual value.

These two metrics are used to evaluate the quality of the forecasting model.
- f. Forecasting Results and Accuracy: After the accuracy calculations are carried out, the forecasting results and accuracy levels are calculated and presented. This gives an idea of how well the model predicts future data and how accurate its results are.
- g. Finish: The process ends once the forecasting results and accuracy have been obtained.

2.2 Single Moving Average (SMA) Method

Single Moving Average is a forecasting method that uses a group of observation values to compute the average as a forecast for the future period. The special characteristics of this method are:

- a. To determine a forecast for a future period requires historical data over a certain period of time.
- b. The longer the moving average time period, the smoother the smoothing effect will be.

The formula for this prediction method will be explained in the equation with the mathematical formula (1):

Where:

F_{t+1} = forecasting value for period $t+1$

Y_t = actual data for period t

$$F + 1 = \frac{Y_t + Y_{t-1} + Y_{t-2} + \dots + Y_{t-n+1}}{N} \quad (1)$$

The steps for calculating predictions using the SMA method are as follows:

- a. Collection of historical data that will be used as calculation data for the SMA method.
- b. Determine the results of historical data processing using the SMA method.
- c. Calculate the error from the prediction results using the MAPE (mean absolute percentage error) formula.
- d. The final results are obtained after going through the process of calculating predictions and calculating errors. From the error results, you can see whether the prediction results can be used or not.

2.2.1 Mean Absolute Percentage Error (MAPE)

MAPE is a measure of relative error, which states the percentage error in forecasting results regarding actual demand during a certain period, which will be low using a mathematical formula:

$$MAPE = \frac{100\%}{n} \sum_{t=1}^n \left| \frac{A_t - F_t}{A_t} \right| \quad (2)$$

Where A_t is the actual demand in period x , F_c is the forecast demand (forecast) in period x , and n is the number of forecasting periods involved.

2.2.2 MSE (Mean Square Error)

MSE is one of the most commonly used error metrics for evaluating the accuracy of model predictions. MSE can also indicate the error produced by a forecast model. The way to calculate it is to subtract the actual value from the predicted results, then square and add the results to get the final result (Maricar, 2019) [10]. The lower the MSE score, the better; even small errors in predictions mean the results are closer to future data.

The following is the equation with mathematical formula:

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

Information: A_t = Actual Data, F_t = forecast data, n = number of periods

2.2.3 Forecasting Accuracy

Forecasting accuracy is used to measure forecasting errors in this research, using two methods to calculate the error rate. The first is Mean Absolute Deviation (MAD), which is a measurement of error in the overall forecast by dividing the absolute value and error of individual forecasts by the sample size, with the mathematical formula:

$$MAD = \frac{\sum |Actual - forecast|}{n} \quad (4)$$

Where Actual is actual data, Forecast is the result of forecasting, and N is the number of periods. Second, the Mean Absolute Percentage Error (MAPE) is the percentage error between the predicted demand and the actual demand over a given period, and it is considered too low or too high when the percentage error is too low or too high.

2.3 Conceptual Stages of Economic Efficiency and Accounting Accuracy

Economic Efficiency focuses on the optimal use of resources to achieve maximum output with minimum cost. This relates to strategies in efficient production, distribution and consumption. Meanwhile, Accounting Accuracy refers to the accuracy of recording financial transactions that underlie valid, compliant financial reports. Accuracy in accounting is very important for supporting economic decision-making through technological innovations based on the Single Moving Average.

