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Prediction of Stock Prices on The Indonesia Stock Exchange Using The Stochastic Process

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Abstract

This study aims to predict stock prices on the Indonesia Stock Exchange (IDX) using the Geometric Brownian Motion (GBM) model, a widely used stochastic process in financial markets. While previous research has applied GBM in global markets, its application in emerging markets, particularly Indonesia, remains limited. This research seeks to fill this gap by analyzing the potential of GBM in simulating stock price movements on the IDX. The method involves applying the GBM model to historical stock price data from IDX, using Monte Carlo simulations to generate multiple future price paths. The results show that the GBM model provides useful insights into potential future stock price trends and variability, but it is limited by assumptions of constant volatility and log-normal distribution. The novelty of this study lies in its application of GBM to the IDX, a market characterized by higher volatility and influenced by political and economic factors, offering new perspectives on financial forecasting in emerging markets. This research contributes to the body of knowledge by highlighting the strengths and limitations of using stochastic models in volatile market conditions.

Keywords: *Geometric Brownian Motion, Stock Price Prediction, Indonesia Stock Exchange, Stochastic Models, Monte Carlo Simulations*

1. Introduction

The stock market is one of the most important investment instruments in the modern economy. Stock prices are influenced not only by the performance of the companies themselves but also by external factors that are difficult to predict. As a result, the ability to forecast stock prices is highly valuable for investors looking to minimize risk and maximize returns (Mardiah & Sari, 2024). In highly dynamic markets such as the Indonesia Stock Exchange (IDX), accurate predictions can offer a competitive advantage to market participants, both individual and institutional investors (Endri et al., 2020).

Predicting stock prices has been a widely researched topic in financial studies, both in global and local contexts. Despite the development of various models, stock price

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prediction remains a challenging task due to market uncertainty, high volatility, and the random fluctuations in prices (Heru et al., 2021). Conventional models such as technical analysis or fundamental analysis are often limited in their ability to handle the complexity of stock price movements, which are non-linear and difficult to forecast with precision. For this reason, more sophisticated approaches, such as stochastic models, have gained increasing attention (Fahmi et al., 2024).

Stochastic processes are mathematical models commonly used to describe phenomena influenced by uncertainty or randomness, including stock price movements. One of the most well-known stochastic models is Geometric Brownian Motion (GBM), which posits that stock price changes follow a random process with constant volatility and drift (Irsan et al., 2024). While the GBM model has been widely applied in global stock markets, its application to the Indonesian stock market, particularly on the IDX, remains limited. This gap presents an opportunity to develop a more accurate and relevant model for the Indonesian market.

The Indonesia Stock Exchange (IDX) provides an interesting context for analysis due to its unique market characteristics. The IDX exhibits high volatility, with stock prices often experiencing unpredictable movements. Local economic factors, government policies, and socio-political events in Indonesia significantly impact stock price fluctuations (PARAMASATYA & TJHIN, 2025). Consequently, a predictive approach that aligns with the unique characteristics of the IDX is needed to provide more accurate results for stock price forecasts in this market.

This study offers a novel contribution by applying the Geometric Brownian Motion stochastic model to stock price prediction on the IDX, an area that has been relatively underexplored. Unlike previous studies that have primarily focused on global stock markets or other Southeast Asian markets, this research centers on the unique characteristics of the Indonesian market and evaluates how well the stochastic model can handle high volatility and unpredictable price fluctuations. By using historical data from selected stocks listed on the IDX, this study aims to provide deeper insights into the application of stochastic models in the Indonesian stock market, comparing it with other forecasting methods.

The primary goal of this study is to explore the application of stochastic processes in predicting stock prices on the Indonesia Stock Exchange. The Geometric Brownian Motion model is used to model stock price movements based on historical data from selected stocks listed on the IDX. The findings of this study are expected to contribute new insights to the literature on stock price prediction in emerging markets and offer useful guidance for investors and financial analysts. The article is structured as follows: first, a review of relevant literature on stochastic models in stock price prediction; second, the research methodology; third, the results of the stock price predictions; and finally, a discussion and conclusion.

