



**FACTORS OF GREEN LOGISTICS IMPLEMENTATION IN
MALAYSIA: A STUDY ON A GLOBAL LOGISTICS PROVIDER**

ROSE LEW AI FEN

MASTER OF SCIENCE IN TECHNOLOGY MANAGEMENT

2017



Faculty of Technology Management and Technopreneurship

**FACTORS OF GREEN LOGISTICS IMPLEMENTATION IN
MALAYSIA: A STUDY ON A GLOBAL LOGISTICS PROVIDER**

Rose Lew Ai Fen

Master of Science in Technology Management

2017

**FACTORS OF GREEN LOGISTICS IMPLEMENTATION IN MALAYSIA:
A STUDY ON A GLOBAL LOGISTICS PROVIDER**

ROSE LEW AI FEN

**A thesis submitted
in fulfilment of the requirements for the degree of Master of Science
in Technology Management**

Faculty of Technology Management and Technopreneurship

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2017

DECLARATION

I declare that this thesis entitled “Factors of Green Logistics Implementation in Malaysia: A Study on a Global Logistics Provider” is the results of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :

Name : Rose Lew Ai Fen

Date :

APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in terms of scope and quality for the award of Master of Science in Technology Management.

Signature :

Supervisor Name : Dr. Chew Boon Cheong

Date :

ABSTRACT

Green logistics has become the newest trend in doing business that is not just economy and social sustainable for the logistics organizations but is also environment sustainable. As the world ecology is becoming worse due to globalization and industrialization with the rising temperature and sea levels, many global logistics companies are applying green logistics as it helps mitigate climate change by reducing carbon emissions. The objectives of this research have been threefold. The first was to identify the factors which need to be considered in green logistics implementation for global logistics company that operates in Malaysia. The second was to examine the ways that a global logistics company operating in Malaysia could take when implementing green logistics. The third was to construct a green logistics model that could contribute empirically to the Malaysian logistics industry. Primary data was collected using 30 semi-structured open-ended interviews and participant observation (observer-as-participant). Secondary data regarding logistics, green logistics (implementation factors and ways) and business sustainability were obtained from various literatures. Findings indicated that there were gaps between the chosen global logistics company which is DB Schenker Malaysia and various literatures findings on green logistics in terms of the internal and external implementation factors as well as on the ways to implement green logistics. A green logistics model was then constructed to close the gaps and provide as a guide for logistics managers and the like especially in Malaysian logistics industry. The green logistics model developed is general enough for further investigation by testing its feasibility in Malaysian logistics industry or any other relevant industries. The model can also be evaluated by comparing with other similar designs by other researchers or by extending its application to other problems.

ABSTRAK

Penghijauan logistik telah menjadi trend terbaru dalam menjalankan perniagaan yang bukan sahaja boleh mewujudkan ekonomi dan sosial yang mampan untuk syarikat-syarikat logistik tetapi juga boleh menghasilkan persekitaran yang mampan. Dengan ekologi dunia yang semakin buruk akibat globalisasi dan perindustrian dengan peningkatan tahap suhu dan laut, banyak syarikat logistik global melaksanakan penghijauan logistik kerana ia boleh membantu mengurangkan perubahan iklim dengan mengurangkan pelepasan karbon. Objektif kajian ini ada tiga iaitu yang pertama adalah untuk mengenal pasti faktor-faktor yang perlu dipertimbangkan dalam pelaksanaan penghijauan logistik untuk syarikat logistik global yang beroperasi di Malaysia. Yang kedua adalah untuk mengkaji cara-cara yang boleh diambil apabila melaksanakan penghijauan logistik di syarikat logistik global yang beroperasi di Malaysia. Yang ketiga adalah untuk membina model penghijauan yang boleh menyumbang secara empirikal kepada industri logistik Malaysia. Data primer dikumpulkan menggunakan 30 temu bual terbuka (separa berstruktur) dan pemerhatian peserta (pemerhati-secara-peserta). Data sekunder mengenai logistik, penghijauan logistik (faktor pelaksanaan dan cara-cara) dan kemampuan perniagaan diperoleh daripada pelbagai sumber. Dapatan kajian menunjukkan bahawa terdapat jurang antara syarikat logistik global yang dipilih iaitu DB Schenker Malaysia dan pelbagai sumber mengenai penemuan penghijauan logistik dari segi faktor pelaksanaan dalaman dan luaran serta mengenai cara-cara untuk melaksanakan penghijauan logistik. Model penghijauan logistik kemudian dibina untuk merapatkan jurang kajian dan sebagai panduan bagi pengurus logistik dan sebagainya terutamanya dalam industri logistik Malaysia. Model penghijauan logistik dibangunkan secara umum untuk kajian lanjutan pada masa hadapan di mana daya maju model tersebut boleh diuji dalam industri logistik Malaysia atau mana-mana industri lain yang berkaitan. Model yang dihasilkan juga boleh dinilai secara mendalam dengan membandingkan dengan model-model yang telah dibangunkan oleh penyelidik-penyelidik yang lain atau dengan meluaskan pelaksanaannya bagi masalah kajian yang lain.