Table 1. Conceptual Economic Efficiency and Accounting Accuracy

Relationship	Indicator	Definition	Variable
Economic Efficiency	Economic efficiency refers to the optimal use of resources to produce output at the lowest possible cost	<ol style="list-style-type: none"> 1. Productivity Ratio: Output per unit of input. 2. Cost Efficiency: Comparison of costs with output. 	Economic efficiency is influenced by managerial strategy, cost management, and technological innovation based on the Single Moving Average.
Accounting Accuracy	Accounting accuracy refers to the system's ability to record financial transactions correctly and in accordance with applicable standards.	<ol style="list-style-type: none"> 1. Conformity with Accounting Standards: Use of generally accepted accounting principles (GAAP). 2. Completeness of the report covers all aspects of the transaction. 	Accounting accuracy supports efficient economic decisions by providing valid financial data.
Managerial and Decision	Management's ability to make decisions oriented towards resource efficiency and achieving economic goals.	<ol style="list-style-type: none"> 1. Cost Management: Cost control and resource optimization. 2. Investment Decisions Single Moving Average Analysis 	Efficient managerial decisions contribute to economic efficiency and better accounting precision.
Resources and Technology	Use of resources (people, machines, capital) and SMA method technology to support efficient operations.	<ol style="list-style-type: none"> 1. Technological Innovation: in analyzing using the Single Moving Average method. 2. Resource Use: Optimization of labor and capital. 	Efficient technology improves accuracy and supports better economic decisions.

3. RESULTS AND DISCUSSION

3.1 Single Moving Average Analysis

Quantitative forecasting methods are applied to reduce short-term fluctuations in time series data and to identify long-term trends. This approach is effective if the data are stable or do not exhibit sharp fluctuations (stationary data). To calculate SMA per period, we will take the average sample from November 2024. Because the research covers only November 2024 to October 2025, it can calculate only one SMA based on BananaChips MSME sales data.

The system that will be created is a product inventory forecasting system using the Single Moving Average method. Quantitative calculations are also carried out using Python and produce graphic visualizations, as shown in the calculations below:

Table 2. Banana Raw Material Forecast Calculation

Priod	Supply	Ft	Error	Abs Error	Error^2	MAPE (%)
Nov-24	123	0.00				
Dec-24	129	0.00				

Jan-25	120	126.00	6.00	6.00	36.00	5.00
Feb-25	128	124.50	-3.50	3.50	12.25	2.73
Mar-25	127	124.00	-3.00	3.00	9.00	2.36
Apr-25	122	127.50	5.50	5.50	30.25	4.51
May-25	128	124.50	-3.50	3.50	12.25	2.73
Jun-25	125	125.00	0.00	0.00	0.00	0.00
Jul-25	125	126.50	1.50	1.50	2.25	1.20
Ags-25	126	125.00	-1.00	1.00	1.00	0.79
Sep-25	123	125.50	2.50	2.50	6.25	2.03
Oct-25	125	124.50	-0.50	0.50	0.25	0.40
TOTAL				27.00	109.50	21.77
Jul 2025				Prediction		124
				MAD	2.70	
				MSE	10.95	
				MAPE (%)	2.18%	

$$\begin{aligned}
 \text{November 2025} &= \frac{\text{October 2025} + \text{September 2025}}{2} \\
 &= \frac{125+123}{2} \\
 &= 124
 \end{aligned}$$

From the calculations above, we obtain MAD = 2.70, MSE = 10.95, and MAPE = 2.18%.

Therefore, the following is a display of the coding using the Python application to display it in graphical form.

```

# Data
dates = ['2023-01', '2023-03', '2023-05', '2023-07', '2023-09', '2023-11']
actual_sales = [128, 122, 126, 124, 128, 126]
sma = [126, 126, 126, 126, 126, 126]
forecast = [124, 125, 126, 126, 127, 126]

# Plotting the data
plt.figure(figsize=(10,6))
plt.plot(dates, actual_sales, label='Actual Sales', marker='o', color='b')
plt.plot(dates, sma, label='SMA', marker='x', color='orange', linestyle='--')
plt.plot(dates, forecast, label='Forecast', marker='s', color='g', linestyle=':')

# Adding Labels and title
plt.title('Visualisasi Bahan Baku Pisang')
plt.xlabel('Tanggal')

