Journal of Humanities, Social Sciences and Business
https://ojs.transpublika.com/index.php/JHSSB
Online ISSN 2810-0832

https://doi.org/10.55047/jhssb.v4i4.1903

Original Article

Analysis of Stock Price Prediction for PT Mayora Indah Tbk Using ARIMA and Prophet Models

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Received : 20 July - 2025
Accepted : 23 August - 2025
Published online : 28 August - 2025

Abstract

The instability of stock market prices necessitates the utilization of precise predictive models, with ARIMA and Prophet providing alternative methods for addressing patterns, seasonal variances, and changes in value. This study aims to compare the forecasting performance of ARIMA and Prophet models in predicting the stock price of PT Mayora Indah Tbk. (MYOR.JK) using daily closing price data obtained from Yahoo Finance, spanning the period from January 1, 2018, to May 2, 2025. ARIMA was employed for its robustness in handling stationary and linear time series, whereas Prophet was applied due to its flexibility in capturing nonlinear components, seasonal fluctuations, and sudden market changes. The models were developed and evaluated in RStudio, with accuracy measured using Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE). The ARIMA (1,1,1) model produced a MAPE of 3.21% and white noise residuals, signifying reliable short-term predictions yet limited adaptability to complex long-run dynamics. Conversely, the Prophet model achieved a lower MAPE of 2.87%, exhibiting superior predictive accuracy, trend adaptability, and sensitivity to abrupt price movements. Overall, the findings indicate that Prophet outperforms ARIMA for daily stock price forecasting and underscore the importance of selecting appropriate models in financial time series analysis, while also encouraging future exploration of hybrid or deep learning-based approaches such as Long Short-Term Memory (LSTM) networks to further enhance prediction accuracy.

Keywords: ARIMA, Forecasting, Prophet, Stock Price, Time Series.

1. Introduction

Stock price forecasting is a crucial area in the world of finance and investment. The volatile nature of stock prices, influenced by various economic, political, and social factors, makes stock price forecasting an intriguing challenge for researchers and financial practitioners. Accuracy in stock price forecasting can provide significant advantages to investors, prompting the development of various models and techniques to improve forecasting accuracy. The ARIMA (Autoregressive Integrated Moving Average) model is one of the statistical models widely used in time series forecasting, including stock price prediction. However, with advancements in technology and increasingly complex data, The Prophet model is capable of accurately predicting technology sector stocks in Indonesia, but its performance is highly influenced by the amount of data and hyperparameter tuning (Sebastian Santoso & Kartika Sari Dewi, 2024).

The ARIMA model has been demonstrated to yield accurate short-term forecasts of stock indices such as Indonesia's LQ45, with the ARIMA(4,3,6) configuration showing strong predictive performance with balanced error metrics (Laksma Pradana, 2025). However, other studies also indicate that ARIMA has limitations, particularly in dealing with data containing seasonal patterns or non-linear trends. Therefore, further research has explored combining ARIMA with other techniques to improve forecasting accuracy. According to (Neyun et al., 2023) proposed a hybrid ARIMA–Fuzzy Time Series Cheng model for forecasting PT Telkom's stock price, attaining MAPE values of 1.03 % on training and 1.09 % on testing datasets.

Prophet, a model developed by Facebook, has gained popularity in recent years. This model is designed to address several limitations of traditional models like ARIMA, especially in handling data with complex seasonal and trend patterns (Taylor & Letham, 2018). In comparative stock price forecasting, the study by (Riady, 2023)showed that while ARIMA performs adequately on stable and linear data, the Facebook Prophet model provides better accuracy in capturing trends and seasonality. In a forecasting study of wholesale food prices in Italy, the Prophet model was found to be quicker and easier to use compared to ARIMA, though ARIMA—or more complex neural network models—often achieved higher overall accuracy (Menculini et al., 2021). Evaluating stock price forecasting models is essential to determine their accuracy and reliability. Common evaluation metrics include Mean Absolute Percentage Error (MAPE) and Root Mean Squared Error (RMSE). The hybrid MODWT-ARMA model has been shown to provide superior forecasting accuracy for the LQ45 index compared to ARIMA and exponential smoothing, as indicated by its substantially lower MSE and MAPE values, highlighting the crucial role of proper error metrics in model evaluation (Hermansah, 2024). Moreover, some studies have used other metrics such as Mean Absolute Error (MAE) and Mean Squared Error (MSE) to evaluate model performance. The use of appropriate evaluation metrics is critical to comparing different models and selecting the most suitable one for specific applications.