ACKNOWLEDGEMENTS

There are many people whom I would like to thank for their guidance and support throughout the process of preparing this master thesis. First and foremost, I would like to express my sincere appreciation to my main supervisor, Dr. Chew Boon Cheong. I thank him for his constructive comments and for his never-ending support throughout my research. I truly thank him for his continuous contribution and valuable assistance in teaching me on how to prepare and write a high quality master thesis as well as giving me the opportunity to express my interest through this thesis. Second, I would like to thank all my university lecturers including my second supervisor, Dr. Mohd Syaiful Rizal Bin Abdul Hamid as well as supported staffs in Centre for Graduate Studies and Faculty of Technology Management and Technopreneurship of Universiti Teknikal Malaysia Melaka. They had teach me on various subjects that may have contributed directly and indirectly for me to write this thesis, especially the various courses and trainings conducted on how to write thesis or papers and on how to prepare and motivate oneself before and after embarking on this master journey. Moreover, thanks to all the research participants from DB Schenker Malaysia who have spent valuable time and information with me so that I could produce this master thesis. I also want to thank my fellow colleagues and friends for their friendship and encouragement during our studies as a master student in general and throughout the master research process in particular. Last, but definitely most importantly, I want to thank heavenly God, my family members, my family-in-laws and my husband, Wong Wei Ming, who have contributed in many significant ways in helping me to complete this master thesis in terms of encouragement, support (financial and moral), motivation and love.

TABLE OF CONTENTS

	PAGE
DECLARATION	
APPROVAL	
ABSTRACT	i
ABSTRAK	ii
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	vii
LIST OF FIGURES	viii
LIST OF APPENDIXES	ix
LIST OF ABBREVIATIONS AND SYMBOLS	xi
CHAPTER	
1. INTRODUCTION	1
1.1 Research Background	1
1.2 Research Problems	4
1.3 Research Objectives	8
1.4 Research Scope	9
1.5 Organization of Thesis	11
2. LITERATURE REVIEW	12
2.1 Introduction	12
2.2 Logistics	12
2.2.1 Definitions of Logistics	13
2.2.2 Logistics Activities	14
2.2.3 The Impacts of Logistics on the Environment, Economy and Social	16
2.2.3.1 Environment	16
2.2.3.2 Economy	17
2.2.3.3 Social	19
2.3 Green Logistics	21
2.3.1 Definitions of Green Logistics	21
2.3.2 Difference between Green Logistics and Traditional Logistics	22
2.3.3 Implementation Factors in Green Logistics	23
2.3.3.1 Internal Implementation Factors in Green Logistics	23
i. Cost Efficiency	23
ii. Human Resource Skills, Knowledge and Supports	24
iii. Information Technology and System	25
iv. Organization's / Top Management Support	26
2.3.3.2 External Implementation Factors in Green Logistics	27
i. Public and Customers' Pressures	27
ii. Competitions	27
iii. Collaboration and Integration with Suppliers and Partners	28