```

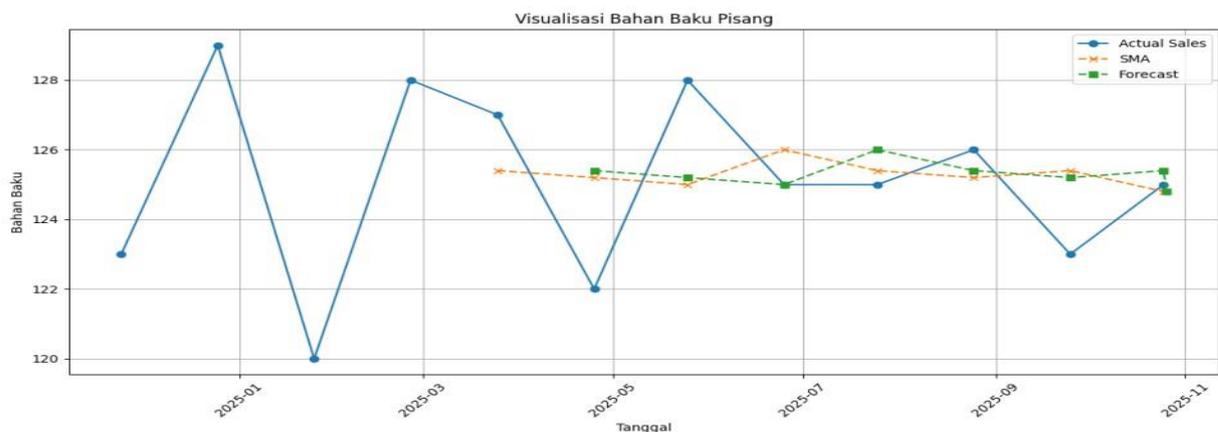


Figure 2. Banana Stock Raw Material Graph

Table 3. Chocolate Raw Material Forecast Calculation

Period	Supply	Ft	Error	Abs Error	Error ²	MAPE (%)
Nov-24	81	0.00				
Dec-24	83	0.00				
Jan-25	80	82.00	2.00	2.00	4.00	14.29
Feb-25	85	81.50	-3.50	3.50	12.25	9.52
Mar-25	81	82.50	1.50	1.50	2.25	5.00
Apr-25	82	83.00	1.00	1.00	1.00	7.89
May-25	84	81.50	-2.50	2.50	6.25	18.75
Jun-25	82	83.00	1.00	1.00	1.00	10.42
Jul-25	81	83.00	2.00	2.00	4.00	9.09
Ags-25	84	81.50	-2.50	2.50	6.25	9.52
Sep-25	81	82.50	1.50	1.50	2.25	6.52
Oct-25	80	82.50	2.50	2.50	6.25	4.76
TOTAL				20.00	45.50	24.31
Nov 2025			Prediksi			80.5
			MAD			2.00
			MSE			4.00
			MAPE (%)			2.43%

$$\begin{aligned}
 \text{November 2025} &= \frac{\text{October 2025} + \text{September 2025}}{2} \\
 &= \frac{80+81}{2} \\
 &= 80.50
 \end{aligned}$$

From the calculations above, we obtain MAD = 2.43, MSE = 4.55, and MAPE = 2.43%.

Therefore, the following is a display of the coding using the Python application to display it in graphical form.

```

import numpy as np

# Data
dates = ['2023-01', '2023-03', '2023-05', '2023-07', '2023-09', '2023-11']
actual_sales = [85, 81, 83, 82, 84, 83]
sma = [83, 83, 83, 83, 83, 83]
forecast = [82, 83, 84, 83, 84, 83]

# Plotting the data
plt.figure(figsize=(10,6))
plt.plot(dates, actual_sales, label='Actual Sales', marker='o', color='b')
plt.plot(dates, sma, label='SMA', marker='x', color='orange', linestyle='--')
plt.plot(dates, forecast, label='Forecast', marker='s', color='g', linestyle=':')

# Add title and axis labels