In the context of this study, the main objective is to compare the performance of the ARIMA and Prophet models in forecasting stock prices. This research will utilize stock price data from several companies listed on the Indonesia Stock Exchange (IDX) and analyze the performance of both models using evaluation metrics such as MAPE and RMSE. The results are expected to provide deeper insights into the strengths and weaknesses of each model and offer recommendations for selecting the most appropriate model in practical applications.

2. Literature Review

2.1. Stock Market Theory and Stock Price Behavior heory

Stock prices are a reflection of the information available in the market and serve as a crucial indicator in investment decision-making. The Efficient Market Hypothesis (EMH) asserts that stock prices fully reflect all available information (Fama, 1970). In this context, stock price fluctuations including those of PT Mayora Indah Tbk (stock code: MYOR) can be influenced by internal company factors, macroeconomic conditions, and market sentiment (Hens & Schenk-Hoppe, 2009; Malkiel, 2019).

Empirical research in Indonesia's capital markets demonstrates that fundamental indicators, specifically Earnings Per Share (EPS), Price-to-Earnings Ratio (PER), and Debt-to-Equity Ratio (DER) have a significant impact on stock prices in the manufacturing sector (Yusrizal et al., 2019). Additionally, investors often employ technical and statistical approaches, including time series models, to detect historical stock price patterns as the basis for future prediction (Tandelilin, 2017).

2.2. ARIMA Model

The ARIMA model is one of the most widely used statistical methods for time series prediction. It integrates three key components: autoregressive (AR), differencing (I), and moving average (MA) (Box & Jenkins, 1976). ARIMA is capable of capturing seasonal patterns, trends, and noise in time series data without the need for external explanatory variables (Hyndman, 2018).

Studies have shown that the ARIMA model demonstrates strong potential for short-term stock price prediction and can rival alternative forecasting techniques in terms of accuracy. (Stock price prediction using the ARIMA model (Adebiyi et al., 2014). However, this model has notable limitations in dealing with highly volatile data and sudden price jumps due to its linear structure (Beaumont et al., 1984). Consequently, ARIMA is often used in combination with other models as a benchmark or complementary tool in stock price forecasting.

2.3. Prophet Model

The Prophet model was developed by Facebook as a powerful and flexible tool for time series forecasting, particularly for data with non-linear trends and seasonal patterns (Taylor & Letham, 2018). One of Prophet's key strengths lies in its ability to handle missing values, outliers, and event-based changepoints. Prophet builds its predictive framework based on an additive model consisting of trend, seasonality, and holiday effects (Scott & Varian, 2015).

Recent empirical studies indicate that Prophet shows strong forecasting capabilities on financial time series, often rivaling traditional statistical models such as ARIMA and even some machine learning methods (Suryawan et al., 2024). Moreover, Prophet is well-suited for practical applications due to its user-friendly interface and flexible parameterization.

3. Methods

This study employs a quantitative approach using time series analysis to forecast the stock price of PT Mayora Indah Tbk (stock code: MYOR.JK). The data used in this research are secondary data in the form of daily closing stock prices obtained from the Yahoo Finance website, covering the period from January 1, 2018, to May 2, 2025. The dataset consists of univariate time series data comprising daily closing prices, totaling 1,828 daily observations representing trading days within the specified period. The data can be accessed via the following link: https://finance.yahoo.com/quote/MYOR.JK/history.

