



Pre-requisites of Accomplishing Environmental Performance:

A Strategic Relevance towards Maritime Industry

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MASTER THESIS

May 2014



Master Thesis

Buskerud and Vestfold University College
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Norway

Availability

- OPEN**
 CONFIDENTIAL

TITLE

Pre-requisites of Accomplishing Environmental Performance: A Strategic Relevance towards Maritime Industry

AUTHOR

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DATE OF DELIVERY

15 May 2014

NUMBER OF PAGES

42

RESEARCH PROJECT

SUPERVISOR

Dr. Umar Burki

3 KEYWORDS

Green supply chain management, environmental performance, 3PL providers

SUMMARY

This study investigates whether firms' operational performance, economic performance and internal green supply chain management practices are the pre-requisites in accomplishing environmental performance in the third party logistics provider context. The data is collected from the 181 third party logistics providers in Turkey and the ordinary least squares (OLS) analysis is used to test the hypotheses. The findings have confirmed that the firms' operational performance, economic performance and internal green supply chain management practices are needed by the business firms to enable them in improving their environmental performance as...



SUMMARY (contin.)

... they have significant positive association towards firms' environmental performance. The prior relevant literatures have emphasized on how environmental performance is able to increase firms' overall level of competitiveness. Thus, this study becomes prominent as it complements those previous studies by introducing a distinct insight regarding the pre-requisites in accomplishing environmental performance.



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Thesis title: Pre-requisites of accomplishing environmental performance: A strategic relevance towards maritime industry

Student name: Krisna Soetanto

Supervisor name: Dr. Umar Burki

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There are two hard copies of this agreement, one for each part.

Dedication

*To my beloved parents and sisters
for your endless support and encouragement*

Preface

First of all, I would like to express huge gratitude to my supervisor, Dr. Umar Burki, for all of the time he has invested for guiding and giving enormous support. He is a very dedicated scholar and his totality in supervising me have made me possible to accomplish this research.

I would like to thank all lecturers in Buskerud and Vestfold University College who have given me all of the valuable knowledge. Specially, I also would like to thank Dr. Halvor Schøyen and Tor Erik Jensen for their time and availability.

I also would like to express gratitude to Tautra Mariakloster, Sr. Gilchrist Lavigne, OCSO, Legion of Mary Tønsberg praesidium, Finn Tony Lysell, Salvacion Ang Lysell and my brother Hussein Sow for all of your support and mental healing. Without your presence, it will be impossible to get through the hard time during living and studying in Norway.

Last but not least, I would like to give my greatest appreciation to my family, my girlfriend Benedicta Santoso, and all my colleagues. Thank you for all of your sincere prayers and support.

Abstract

This study investigates whether firms' operational performance, economic performance and internal green supply chain management practices are the pre-requisites in accomplishing environmental performance in the third party logistics provider context. The data is collected from the 181 third party logistics providers in Turkey and the ordinary least squares (OLS) analysis is used to test the hypotheses. The findings have confirmed that the firms' operational performance, economic performance and internal green supply chain management practices are needed by the business firms to enable them in improving their environmental performance as they have significant positive association towards firms' environmental performance. The prior relevant literatures have emphasized on how environmental performance is able to increase firms' overall level of competitiveness. Thus, this study becomes prominent as it complements those previous studies by introducing a distinct insight regarding the pre-requisites in accomplishing environmental performance.

Keywords: Green supply chain management, environmental performance, 3PL providers.

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Chapter 1. Introduction

This chapter contains the thesis background, brief overview of prior research, description of research area, the thesis objective and contribution. Finally the structure of this thesis is presented.