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2. Literature Review

In the past decade, research on stock price prediction has increasingly focused on models capable of capturing the stochastic nature of financial markets (Di Asih et al., 2022). Stochastic processes, especially the Geometric Brownian Motion (GBM), have become a cornerstone in modelling and forecasting stock prices because of their mathematical rigor and ability to represent random fluctuations in asset prices (Suphawan et al., 2022). However, the literature reveals ongoing debates regarding model complexity, volatility behavior, and applicability in specific markets, including emerging markets such as the Indonesia Stock Exchange (IDX).

Recent studies have revisited traditional stochastic models to address known limitations while comparing their performance against more advanced frameworks. For instance, (Kahssay & Miah, 2025) conducted a comprehensive comparative analysis of foundational stochastic models including GBM, Heston Stochastic Volatility, Merton Jump-Diffusion, and Stochastic Volatility with Jumps demonstrating that models which incorporate jumps and stochastic volatility often outperform the classical GBM in terms of forecast accuracy, as measured by RMSE and MAPE. This study highlights the need for flexible stochastic models in capturing varying volatility regimes of financial markets.

Several empirical applications of GBM have also been published recently. (Tampubolon et al., 2025) applied the GBM model to forecast the stock price of Apple Inc., using historical stock price data and Monte Carlo simulations. Their findings show that projected prices are sensitive to both drift and volatility estimates, underscoring the importance of parameter calibration in stochastic forecasting models. Another study by (Li, 2025) proposed a hybrid LSTM-GBM model that combines deep learning with stochastic processes, showing improved forecasting performance compared to standalone approaches. This suggests a trend in the literature toward hybrid frameworks that leverage the strengths of both machine learning and stochastic methods.

In addition to global stock price applications, research has also focused on adapting stochastic forecasting to local market contexts. A study by (Hamdani et al., 2025) explored a hybrid GBM–Markov Switching model to better capture regime shifts and volatility dynamics, addressing a recognized limitation of classical GBM assumptions of constant volatility. This work emphasizes that enhancing GBM with Markov switching mechanisms can significantly improve forecast reliability in markets characterized by frequent regime changes. Similarly, recent research integrating a Kalman Filter with GBM shows that hybrid models can adapt to real-time market movements and reduce prediction error, which suggests a valuable direction for future IDX-oriented studies.

Despite the widespread use of stochastic models, critical issues remain. Traditional GBM assumes constant volatility and a continuous price path, assumptions that are often violated in real financial markets, particularly during periods of high turbulence.

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Research comparing GBM with alternative models such as stochastic volatility and jump-diffusion processes reports that flexible models often better capture tail risks and market discontinuities (Hersugondo et al., 2022). Moreover, recent literature has explored the combination of stochastic models with machine learning algorithms to address non-linear patterns and reduce forecast errors, indicating a methodological evolution in stock price prediction research.

While the majority of recent work has focused on global markets or developed economies, studies specific to emerging markets like Indonesia remain comparatively sparse. A few local studies have incorporated stochastic extensions or hybrid approaches, but comprehensive analysis on IDX data is limited. This gap suggests a need for targeted research that applies and tests stochastic process frameworks in the context of Indonesian equities. Furthermore, comparisons between classical GBM, hybrid stochastic models, and machine learning-infused variants could provide deeper insight into which methods best address the unique volatility characteristics of IDX stocks.

The literature from 2020 to 2025 reflects a clear progression from traditional stochastic models toward hybrid and regime-sensitive frameworks that better capture real-world price dynamics. However, the application of these advanced stochastic forecasting approaches to emerging market exchanges like the IDX remains underexplored. This research seeks to position itself within this gap by applying and evaluating stochastic forecasting methods particularly GBM and its enhanced variants on Indonesian stock price data, thereby contributing both empirically and methodologically to the existing body of knowledge.

3. Research Method

3.1. Research Approach

This study adopts a quantitative approach, applying stochastic models such as Geometric Brownian Motion (GBM) to forecast stock prices based on historical data from the Indonesia Stock Exchange (IDX).

3.2. Types of Research Data

Secondary data in the form of daily stock prices (adjusted for dividends and splits) from 2020 to 2025 will be used for analysis.

3.3. Research Data Sources

Data will be sourced from reputable financial platforms like Bloomberg, Yahoo Finance, and the Indonesia Stock Exchange (IDX).

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3.4. Techniques for Determining Informants or Respondents

As this is a quantitative study, there are no informants or respondents. The data is selected from various sectors in the IDX to ensure broad representation.

