ABSTRACT

The continuously increasing energy demand in Indonesia is not matched by domestic oil and gas (migas) production capacity, making oil and gas imports a strategic step to meet domestic needs. Fluctuations in oil and gas import values significantly impact the trade balance and national foreign exchange reserves, necessitating accurate forecasting approaches to support strategic policymaking. Time series analysis is an appropriate method, especially when data patterns contain both linear and nonlinear elements. The Autoregressive Integrated Moving Average (ARIMA) model is capable of capturing linear patterns, while Support Vector Regression (SVR) effectively accommodates nonlinear patterns through kernel techniques. A hybrid approach combines both models to capture linear and nonlinear components simultaneously. This study compares two hybrid models: ARIMA-SVR, built using a differencing process, and AR-SVR, developed without differencing. The ARIMA(2,1,0)-SVR model is constructed using ARIMA residuals as SVR input, while the AR(2)-SVR model is built directly from AR residuals. The optimal SVR parameters (ε, cost, gamma) are selected using a two-stage grid search method. Evaluation results show that the AR(2)-SVR model provides higher forecasting accuracy with a MAPE of 11.20%, compared to ARIMA(2,1,0)-SVR with a MAPE of 12.00%. These findings indicate that the AR-based approach is not only simpler in terms of computational complexity but also yields more accurate results in forecasting Indonesia's oil and gas import values.

Keywords: *Oil and gas imports, Hybrid, Grid search, RBF kernel*