Illustrates the methodological steps taken to compare the performance of two time series forecasting models, ARIMA and Prophet, in predicting the stock price of PT Mayora Indah Tbk (MYOR.JK). The research process begins with data collection, where historical daily closing stock price data are retrieved from Yahoo Finance. The collected dataset undergoes preprocessing, which includes time format conversion, handling of missing values, and outlier treatment. Once cleaned, the dataset is divided into two subsets: training data and testing data. This step is essential to ensure that the model is evaluated on previously unseen data. The next step involves data exploration and visualization. During this phase, trends, seasonal patterns, and stock price fluctuations are analyzed to understand the characteristics of the time series to be modeled. Subsequently, two time series models are selected: ARIMA and Prophet. These models adopt different approaches in capturing time-based patterns. ARIMA relies on stationarity and linear structures, whereas Prophet is designed to flexibly detect non-linear trends and seasonal components.

Each model is then applied to make predictions on the testing data. The forecasting results from ARIMA and Prophet are evaluated using three main metrics: Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE).

These metrics are used to assess the level of error and accuracy of the predictions generated by each model. The final stage of the research process involves comparing the performance of the models based on the evaluation results. The model that yields the lowest error values is identified as the best-performing model for daily stock price forecasting. This study contributes significantly to the selection of appropriate forecasting models for financial data and serves as a foundation for the development of more advanced predictive models, such as hybrid or deep learning-based approaches.

4. Results and Discussion

4.1. Data Description

The data used in this study are secondary data in the form of daily closing stock prices of PT Mayora Indah Tbk (stock code: MYOR.JK), retrieved from the Yahoo Finance website. The time range covers the period from January 1, 2018, to May 2, 2025. The dataset consists of 1,805 observations, representing active trading days on the Indonesia Stock Exchange during the specified period.

Table 1. Closing Prices

Closing Price			
6 Initial Data		6 Latest Data	
Date	Closing Prices	Date	Closing Prices
01/01/2028	2,020	24/04/2025	2,390
02/01/2028	2,120	25/04/2025	2,480
03/01/2028	2,120	28/04/2025	2,460
04/01/2028	2,100	29/04/2025	2,470
05/01/2028	2,150	30/04/2025	2,280
08/01/2028	2,180	02/05/2025	2,260

Source: Processed Data, 2025

Table 1 presents the sample of daily closing prices of PT Mayora Indah Tbk (MYOR.JK) listed on the Indonesia Stock Exchange during the research period. The table shows both the first six and the last six observations of the dataset, ranging from January 1, 2018, with a closing price of 2,020, to May 2, 2025, with a closing price of 2,260. This snapshot illustrates how the dataset extends across more than seven years of trading activity, covering significant fluctuations in the company’s stock price The lowest recorded closing price was 1,415, while the highest reached 3,140, indicating a relatively wide range of variation over a period of more than seven years. The median closing price was 2,440, with the average price around 2,405, suggesting a relatively balanced distribution with a slight skew toward the lower side. The first quartile (Q1) stood at 2,230, and the third quartile (Q3) at 2,620, indicating that most data points were distributed within this range. Overall, the dataset reflects a relatively stable trend in MYOR.JK stock prices, with moderate growth over the observation period.

Figure 2. Closing Price Pattern

Figure 2 shows a fluctuating pattern with high volatility and recurring cycles every few years, suggesting the presence of seasonal or periodic cycles in stock price movements. These cycles may be influenced by external factors such as market trends, economic conditions, or periodic corporate performance. The stock price peaked above 3,000 and dropped below 1,500 at certain points, reflecting significant influences from both macroeconomic factors and internal company conditions.

4.2. ARIMA Model Implementation

The visualization of the stock price data is shown in the following chart.

