



Faculty of Manufacturing Engineering

**MODELLING AND SIMULATION FOR LOGISTIC SERVICE
COMPANY: CASE STUDY ON CUSTOMER SERVICE
OPERATION**

Deborah Chow Yen May

**Master of Manufacturing Engineering (Quality
System Engineering)**

2014

**MODELLING AND SIMULATION FOR LOGISTIC SERVICE COMPANY:
CASE STUDY ON CUSTOMER SERVICE OPERATION**

DEBORAH CHOW YEN MAY

**A thesis submitted
in fulfillment of the requirements for the degree of Master of
Manufacturing Engineering (Quality System Engineering)**

Faculty of Manufacturing Engineering

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2014

DECLARATION

I declare that this thesis entitle “Modelling and Simulation for Logistic Service Company: Case Study on Customer Service Operation” is the results of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature:

Name: Deborah Chow Yen May

Date:

APPROVAL

I hereby certify that I have read this report and in my opinion this report is sufficient in term of scope and quality for the degree of Master of Manufacturing Engineering (Quality System Engineering).

Signature :

Name : Dr. Wan Hasrulnizam bin Wan Mahmood

Date :

DEDICATION

To my beloved husband, parents, sibling and friends, who gave me constant support and encouragement to complete this project. Millions of thanks to my supervisor, Dr. Wan Hasrulnizam bin Wan Mahmood who provided me with lots of guidance and advice throughout this project. Thanks to all other who had helped me.

ACKNOWLEDGEMENT

First of all, I would like to express my gratitude to my project supervisor, Dr. Wan Hasrulnizam bin Wan Mahmood for guiding me throughout this project. He provided me precious opinions, guidance and also advices. He also shared with me his experiences and knowledge as well as corrected me of mistakes in this project. As a result, I was able to rectify my problem and hopefully more improvements can be made by me in the future.

Apart from that, I would also like to thank DNE Sdn. Bhd. for allowing me to conduct this study in the company. Special thanks to Mr. Peter Wong (DNE General Manager) who consistently cooperated and provided relevant information to this study. I would also like to thank my friends and classmates who have supported me during difficulty and also encouraged me during my difficult times. They shared with me their knowledge, experience and also valuable ideas to solve problems in this project. They were also willing to provide suggestions in order for me to improve in my project.

Finally, I thank my family for the continuous support and encouragement throughout the period of completing this project. Their care and help had lessened my worries in this project.

ABSTRACT

Modelling and simulation approach is widely used in the management, manufacturing and services industries. The purpose of using modeling and simulation is to improve in business performance and achieve in business goals and targets. However, there is lack of such an application in the customer service operation for the logistic industry. The project is performed to evaluate the roles and responsibilities of Customer Service Officer (CSO) in the import and export operations for a logistic service company, to ensure customer satisfaction for the services provided by CSO from a logistic service company in the import and export operations and to recommend appropriate parameters for a logistic service company for improvement of business performance after operation re-engineering. The research method consists of interview, observation, document review and simulation. The project was conducted in DNE group, a logistic service company located in Klang Valley, Malaysia. The general manager and CSO of import and export operation (five CSO for each operation) were interviewed. The work of CSO of both import and export operations were observed. The relevant forms for the import and export operations and the CSO import and export operational procedure where the company intends to adhere to ISO 9001:2008 were reviewed. ARENA simulation was used to simulate the suggested methods for the purpose of improving business performance. There are four proposals for the import operation. The proposals are to add two working hours for each CSO, to add an extra officer to each import process, to allow two shifts for the CSO and to have more job separation. The export operation consists of three proposals. The proposals are to add two working hours for each CSO, to add an extra officer to each export process and to allow two shifts for the export CSO. These suggestions can be applied to other logistical companies and a conceptual model can be established for future research.

