

Hrucha Ghatpande

Methods and Policies to Reduce Carbon Dioxide Emission in Logistics

Master's Thesis

YOUR KNOWLEDGE HAS VALUE



- We will publish your bachelor's and master's thesis, essays and papers
- Your own eBook and book - sold worldwide in all relevant shops
- Earn money with each sale

Upload your text at www.GRIN.com
and publish for free



Bibliographic information published by the German National Library:

The German National Library lists this publication in the National Bibliography; detailed bibliographic data are available on the Internet at <http://dnb.dnb.de> .

This book is copyright material and must not be copied, reproduced, transferred, distributed, leased, licensed or publicly performed or used in any way except as specifically permitted in writing by the publishers, as allowed under the terms and conditions under which it was purchased or as strictly permitted by applicable copyright law. Any unauthorized distribution or use of this text may be a direct infringement of the author s and publisher s rights and those responsible may be liable in law accordingly.

Imprint:

Copyright © 2021 GRIN Verlag
ISBN: 9783346505170

This book at GRIN:

<https://www.grin.com/document/1132699>

Hrucha Ghatpande

Methods and Policies to Reduce Carbon Dioxide Emission in Logistics

GRIN - Your knowledge has value

Since its foundation in 1998, GRIN has specialized in publishing academic texts by students, college teachers and other academics as e-book and printed book. The website www.grin.com is an ideal platform for presenting term papers, final papers, scientific essays, dissertations and specialist books.

Visit us on the internet:

<http://www.grin.com/>

<http://www.facebook.com/grincom>

http://www.twitter.com/grin_com

HTW Berlin-University of Applied Science

Master's Thesis

Methods and policies to reduce carbon dioxide emission in logistics

Hrucha Ravindra Ghatpande

MBA&E Global Procurement

DEDICATION

I am dedicating my master's thesis to my God 'Bramha Chaitanya Gondavalekar Maharaj', for showering blessing on me and strengthening my abilities. To the memory of my grandparents Late. Ghatpande Shivaram and Late. Ghatpande Vimal and for teaching me to dream and work hard enough to achieve those dreams. To my parents Mr. Ghatpande Ravindra Shivaram (Member Industrial Court/ District Judge) and Mrs. Ghatpande Poonam Ravindra (Headmistress - Kanya Vidyalaya, Chakan) for being my strong pillar and inspiration. To my brother Mr. Ghatpande Amey Ravindra and sister-in-law Mrs. Radhika Amey Ghatpande who supported me throughout the journey.

मी माझा प्रबंध माझे जगावियंता सद्गुरू श्री. ब्रम्हचैतन्य गदवलकरे महाराज याच्यं चरणी

समर्पत करते. त्यांच्याकडून प्रमळालेल्या आशीवादा आणून सामर्थ्यांमुळे च मी हा प्रबंध यशस्वीपणे पूर्ण करू शकले. मला स्वप्न बघण्याचा दृष्टिकोन आणून ती स्वप्ने साकार करण्यासाठी लागणारे कठिण करण्याची तयारी ही प्रशक्कवण नदलेले माझे नदवंगत आजी-आज बा नमल घाटपांडे व प्रशवराम घाटपांडे यांस दे खील मी हा प्रबंध समर्पत करते. तसेच माझे आधारस्तंभ व प्रेरणास्थान माझे आई-वडील सौ. पूनम रवींद्र घाटपांडे आणून श्री. रवींद्र प्रशवराम घाटपांडे यांस

दे खील हा प्रबंध समर्पत करते. माझ्या ह्या वाटचालीत प्रेरणा आणून मागदशनात मलाचा वाटा

असणाऱ्या माझा भाऊ श्री. अमेय रवींद्र घाटपांडे आणून वन्रहनी सौ. रात्रधका अमेय घाटपांडे यांना दे खील हा प्रबंध मी समर्पत करते.

ACKNOWLEDGEMENT

I started my master's thesis in November 2020, during this period whole world was passing through the massive COVID-19 pandemic crisis. During that period, emergency protocols were implemented in every country of the world to control the spread of the virus which resulted in restrictions on all non-essential public movements. To keep always motivated for any individual was the most difficult part throughout this period.

This thesis would have not possible without the support and help of several individuals and institutions who one way another contributed and extended their valuable assistance in the preparation and completion of this study.

First and foremost, I would like to express my sincere gratitude to my supervisor Prof. Dr. Stephan Seeck for his motivation and enormous contribution of knowledge. His guidance and support were invaluable to the success of this work. My sincere gratefulness goes to Mr. Engelhardt Maximilian for his supervision and support.

Besides my supervisors, I would like to thank my company colleagues at Volkswagen AG, Kassel, Dr. Schade Konrad, Mr. Kleis Stefan, Mr. Ernst Martin, Ms. Noyer Julie Carole, and Ms. Kramer Adriana for their support by participating in group discussion and guidance on topic selection for this thesis. Will always remember our team meetings and a great time working at Volkswagen AG, Kassel.

My sincere appreciation goes to all responders of the survey for sharing their knowledge and information.