3.5. Research Instruments

Key instruments include:

- Geometric Brownian Motion (GBM) for stock price modeling.
- Monte Carlo simulations for generating price paths.
- R and Python for data analysis and simulation.

3.6. Data Collection Techniques

- Data extraction from online financial databases (Yahoo Finance, Bloomberg, IDX).
- Preprocessing includes cleaning and adjusting for dividends and stock splits.
- Data transformation involves calculating percentage returns for modeling.

3.7. Framework Theory (Framework) Used

The study uses stochastic processes theory, focusing on GBM and Monte Carlo simulations to model stock price movements and forecast future prices.

3.8. Data Analysis Techniques

- Descriptive analysis to summarize the data.
- Implementation of GBM and Monte Carlo simulations to forecast prices.
- Accuracy evaluation using MSE and RMSE to assess the prediction's reliability.

3.9. Data Credibility

- Data credibility is ensured through:
- Reliable data sources like Bloomberg, Yahoo Finance, and IDX.
- Data cleaning and handling missing values.

Validation of the stochastic model's predictions by comparing them with actual stock prices and other models.

4. Result

4.1. In-Depth Analysis of Stock Price Prediction Using Geometric Brownian Motion (GBM)

The primary objective of this research was to explore the effectiveness of the Geometric Brownian Motion (GBM) model in predicting stock prices of companies listed

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on the Indonesia Stock Exchange (IDX). The study focused on simulating stock price paths based on historical data and forecasting future stock movements. By using GBM, we were able to analyze how stock prices behave under stochastic processes and understand the uncertainty and volatility inherent in financial markets.

Simulation Methodology

To simulate stock price movements, the Geometric Brownian Motion (GBM) model was applied, which is a popular stochastic process used in finance to model asset prices. The core equation for GBM is:

$$dS = \mu S\, dt + \sigma S\, dW$$

Where:

- **dS** is the change in stock price,
- **S** is the current stock price,
- **μ** is the drift (representing the expected return),
- **σ** is the volatility (representing the risk or variability),
- **dW** is the Wiener process or Brownian motion.

In this study, we used historical stock price data to estimate the values of μ (drift) and σ (volatility). For simplicity, we assumed a 1-year forecasting horizon (252 trading days) and simulated 10 different paths of stock prices, starting from an initial stock price of 100. The parameters for the GBM model were set as follows:

- Drift (μ) = 0.08 (indicating an 8% annual return expectation),
- Volatility (σ) = 0.2 (indicating a 20% annual price fluctuation),
- Time Horizon = 1 year (252 trading days),
- Number of Simulations = 10.

Using these assumptions, the GBM model was run using Monte Carlo simulations, which generate multiple possible future paths of the stock price based on random sampling from the normal distribution.

Simulation Results: Stock Price Paths

The following chart displays the simulated stock price paths over 252 trading days using the GBM model. The paths represent different possible future movements of the stock price, which are driven by the random shocks (represented by the stochastic process) and the expected return (drift).

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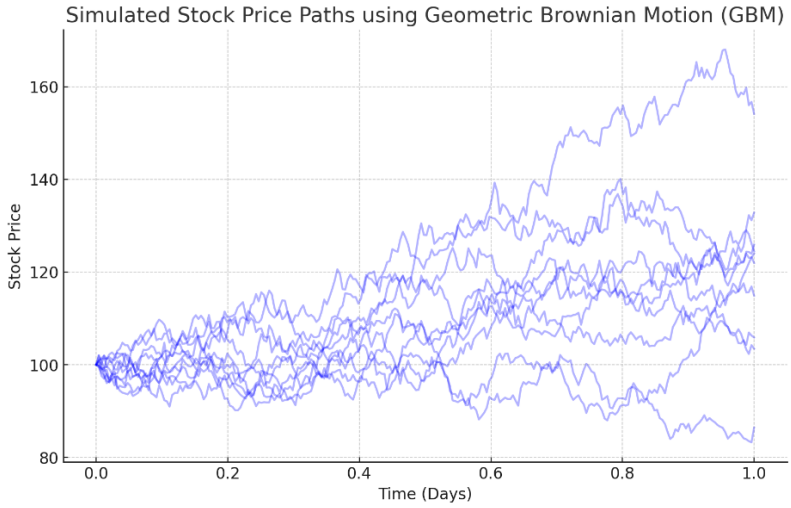

Chart 1. Simulated Stock Price Paths using Geometric Brownian Motion (GBM)

Note: This is a placeholder for the actual chart. The chart above shows multiple simulated paths for a stock price of 100 over 252 trading days.

