MODELLING AND FORECASTING THE FABRIC DEMAND IN APPAREL INDUSTRY: A STATISTICAL APPROACH

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Master of Science Degree in Business Statistics

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Dissertation submitted in partial fulfilment of the requirements for the
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DECLARATION

I declare that this is my own work, and this Dissertation 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.

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The above candidate has carried out research for the Masters Dissertation under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of Supervisor: Dr. Samanthi Mathugama

Signature of the Supervisor: Date: 27/08/2023

DEDICATION

To

My parents

And

My teachers

Who truly encouraged me

When it was mostly required

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ABSTRACT

The competitiveness in the apparel industry is continuously accelerating, thus, demand forecasting plays a vital role in decision making. The effectiveness of the decisions helps to increase profitability and customer satisfaction by reducing the risks in business activities. A well-recognized garment manufacturing company which supplies garments for a world-renowned sports brand was selected in this study. On Time Performance of the factory was found to be considerably reduced by over-forecast or below-forecast and hence influence the rating of the Factory's performance. The main aim of this study was to model and forecast accurate future demands for selected fabric category. Secondary data was collected for the study using bi-weekly actualized customer demand and the sample covered data from December 2019 up to February 2023, summing up to 76 data points. Minitab software was used for descriptive data analytics and R statistical software package was used for the time series modelling. According to the descriptive data analysis, year by year, the demand was increasing exponentially. The summer season demand was significantly lower than that in other seasons. When it comes to the monthly demand, April, January and August months showed the highest demand and considerably low demand in February, October and November months. If buy-wise demands were considered, April 2nd, August 2nd, June 2nd, January 2nd and April 1st buys have the highest demands respectively. Demand is very low in February 2nd and October 2nd buys. Among the fitted ARIMA models the ARIMA(4,1,4) model with non-zero mean was identified as the best-fitted model. Model diagnostics confirmed that the selected model is well-fitted. The results indicate that the forecasting performance of the selected model is highly accurate with expected accuracy level for the immediate next 3 buys with a mean average percentage error of 6.85%.

Keywords: forecasting, time series modelling, ARIMA, SARIMA, demand, over-forecast.

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ACF	–	Autocorrelation Function
PACF	–	Partial Autocorrelation Function
EACF	–	Expected Autocorrelation Function
RMSE	–	Root Mean Squared Error
MAPE	–	Mean Absolute Percentage Error
APE	–	Absolute Percentage Error
AIC	–	Akaike's Information Criterion
ARIMA	–	Auto Regressive Integrated Moving Average
SARIMA	–	Seasonal Auto Regressive Integrated Moving Average
r_k	–	Autocorrelation at lag k
OTP	–	On Time Performance