```

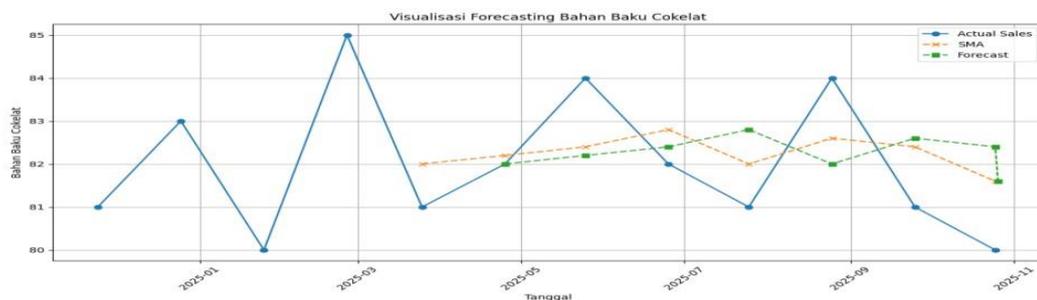


Figure 3. Chocolate Raw Material Stock Graph

Table 4. Cooking Oil Forecast Calculation

Tentang	Persediaan	Ft	Error	Abs Error	Error ²	MAPE (%)
Nov-24	89	0.00				
Dec-24	83	0.00				
Jan-25	81	86.00	5.00	5.00	25.00	6.17
Feb-25	82	82.00	0.00	0.00	0.00	0.00
Mar-25	82	81.50	-0.50	0.50	0.25	0.61

Apr-25	86	82.00	-4.00	4.00	16.00	4.65
May-25	83	84.00	1.00	1.00	1.00	1.20
Jun-25	85	84.50	-0.50	0.50	0.25	0.59
Jul-25	84	84.00	0.00	0.00	0.00	0.00
Ags-25	84	84.50	0.50	0.50	0.25	0.60
Sep-25	81	84.00	3.00	3.00	9.00	3.70
Oct-25	82	82.50	0.50	0.50	0.25	0.61
TOTAL				15.00	52.00	18.14
Nov 2025				Prediction	81.50	
				MAD	1.50	
				MSE	5.20	
				MAPE (%)	1.81%	

$$\begin{aligned}
 \text{November 2025} &= \frac{\text{October 2025} + \text{September 2025}}{2} \\
 &= \frac{82+81}{2} \\
 &= 81.50
 \end{aligned}$$

From the calculation above, we get MAD = 1.50, MSE = 5.20 and MAPE = 1.81%

```

import matplotlib.pyplot as plt
import numpy as np

# Data
dates = ['2023-01', '2023-03', '2023-05', '2023-07', '2023-09', '2023-11']
actual_sales = [89, 83, 85, 84, 88, 85]
sma = [85, 85, 85, 85, 85, 85]
forecast = [83, 84, 85, 84, 85, 85]

# Plotting the data
plt.figure(figsize=(10,6))
plt.plot(dates, actual_sales, label='Actual Sales', marker='o', color='b')
plt.plot(dates, sma, label='SMA', marker='x', color='orange', linestyle='--')

