ABSTRACT

The dynamic development of the stock market, characterized by large volumes of data, poses significant challenges in generating accurate stock price forecasts. Human limitations in analyzing big data, combined with high market volatility, often cause conventional methods to produce suboptimal predictions. Consequently, stock price forecasting has become a crucial aspect of investment decision-making, particularly in the continuously growing Indonesian stock market, including the infrastructure sector. One company that has attracted considerable investor attention in this sector is PT Barito Renewables Energy Tbk (BREN). This study aims to improve the accuracy of BREN stock price forecasting through the development and comparison of deep learning models. The novelty of this research lies in the application of two hybrid architectures, namely Sequential LSTM–GRU and Parallelized LSTM–GRU, which are compared with baseline models, namely Long Short-Term Memory (LSTM) and Gated Recurrent Unit (GRU). This study uses the open, high, low, price, and volume variables at period t as input variables (X), while the price at period t+1 as the target variable (Y), over the period from October 10, 2023 to October 10, 2025. The dataset contains 471 observations. The analysis stages include splitting the dataset into training and testing sets, followed by preprocessing through Min–Max Normalization with a feature range of [−1,1] and the application of a sliding window with a lookback of 20. Model performance is evaluated using the Mean Absolute Percentage Error (MAPE). The results indicate that the Parallelized LSTM–GRU model achieves the best performance, with a MAPE value of 2.69 percent, demonstrating improved forecasting accuracy compared to the baseline and other hybrid models. These findings suggest that parallel hybrid architectures can deliver superior performance compared to sequential hybrid architectures, even when using a relatively limited dataset.

Keywords: Investment, Stock, Long Short-Term Memory, Gated Recurrent Unit, LSTM-GRU Sequential, Parallelized LSTM-GRU