IMPROVING TRANSPARENCY IN SUPPLY CHAIN FOR BETTER BRAND PERFORMANCE: A STATISTICAL APPROACH

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Degree of Master of Science

Department of Mathematics

University of Moratuwa
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Thesis/Dissertation submitted in partial fulfilment of the requirements for the Master of Business Statistics

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DECLARATION

I declare that this is my own work and this thesis/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/MPhil/PhD thesis/ Dissertation under my supervision.

Name of the supervisor: Dr.(Mrs). S.C. Mathugama

Signature of the supervisor: *UOM Verified Signature* Date : 07-04-2022

ABSTRACT

The competition of the economic environment is increasing rapidly and it has been a prevailing issue in many businesses to achieve the balance between the supply and demand. This issue is further increased when there is a lack of transparency in the supply chain both internally and externally. Proper analysis on how to mitigate the gap of lack of transparency would lead to better performance of the business. Various time series forecasting analyses with the soft computing of neural networks can be utilized to hinder the gap of supply chain transparency. Further, application of queuing theory for the complete process enables to mitigate the issues created due to lack of transparency in the supply chain process.

In this study, the focus was to improve the transparency by in depth study of produced and sold garments of a particular style in a global brand. The quantities of produced and sold were taken from a leading manufacturing company in Sri Lanka. The study was carried out with both time series analysis and queuing theory. For time series analysis, decomposition method, ARIMA method, VAR method have been applied. The VAR model was statistically adequate where models were derived for manufactured and sold quantities. Application of queuing theory has been carried out to understand the finished good quantity that would be stored in the warehouse before selling it to the consumer. Apart from that, a mathematical model has been carried out to identify the extensive stocks that were stored in the warehouse with a percentage reduction. This mathematical model could reduce further stock amount and thereby lead to better financial performance as well. The final short-term solution of stock reduction model is helpful to reduce the stock that will be stored in the warehouses and also opens for more holistic queueing modelling in future.

Key words: Forecasting, Queuing, supply chain

DEDICATION

This Thesis is dedicated to all those who helped me, encouraged me in numerous ways!

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