2.3.4	Ways to Implement Green Logistics	29
2.3.4.1	Green Packaging	30
2.3.4.2	Green Storage	32
2.3.4.3	Green Technology	34
2.3.4.4	Green Transportation	36
2.3.4.5	Reverse Logistics	38
2.4	Business Sustainability	40
2.4.1	Definitions of Sustainability	40
2.4.2	The Triple Bottom Line of Business Sustainability	42
2.4.2.1	“Planet” (Environment Sustainability)	43
2.4.2.2	“Profit” (Economy Sustainability)	45
2.4.2.3	“People” (Social Sustainability)	46
2.4.3	The Interactive Relationship between Green Logistics and Business Sustainability	47
2.5	Summary	50
3.	RESEARCH METHODOLOGY	52
3.1	Introduction	52
3.2	Research Philosophy	53
3.3	Research Design	55
3.4	Methodological Choice	57
3.5	Primary Data Sources and Secondary Data Sources	58
3.6	Location of the Research	60
3.7	Data Analysis Method	63
3.8	Research Strategy	65
3.9	Time Horizon	66
3.10	Scientific Canons	67
3.11	Summary	70
4.	RESULTS AND DISCUSSION	71
4.1	Introduction	71
4.2	Descriptions of the Research Participants	72
4.3	Factors Considered in Green Logistics Implementation for DB Schenker Malaysia	73
4.3.1	Cost Efficiency	74
4.3.2	Human Resource Skills, Knowledge and Supports	79
4.3.3	Information Technology and System	82
4.3.4	Organization’s / Top Management Support	86
4.3.5	Public and Customers’ Pressures	88
4.3.6	Competitions	89
4.3.7	Collaboration and Integration with Suppliers and Partners	92
4.4	Ways to Implement Green Logistics in DB Schenker Malaysia	94
4.4.1	Green Packaging	96
4.4.2	Green Storage	100
4.4.3	Green Technology	106
4.4.4	Green Transportation	108
4.4.5	Reverse Logistics	113
4.5	Business Sustainability of DB Schenker Malaysia	118
4.5.1	Economic	120

4.5.2	Social	122
4.5.3	Environmental	124
4.6	Green Logistics Model	126
4.7	Summary	130
5.	CONCLUSION AND RECOMMENDATIONS FOR FUTURE RESEARCH	131
5.1	Introduction	131
5.2	Research Findings	131
5.3	Research Contributions	134
5.4	Research Limitations and Recommendations for Future Research	135
5.5	Summary	137
	REFERENCES	138
	APPENDIXES	177

LIST OF TABLES

TABLE	TITLE	PAGE
2.1	Green logistics activities identified in the literatures	29
4.1	Demographic characteristics of research participants	72
4.2	Responses to green logistics implementation factors	73
4.3	Responses to ways of implementation green logistics	95

LIST OF FIGURES

FIGURE	TITLE	PAGE
2.1	Triple bottom line of business sustainability	43
2.2	Conceptual framework	51
4.1	DB Schenker Malaysia's green logistics model	126

LIST OF APPENDIXES

APPENDIX	TITLE	PAGE
A	Logistics activities	177
B	Forward logistics mix	179
C	Differences between green logistics and traditional logistics	180
D	Philosophical beliefs of positivism	181
E	Interview protocol	183
F	Themes emerged from research participants	184
G	Packaging optimization flow	195
H	Machines used for packaging purposes	196
I	Multi-location deliveries with reduced or eliminated packaging	198
J	Packaging wastes	199
K	Eco-friendly facility features of DB Schenker Malaysia	200
L	Lighting system	202
M	Cold room	203
N	Delivery truck	204
O	Reused and discarded wooden pallets	205
P	DB Group's three dimensions of business sustainability	206
Q	DB Group's four strategic directions of business sustainability	207
R	Vision and goals of DB Group	208

APPENDIX	TITLE	PAGE
S	DB Schenker's eco triangle	209

LIST OF ABBREVIATIONS AND SYMBOLS

%	-	Percent
3P	-	“People”, “profit” and “people”
5S	-	Sort, set in order, shine, standardize and sustain
AG	-	Aktiengesellschaft (German word for a corporation limited by share ownership)
ASML	-	Asml Holding N.V.
BOL	-	Bill of lading
CEVA	-	CEVA Logistics
City-Link Express	-	City-Link Express (M) Sdn Bhd
CL	-	Contract logistics
CNC	-	Compressed natural gas
CO	-	Carbon monoxide
CO ₂	-	Carbon dioxide
CQI	-	Continuous quality improvement
CSCMP	-	Council of Supply Chain Management Professionals
CSR	-	Corporate social responsibility
DA	-	Discourse analysis
DB	-	Deutsche Bahn
DB ML	-	DB Mobility Logistics / Deutsche Bahn Mobility Logistics

DHL	-	Deutsche Post AG
EAN	-	International article number
EMS	-	Environmental management systems
EPU	-	Economic planning unit
ERP	-	Enterprise resource planning
et al.	-	and others
FedEx	-	FedEx Corporation
FLEX	-	Flawless execution
ft	-	Feet
FTL	-	Full truck load
gCO ₂ /tonne-km	-	Carbon emission factors based on an average load factor of 80% of the maximum vehicle payload and 25% of empty running
GDEX	-	GD Express Sdn. Bhd.
GDP	-	Gross domestic product
GHGs	-	Greenhouse gases
GWh	-	Gigawatthours
H	-	Height
HRM	-	Human resource management
ICT	-	Information and communication technology
IPA	-	Interpretative phenomenological analysis
ISO	-	International Organization for Standardization
IT	-	Information technology
JNC	-	JNC Corporation