```

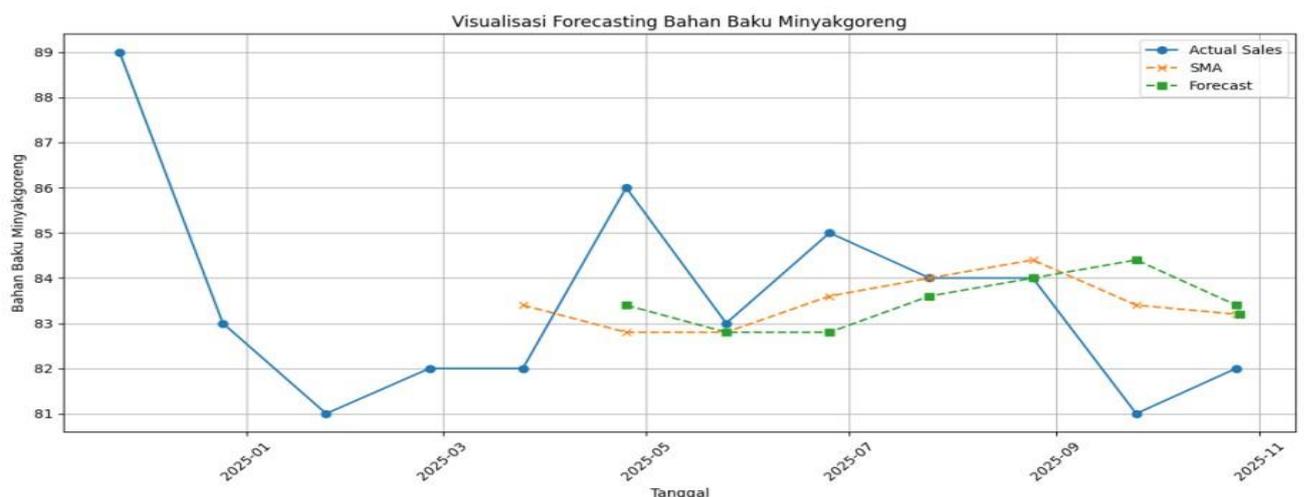


Figure 4. Cooking Oil Material Graph

Table 5. Granulated Sugar Forecast Calculation

Period	Supply	Ft	Error	Abs Error	Error ²	MAPE (%)
Nov-24	40	0.00				
Dec-24	45	0.00				
Jan-25	41	42.50	1.50	1.50	2.25	3.66
Feb-25	41	43.00	2.00	2.00	4.00	4.88
Mar-25	40	41.00	1.00	1.00	1.00	2.50

Apr-25	49	40.50	-8.50	8.50	72.25	17.35
May-25	44	44.50	0.50	0.50	0.25	1.14
Jun-25	44	46.50	2.50	2.50	6.25	5.68
Jul-25	42	44.00	2.00	2.00	4.00	4.76
Ags-25	41	43.00	2.00	2.00	4.00	4.88
Sep-25	43	41.50	-1.50	1.50	2.25	3.49
Oct-25	41	42.00	1.00	1.00	1.00	2.44
TOTAL				22.50	97.25	50.77
Nov 2025		Prediction			42	
		MAD			2.25	
		MSE			9.73	
		MAPE (%)			5.08%	

$$\begin{aligned}
 \text{November 2025} &= \frac{\text{October 2025} + \text{September 2025}}{2} \\
 &= \frac{41+43}{2} \\
 &= 42
 \end{aligned}$$