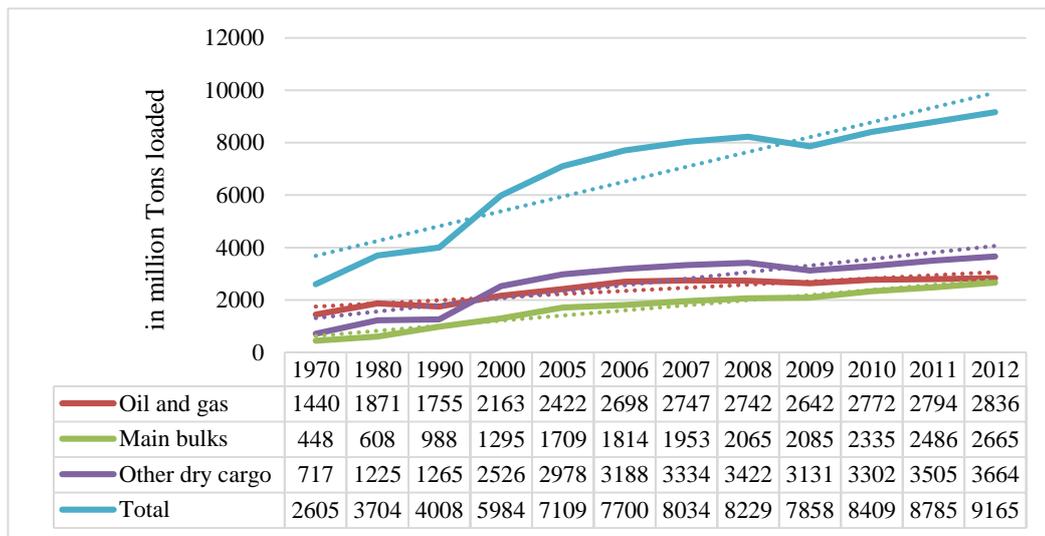
Background

Along with the intense competition among business firms, the utilization of third party logistics (3PL) providers' services has now become the norm across most industries (Laarhorven, Berglund, & Peters, 2000). Utilizing the service of 3PL providers is believed to help the business firms in pursuing higher efficiency and focusing in their core competence. Third party logistics is defined as "*activities carried out by logistics service provider on behalf of a shipper and consisting of at least management and execution of transportation and warehousing (if warehousing is part of the process)*" (Berglund, Laarhorven, Sharman, & Wandel, 1999, p. 59)

3PL providers and shipping industry in particular are the integral part of supply chains due to its position that link different parties along the supply chains. In addition, everyone agrees that shipping is the main engine of world economic growth and has an overwhelming importance in the international trade due to its ability to create economic of scale (Lun, Lai, Wong, & Cheng, 2013). The fact that shipping has an important role in international trade can be seen in the Fig 1 which shows that the total goods being transported by the international seaborne trade keep increasing over the period of time.

However, the environmental harms caused by this industry has raised the public anxieties. The pollution in shipping and logistics industry is not only limited to the off-shore based pollution (generated by ship herself and tugboats), but also generated by shore based supporting facilities, for example gantry crane, forklifts, and other cargo handling equipment (Bailey & Solomon, 2004). As a result, the insistence from various stakeholders to the business enterprises in this industry for greening its supply chain becomes stronger. This can be seen from the fact that the rules and regulations that govern environmental aspects of sea-going merchant vessels have become more stringent in the past decades. For example, the rules and regulations in relation to SO_x (regulation 14 of MARPOL Annex VI), NO_x (regulation 13 of MARPOL Annex VI), ozone depleting pollutants and emissions (regulation 12 of MARPOL Annex VI), chemical discharge, ballast water treatment, energy usage, waste reduction, and recycling rate.

Fig 1. Development of international seaborne trade (in million tons loaded)



Adapted from: Review of maritime transport 2013 (UNCTAD, 2013)

As the public concern towards environmental issues have been continuously strengthened, business firms are expected to operate in an environmental friendly manner and it becomes essential for 3PL providers to accomplish their environmental performance. Therefore, there is an ever increasing desire to understand how business firms apply and follow environmental practices that can minimize environment damage (Walker, Di Sisto, & McBain, 2008). Environmental performance of 3PL providers can be augmented by implementing green supply chain management practices which fundamentally intend to make the entire supply chain more environmental friendly.

The purpose of this study is to identify the pre-requisites needed by the business firms in order to enable them accomplishing their environmental performance. Three pre-requisites being analyzed are: firms’ operational performance, economic performance and internal green supply chain management practices. This focus of the analysis is chosen in accordance to the abundance of existing studies highlighting the effect of environmental performance to firms’ operational and economic performance. Prior studies have shown that: green supply chain management practices will lead to higher economic, operational, and environmental performance and finally result higher level of competitiveness (Rao & Holt, 2005; Yang, Lu, Haider, & Marlow, 2013).

However, those studies do not elaborate deeply about the preconditions which encourage business firms to enhance their environmental performance. This becomes important since a great level of investment is required to enhance the environmental performance and a positive result may not be guaranteed (Walker et al., 2008). Therefore,

this study aims to analyze from a distinct point of view, where firms might need to have a good operational performance, economic performance and internal green supply chain management practices first, before they are able to start improving their environmental performance. Conversely, when they are still struggling with unstable operational and economic performance, they will care less about the firm's environmental performance.

The empirical setting of this research is conducted within 3PL providers in Turkey. Turkey is chosen because, adapting to Demirbaş (2002), this nation has a unique geographical and political position which bridge the east and the west.

