EFFECTS OF MULTIPLE ADJUSTMENTS IN SUPPLY CHAIN FORECASTING ON FORECAST ACCURACY

Banusha Aruchunarasa

208025X

Degree of Master of Science

Department of Transport and Logistics Management

University of Moratuwa

Sri Lanka

December 2021

EFFECTS OF MULTIPLE ADJUSTMENTS IN SUPPLY CHAIN FORECASTING ON FORECAST ACCURACY

Banusha Aruchunarasa

208025X

Thesis/Dissertation submitted in partial fulfillment of the requirements for the degree of Master of Science in Supply Chain Optimization

Department of Transport and Logistics Management

University of Moratuwa

Sri Lanka

December 2021

DECLARATION OF ORIGINALITY

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.

Also, I hereby grant to the University of Moratuwa the non-exclusive right to reproduce and distribute my thesis/dissertation, in whole or in part in print, electronic or other medium. I retain the right to use this content in whole or part in future works (such as articles or books).

Signature: UOM Verified Signature Date: 19/03/2022

STATEMENT OF THE SUPERVISOR

The above candidate has carried out research for the Degree of Master of Science under my supervision.

Name of the supervisor: Dr. H.N. Perera

Signature of the Supervisor: UOM Verified Signature Date: 19th March 2022

ABSTRACT

Behavioral supply chain management is a subdiscipline within behavioral operations management that is growing rapidly. Judgmental adjustments of forecasts are considered part of this domain given the salience of forecasts to the smooth functioning of a supply chain. System-generated forecasts are frequently modified in the industry by forecasting professionals for numerous purposes. Accurate forecasts are significant to supply chain management and efficient organizational planning. Multiple adjustments occur when forecasts are subjected to more than one adjusted in its life cycle. Multiple adjustments are one of the key forecasting issues which impact forecast accuracy. Despite this, multiple adjustments to forecasts remain a not well-addressed research gap in academia. There are very few preliminary studies that investigate multiple adjustments to forecasts. Thus, to investigate the effect of multiple adjustments to forecasts to enhance forecast accuracy in the SC, the researcher employed a laboratory experiment with four different treatments to measure the forecasters' behavior specifically on multiple adjustments to forecasts. 194 undergraduate and MBA students were recruited as participants for the experiment.

In the Control Group, forecasts with first adjustments were observed while other treatments investigate how the participants would perform when they do subsequent adjustments with different levels of information availability. The authors found that multiple adjustments to forecasts significantly improve forecast accuracy. This expands the knowledge of multiple adjustments to forecasts to industry and academic professionals. Moreover, the provision of relevant information related to the previous adjustment allows the forecasters to perform better. The authors suggest the industries to increase information visibility among supply chain partners to have accurate forecasts and subsequent results in supply chain optimization. The results emphasize the importance of industry exposure and understanding the practical situations for a forecaster to improve his/her decision-making regarding judgmental adjustments. This study stresses the supply chain management-related degree programs to provide industry exposure to students to understand the practical implications of forecasting and other supply chain issues. Further works in this avenue, such as developing a forecasting model by integrating multiple adjustments and investigating the impact of the black-box effect in multiple adjustments are encouraged.

Keywords:

Forecasting, Judgmental adjustments, Multiple Adjustments, Laboratory Experiment, Behavioral Supply Chain Management

ACKNOWLEDGEMENT

In the first place, I intend to convey my heartfelt gratitude to Dr. Niles Perera, my post-graduate research supervisor. I have been privileged to get supervised by a supervisor like him who directed me from the very start of my MSc to the end. Further, I am thankful for his knowledge, motivation, guidance, and commitment throughout the degree program. I am sincerely grateful to my external advisor Prof. Dilek Onkal of Northumbria University, United Kingdom for her guidance, motivation, and support in the methodology development of my research study.

I intend to express my gratitude to the post-graduate research coordinator of the Department of Transport and Logistics Management Dr. T. Sivakumar for his guidance and support for the progress reviews at each step of the degree program. My profound gratitude should go to Senior Prof. Amal S. Kumarage, Former Head and Founder of the Department of Transport and Logistics Management of University of Moratuwa, and the current Head of the Department, Prof. A.A.D.A.J. Perera for providing me the opportunity to follow the degree program.

Further, I would like to thank Dr. A.I.T. Gamage and Mr. H.H.H.R. Chamara for their support and guidance throughout the experimental design and data collection for the research study. I am also thankful to the undergraduate and post-graduate students of the Department of Transport and Logistics Management and SLIIT Academy for their participation in the experiment. I wish to appreciatively acknowledge the Senate Research Grant No. SRC/LT/2020/20 of the University of Moratuwa, Sri Lanka for funding my research.

I would also like to thank all the academic and non-academic staff of the Department of Transport and Logistics Management for their support. Finally, I am truly grateful to my family, friends, and team members of the Center for Supply Chain, Operations and Logistics Optimization (SCOLO) for their advice, encouragement, and emotional support throughout the research study.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF EQUATIONS

LIST OF ABBREVIATIONS

ANOVA – Analysis of Variance

BSCM – Behavioral Supply Chain Management

BSC – Behavioral Supply Chain

CG – Control Group

FSS – Forecast Support System

FBA – Forecast by Analogy

FVA – Forecast Value Addition

MAPE – Mean Absolute Percentage Error

MBA – Master of Business Administration

MRP – Material Resource Planning

RBF – Rules Based Forecasting

SC – Supply Chain

SCM – Supply Chain Management

SD – Standard Deviation

SKU – Stock Keeping Unit

SLIIT – Sri Lanka Institute of Information Technology

SRC – Senate Research Committee

UK – United Kingdom

QQ – Quantile – Quantile plot