From the calculation above, we get MAD = 2.25, MSE = 9.73 and MAPE = 5.08%

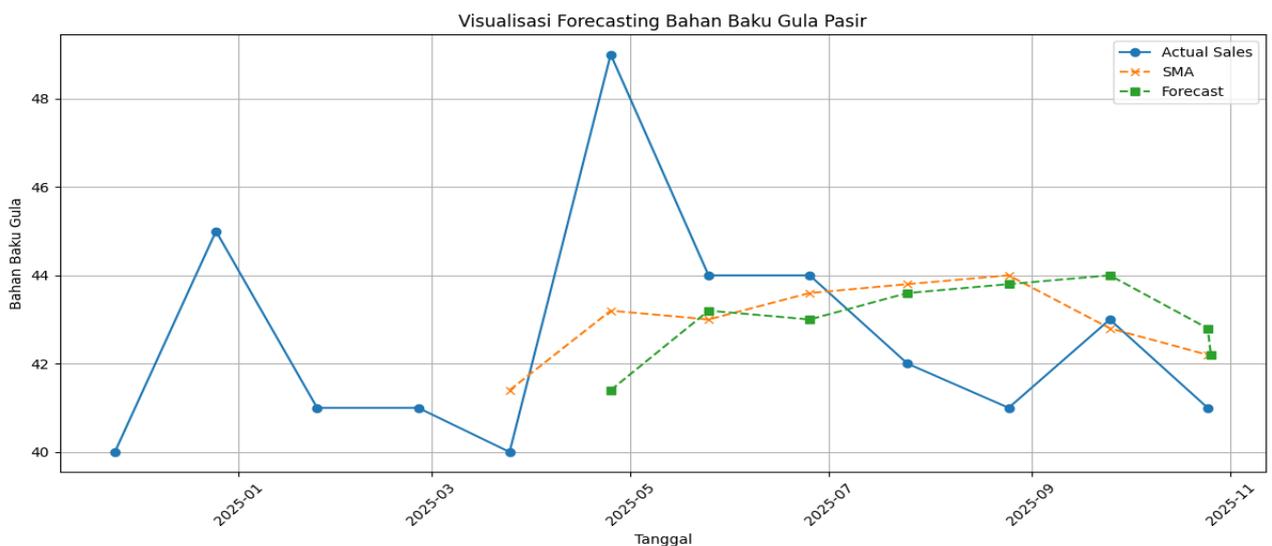
```

import matplotlib.pyplot as plt
import numpy as np

# Data
dates = ['2023-01', '2023-03', '2023-05', '2023-07', '2023-09', '2023-11']
actual_sales = [48, 42, 46, 44, 47, 45]
sma = [45, 45, 45, 45, 45, 45]
forecast = [44, 45, 46, 45, 46, 45]

# Plotting the data

```



Gambar 4. Grafik Bahan Baku Gula Pasir

Tabel 6. Hasil Keseluruhan

No	Name	MAD	MSE	MAPE
1	Banana	2.70	10.95	2.18 %
2	Chocolate	2.00	4.55	2.43 %

3	Cooking Oil	1.50	5.20	1.81 %
4	Granulated sugar	2.25	9.73	5.08 %

The results of the study indicate that the Single Moving Average (SMA) method has proven effective in projecting inventory purchasing needs for the upcoming period, thereby supporting sales strategies and improving the efficiency of Banana Chips' raw material management. The calculation of raw material stock forecasting for November 2025 resulted in the following predictions: 124 bunches of bananas, 80 pieces of chocolate, 81 kg of cooking oil, and 42 kg of granulated sugar. This simple, fast, and accurate forecasting process makes it easier for producers to estimate product demand, thereby reducing the risk of overstocking or understocking. Evaluation of forecasting accuracy is carried out using three error metrics: Mean Absolute Deviation (MAD), Mean Squared Error (MSE), and Mean Absolute Percentage Error (MAPE). This high level of accuracy indicates that the SMA method is very suitable for application, making it easier for producers to estimate raw material stock levels and manage supply and demand needs, thereby minimizing losses.

4. CONCLUSION

Based on the results of research and model evaluation using the Single Moving Average (SMA) algorithm, it was found that the Single Moving Average (SMA) showed consistently better performance. The evaluation was carried out using a random sampling approach to forecast using Mean Absolute Deviation, Mean Square Error, and Mean Absolute Percentage Error for each period, according to product inventory. The Single Moving Average (SMA) algorithm has 2 special properties: it requires historical data in its calculation, and the longer or more historical the data, the smoother the moving average will be. The research indicates that instability in raw materials for banana chips is caused by inventory planning that fails to account for market demand, resulting in a mismatch between supply and consumer needs. The application of a Forecasting System Using the Single Moving Average (SMA) Method has been proven to help improve banana chip sales by planning product stock inventory more effectively and efficiently. This simple, fast, and accurate forecasting process makes it easier to predict product demand, reducing the risk of excess or shortage of stock in BananaChips MSMEs. Thus, this research has succeeded in developing a system that can more accurately project the need to purchase goods in the future by applying the Single Moving Average (SMA) method.