I would like to thank my parents for their huge contribution to my academic pursuit from my primary to master's stage. You sacrificed everything to help me come this far in life. To my brother and sister-in-law, you were all there for me with every form of encouragement. Talking with your 2 years old daughter 'Radnyee' was one of the factors for boosting my positivity.

Last but not least, special thanks to my friends for being there always with me.

ABSTRACT

The report is focused on carbon dioxide emission in logistics industry. It evaluates some segments of logistics industry that how carbon dioxide emission is takes place in the logistics operations. Global warming and climate control elements are turning into a genuine worldwide concern. The enactment is turning into a fundamental plan to control the measure of carbon dioxide discharge that may impact the entire world in upcoming years. To figure out this issue, the research is conducted to investigate the methods and policies which support the logistics operation to lessen or control the carbon dioxide emission. The report has some insight that how various logistics factors are responsible to influence level of carbon dioxide. Furthermore, various opportunities to reduce the transportation as well as warehouse related carbon dioxide emission are identified. With the analysis of different industries, the most promising and feasible methods for logistics operations are determined such as increasing load factor, modal shift, alternative fuels, electric forklifts. In addition to this, analysis of environmental policies are also determined namely carbon emission trading, carbon tax. The impacts on organizations after applications of studied methods and policies has been also reviewed. The research outcome has overall contribution to green logistics management.

Keywords:

Carbon dioxide emission, transportation emission, warehouse emission, green logistics, environmental tax policy, environmental taxes, carbon footprint.

TABLE OF CONTENTS

DEDICATION.....	I
ACKNOWLEDGEMENT.....	II
ABSTRACT.....	III
TABLE OF CONTENTS.....	IV
LIST OF FIGURES	VII
LIST OF TABLES	VIII
ABBREVIATIONS	IX
1. INTRODUCTION.....	1
1.1. Research Background.....	1
1.2. Problem Statement.....	3
1.3. Research Objectives.....	4
1.4. Scope And Limitations Of The Research.....	5
1.5. Structure Of Thesis	6
2. LITERATURE REVIEW.....	7
2.1. Introduction.....	7
2.1.1. Green Logistics.....	8
2.1.2. Carbon Dioxide Emission	10
2.2. Factors Influencing CO ₂ Level Through Logistics.....	12
2.2.1. Structural And Operational Factors	13
2.2.2. Commercial And Functional Factors	14
2.3. Background Of Methods And Policies	15
2.4. Methods To Reduce Carbon Dioxide Emission In Transportation Management	18
2.4.1. Shipping Route	18
2.4.2. Chargeable Weight	21
2.4.3. Choice Of The Transportation Mode	22
2.4.4. Efficiency Of Transport.....	24
2.4.5. Other Methods.....	26
2.5. Alternative Methods To Reduce Carbon Dioxide Emission In Warehouse Management	28
2.5.1. Renewable Energy.....	30
2.5.2. Material Handling Equipment.....	32

2.5.3.	Green Technology Investment	32
2.5.4.	Warehouse Construction	34
2.6.	Policies To Reduce Carbon Dioxide Emission	35
2.6.1.	Carbon Emissions Trading	35
2.6.2.	Carbon Tax	38
2.6.3.	Difference Between Policies By Various Parameters	40
3.	DATA COLLECTION	42
3.1.	Data Collection Methods	42
3.2.	Primary Data	43
3.3.	Secondary Data	46
4.	RESULT AND ANALYSIS	49
4.1.	Expertise Survey Of Logistics Department	49
4.1.1.	Type Of Industries	50
4.1.2.	Approach For Carbon Dioxide Emission Calculation And Kyoto Protocol 51	
4.1.3.	Selection Of Transportation Practices	53
4.1.4.	Efficient Methods And Policies For CO ₂ Emission Reduction	56
4.1.5.	CO ₂ Emission Reduction And Impacts Within Companies	58
4.2.	Semi-Structured Interview With Employees Of Logistics Department	60
4.2.1.	Problems Related To Transportation	61
4.2.2.	Problems Related To Warehouse	62
4.2.3.	Problems Related To Policies	63
4.3.	Case Studies On Various Methods In Logistics	65
4.3.1.	Case Study: Selection Of Mode	65
4.3.2.	Case Study: Increasing Loading Degree Or Payload	67
4.3.3.	Case Study: Comparison Of Engine Technologies In Heavy Duty Vehicle 70	
4.3.4.	Case Study: Use Of APU And SP	71
4.3.5.	Case Study: Use Of Drones For Delivery	72
4.3.6.	Case Study: Use Of Forklift	75
4.4.	Official Reports On Technology And Policies	77
4.4.1.	Alternative Fuels	77
4.4.2.	Performance Of Carbon Tax And Emission Trading System	78
5.	SUMMARY, CRITICAL APPRAISAL, OUTLOOK	80
5.1.	Summary	80
5.2.	Critical Appraisal	84

5.3. Outlook.....	84
6. CONCLUSION AND RECOMMENDATION	86
6.1. Conclusion	86
6.2. Recommendation.....	88
REFERENCES.....	89
APPENDICES	94
APPENDIX I: Structured Questionnaire For Expertise Survey	94
APPENDIX II: Semi-Structured Interview.....	97