The Research Objective

The main objective of this thesis is to analyze the pre-conditions which influence the environmental performance of business firms. More specifically, three pre-conditions are chosen, namely: the operational performance, the economic performance and the internal green supply chain management practices. Accordingly, a research question is formulated as the following: "Do the firm's operational performance, economic performance and internal green supply chain management practices have significant positive association with its environmental performance?"

The findings of this study contribute to provide some theoretical and managerial insights in understanding the encouraging factors for business firms in improving their environmental performance, particularly in the case of 3PL providers in Turkey. It is an important area to be discovered because there are still limited number of studies which empirically test the pre-requisites in accomplishing environmental performance. Whereas, without knowing these pre-requisites, business firms will experience confusion in determining their business priorities.

This paper is organized as follows. The chapter following this introduction is the literature review in which the forms of green shipping and the barriers to be green, the environmental performance, the motives for enhancing environmental performance, how it is related to the 3PL providers and the gap in the existing studies will be elaborated. The research model and hypotheses are then presented in the Chapter 3. Chapter 4 contains the research design and methodology. It is followed by the empirical findings in the Chapter 5. The last section will be the discussion, concluding remarks, the strategic relevance towards maritime sector, the managerial implications and the direction of further research.

Chapter 2. Literature Review

This chapter provides the review of relevant literatures. First, the environmental aspect in shipping industry. Second, the third party logistic providers and its relation with environmental performance. Next, the environmental performance, the underlying motives and the green supply chain management. Finally, the gap in the current literature is defined.

Environmental Aspects in Maritime Industry

Maritime industry holds a strategic role in the international trade. It has been the main engine for world economic growth as more than eighty percent of global merchandise total volumes are transported by sea and handled by ports worldwide (Rodrigue, Comtois, & Slack, 2006). Despite its importance in the development of global economic, maritime industry has a prevailing challenge regarding its negative impact towards environment. As reported by DNV (2013), world merchant vessels has accounted approximately 3% of total anthropogenic CO₂. It is further reported that emissions of NO_x and SO_x from shipping industry accounted approximately 15% and 9% of global anthropogenic emissions. Accordingly, UNCTAD (2013), suggested that the contribution of maritime industry to the world climate change has been the highest priority of the international policy agenda.

In the business activities, instead of operating in vacuum, the shipping companies are continuously dealing with various stakeholders such as: suppliers, wastes operators, shippers, cargo owners, social organization, port and other shore based authorities, and the regulatory bodies. The interests of those stakeholders will diverge with respect to economics and environment (Krozer, Mass, & Kothuis, 2003). The most well-known pressures to the shipping companies with regards to environmental issues are the regulations made by International Maritime Organization (IMO). IMO has a convention, named International Convention for the Prevention of Pollution from Ships (MARPOL) which specially providing regulations and guidelines related to pollution prevention. The coverage of each Annex in MARPOL is presented in the Table 1.

MARPOL is not the only attempt initiated by IMO in order to create a greener shipping. IMO's senior technical body in charge of marine pollution, MEPC (Marine Environment Protection Committee), has formulated some tools and regulations in order to minimize shipping greenhouse gasses emissions. Those are inter alia: Energy Efficiency Design Index (EEDI), and the Ship Energy Efficiency Management Plan (SEEMP). EEDI entered into force in 2013 as an amendment to MARPOL Annex VI. The main goal is

basically setting a minimum level of energy efficiency for ship (IMO, 2012). Ship which fulfil this requirement can be categorized as fuel efficient, and in order to fulfill this index, continuous technical innovation and development are needed (DNV, 2013).

Table 1. IMO's MARPOL

List of annexes	Regulation coverage
Annex I	Prevention of pollution by oil
Annex II	Control of pollution by noxious liquid substances in bulk
Annex III	Prevention of pollution by harmful substances carried by sea in packaged form
Annex IV	Prevention of pollution by sewage from ships
Annex V	Prevention of pollution by garbage from ships
Annex VI	Prevention of air pollution from ships

(Source: IMO official website)

The Ship Energy Efficiency Management Plan (SEEMP) is “*an operational measure that establishes a mechanism to improve the energy efficiency of a ship in a cost-effective manner*” (IMO, n.d.). The SEEMP excels in introducing the screening manner of ship and fleet performance as well as in assisting ship owner in including novel technology and practices in magnifying ship performance (DNV, 2013).