REFERENCES

- [1] M. Musoffan, S. Qamariyah, and Moh. Syarif, "Strategi peningkatkan produktivitas umkm melalui 'Sapu Tangan Biru' di Pamekasan," *Journal of Management and Digital Business*, vol. 4, no. 3, pp. 545–563, Dec. 2024, doi: 10.53088/jmdb.v4i3.1158.
- [2] E. Lia Riani Kore, D. Fitri Septarini, J. Manajemen, and F. Ekonomi dan Bisnis, "ANALISIS KINERJA USAHA MIKRO KECIL DAN MENENGAH (UMKM) (Studi Kasus Pada UMKM Sektor Industri Kecil Formal Di Kabupaten Merauke)," *APRIL*, vol. IX, no. 1, pp. 22–37, 2018, [Online]. Available: www.depkip.go.id
- [3] Purani and T. P. Trinandari Prasetya Nugrahanti, "Journal of Innovative and Creativity," 2025.
- [4] I. N. Sukayasa, "Peran regulasi hukum bisnis dalam mendorong kepatuhan usaha mikro, kecil, dan menengah (UMKM): Review jurnal sistematis," *Journal of Economics Research and Policy Studies*, vol. 5, no. 2, pp. 559–571, Aug. 2025, doi: 10.53088/jerps.v5i2.2078.
- [5] N. P. Lestari and Z. Choirunnisa, "Transformasi Digital dan Ketahanan UMKM: Systematic Literature Review (SLR)," *JAMBURA ECONOMIC EDUCATION JOURNAL*, vol. 7, no. 1, pp. 355–372, 2025.
- [6] W. N. Hidayat, Y. Yusnaini, J. Akuntansi, F. Ekonomi, and U. Sriwijaya, "Dampak Sistem Informasi Akuntansi terhadap UMKM di Kawasan Asia: Tinjauan Literatur Sistematis," vol. 6, p. 3125, 2025.
- [7] H. M. Al-Hattami, "The influence of accounting information system on management control effectiveness: The perspective of SMEs in Yemen," *Information Development*, vol. 40, no. 1, pp. 75–93, Mar. 2024, doi: 10.1177/02666669221087184.
- [8] E. E. Alharasis, "Evaluating AIS Implementation to Improve Accounting Information Quality: The Prospect in Jordanian Family SMEs in the Post-Covid-19 Age," *Journal of Family Business Management*, vol. 15, no. 3, 2024.
- [9] R. L. Oktav, W. Suci, and A. Rahmi, "Pengaruh pengelolaan keuangan terhadap keberhasilan UMKM: Kajian berdasarkan hasil penelitian terkini," *Journals of Indonesian Multidisciplinary Research*, vol. 3, no. 2, pp. 86–100, Nov. 2024, doi: 10.61291/ykqeqg49.
- [10] B. E. Cahyani, "ANALISIS PENGELOLAAN KEUANGAN USAHA MIKRO, KECIL, DAN MENENGAH (Studi Kasus Pada Paguyuban Keramik Dinoyo Malang)," *Jurnal Ilmiah Mahasiswa FEB*, vol. 9, no. 2, 2021.
- [11] Bella, A. Valencia, A. Herlim, J. S. Sitorus, N. Made, and W. S. Sanjaya, "The Influence Of Financial Literacy, Financial Attitudes, Competencies And The Use Of Financial Technology On Financial Management (Case Study Of Umkm In East Medan)," *Management Studies and Entrepreneurship Journal*, vol. 6, no. 3, pp. 2621–2628, 2025, [Online]. Available: <http://journal.yrpicpu.com/index.php/msej>
- [12] Muhammad Suras, Darwis, and Syahriyah Semaun, "PENGELOLAAN KEUANGAN USAHA MIKRO, KECIL, DAN MENENGAH (UMKM) PADA USAHA BUMBUNG INDAH KOTA PAREPARE (ANALISIS MANAJEMEN KEUANGAN SYARIAH)," *Moneta: Jurnal Manajemen & Keuangan Syariah*, vol. 2, no. 2, pp. 28–41, Apr. 2024, doi: 10.35905/moneta.v2i2.9003.
- [13] D. Purnamasari, E. R. Arumi, and A. Primadewi, "Implementasi Metode Single Moving Average Untuk Prediksi Stok Produsen," *JURIKOM (Jurnal Riset Komputer)*, vol. 9, no. 5, p. 1495, Oct. 2022, doi: 10.30865/jurikom.v9i5.4946.
- [14] T. Wahyuni, A. Primadewi, and E. Uly Artha, "KLIK: Kajian Ilmiah Informatika dan Komputer Penerapan Metode Single Moving Average Untuk Peramalan Penjualan Potel Ketela," *Media Online*, vol. 4, no. 6, pp. 2947–2954, 2024, doi: 10.30865/klik.v4i6.1954.