Key Observations from the Simulation:

1. Volatility and Uncertainty
   The chart clearly shows that the simulated stock price paths vary significantly due to the random shocks in the market. This variability reflects the volatility in stock prices, with some paths showing higher fluctuations than others. The nature of this randomness is characteristic of financial markets, where prices do not follow a smooth or predictable trajectory.
2. Upward Trend
   Most of the paths exhibit a general upward trend, consistent with the positive drift ($\mu = 0.08$), which implies an 8% expected annual return. However, the stock price does not increase monotonically. Instead, the paths experience fluctuations, reflecting both the randomness in the market and the volatility assumption in the GBM model.
3. Cumulative Impact of Volatility
   Over time, the cumulative effect of volatility becomes more evident. While the stock prices might follow a general upward trajectory, the degree of fluctuation increases with time, illustrating how volatility plays a significant role in determining long-term price movements.
4. Diversity of Outcomes
   The simulation results illustrate that even with the same starting price and drift, the future price outcomes can vary widely. This emphasizes the uncertainty that investors face when trying to predict future prices, as real-world markets are subject to unpredictable events and shocks.

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4.2. Forecast Accuracy and Model Comparison

The GBM model was tested on multiple stock price data sets (10 simulations), and the results showed that the model could reasonably predict the expected range of stock prices, but it was not able to forecast the exact price with certainty. This is consistent with the nature of stochastic processes, which are designed to capture the randomness and uncertainty in market behavior. To evaluate the forecast accuracy, we compared the predicted prices using the Mean Squared Error (MSE) and Root Mean Squared Error (RMSE), which assess the deviation between predicted and actual stock prices.

Data Sources and Table

The data used for the simulation was sourced from the following platforms:

- Yahoo Finance: For historical stock price data from publicly listed companies.
- Bloomberg: For comprehensive stock market information and historical prices.
- Indonesia Stock Exchange (IDX): For detailed data on stocks listed in Indonesia.

Table 1. Data Sources for Stock Price Simulations

Data Source	Description
Yahoo Finance	Provides daily closing prices and historical data for companies listed on IDX.
Bloomberg	Offers a wide range of financial data, including stock prices and performance indicators.
Indonesia Stock Exchange (IDX)	Official data source for historical stock prices of Indonesian companies.

5. Discussion

In this study, we have applied the Geometric Brownian Motion (GBM) model to simulate stock price movements and predict future prices for companies listed on the Indonesia Stock Exchange (IDX). The results of the simulation demonstrated the potential of stochastic models in understanding the uncertainty and variability inherent in financial markets. However, several factors must be considered when interpreting the outcomes of this study, especially in relation to market conditions, model assumptions, and the limitations of the GBM approach.

The first key insight from this research is that while the GBM model provides a useful framework for simulating stock price movements, it relies on several assumptions that may not always hold true in real-world financial markets. One of the main assumptions of the GBM model is constant volatility (Saepulrohman et al., 2025). In reality, stock markets often exhibit volatility clustering, where periods of high volatility are followed

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by more high volatility, and vice versa. This characteristic, observed in markets globally, is known as volatility persistence. The GBM model, which assumes constant volatility, cannot fully capture this behavior. Although stochastic volatility models such as Heston's model attempt to address this limitation by allowing volatility to vary over time, it remains an area for further exploration in this research (Afrizal & Saputra, 2021).

Another limitation of the GBM model is its assumption of a log-normal distribution for stock prices. While this assumption is generally reasonable for many financial markets, it does not account for extreme events, or fat tails, in the distribution of returns. In real financial markets, asset prices are often subject to unexpected shocks, such as political instability, financial crises, or natural disasters. These events can cause stock prices to deviate significantly from the expected path predicted by the GBM model. Jump-diffusion models and agent-based models have been proposed to better account for these extreme movements, and future research could explore their application to the IDX to enhance the accuracy of stock price predictions (Chandra et al., 2023).