ABSTRAK

Permodelan dan simulasi merupakan kaedah yang digunakan dalam pelbagai industry termasuk industry pengurusan, industry pembuatan dan industry pelayanan. Tujuannya adalah untuk membangunkan prestasi perniagaan dan mencapai tujuan dan matlamat perniagaan. Namun, masih kurang digunakan dalam operasi servis pelanggan bagi industry logistik. Projek ini dilaksanakan untuk menilai peranan dan tanggungjawab Pegawai Servis Pelanggan (PSP) dalam operasi import dan eksport bagi syarikat servis logistik, untuk memastikan kepuasan pelanggan dan mencadangkan parameter yang sesuai untuk menambahbaik prestasi perniagaan selepas pengoperasian semula. Kaedah kajian merangkumi temuduga, pemerhatian dan penyemakan semula dokumen. Projek ini dilaksanakan di DNE group, syarikat servis logistik yang terletak di Lembah Klang, Malaysia. Pengurus Besar dan PSP bagi operasi import dan eksport (lima pegawai bagi setiap operasi) telah ditemuduga. Cara kerja PSP bagi import dan eksport telah diperhatikan. Dokumen yang berkaitan bagi operasi import dan eksport serta prosedur operasi bagi import dan eksport PSP di mana syarikat berniat untuk mengikuti ISO 9001:2008 telah disemak semula. Simulasi ARENA telah digunakan untuk mensimulasikan cara yang dicadangkan demi membangunkan prestasi perniagaan. Terdapat empat cadangan bagi operasi import, iaitu menambahkan dua jam waktu kerja bagi setiap PSP, menambahkan seorang PSP bagi setiap proses import, membenarkan dua shif bagi PSP dan mencabangkan lebih pecahan kerja. Bagi operasi eksport pula merangkumi tiga cadangan. Cadangan tersebut adalah menambahkan dua jam waktu kerja bagi setiap PSP, menambahkan seorang PSP bagi setiap proses eksport dan membenarkan dua shif bagi PSP. Cadangan-cadangan tersebut boleh digunakan untuk syarikat logistik yang lain dan satu model konseptral boleh dibentuk untuk kajian masa depan.

TABLE OF CONTENTS

	PAGE
DECLARATION	ii
APPROVAL	iii
DEDICATION	iv
ACKNOWLEDGEMENT	v
ABSTRACT	vi
ABSTRAK	vii
LIST OF FIGURES	xi
LIST OF TABLES	xiii
LIST OF APPENDICES	xiv
LIST OF ABBREVIATIONS	xv
CHAPTER 1: INTRODUCTION	1
1.1 Background	1
1.2 Problem Statement	2
1.3 Research Questions	3
1.4 Objectives	4
1.5 Scope of Study	4
1.6 Significance of Study	5
CHAPTER 2: LITERATURE REVIEW	6
2.1 Introduction	6
2.2 Objectives	7
2.3 Logistic Service Company	8
2.3.1 Shipping Liners	11
2.3.2 Port	12
2.3.3 Freight Forwarders	12
2.3.4 Customs	13
2.3.5 Forwarding Agents	13
2.3.6 Road Hauliers	14
2.3.7 Depots or Warehouses	14

2.3.8	Customers	15
2.4	Import and Export Operation	15
2.4.1	Import Operation	16
2.4.2	Export Operation	20
2.5	Customer Service Roles and Responsibility	23
2.5.1	The Relationship of Customer Requirements and Customer Service	23
2.5.2	The Roles of Customer Service Officers in Case Study Company	24
2.6	Operation Re-engineering	25
2.7	Modelling and Simulation	27
2.8	ISO 9001: 2008	28
2.9	Summary	30
 CHAPTER 3: METHODOLOGY		 31
3.1	Introduction	31
3.2	Objectives	31
3.3	Research Design	32
3.4	Data Collection	34
3.5	Data Analysis	36
3.6	Summary	37
 CHAPTER 4: RESULT AND DISCUSSION		 38
4.1	Introduction	38
4.2	Objective of the Analysis	38
4.3	Terminologies and Definition	39
4.3.1	Logistical Import Operation	39
4.3.2	Logistical Export Operation	40
4.4	Scope of Analysis	41
4.5	Case Study Company	42
4.6	CSO Roles in the Operation	43
4.6.1	Summary of Roles of a CSO in Import Operation	48
4.6.2	Summary of Roles of a CSO in Export Operation	49
4.7	Quality Assurance System (ISO 9001: 2008)	50
4.7.1	Import Procedure Abiding ISO 9001: 2008	50
4.7.2	Export Procedure Abiding ISO 9001: 2008	54