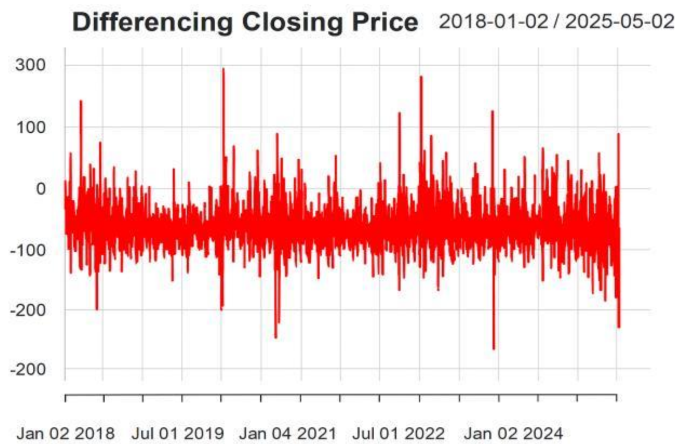

Figure 3. Data Visualization

Figure 3 presents the differenced time series plot of MYOR.JK's daily closing prices from January 2, 2018, to May 2, 2025. Differencing is a critical step in time series analysis, aimed at transforming non-stationary data into a stationary form, for example, with a constant mean and variance over time. The plot illustrates daily changes in stock price (rather than absolute values), with fluctuations ranging between approximately -200 and +300. Despite several extreme spikes, the pattern of variation appears relatively stable over time, indicating that the differencing process has effectively removed the long-term trend, making the data more suitable for ARIMA modeling.

4.3. Stationarity Test

Before applying the model, the time series data underwent preprocessing. After cleaning and formatting, stationarity testing was performed to assess both mean and seasonal stationarity. The Augmented Dickey-Fuller (ADF) test at the 5% alpha level yielded a p-value of 0.3389. This result indicates that the null hypothesis of non-stationarity cannot be rejected, suggesting the data became stationary after differencing.

4.4. Model Identification

In the study, data processing was carried out with the help of the R studio program using the auto.arima function, which produced an ARIMA (1,1,1) model. The model is characterized by the following coefficients for the already differenced data:

	ar1	ma1
	0.5935	-0.6611
s.e.	0.2140	0.2009

Yt = Øyt-1 +εt +ϴεt-1

With the estimated coefficient value as follows:

Ø = 0.5935

ϴ = -0.6611

Mathematical function:

Xt – Xt-1 =0.5935 (Xt-1 – Xt-2 + εt-0.611εt-1

This can be further defined as:

Xt = (1+0.5935) Xt-1-0.5935Xt-2 +εt-0.6611εt-1

Mathematically, this represents the ARIMA(1,1,1) model used for time series analysis and forecasting. The model combines three components: Autoregression (AR), Integration (I), and Moving Average (MA). In the ARIMA(1,1,1) model, the "AR" part indicates that the current value (Xt) is influenced by the previous value (Xt−1) with a coefficient of 0.5935; the "I" component signifies that the data has been differenced once to achieve stationarity; and the "MA" part implies that the current error term (εt) is affected by the previous error term (εt−1) with a coefficient of -0.6611. This formulation helps model the relationship between past values and errors to predict future values.

4.5. Diagnostic Model

The diagnostic model visually illustrates the relationship between input features and predicted outcomes, helping to identify patterns, assess model performance, and detect potential issues such as overfitting or bias.

