MODELLING AND FORECASTING VOLATILITY IN APPAREL EXPORTS IN SRI LANKA WITH A SPECIAL REFERENCE TO COVID 19 PANDEMIC

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Thesis submitted in partial fulfillment of the requirements for the degree
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DECLARATION

I declare that this is my own work and this Thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or Institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text. I retain the right to use this content in whole or part in future works (such as articles or books).

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The supervisors should certify the Thesis with the following declaration.

The above candidate has carried out research for the M.Sc. in Operational Research Thesis under our supervision. We confirm that the declaration made above by the student is true and correct.

Name of Supervisor: Mrs. Ravindi Jayasundara

Signature of the Supervisor: Date:

Name of Supervisor: Dr. (Mrs.) S. C. Mathugama

Signature of the Supervisor: Date:

ACKNOWLEDGEMENT

First and foremost, I would like to express my heartfelt gratitude to my research supervisor, Mrs. Ravindi Jayasundara and Dr. (Mrs.) S. C. Mathugama, for providing me with guidance and advice from the start of this study.

Further, I would like to convey my gratitude to Dr. Pasan Edirisinghe, the Course Coordinator of M.Sc. in Operational Research, and all of the lecturers for their unwavering support, encouragement, and invaluable advice for the successful completion of this degree programme.

I would also like to acknowledge my batchmates for their continued support throughout this journey.

Last but not least, I am forever indebted to my parents for providing me with the space, resources, and motivation needed to complete this study successfully.

ABSTRACT

The apparel industry in Sri Lanka contributes predominantly to the country's economy. Therefore, it is crucial for policymakers and other stakeholders to know about the behavior of apparel and textile exports in order to make informed decisions. Thus, the primary objective of this study is to model Sri Lankan apparel and textile exports for the period of January 2007 to December 2022 and provide accurate forecasts. The ARIMA model was employed to do the univariate time series analysis with modeling and forecasting. Accordingly, ARIMA(0,1,2)(2,0,0)[12] was found to be the best-fitted model. However, after fitting ARIMA model, heteroscedasticity was found in the residuals of the fitted model. Therefore, in order to capture the volatility behavior, a hybrid ARMA-GARCH model was fitted, and the best-fitted model was ARMA(0,2)-GARCH(1,1). Forecasts were generated for the two years ahead. When selecting the most appropriate model from the other candidate models, information criteria such as AIC, AICc, and BIC values were considered, and forecast accuracy was checked with metrics such as MAPE, RMSE, and MAE. The best-fitted model for generating forecasts had a MAPE of 7.26%, which implied a good forecast for the period considered. Apart from the numerical forecasts found for the two-year period, the fluctuations over the study period were also examined using a seasonal plot and a subseries plot. In addition to the seasonal fluctuations due to seasonal variations in the countries of major markets for Sri Lankan apparel and textile exports, a significant drop in export earnings was identified in March 2020 because of the COVID-19 pandemic. However, when scrutinizing the COVID-19 caused fluctuations, it was found that the industry was resilient and could quickly adapt and bounce back within a short period. The findings of this study will provide valuable insights for the government and stakeholders in making informed decisions to improve industry dynamics, considering the impact of the apparel industry on the national economy.

Keywords: ARIMA, GARCH, Heteroscedasticity, Textiles

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LIST OF ABBREIATIONS

abbreiation	Description
AIC	Akaike Information Criterion
AICc	Corrected Akaike Information Criterion
ANN	Artificial Neural Network
ARCH	Autoregressive Conditional Heteroskedasticity
ARIMA	AutoRegressive Integrated Moving Average
BIC	Bayesian Information Criterion
CBSL	Central Bank of Sri Lanka
EU	European Union
GARCH	Generalized Autoregressive Conditional Heteroskedasticity
GDP	Gross Domestic Product
JAAFSL	Joint Apparel Association Forum Sri Lanka
LSTM	Long Short-Term Memory
MAE	Mean Absolute Error
MAPE	Mean Absolute Percentage Error
RMSE	Root Mean Squared Error
SARIMA	Seasonal AutoRegressive Integrated Moving Average

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