4.7.3	Summary of Procedure in Import Operation for CSO (Full Container Loading)	56
4.7.4	Summary of Procedure in Export Operation for CSO (Full Container Loading)	58
4.8	Operation Re-engineering Procedures	59
4.9	Previous and Current Practices for CSO in the Import and Export Operations	63
4.10	Simulation	65
4.11	Summary	76
CHAPTER 5: CONCLUSION		77
5.1	Introduction	77
5.2	Conclusion	77
5.2.1	Roles and Responsibilities of CSO	78
5.2.2	Ensure Customer Satisfaction	78
5.2.3	Recommendation of Appropriate Parameters for Better Business Performance of DNE	79
5.3	Recommendation for Future Research	80
REFERENCE		81
APPENDICES		
A		87
B		88
C		89
D		90
E		91
F		93
G		94
H		95

LIST OF FIGURES

FIGURES	TITLE	PAGE
2.1	Inter-relationships between various components involved in a logistic supply chain for import operation	10
2.2	Inter-relationships between various components involved in a logistic supply chain for export operation	10
2.3	Import flow chart for full container loading (MITI, 2012)	19
2.4	Export flow chart for full container loading (MITI, 2012)	22
3.1	Flow of research	33
4.1	The roles of a single CSO in the import operation	46
4.2	The roles of a single CSO in the export operation	47
4.3	Import operational procedure for CSO in DNE according to ISO 9001: 2008 for process A	52
4.4	Import operational procedure for CSO in DNE according to ISO 9001: 2008 for process B to D	53
4.5	Export operational procedure for CSO in DNE according to ISO 9001: 2008 for process A to D	55
4.6	Roles of CSOs in different import operational processes	61
4.7	Roles of CSOs in different export operational processes	62
4.8	Model of ARENA simulation for Current Practice of import operation	66
4.9	Run setup in ARENA simulation for Current Practice of import operation	66
4.10	Performance measure for different import operations	68
4.11	Model of ARENA simulation for <i>Proposal 4</i> of import operation	69
4.12	Run setup in ARENA simulation for <i>Proposal 4</i> in import operation	70
4.13	Performance measure of Current Practice and <i>Proposal 4</i> for the import operations	71

4.14	Model of ARENA simulation for Current Practice of export operation	72
4.15	Run setup for ARENA simulation for current practice in export operation	72
4.16	Performance measure for different export operations	74

LIST OF TABLES

TABLES	TITLE	PAGE
4.1	Verification of simulated data with actual data	65
4.2	Different parameters used for the import operation simulation	67
4.3	Simulation results for various import operations	67
4.4	Results for more jobs separation for individual CSO in import operation	70
4.5	Different parameters used for export operation simulation	73
4.6	Simulation results for various export operations	73

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	CERTIFICATE OF ORIGIN (COO)	87
B	BILL OF LADING (BOL)	88
C	CUSTOM K1 FORM	89
D	DELIVERY ORDER (DO)	90
E	SUMMARY OF IMPORT OPERATION	91
F	CUSTOM K2 FORM	93
G	CONTAINER DISPATCH ORDER (CDO)	94
H	SUMMARY OF EXPORT OPERATION	95

LIST OF ABBREVIATIONS

BOL	–	Bill of Lading
CDO	–	Container Dispatch Order
CMO	–	Container Movement Order
COO	–	Certificate of Origin
CSO	–	Customer Service Officer
DNE	–	DNE Group Sdn. Bhd.
DO	–	Delivery Order
EDO	–	Electronic Delivery Order
EIR	–	Equipment Interchange Receipt
LC	–	Letter of Credit
MITI	–	Ministry of International Trade and Industry
OGA	–	Other Governmental Agency
PIA	–	Permit Issuing Authority
RFD	–	Request for Delivery

CHAPTER 1

INTRODUCTION

1.1 Background

Logistic service companies encompass processes such as transportation, consolidation warehousing and in or out-country distribution. Such industry provides services to manage customers' needs by providing valued operations across different industries and fields in the form of logistics (Liu et al., 2011).