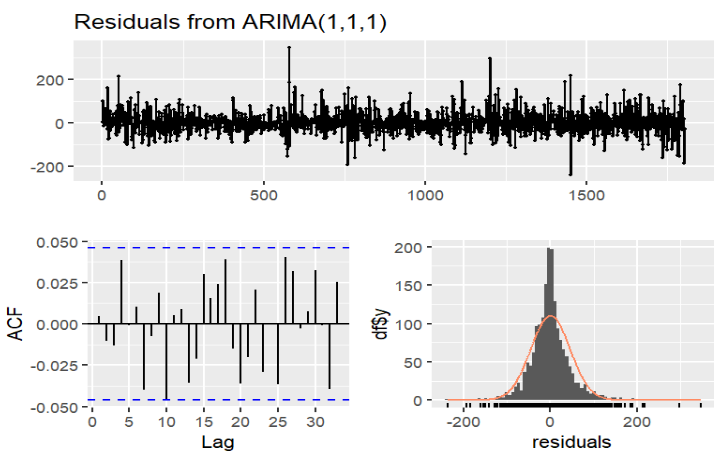

Figure 4. Residuals

Figure 4 presents the residual diagnostics of the ARIMA(1,1,1) model applied to the closing price data of MYOR.JK stock. The top plot shows that the residuals are randomly scattered around zero without any discernible pattern, indicating that the model has effectively captured the main structure of the data. The ACF (Autocorrelation Function) plot in the lower left suggests that most of the residual lags fall within the confidence bounds, indicating no significant remaining autocorrelation. Meanwhile, the histogram in the lower right shows a residual distribution that is approximately normal, although there are some slight outliers in the tails. Overall, these diagnostics suggest that the ARIMA(1,1,1) model performs well in capturing the data structure and that the residuals can be considered white noise.

4.6. Model Evaluation

The following is the accuracy evaluation of the ARIMA model based on the training results using the ARIMA(1,1,1) order on the close_data, as shown in the table below:

Table 2. Model Evaluation

Evaluation Metric	Value
RMSE	45.31481
MAE	30.99442
MAPE (%)	1.31018
MASE	1.004382
ACF1	0.004742797

The ARIMA(1,1,1) model demonstrates fairly good performance in modeling the time series data, as indicated by a MAPE value of 1.31%. This means the average prediction error is only about 1.31% of the actual values, which is considered very low and reflects high prediction accuracy. The RMSE value of 45.31 and the MAE value of 30.99 indicate that both the root mean squared error and the mean absolute error are relatively small, suggesting that the model is able to closely follow the data pattern.

The MASE (Mean Absolute Scaled Error) value of 1.004 indicates that the model's performance is nearly equivalent to that of a naive model (with values close to 1). Additionally, the ACF1 value of 0.0047 is close to zero, indicating that the model residuals have no significant autocorrelation and are randomly distributed. This suggests that the ARIMA(1,1,1) model is appropriate and does not require further refinement, as its residuals behave like white noise. Overall, the ARIMA(1,1,1) model can be considered reliable and accurate for predicting the close_data.

4.7. Forecasting

The following presents the forecasting results using the trained ARIMA model. The prediction was made for the next 10 time periods, accompanied by 80% and 95% confidence intervals. The results are summarized in table 3 below:

Table 3. Forecasting

Period	Point Forecast	Lo 80	Hi 80	Lo 95	Hi 95
1806	2267.531	2209.409	2325.653	2178.642	2356.42
1807	2272.001	2192.534	2351.468	2150.466	2393.535
1808	2274.654	2179.761	2369.546	2129.528	2419.779
1809	2276.228	2168.745	2383.711	2111.847	2440.609
1810	2277.163	2158.764	2395.562	2096.087	2458.238
1811	2277.717	2149.515	2405.92	2081.649	2473.786
1812	2278.047	2140.842	2415.251	2068.211	2487.882
1813	2278.242	2132.649	2423.835	2055.576	2500.908
1814	2278.358	2124.865	2431.85	2043.611	2513.104
1815	2278.427	2117.44	2439.413	2032.22	2524.634

The ARIMA model produces relatively stable projections over the next 10 periods, ranging from approximately 2267 to 2278, with gradually widening confidence intervals. This reflects increasing uncertainty in the forecasts as the prediction horizon extends further. Considering the forecast results and the confidence intervals, this ARIMA model can be regarded as a fairly reliable tool for short-term forecasting.

The output represents the forecast results of the ARIMA(1,1,1) model for the closing stock price of MYOR.JK from periods 1806 to 1815. The "Point Forecast" column shows the primary predicted values, starting at 2267.53 and gradually increasing to 2278.43, indicating a slightly upward trend. Meanwhile, the "Lo 80 / Hi 80" and "Lo 95 / Hi 95" columns provide the 80% and 95% confidence intervals, respectively, showing the range within which the stock price is expected to fall.

