

## Enhancing Sri Lankan textile export forecasting using social media sentiment with machine learning

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The apparel industry has continued to be the largest export economic activity in Sri Lanka. However recent shocks such as the COVID-19 pandemic and the 2022 financial crisis revealed large vulnerabilities in conventional forecasting mechanisms. Linear econometric models including ARIMA and SARIMA are slow to detect behavioural turning points that precede significant changes in trade flows. This study addresses this gap by combining a high-frequency Social Media Sentiment Index with traditional macroeconomic indicators to assess the importance of sentiment-based information in improving the predictability of the textile export performance. Three forecasting architectures were built through a comparative modelling framework, based on SARIMA, econometric framework as a benchmark, XGBoost as a nonlinear ensemble learning model, and (LSTM) networks as a deep learning framework. The monthly export statistics between 2012-2024 were matched with the sentiment ratings based on around 46000 scraped social media postings (tweets). Findings indicate that there is a clear model performance hierarchy. SARIMA generated consistent forecasts with an RMSE of 31.50, whereas the sentiment-enriched XGBoost was the most accurate overall with an RMSE of 28.93 demonstrating the strongest generalization. LSTM also had the lowest performance and had the highest RMSE of 48.26, indicating overfitting, since the macroeconomic time series is of low frequency and low sample. These findings affirm that sentiment predicts behavioural dynamics that other basic indicators do not capture and that ensemble learning is better than deep learning in this scenario. The results reveal that sentiment-enriched machine learning models provide a clear development in predicting exports in unstable economic conditions. This underlines the importance of combining behavioural information, which is not structured, with economic measures in a structured manner offers a methodological basis of the real-time nowcasting instruments in the export management and policy planning.

**Keywords:** *Textile exports; Sentiment analysis; Xgboost; Sarima; Economic forecasting.*