The logistic service companies require various components to be involved in the logistic supply chain. The components include shipping liners, ports, freight forwarders, road hauliers, forwarding agents and; depots or warehouses. The logistic service company may act as a freight forwarder, a road haulier or a forwarding agent or any combinations of the mentioned three (MITI, 2012).

Among the components of a logistic supply chain, the import and export operations play key roles in ensuring the business of all the logistic service components. The import operation consist of activities and components involved to import goods from the port to the customer premise while the export operation consist of activities and components involved to deliver goods from customer's premise to the port (Peng, 2012).

The logistic supply chain components practice logistic outsourcing to ensure economic growth of the logistic service industry as well as enhancing the value-added logistic services (Hsiao et al., 2010). Amongst the components involved in a logistic

supply chain, Customer Service Officer (CSO) is responsible to ensure the smooth import and export operations.

1.2 Problem Statement

The operations conducted by CSO in import and export for a logistic service company has proven to be quite difficult to manage (Liu, 2010; Florez and Ramon, 2012; Khodakamari and Chan, 2013). According to Florez and Ramon (2012), such difficulty was observed even when careful attention is paid to involving upper management and key stakeholders in the design and implementation process. Additionally, some difficulties in providing satisfied services to customers have been observed due to technological barriers and users' perceived satisfaction (Xu et al., 2009).

According to Rao et al. (2011), operation re-engineering of CSO may help the managers in better managing customer demands at the same time ensure business growth for logistic service industry. The benefits of successful implementation of operation re-engineering of services for CSO have been documented. Khodambashi (2013) and Oprean (2014) found that operation re-engineering of roles of CSOs in the import and export operations increases performance efficiency in satisfying customers and profit for the company. While Meidutė-Kavaliauskienė (2014) found that such implementation ensures long term business success for the logistic service company. Import operation refers to the loading of goods from ports and transported to the warehouses or premise of a customer. The export operation refers to unloading of goods that was delivered from a manufacturer or a supplier to the depot or ports. The operation system to overlook the entire operation is very important and would influence the delay of the delivery of goods that is why this study needs to be conducted.

Operations can be improved using methods such as improvement in information and technology, using knowledge management as a tool for operations and optimization of resources in a company. Operation re-engineering also serves as one of the methods for operation improvement. The operation re-engineering of CSO can be categorized as restructuring the roles played by CSO in the import and export operation. However, such an improvement using operation re-engineering coupled with the costs associated with failed attempts like CSO losing self-confidence and CSO not having motivation to perform well in work has made effective implementation of operation re-engineering for CSO vital (Hoang et al., 2010). Although a number of factors have been suggested as important elements in impacting the success of operation re-engineering, the impact of organizational structure that manages well the human resources appears as a common thread (Chen et al., 2012). Unfortunately, very little attention has been given in literature to exactly what constitutes the optimal organizational structure for an effective implementation of operation re-engineering and how to foster that culture in a logistic service company. It is also unclear on an appropriate method to analyse the effectiveness of the operation re-engineering conducted in a logistic service company.

1.3 Research Questions

1. What are the components in the logistic service supply chain that is involved in importing and exporting operations?
2. What are the common procedures involved in the import and export operations of a logistic service provider?
3. What are the roles and responsibilities played by Customer Service Officers (CSOs) in the import and export operations for a logistic service company?
4. Does every steps carried out by CSOs ensure customer satisfaction?

5. Why does the case study company conduct operation-reengineering of the CSOs for the import and export operation?
6. What are the changes involved in the operation re-engineering of the CSOs in the import and export operations?
7. What are the factors that may affect the work performance of the CSOs?
8. How to evaluate and improve the work performance?

1.4 Objectives

1. To evaluate the roles and responsibilities of CSO in the import and export operations for a logistic service company.
2. To ensure customer satisfaction for the services provided by CSO from a logistic service company in the import and export operations.
3. To recommend appropriate parameters of a logistic service company for improvement of business performance after operation re-engineering.