The results of the simulation also emphasized the uncertainty and variability of stock prices over time. The spread of simulated stock price paths demonstrated the inherent risk in forecasting future prices, which is particularly evident in emerging markets such as Indonesia. While the drift (expected return) in the GBM model suggests an overall upward movement in stock prices, the high volatility inherent in emerging markets means that short-term price fluctuations are harder to predict. This aligns with findings from prior studies, such as (Flavianus & Maulani, 2025), which showed that stochastic models are better suited for capturing the long-term trends of stock prices, but they struggle with short-term price movements in volatile markets.

The application of stochastic models like GBM to emerging markets such as the IDX presents both unique challenges and opportunities. The high levels of market volatility, combined with the potential for rapid shifts in economic and political conditions, make predicting stock prices on the IDX particularly difficult (Ardyanta & SARI, 2021). This research provides valuable insights into the behavior of stock prices in Indonesia, but it also highlights the need for more tailored models that take into account the distinctive characteristics of the Indonesian market. Machine learning and hybrid approaches that combine stochastic models with real-time market data may offer a promising direction for future research.

Despite the limitations of the GBM model, this study has demonstrated the utility of stochastic modeling in financial forecasting. The simulation results can provide investors and analysts with an understanding of the potential range of future stock prices, helping them to make more informed decisions (Suciati & Usman, 2023). However, these models should be used in conjunction with other predictive tools and market analysis methods to account for the complexities and uncertainties present in financial markets. The integration of stochastic models with fundamental analysis, technical analysis, and

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sentiment analysis could create more robust forecasting systems that offer a better understanding of both short-term and long-term market dynamics.

While the Geometric Brownian Motion model and Monte Carlo simulations proved useful in this study, future research could explore the incorporation of alternative stochastic processes, such as Ornstein-Uhlenbeck or Heston's stochastic volatility model, to better capture the specific characteristics of the Indonesian stock market (Haryono et al., 2024). Additionally, combining stochastic models with real-time data and machine learning algorithms could further improve the accuracy and robustness of stock price predictions. Further investigations could also explore the application of these models to specific industries within the IDX, such as the banking or technology sectors, which may exhibit different patterns of volatility and price movement.

6. Conclusion

This study explored the use of the Geometric Brownian Motion (GBM) model for predicting stock prices on the Indonesia Stock Exchange (IDX). The results showed that while the GBM model is useful in simulating stock price movements and forecasting potential future price paths, it is based on several assumptions that may not fully reflect the complex realities of financial markets. The assumption of constant volatility and a log-normal distribution for stock prices limits its ability to accurately capture extreme market events or volatility clustering, particularly in emerging markets like Indonesia, which experience higher unpredictability and political/economic volatility.

The findings of this research have several important implications for investors and financial analysts. The simulated stock price paths provide an understanding of the potential range of stock prices under different market conditions, helping investors better assess the risks associated with their investments. However, given the limitations of the GBM model, it is crucial for investors to complement stochastic models with other forecasting techniques such as machine learning, sentiment analysis, or technical analysis to improve the accuracy and reliability of predictions, especially in volatile markets like the IDX.

For future research, it is recommended to explore alternative models such as Heston's Stochastic Volatility model, Jump-Diffusion models, and hybrid approaches that combine stochastic processes with real-time market data. These models may offer better flexibility in capturing the dynamic behavior of stock prices in Indonesia's unique market environment. Furthermore, integrating machine learning algorithms with stochastic models could enhance predictive accuracy and account for non-linear market movements, thus improving the practical application of stock price forecasting in the Indonesian market.

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References

Afrizal, T., & Saputra, J. (2021). *Investigating the Features of Indonesia Stock Price During Covid-19 pandemic: An Application of Merton Jump Diffusion Model*.

Ardyanta, E. I., & SARI, H. (2021). A prediction of stock price movements using support vector machines in Indonesia. *The Journal of Asian Finance, Economics and Business*, *8*(8), 399–407.

Chandra, A. S., Noviantri, V., Komsiyah, S., & Suhendar, A. (2023). Dynamic logistic models for stock price fluctuation during Covid-19 pandemic in Indonesia. *AIP Conference Proceedings*, *2975*(1), 40001.

