



Forecasting Green Tea Production in Sri Lanka: A Time Series Analysis

S.H.C.B. De Silva¹, S.D.M. Dilshani^{1}*

¹ Department of Mathematics, University of Ruhuna, Matara, Sri Lanka

**Corresponding author: chamathbimsara1999@gmail.com*

Tea is the main agricultural value-added export product in Sri Lanka, providing a significant contribution to the national economy. Specifically, green tea has drawn worldwide attention in this sector due to its growing consumer demand. Therefore, the main objective of this study was to obtain a reliable forecasting model for green tea production using time series analysis, which is essential for strategic planning to maintain competitiveness in the international market. This study develops time series forecasting models for monthly green tea production using both traditional Seasonal Auto Regressive Integrated Moving Average (SARIMA) models and modern approaches such as Recurrent Neural Network (RNN) models, specifically Long Short-Term Memory (LSTM) models. Monthly production data from 2013 to 2024 were obtained from the Sri Lanka Tea Board for analysis. Model forecasts were evaluated against observed values using standard forecasting accuracy measures such as MAE, MAPE, and RMSE to identify the best-performing model. SARIMA (2,1,2) (1,1,1)₁₂ and LSTM models were developed to forecast monthly green tea production for the test data months. The dataset was split into training and testing data, focusing on capturing short-term production patterns. The results indicate that the LSTM model achieves the lowest prediction error, demonstrating superior forecasting performance. The results demonstrate that modern forecasting approaches, such as LSTM based on Recurrent Neural Networks (RNNs), can effectively capture the nonlinear dynamics of tea production and outperform traditional SARIMA models. These findings suggest that industry stakeholders and policymakers can use RNN-based forecasts to improve production planning, resource allocation, and market supply management, thereby supporting more informed decision-making in the green tea sector.

Keywords: LSTM, MAE, MAPE, RMSE, SARIMA