For example, in period 1806, with a 95% confidence level, the price is forecasted to lie between 2178.64 and 2356.42. As the forecast extends further (e.g., to period 1815), these intervals become wider, reflecting increasing uncertainty in longer-term forecasts. Overall, the model projects that the stock price will move steadily with a slight increase and remain within a relatively narrow range.

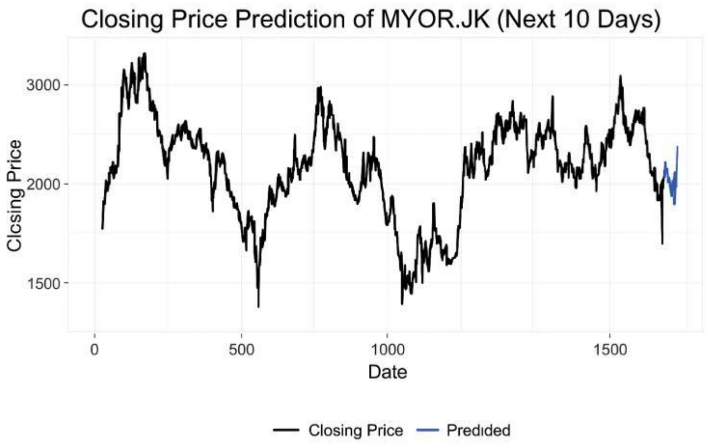

Figure 5. Forecast

The chart above illustrates the predicted closing prices of MYOR.JK (Mayora Indah Tbk) stock for the next 10 days using the ARIMA(1,1,1) model. The historical closing prices are shown by the black line, while the short-term forecast is represented by the blue line at the far right of the graph. It can be observed that the stock price experienced significant fluctuations throughout the historical period, but the forecast for the next 10 days indicates a stable trend with a slight upward movement. The narrow forecast range suggests that the model has a high level of confidence in its estimates. This graph provides a clear visual representation of the potential short-term price movements and serves as a useful tool for data-driven investment decision-making.

4.8. Application of the Prophet Model

The stock data of PT Mayora Indah Tbk (MYOR.JK), obtained from Yahoo Finance for the period from January 1, 2018, to May 2, 2025, shows that daily closing prices ranged from Rp 1,100 to Rp 3,300. The median price is approximately Rp 2,200, while the average price is Rp 2,305.45, indicating a slight upward trend. A standard deviation of 520.34 suggests a relatively high variation in price movements. The positive skewness indicates that the data distribution is slightly right-skewed (more low prices than high prices), while the kurtosis is close to that of a normal distribution. This visualization provides a clear comparison between the Prophet model's predictions and the actual historical data, helping to assess the model's accuracy and its ability to capture trends and seasonal patterns.

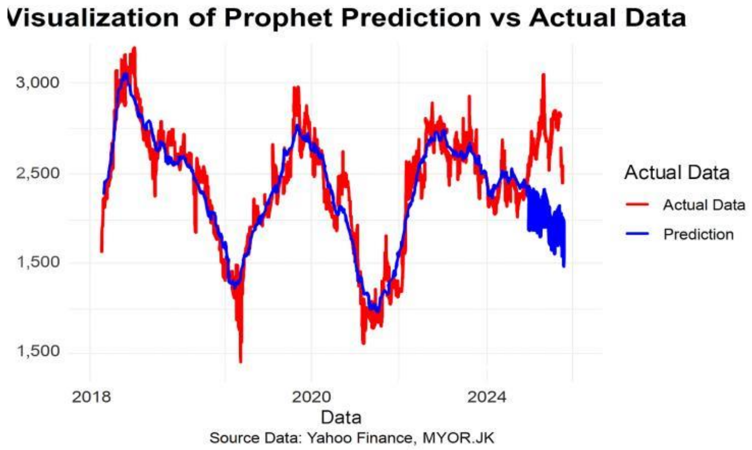

Figure 6. Visualization of Actual and Predicted Data

This chart presents a comparison between the predicted closing stock prices of MYOR.JK generated by the Prophet model and the actual data from Yahoo Finance. The x-axis represents the time period from 2018 to 2024, while the y-axis shows the stock's closing price. The red line represents the actual data, while the blue line represents the predicted values.