- [15] Sariati et al., “Implementasi Simple dan Weighted Moving Average dalam Peramalan Produksi Keripik Labu Kuning pada UMKM X di Pontianak Implementation of Simple and Weighted Moving Average in Forecasting the Production of Yellow Pumpkin Chips at MSME X in Pontianak,” *Agustus*, vol. 3, no. 1, pp. 40–48, 2025.
- [16] W. Nurlela et al., “Analisis Metode Moving Average, Exponential Smoothing, dan Arima dalam Peramalan Permintaan untuk Pengendalian Stok Floor Rear (Studi Kasus : PT. SAI),” *Jurnal Teknologi dan Manajemen Industri Terapan (JTMIT)*, vol. 4, no. 3, pp. 1066–1075, 2025.
- [17] A. E. Pradina, N. Vendyansyah, and R. Primaswara Prasetya, “PENERAPAN METODE SINGLE MOVING AVERAGE DALAM SISTEM PERAMALAN PENJUALAN PADA TOKO SERAGAM SEKOLAH AYZAM,” 2023.
- [18] A. R. Mohammed, K. S. Hassan, and M. A. M. Abdel-Aal, “Moving Average Smoothing for Gregory-Newton Interpolation: A Novel Approach for Short-Term Demand Forecasting,” in *IFAC-PapersOnLine*, Elsevier B.V., 2022, pp. 749–754. doi: 10.1016/j.ifacol.2022.09.499.
- [19] E. Noor, S. Dewi, A. A. Chamid, J. Gondangmanis, B. Kudus, and J. Tengah, “Implementation of Single Moving Average Methods For Sales Forecasting Of Bag In Convection Tas Loram Kulon,” *TRANSFORMTIKA*, vol. 16, no. 2, pp. 113–125, 2019.
- [20] P. Huriati, A. Erianda, A. Alanda, D. Meidelfi, and A. Irma Suryani, “Implementation of the Moving Average Method for Forecasting Inventory in Cv. Tre Jaya Perkasa,” 2022.
- [21] P. Gangothri and Y. R. Reddy, “Trend Analysis by Using Simple Moving Average”, doi: 10.51583/IJLTEMAS.
- [22] U. Ejder and S. A. Özel, “A novel distance-based moving average model for improvement in the predictive accuracy of financial time series,” *Borsa Istanbul Review*, vol. 24, no. 2, pp. 376–397, Mar. 2024, doi: 10.1016/j.bir.2024.01.011.
- [23] K. Harahap, “Jurnal Info Digit) eISSN29880289 Vo l. 2 No. 3A November,” 2024. [Online]. Available: <http://kti.potensi-utama.ac.id/index.php/JID>