1.5 Scope of Study

The study conducted in DNE group Sdn. Bhd., a logistic service company whose headquarter is situated in Klang Valley, Malaysia. The study is carried out in the department of customer services where CSO's roles and responsibilities are carefully evaluated. The procedures conducted by CSO in the import and export operations are also reviewed along with ISO 9001: 2008 since DNE is applying the Quality Management System at the time of the research being carried out in DNE. ARENA simulation software is used to model and simulate the current practice of DNE and also provide suggestion to improve in DNE business performance.

1.6 Significance of Study

1. Evaluating and understanding the roles and responsibilities of CSOs in the import and export operations.
2. Manufacturing the best implementation of quality services for import and export operations conducted by CSOs to meet customers' needs.
3. Understanding the fundamental key parameters to improve business performance in an operation re-engineered logistic service company through modelling and simulation.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Logistic Service Company enables goods to be transported from one place to the required destination. The logistic service companies provide transportation either on sea or on the road to aid in the goods transportation (Peng, 2012).

Various parties are involved in the major logistic supply chain. Thus, a systematic and orderly system and structure needs to be conducted to evaluate and determine accurately the whereabouts of the goods. Good relationships between the parties involved allow smooth transportation of goods. This then provides opportunities for business to grow in the future.

Among the processes involved, the customer service quality plays an important role to ensure the improvement and growth of a logistic service company. Hence, the customer service officers involved on a logistic service company is studied to discover the roles of the officers and also the operations involving such officers (Florez and Ramon, 2012).

The operation re-engineering of customer service officers is of interest as this enables better quality services. Compliance to ISO 9000, especially ISO 9001: 2008 is also studied. The reason is that ISO 9001: 2008 standard provides guidelines for logistic service provider to consistently meet customer requirements. By complying with such standard,

customers are rest assured of their goods being able to be transported to the required destination on time and effectively (Chen et al., 2012).

The following reviews literatures from various researchers regarding the roles of logistic service companies, the roles and responsibilities of customer officers, the operation re-engineering, modelling and simulation for business improvement and also on ISO 9001 for customer satisfaction and service assurance.

2.2 Objectives

The literature review is performed based on the following objectives.

1. To review different components involved in the logistic supply chain and the inter-relationship between the components.
2. The review the proper procedures of import and export operations of a logistic service company according to *Ministry of International Trade and Industry (MITI)*.
3. To identify the roles and responsibilities played by customer service officers in the logistic service company.
4. To determine the relationship between roles of customer service officers and quality assurance of services provided by a logistic service company.
5. To review ISO 9001: 2008 standards and to study on the relevance of ISO 9001: 2008 to the quality of services.
6. To review on previous studies conducted by various researchers on the logistic supply chain especially in providing quality services to customers.

2.3 Logistic Service Company

Logistic is the process of planning, implementing and controlling the efficient, cost-effective and storage of raw materials, in-process inventory and finished goods from point of origin to point of consumption for the purpose of satisfying customer requirements. *Logistic Industry* acts as one of the leading industries that greatly influence world economy. Indicators that confirm the importance of logistic industry in a certain country include logistic service trade balance and potential of logistic development in a country (Peng, 2012; Trajkov and Biljan, 2012). The logistic industry includes an array of actions that encompasses transportation, consolidation of cargo, payment systems, warehousing and border system to in or out-country distribution. Such industry provides services to manage value-added processes across organizational boundaries to meet the real needs of customers or end users (Hsiao, 2009; Liu et al., 2011).

The growing importance of logistic services has result in logistic companies place emphasis on supply chain management. Researchers have done studies on supply chain relationship management (Hsiao et al., 2010; Chiang et al., 2011; Li, 2011); and quality supervision and coordination of logistics service supply chain (Hu et al, 2010; Han et al., 2011; Liu et al., 2012). In the studies for supply chain relationship management, researchers found that factors such as relationship between manufacturers and logistic providers, collaborative relationship and communication greatly influence the satisfaction of the customers. Researchers discovered that in order for coordination of logistic service supply chain to be successful, a systematic and multi-period coordination model need to be studied and implemented among the logistic service companies.

Logistic outsourcing also plays great importance in the economic growth of the industry (Trajkov and Biljan, 2012). Hsiao et al., (2009) had listed four levels of outsourcing logistic activities. Such levels include transportation, packaging, transportation