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# Time series analysis on garments and textiles exports in Sri Lanka From 2009 – 2018

**Edirisooriya EDSD[1], Senevirathne BH[2]**
[1, 2] University of Sri Jayewardenepura, Sri Lanka

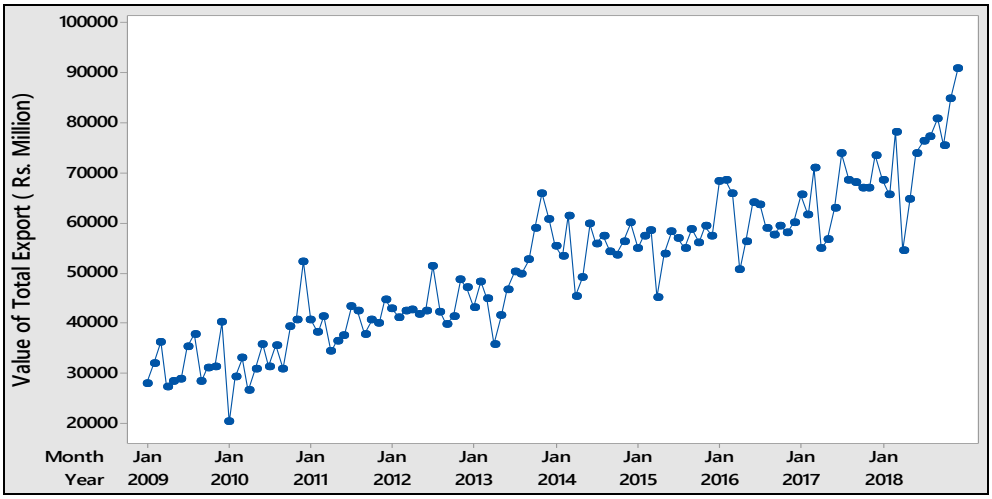
**Abstract**
Garments and textiles exports play a significant role in the Sri Lankan economy. This study focused to model and forecast garments and textiles exports in Sri Lanka from 2009 to 2018. USA, UK, Italy, Germany and Belgium are main markets of garments and textiles exports in Sri Lanka. Monthly garments and textiles exports data were collected from Sri Lanka Customs. Values generated from garments and textiles exports show upward trend with seasonal fluctuations throughout the period. Seasonal indexes were developed to capture seasonal fluctuations. In this study, Box-Jenkins methods were used to build time series models. Seasonal auto regressive moving average (SARIMA) model was best fitted for total garments and textiles exports values. The best model was selected according to Akaike criterion, Schwarz Criterion and Hannan-Quinn Criterion. Model was validated by mean squared error (MSE). According to the model selection criteria SARIMA (2, 1, 0) (1, 0, 2)$^{12}$ was identified as the best fitted model for total garments and textiles exports of Sri Lanka.

**Keywords:** SARIMA model, forecasting, garments and textiles exports, time series analysis

## Introduction
Trade is significant part of the total development effort and national growth of all economies this stance is no different to Sri Lanka. Export trade plays a central role in the development plan of Sri Lanka. Exports trade serve to balance the exchange rate gap and indirectly export growth will increase the country's import capacity. This would result in increasing industrialization and overall economic activity. The garments and textiles industry are the most significant and dynamic contributor to the Sri Lankan economy. According to Sri Lankan export development board the garments and textiles industry has positively grown over the past four decades. The industry has recorded as Sri Lanka's primary foreign exchange earner accounting to forty percent (40%) of the total exports and fifty two percent (52%) of industrial products exports. The history of textiles and garments industry in Sri Lanka can be traced back to the 1960s when it was primarily focused on providing textiles and clothing on a domestic scale. The textiles and garments industry in Sri Lanka started to expand after the liberalization of the economy in 1977. According to the value of markets, United Stated America (U.S.A), United Kingdom (U.K), Italy, Germany and Belgium are the top five export markets for garments and textiles exports in Sri Lanka. Among those countries USA is the main export market for garments and textiles exports in Sri Lanka ensuring fifty one percent from total contribution.
In Sri Lanka, export earnings have persistently fallen behind import payments. Consequently, every year the country incurs a trade deficit. To address this issue, it is important to increase the total garment exports. In order to identify the past behavior and to predict garment exports it will be useful to make a time series analysis of garments and textiles exports in Sri Lanka. Therefore, the research problem of this study is based on the main question; what would be the effective time series model that can be used to demonstrate Sri Lankan garments and textiles export? Hence the main objective of this study is to develop the time series model for garments and textiles export in Sri Lanka from 2009-2018.

## Methodology
In order to develop the model of garments and textiles exports in Sri Lanka, time series data have used in this study. The study based on the secondary data. Monthly data on exports of garments and textiles from 2009(1)-2018(12) were collected from Sri Lanka customs. Sri Lanka had faced seve0ral irregular shocks due to civil war. Civil war resulted considerable impact on economic status of a country including garments and textiles export industry. However, the economy was stabilized accordingly after the war. Therefore, Post war time period was taken for the analysis. Data have analyzed using time series analysis techniques E views and SPPS statistical packages have being used to the analysis. Box-Jenkins methods were used to modeling.