kboe/d	-	Kilo barrel of oil equivalent per day
kg	-	Kilogram
KLIA	-	Kuala Lumpur International Airport
KPIs	-	Key performance indicators
ktoe	-	Kiloton of oil equivalent
LEDs	-	Light-emitting diodes
LEPs	-	Light rail transit extension projects
LRT	-	Light rail transit
lm/W	-	Lumens per watt
LPI	-	Logistics performance index
LSP	-	Logistics service provider
LTL	-	Less than truck load
MAS	-	Malaysia Airlines
mm	-	Millimetre
MNCs	-	Multinational corporations
MRP	-	Material requirements planning
MRP II	-	Manufacturing resource planning
MSDS	-	Material safety data sheet
MSW	-	Municipal solid waste
MW	-	Megawatt
N.V.	-	Naamlozevennootschap (a Dutch phrase for a public company)
NO ₂	-	Nitrogen dioxide
PET	-	Polyethylene terephthalate

PETRONAS	-	Petroliam Nasional Berhad
PM	-	Particulate matter
POP	-	Permanent optimization program
Pos Malaysia	-	Pos Malaysia Berhad
RFID	-	Radio frequency identification
SAP	-	System analyse
SCM	-	Supply chain management
TBL or 3BL	-	Triple bottom line
TPL or 3PL	-	Third-party logistics
UAE	-	United Arab Emirates
UPS	-	United Parcel Service Of America, Inc.
VAS	-	Value added services
WMS	-	Warehouse management system
XML	-	Extensible markup language
Yang Ming	-	Yang Ming Marine Transport Corporation

CHAPTER 1

INTRODUCTION

1.1 Research Background

Human activities especially in business has contributed many negative impacts to the ecosystem that causes global warming, climatic disasters, ocean acidification, and so on. According to the Intergovernmental Panel on Climate Change (2015), human impact on the environment is obvious and rising, with effects detected over all continents and seas. The report states with 95% certainty that humans are the primary cause of the present global warming. In addition, the report finds that the more human activities disturb the environment, the more prominent the risks of pervasive and irreversible impacts for inhabits and ecosystems, causing long-lasting changes to the climate system.

There are extensive acknowledgements that the environment is significantly affected by logistics activities where on one hand, logistics produce the desired service and on the other hand, an inevitable negative environmental impact (Thiell, et al., 2011). Transportation is one of the logistics processes that has significant impact on the environment where carbon dioxide (CO₂) and other greenhouse gases (GHGs) emissions from automobiles, airplanes and vessels used to transport goods produce atmospheric contamination, often considered as one of the core reasons of the global warming consequence threatening the world today. Furthermore, related logistics activities bring serious air pollution, water pollution, fuel consumption, solid garbage disposal, etc. (Lin and Chan, 2011).

In order to minimize the severity of these problems, the concept of “green logistics” was born in mid-80s to characterize logistics systems that employ advanced technology and equipment to minimize environmental damage during business operations, while increasing the utilization of resources within the systems. Green logistics stresses the combination of environmental goals into the target systems of organizations and value chains in order to offer a balanced set of total value to customers (Thiell, et al., 2011). It can help organizations to deal effectively the relationship between the logistics development and environmental protection, and make the economy interests, social interests and environmental interests unity.

Green logistics has many benefits where the social, economy and environmental value of green logistic has slowly capture the attentions of governments, academia and business communities in many countries (Xiu and Chen, 2011). It is exceptionally reassuring that organizations recognize that a sound stream of conventional business benefits can stream from greening of logistics (McKinnon, et al., 2012). According to Shecterle and Senxian (2008), there are eleven benefits in greening supply chains where the benefit of reduce overall business costs was found to be the best-in-class objectives for sustainability activities. BearingPoint, Inc., (2008) found that greening the supply chain could improve brand image and other nine benefits such as competitive advantage establishment, logistics flow optimization and new markets expansion for companies.

In another study by Hilda, et al., (2012), there are twelve benefits in practicing green logistics which includes reduce overall business costs, reduce environmental impacts, enhance good environmental conditions for society, reduce fossil fuel consumption, and so on. Malaysian food based manufactures perceived the item of increase profits and revenue to be the number one benefit from practicing green logistics. The result of the study by Hilda, et al., (2012) concludes that green logistics practices were confirmed to give

benefits in regards to environment, economy and social perspective to the food based manufacturers in Malaysia.

