IMPACT OF CONTINUOUS FLOW ON OPERATIONAL PERFORMANCE IN A WAREHOUSE OPERATION - APPAREL SECTOR CASE STUDY.

I. S. W. Jayasooriya

179212M

Degree of Master of Business Administration of Supply Chain Management

Department of Transport and Logistic Management

University of Moratuwa

Sri Lanka

May 2019

IMPACT OF CONTINUOUS FLOW ON OPERATIONAL PERFORMANCE IN A WAREHOUSE OPERATION - APPAREL SECTOR CASE STUDY.

I.S.W.Jayasooriya

179212M

Thesis submitted in partial fulfilment of the requirements for the degree Master of Business Administration of Supply Chain Management

Department of Transport and Logistic Management

University of Moratuwa

Sri Lanka

May 2019

DECLARATION OF THE CANDIDATE AND SUPERVISOR

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 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: Date

Isuru Jayasooriya.

The above candidate has carried out research for the MBA thesis/Dissertation under my supervision.

……..

Name of the supervisor:

…….. ……

Signature of the supervisor: Date:

ABSTRACT

The aim of this research is to investigate the possibility and requirement of devising the use of the one piece flow to increase operational performance.

The empirical research is used to understand the reasons for outsourcing 3PL providers to utilise the concepts continuous flow in an apparels finished goods hub operation. Moreover the paper discusses the aspects of continuous flow in terms of information and material flow and applying theories of Value Stream, Layout and the one piece flow. A quantitative study is conducted focused on professionals from apparels finished goods hub operations. Thereafter operational performance is defined and elaborated with specific and relevant indicators i.e. KPIs.

The results indicated that the knowledge and understanding of the 3PL professionals to be at a high level in terms of continuous flow and its contribution towards operational performance. However several key concerns were also highlighted which hindered the implementation of the concepts discussed.

The experience of the 3PL service provider in this study provides insights and promote the benefits of continuous flow that can enhance warehouse performance which will contribute to improve Sri Lankan national productivity.

ACKNOWLEDGEMENT

I would convey heartiest gratitude to my research supervisor Ms. Harishani liyanage, lecturer of the Department of Transport and Logistics Management, University of Moratuwa for the guidance and the encouragement given in carrying out research. Also, my gratitude extends to the research coordinator Mrs. Thivya Amalean for giving direction and guidance to carry out the research.

I extend my gratitude to Prof. Amal Kumarage, Head of the Department of Transport and Logistics Management of University of Moratuwa, and all the academic staff members for providing the knowledge and skills throughout the degree program that supported to carry out the research and providing an opportunity to expose to research.

Also, I would like to convey my gratitude to professionals from Apparel warehouse industry, in different organizations and for the people who provided me with contacts in the related industry for helping me to collect data and information to carry out the research project. Without their immense support, this research would not be a reality.

Furthermore, I convey my sincere gratitude to my family members, batch mates, colleagues, friends who supported me to make this research a success and to everyone who supported me with a mere word, encouragements, advices and opinions when bringing this study into a reality.

Table of Contents

DECLARATION OF THE CANDIDATE AND SUPERVISOR iii
ABSTRACT iv
ACKNOWLEDGEMENT v
LIST OF FIGURES viii
LIST OF TABLES viii
LIST OF APPENDIXES ix
LIST OF ACRONYMS x
CHAPTER 1: INTRODUCTION 1
1.1 Background 1
1.2 Research Objectives 2
1.3 Significance of the study 2
1.4 Basic Approach/Outcome 2
1.5 Validation and Conclusion 3
1.6 Limitations to the study 3
1.7 Outline of the chapters 3
CHAPTER 2: LITERATURE REVIEW 5
2.1 Supply Chain Management 5
2.1.1 SCOR model 6
2.1.2 Supply Chain Flows 7
2.1.2.1 Material flow 7
2.1.2.2 Information flow 8
2.2 Third Party Logistics Operation 9
2.2.1 Warehousing 10
2.2.2 Types of warehouses 10
2.2.3 HUB Concept 11
2.3.1 One Piece Flow 11
2.3.2 Value Stream Mapping (VSM) 13
2.3.3 Layout 14
2.4 Operational Performance 14
2.4.1 Key Performance Indicators (KPI) 14
2.4.2 Operational and productivity measurement model. 15
2.4.3 Multi-dimensional nature of measurements 15

