

ABSTRACT

Brent crude oil is one of the world's crude oil price benchmarks and plays a crucial role in determining the Indonesia Crude Price (ICP). The fluctuating price movements require an adaptive forecasting method. A fuzzy logic-based method, namely Fuzzy Time Series, is chosen because it can overcome the limitations of classical time series methods, particularly in handling data without requiring strict assumptions, by transforming numerical data into linguistic variables represented as fuzzy sets. This study aims to compare the performance of the Automatic Clustering Fuzzy Time Series and Automatic Clustering Fuzzy Time Series Markov Chain methods in predicting daily Brent crude oil prices for the period January to December 2025. The formation of fuzzy intervals is carried out using an Automatic Clustering approach that is adaptive to data characteristics. In the Automatic Clustering Fuzzy Time Series Markov Chain method, the forecasting stage is developed by adding a Markov chain approach. The model accuracy level is evaluated using the Mean Absolute Percentage Error (MAPE). The results show that the Automatic Clustering Fuzzy Time Series method produces a MAPE value on training data of 0.64%, while the Automatic Clustering Fuzzy Time Series Markov Chain method produces a MAPE value of 0.81%. The second method demonstrated a high level of accuracy, but the Automatic Clustering Fuzzy Time Series method produced a lower error rate based on the MAPE values of the training data. The selected model is then used to forecast the testing data and future Brent crude oil prices. The forecasting results on the testing data produce a MAPE value of 1,62%, and the forecasts for the next five periods.

Keywords: Brent Crude Oil, Forecasting, Automatic Clustering Fuzzy Time Series, Markov Chain, MAPE