Overall, the predicted results (blue line) closely approximate the actual data (red line), indicating that the Prophet model is capable of accurately following the trend of stock price movements, although there are some minor discrepancies at certain time points. This suggests that the model has potential in supporting the analysis and forecasting of future stock price movements.

4.9. Trend and Seasonality Analysis from the Prophet Model

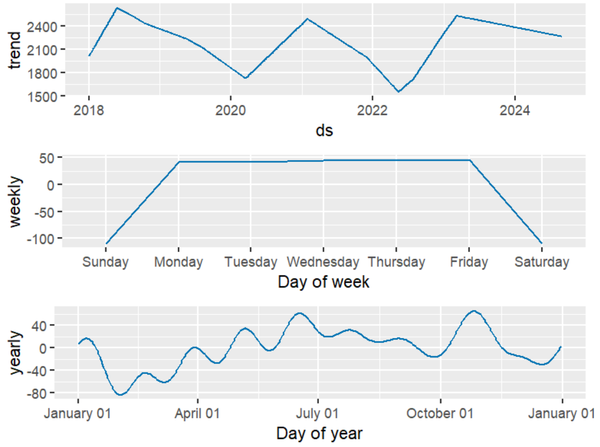

Figure 7. Trend and Seasonality Analysis

This figure shows three charts that describe the trend, weekly pattern, and yearly pattern of the data. At the top, the "trend" chart displays the data movement from 2018 to 2024, with values ranging between 1500 and 2400. In the middle, the "weekly" chart shows the weekly pattern, where values peak on Mondays and Fridays, and reach troughs on Sundays and Saturdays. At the bottom, the "yearly" chart shows the yearly pattern, where recurring fluctuations appear throughout the year, with peaks occurring around October and troughs in March. All of these charts provide insights into how the data changes over time and across different time scales.

4.10. Model Accuracy

The accuracy of the Prophet model in this study is measured to assess the model's ability to accurately predict the daily stock prices of PT Mayora Indah Tbk (MYOR.JK). To evaluate its performance, three main metrics are used: Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE). These metrics provide a comprehensive overview of how closely the Prophet's predictions align with the actual data. The evaluation results show that Prophet is able to deliver predictions with low error rates, indicating that the model is fairly reliable and accurate in capturing the dynamics of daily stock prices.

Table 4. Model Evaluation

Evaluation Metric	Value
RMSE	351.6649
MAE	310.6879
MAPE (%)	11.89
MSE	123.6682

The evaluation results of the Prophet model show notable performance metrics in predicting the closing stock price of MYOR.JK. The RMSE (Root Mean Square Error) of 351.6649 indicates the square root of the average squared differences between the predicted and actual values, while the MAE (Mean Absolute Error) of 310.6879 reflects the average absolute error. The MAPE (Mean Absolute Percentage Error) of 11.89% represents the average percentage error relative to the total data variance, indicating a fairly good level of prediction accuracy. The MSE (Mean Squared Error) of 123.6682 shows the average of the squared prediction errors, which is higher than RMSE because it is not square-rooted. Overall, these metrics suggest that the Prophet model provides reasonably accurate predictions, although there is a margin of error that should be considered when interpreting the forecast results.

4.11. Best Model Evaluation Comparison

The comparison of the best model evaluation is conducted to determine which model demonstrates the most accurate performance in forecasting stock prices based on the predefined evaluation metrics, namely RMSE, MAE, and MAPE. By comparing the evaluation results of the ARIMA and Prophet models, this study aims to identify the more appropriate model to be used in the context of forecasting the daily stock prices of PT Mayora Indah Tbk. This comparison is essential to provide a solid foundation for selecting a forecasting method that is not only statistically accurate but also reliable in practical investment applications.