2.3.4 Real time problems solved in the industry 16
2.5 Apparel Supply Chain in Sri Lanka 22
2.5.1 3PL operations in the Apparel Sector 23
2.5.2 Supply chain design for 3PL operations in apparel sector 25
CHAPTER 3: RESEARCH METHODOLOGY 26
3.1 Research Design 26
3.2 Population and Sample 27
3.3 Data collection 28
3.3.1 Primary data collection 28
3.3.2 Secondary data collection 28
3.3.3 Questionnaire Development 28
3.4 Justification of the analytical framework 30
3.5 Analytical methods used 30
3.5.1 Descriptive Analysis 30
3.5.2 Weighted average method use for analyse the questionnaire 30
3.6 Validity of the Test 31
3.7 Reliability of the results 31
CHAPTER 4: DATA ANALYSIS 32
4.2 Background analysis (Daily receiving) 33
4.3 CCA Operation 36
4.4 Questionnaire Analysis 41
4.4.1 Information flow implemented 41
4.4.2 Effectiveness of the material flow on the warehouse operation 42
4.4.3 Operation performance based on KPIs 45
4.4.4 Relationship between the continues flow and the performances 46
CHAPTER 5 – DISCUSSION 49
5.1 Literature Survey 49
5.2 Background Analysis 49
5.3 Findings and Discussion 50
CHAPTER 6 – CONCLUSION 56
6.1 Recommendations for future research 57
References 58

LIST OF FIGURES

Figure 2-1 3PL Revenues (2008) 9
Figure 2-2 Value Stream Mapping by Wolfgang, Li & Walton (2007)..... 13
Figure 2-3 Nature of Measurement 16
Figure 2-4 Apparel Sector Export Performance 2007-2017 23
Figure 3-1 Questionnaire Rationale 29
Figure 4-1 FG HUB Operational Process 32
Figure 5-1 Value stream mapping for FG hub operation..... 53
Figure 5-2 Yamasumi Chart (Workload balance graph)..... 54

LIST OF TABLES

Table 1-1: Time plan…….04
Table 2-1: Verified root causes…….20
Table 2-2: Verified root causes…….21
Table 2-3: Root cause……..24
Table 3-1: Dimensions……..29
Table 3-2: Weighted average……...30
Table 4-1: receiving statistical summary……..33
Table 4-2: Unloading bays wise performances……....35
Table 4-3: CCA Audit summery……...36
Table 4-4: CCA operation……....37
Table 4-5: Summary statistics……...38
Table 4-6: Loading operation……...39
Table 5-1: summarising data……..48
Table 6-1: Weighted rates……..50

LIST OF APPENDIXES

Appendix	Description
Appendix A	Sample Questionnaire
Appendix B	Receiving SOP
Appendix C	Issuing SOP
Appendix D	CCA SOP
Appendix E	Kaizen ideas

LIST OF ACRONYMS

Abbreviation	**Description**
SCM	Supply Chain Management
POLI	Purchase Order Line Item
3PL	Third party logistic
CLH	Central logistic hub
NLH	Nugape logistic hub
CCA	Client certified Audits
VSM	Value stream map
GPS	Global positioning system
RFID	Radio frequency identification
EFA	Exploratory Factor Analysis
CT	Cycle time
NPT	Net production time
A/P	Account payable
A/R	Account receivable
NVA	Non-value addition
VA	Value addition
JIT	Just in time
IFR	Item fill rate
OTD	On time dispatched
CBM	Cubic meter
VAS	Value added service
KPI	Key performance indicators
ETA	Estimated transfer arrival
ERD	Estimated received date
PTP	Plan to perform