## Findings
As per the value of total garments and textiles export varies between minimum of Rupees 20,276Mn (2010, January) and maximum value of Rupees 90,806Mn (2018, December). The average value of total garment and textiles export is Rupees 51,049Mn with standard deviation of 14,478.
Figure 1 depicts the behavior of the time series components of total garment and textiles export from 2009(1) to 2018(12). An upward trend is noticed in the garment and textiles exports within the considered period. Furthermore, seasonal fluctuations can be considered throughout the period.




***Source*:** Sri Lanka Customs Data, 2009-2018

**Fig 1:** The Temporal Variability of Total Garment and Textiles Export

To determine seasonal indices Ratio to Moving Average method was used and highest value of garment and textiles export was recorded in December, with the seasonal index moving up to 111, recording a 11 percent increase above the monthly average value. The lowest index of 84 in April indicates that value of garment and textiles export is 16 percent lesser than the average monthly value. The value of garment and textiles export, record high in March and December in every year. This is mainly due to summer, late summer early spring of different regions. However, there is no much enough evidence about irregularity and cyclical pattern.

Following table 1 summarizes the possible models fitted to the time series.

**Table 1:** Summary of Possible Models

| Model | Coefficient | P Value | Model Selection Criteria | | | Forecasting Error | | |
|---|---|---|---|---|---|---|---|---|
| | | | AIC | SC | HQC | RMSE | MAE | MAPE |
| SARIMA (2,1,0) (1,0,2) | C | 0.8216 | 19.68 | 19.84 | 19.75 | 4267.727 | 3715.389 | 4.523 |
| | AR (1) | 0.0000 | | | | | | |
| | AR (2) | 0.0209 | | | | | | |
| | SAR (1) | 0.0000 | | | | | | |
| | SMA (1) | 0.0000 | | | | | | |
| | SMA (2) | 0.0304 | | | | | | |
| SARIMA (1,1,1) (0,0,1) | C | 0.0000 | 19.78 | 19.88 | 19.82 | 5693.157 | 4596.334 | 5.455 |
| | AR (1) | 0.0000 | | | | | | |
| | MA (1) | 0.0000 | | | | | | |
| | SMA (1) | 0.0000 | | | | | | |

***Source*:** Compiled By Researcher Based on Sri Lanka Customs Data, 2009 – 2018

All the parameters, are significant for the model ARIMA (2, 1, 0) (1, 0, 2)$^{12}$. Considering the information statistics for the model ARIMA (2, 1, 0) (1, 0, 2)$^{12}$, AIC, SC and HQC (AIC = 19.68 SC = 18.84, HQC = 19.75) is comparatively lower than the other model. According to the residual analysis of the fitted models, it indicated that the Jarque-Bera test statistic for SARIMA (2, 1, 0) (1, 0, 2)$^{12}$ is not significant (JB=2.977/P=0.2325). It implies that the residual terms follow a normal distribution. In addition, Breusch-Godfrey Serial Correlation LM test indicates the F statistic is not significant (F=1.03555/0.3592) which indicates that there is no serial correlation in the residuals. According to the ARCH test, the F statistic is not significant (F=0.4154/0.5208). It implies that the variance of the residual terms are constant.

According to the all model selection criteria can concluded SARIMA (2, 1, 0) (1, 0, 2)$^{12}$ is the best fitted model for total garments and textiles exports. Fitted model with extracted coefficients and equation are as follows.

$Y_t - Y_{t-1} = -0.46(Y_{t-1} - Y_{t-2}) - 0.2446(Y_{t-2} - Y_{t-3}) + 1.0153Y_{t-12} + 0.6594U_{t-12} + 0.2264\ U_{t-24} + \varepsilon$

## Conclusion

Garments and textiles exports in Sri Lanka showed upward trend with seasonality. Peak season of garments and textiles exports in Sri Lanka has been recorded as March and December. There is no evidence about irregularity. SARIMA model was fitted to capture the variations of the series and the fitted model is SARIMA (2, 1, 0) (1, 0, 2)$^{12}$. Based on the results of the study, it is identified that the garments and textiles exports increase in future especially in March and December. In the future, researchers can consider about the factors that affect to garments and textiles exports in modeling total exports.

## References

1. Apparel Manufacturers, Suppliers & Exporters in Sri Lanka [WWW Document], n.d. URL http://www.srilankabusiness.com/apparel/ (accessed 7.14.19).
2. ARIMA modeling | Business Forecasting, n.d. URL http://businessforecastblog.com/tag/arima-modeling/ (accessed 7.16.19).
3. Emang D., Shitan M, Abd Ghani AN, Noor KM.

Forecasting with Univariate Time Series Models: A Case of Export Demand for Peninsular Malaysia's Moulding and Chipboard. JSD, 2010, 3:p157. https://doi.org/10.5539/jsd.v3n3p157
4. Farooq A. Arima Model Building and Forecasting ON Imports and Exports of Pakistan. Pak.j.stat.oper.res, 2014, 10:157. https://doi.org/10.18187/pjsor.v10i2.732