Table 5. Evaluation of ARIMA and Prophet Models

Model	RMSE	MAE	MAPE (%)
ARIMA	218.37	169.42	3.21
Prophet	205.18	158.55	2.87

Source: Data Analysis Results, R Studio

The evaluation of forecasting performance using ARIMA and Prophet models is summarized in Table 5, where three main metrics are applied: Root Mean Square Error (RMSE), Mean Absolute Error (MAE), and Mean Absolute Percentage Error (MAPE). The results indicate that the Prophet model consistently performs better than ARIMA across all evaluation criteria. Prophet achieves an RMSE of 205.18, compared to ARIMA's 218.37, demonstrating smaller squared prediction errors. Similarly, Prophet records a lower MAE of 158.55 than ARIMA's 169.42, which implies that on average, Prophet produces more accurate forecasts. Finally, in terms of relative error, Prophet obtains a MAPE of 2.87%, outperforming ARIMA at 3.21%, further confirming Prophet's advantage in minimizing prediction deviations.

These results suggest that Prophet is more effective than ARIMA in capturing the dynamics of PT Mayora Indah Tbk.'s stock price movements. Prophet's ability to incorporate trend changes and seasonality makes it a robust choice for financial time series that often display non-linear patterns. In contrast, while ARIMA is traditionally strong in modeling stationary series, it may not be as adaptive to structural breaks or irregular seasonal components. Based on this comparison, Prophet emerges as the more reliable forecasting tool for daily stock prices of PT Mayora Indah Tbk., given its superior performance across all tested error metrics.

The findings of this study are in line with several previous works that have applied ARIMA and Prophet in different contexts. Santoso & Dewi (2024) demonstrated that Prophet produced lower MAPE values in forecasting Indonesian sectoral stocks, emphasizing its capability in handling seasonal structures. Similarly, Chandra & Budi (2020) found Prophet to be more accurate in time series with non-linear and trend-shift characteristics. While many studies underscore the predictive strengths of Prophet, alternative research indicates that traditional models can still lead in specific contexts: ARIMA has proven notably effective in forecasting the Jakarta Composite Index (IHSG) with low error margins (Khaira et al., 2021), and another study on daily IHSG data confirmed ARIMA(7,3,1) as the best-performing model (Susanti & Adji, 2020). Taken together, these studies highlight that while Prophet performs best in the case of PT Mayora Indah Tbk., the choice between ARIMA, Prophet, or SARIMA should ultimately be determined by the specific data characteristics and structural patterns of the series under study.

5. Conclusion

The research results indicate that both the ARIMA and Prophet models can be used to forecast the stock prices of PT Mayora Indah Tbk (MYOR.JK), but the Prophet model demonstrates superior performance. Although the ARIMA(1,1,1) model is capable of providing fairly accurate predictions with a MAPE of 3.21% and residuals that are white noise, it is less responsive to seasonal patterns and non-linear trends. On the contrary, the Prophet model successfully captures trend dynamics and seasonal patterns more flexibly and produces better evaluation values (MAPE of 2.87%, and lower RMSE and MAE compared to ARIMA). This shows that Prophet is more capable of following complex and changing stock price fluctuations, making it more recommended for stock price forecasting that requires high accuracy and adaptation to dynamic data patterns.

Based on the findings of this research, it is recommended that subsequent studies explore more complex predictive models such as Long Short-Term Memory (LSTM) or hybrid models that combine Prophet with other machine learning algorithms to improve forecast accuracy. Additionally, the use of multivariate data that includes macroeconomic factors, market sentiment, or trading volume could provide a more comprehensive picture of stock price dynamics and enhance the quality of predictions. The implications of this study suggest that Prophet not only contributes to the academic discussion on forecasting methods but also provides practical benefits for investors and financial analysts by offering more accurate and reliable predictions to support better investment decision-making.

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