ABSTRACT

Forecasting of stock prices in the energy sector create a challenge for investors due to its high volatility. The IDX Energy and Newcastle Coal, as examples of stocks in the energy sector, exhibit fluctuating and non-linear price movements, making it difficult for traditional forecasting models such as Vector Autoregressive (VAR) models which are only capable of capturing linear patterns, whereas deep learning models like Long Short-Term Memory (LSTM) can be more effective in handling non-linear patterns although require large amounts of data for optimal performance. This research conducts a hybrid modeling approach combining VAR and LSTM to utilize the strengths of each model in predicting the stock prices of the IDX Energy and Newcastle Coal. This research uses daily closing price data for the IDX Energy and Newcastle Coal from January 1, 2020, to December 31, 2024 with total 953 observation data, sourced from Investing.com. The VAR model is used to identify linear patterns and generate residuals from the VAR prediction results, which will subsequently serve as input for the LSTM model to capture non-linear patterns. The results show that the hybrid VAR(2)-LSTM model can increase prediction accuracy compared to using the VAR(2) model individually. The Mean Absolute Percentage Error (MAPE) value based on testing data for VAR(2) is 9.21% for the IDX Energy stock price and 4.92% for the Newcastle Coal price, while the hybrid VAR(2)-LSTM model achieved 3.06% for the IDX Energy stock price and 3.01% for the Newcastle Coal price, showing a notable reduction.

Keywords: *Vector Autoregressive, Long Short-Term Memory, Hybrid Model, Forecasting, Stock Price, IDX Energy, Newcastle Coal.*