

ANNUAL PATTERN ANALYSIS AND FLIGHT FORECASTING AT INDONESIAN AIRPORTS USING SARIMA AND ARTIFICIAL NEURAL NETWORK METHODS

ICHSAN FACHRUL RYAN ROZIKIN

*Informatics Study Program, Faculty of Science and Technology
University of Technology Yogyakarta
Jl. Ringroad Utara Jombor, Sleman, Yogyakarta
E-mail: icanfahrul@gmail.com*

ABSTRACT

Indonesia, as an archipelagic nation with the largest population in Southeast Asia, relies heavily on air transportation to ensure accessibility across its vast regions. Air travel generates time series data due to its dependency on scheduled departures and consistent passenger flow. The continuous increase in air traffic each year necessitates strategic forecasting for optimizing resources and services. This study aims to forecast passenger, cargo, and baggage volumes at Indonesian airports using two models: Seasonal Autoregressive Integrated Moving Average (SARIMA) and Artificial Neural Network (ANN). The dataset, sourced from the Indonesian Central Statistics Agency (BPS), covers the period from 2016 to 2023. Evaluation metrics such as Mean Absolute Error (MAE), Root Mean Squared Error (RMSE) and Mean Absolute Percentage Error (MAPE) were used to assess prediction accuracy. Experimental results show that the best SARIMA model, SARIMA (0,0,0)(0,0,0), yielded MAE 0.34420, RMSE 0.34420, and MAPE 41.84% for passenger data; MAE 0.44631, RMSE 0.44631, and MAPE 56.78% for baggage; and MAE 0.63289, RMSE 0.63289, and MAPE 17.92% for cargo. In contrast, the ANN model with 20 epochs achieved better performance with MAE 0.25311, RMSE 0.25311, and MAPE 30.77% for passengers; MAE 0.02275, RMSE 0.02275, and MAPE 32.77% for baggage; and at 100 epochs, MAE 0.08828, RMSE 0.08828, and MAPE 2.50% for cargo. The ANN method demonstrated superior forecasting accuracy, making it a suitable approach for modelling annual air transportation trends in Indonesia due to its lower error rates.

Keywords: *Time Series, Airport, Forecasting, SARIMA, ANN, MAPE*