The list of benefits from greening the logistics goes on where Malaysian logistics industry needs to quickly implement the concept of green logistics for business sustainability while protecting the Mother Earth. In fact, the spine to the Malaysian supply chain is the logistics industry and it is known to facilitate business, stimulate trade and spur financial development. Economic Planning Unit (EPU) with the knowledge of Malaysia's potential in this logistics industry, has developed the Logistics and Trade Facilitation Masterplan (2015-2020) to provide the strategic direction for the advancement of the Malaysian logistics industry to further enhance its competitiveness and productivity (Ministry Of Transport Malaysia, 2015a). One of action plans in the Masterplan is to outline incentives that empower the adoption of green practices and to provide support to green supply chain initiatives such as green design and purchasing, reverse logistics, route optimisation, and load optimisation (Ministry Of Transport Malaysia, 2015b). Hence, this research goes hand-in-hand with Malaysian government plan to raise Malaysian logistics service providers' values and to enhance efficiency of current logistics personnel.

In this research, the studies of logistics, green logistics and business sustainability will be review. The implementation factors of green logistics will be identified. The ways to implement green logistics is also explore through various data sources in order to come out with a green logistics model which will be done at the end of this research.

1.2 Research Problems

Severe environmental pollution faced today has caused many organizations and governments to create a more conscious attitude toward the environment, driving ecological concerns to the front line of numerous organizations' sustainability strategies (Thiell, et al., 2011). According to Department of Statistics, Malaysia (2014), the main sources of air pollution in Malaysia in the year of 2013 were emissions from motor vehicles (buses, goods vehicles for logistics purposes, motorcars, motorcycles, taxis and hired cars, and other vehicles), stationary sources (industries including power plants, logistics warehouses and facilities) and others such as open burning activities. Motor vehicles accounted for 68.5% while stationary sources and other sources were at 26.7% and 4.8% respectively. Carbon monoxide (CO) is the number one pollutant released to the air in 2013 with 63% followed by nitrogen dioxide (NO₂) with 29% and particulate matter (PM) with 6.5%. These data shows that environmental pollution is real and that logistics is one of the industry perpetrators of pollution.

Green logistics is one sustainable development concept that can solve environmental problems while maintaining the activities and economy of an organization and country within the processes of exchange goods and services (Zhang, et al., 2012). Green logistics practices within organizations can influence the entire value and supply chains of the organization and their presence has become a requirement for doing business. According to The World Bank, green logistics is quickly gaining prominence in high-income and emerging economies and is likely to become more important elsewhere (Arvis, et al., 2012). Developing countries like Malaysia, which is currently ranked 25th in the World Bank Logistics Performance Index (LPI) Report 2014, will need to consider the environmental footprint of logistics as the development of green logistics in Malaysia is still relatively backward (Arvis, et al., 2014).

For Malaysian logistics industry, green logistics is still at the early stage where many Malaysian logistics providers are slow and yet to adopt the green concept in their business strategy (Eltayeb and Suhaiza, 2009; Goh and Suhaiza, 2010; Suhaiza, et al., 2011; Noor Aslinda, et al., 2012). A study by Suhaiza, et al. (2011) revealed that more than half of the Malaysian logistics providers being studied do not consider environmental issues as part of their company's strategy, they do not have formal environmental policy in their Corporate Social Responsibility (CSR) strategy nor do they measure their carbon footprint corresponding to the impact of their logistics activities. The enterprise level of research and input even more remote causing the Malaysian logistic industry to ignore the importance of going green to the environment and to the organization (Eltayeb, et al., 2010). Hence, by studying the factor and ways to implement green logistics as well as applying the proposed green model, Malaysian logistics providers can understand better on how to implement green logistics.

According to Eltayeb and Suhaiza (2009), Malaysian fully owned firms have the lowest level participation of green initiatives compare to foreign based companies and subsidiaries of Multinational Corporations (MNCs). Some of the reasons why Malaysia local companies adopt less green concept than larger firms were because of the lack of capabilities and resourcefulness to go green, lower awareness of environmental practices, high costs and other constraints of green initiatives, or because the green concept is still a very new concept in Malaysia whereby many companies in Malaysia do not understand how the green concept works or how they can implement it (Eltayeb and Suhaiza, 2009; Goh and Suhaiza, 2010; Suhaiza, et al., 2011).

Meanwhile, many global companies in developed countries have implemented green by reviewing and identifying areas in their business practices along their supply chain so that a greener approach can be applied to improve their business, reduce waste of