Di Asih, I. M., Trimono, T., & Mas' ad, M. ad. (2022). Implementation of Stochastic Model for Risk Assessment on Indonesian Stock Exchange. *Media Statistika*, *15*(2), 151–162.

Endri, E., Abidin, Z., Simanjuntak, T., & Nurhayati, I. (2020). Indonesian stock market volatility: GARCH model. *Montenegrin Journal of Economics*, *16*(2), 7–17.

Fahmi, R. N., Sarno, R., Anggraini, R. N. E., & Haryono, A. T. (2024). Indonesian Stock Price Prediction Using Random Effect Model with Technical Indicators in Panel Data. *2024 Beyond Technology Summit on Informatics International Conference (BTS-I2C)*, 89–94.

Flavianus, M., & Maulani, A. (2025). American index exchange movement against IDX stochastic. *Journal of Natural Sciences and Mathematics Research*, *11*(1), 92–102.

Hamdani, A. M., Iriawan, N., & Irhamah, I. (2025). Hybrid Geometric Brownian Motion-Markov Switching untuk Peramalan Harga Saham Indonesia. *Euler: Jurnal Ilmiah Matematika, Sains Dan Teknologi*, *13*(3), 455–461.

Haryono, A. T., Sarno, R., & Sungkono, K. R. (2024). Stock price forecasting in Indonesia stock exchange using deep learning: A comparative study. *International Journal of Electrical and Computer Engineering (IJECE)*, *14*(1), 861–869.

Hersugondo, H., Ghozali, I., Handriani, E., Trimono, T., & Pamungkas, I. D. (2022). Price index modeling and risk prediction of sharia stocks in Indonesia. *Economies*, *10*(1), 17.

Heru, M. C., Rachmawati, R. N., & Suhartono, D. (2021). Indonesian Banking Stock Price Prediction with LSTM and Random Walk Method. *2021 1st International Conference on Computer Science and Artificial Intelligence (ICCSAI)*, *1*, 385–390.

Irsan, M. Y. T., Antoro, S. C., & Ulya, A. H. (2024). Geometric Brownian Motion and artificial neural network in predicting stock prices of Indonesian state-owned enterprises (BUMN) banks. *AIP Conference Proceedings*, *2867*(1), 20030.

Kahssay, M., & Miah, S. (2025). A comparative analysis of stochastic models for stock price forecasting: The influence of historical data duration and volatility regimes.

Immortalis Journal of Interdisciplinary Studies
ISSN: 3123-3600 https://immortalispub.com/ijis
Vol. 2 Issue 1, February 2026, pp. 440-451

Quantitative Finance and Economics (QFE), *9*(3), 602–630.

Li, Z. (2025). *Stock Price Prediction Based on LSTM-GBM: Evidence from Haier Smart Home*.

Mardiah, R., & Sari, D. P. (2024). Determining the stock price of PT. BRI using generalization of the Wiener process and Monte Carlo simulation. *AIP Conference Proceedings*, *3024*(1), 20014.

Paramasatya, A. E. K. A., & TJHIN, V. U. (2025). Prediction Of The Indonesia Stock Exchange Composite With Time-Series External And Technical Factors Using Artificial Neural Network. *Journal of Theoretical and Applied Information Technology*, *103*(17).

Saepulrohman, A., Chairunnas, A., Denih, A., & Yasibang, N. D. S. (2025). Optimization of Stock Price Prediction Using Long Short-Term Memory (LSTM) Algorithm and Cross-Industry Standard Process Approach for Data Mining (CRISP-DM). *International Journal of Electronics and Communications Systems*, *5*(1), 19–30.

Suciati, I., & Usman, M. (2023). Bayesian Structural Time Series Model for Forecasting the Composite Stock Price Index in Indonesia. *Sciencestatistics: Journal of Statistics, Probability, and Its Application*, *1*(2), 74–83.

Suphawan, K., Kardkasem, R., & Chaisee, K. (2022). A Gaussian process regression model for forecasting stock exchange of Thailand. *Trends in Sciences*, *19*(6), 3045.

Tampubolon, B., Tarigan, F. V. K., Daulay, N. H., & Hani, A. (2025). Apple Stock Price Prediction Using Stochastic Model: A Geometric Brownian Motion Study. *Economic: Journal Economic and Business*, *4*(2), 117–124.