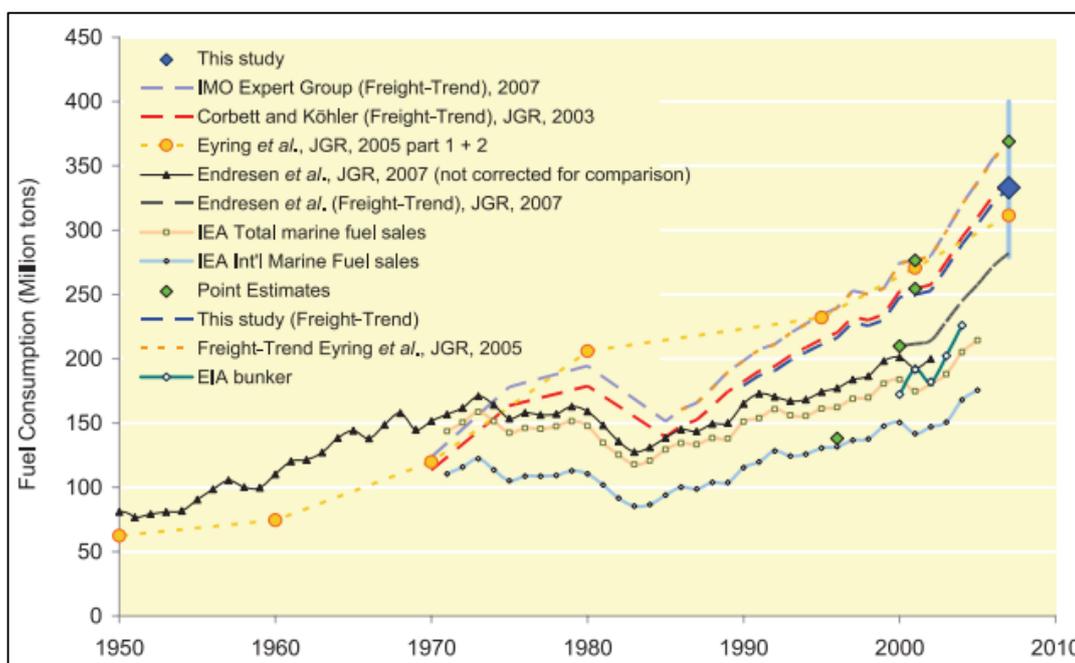
In addition to the regulations provided by IMO, each geographical area generally has special regulation, and monitoring action regarding environment which apply to all ships being in its water territory. For example, in the Europe, the existence of European Maritime Safety Agency (EMSA) is helping in controlling and preventing environmental pollution from ships thorough their regulatory instruments. Additionally, each port state in the world also has special rules regarding environmental protection. Violations to these rules will result several consequences, from fines to detention of entry/exit the related port.

The various regulations, demands and pressures implied that there is an increasing awareness of different stakeholders in the maritime industry towards environmental issues over time. Therefore, to analyze the pre-requisites of accomplishing higher environmental performance in the maritime logistics service provider is quite essential for the current situation. In the following subsection, the forms of environmental pollution in maritime industry, green shipping and the barriers to manifest it will be presented.

The environmental pollution generated by maritime industry

There are various forms of environmental pollution in the maritime industry. Three forms of pollution are considered as the most important, namely: gas emissions, pollution from ship accident and pollution from the waste and ballast water disposal. Emission is basically the by-product of the fuel-based engine's combustion, mostly in the form of SO_x, NO_x and carbon based substance. In other words, the higher the level of ship's fuel consumption, the higher the emissions will be. The increasing trend of ship's fuel consumption is presented in the Fig 2. Based on this figure, it can be seen that there has been a steep increasing trend in the world merchant vessel fuel consumption. It also means over period of time, the emission resulted by the shipping industry has been rising tremendously.

Fig 2. World merchant vessel fuel consumption



Source: (Buhaug *et al.*, 2009, p. 26)

There are various types of emission and they are presented in the Table 2. Those emissions have negative consequences towards human health and environment and they can pollute a large radius from their sources (Eyring *et al.*, 2010). The greenhouse gases (GHG) are the most substantial anthropogenic driver for global warming and have been the focus of international community for more than two decades (DNV, 2012).

Another serious environmental issue in maritime industry is the pollution from accidents. There are many ship accidents which cause a massive environmental pollution. One of the most well-known example is the grounding of Exxon Valdez in Prince William

Sound which finally end up with the spill of crude oil. In addition to the huge economic and financial loss, this accident has an enormous negative impact towards the marine wildlife and ecosystem that cannot be recovered in the short term period (Carson et al., 2003). This accident has raised public awareness to find a way in preventing environmental damages from the maritime industry. The outcomes are inter alia, the signed of the Oil Pollution Act (OPA) in 1990 and the amendment of MARPOL which obligate oil tanker to be fitted with double-hulls. The OPA mainly regulates the prevention, the procedures and the liability specification in an oil-spill accident (OPA, 1990).

Table 2. Environmental pollution from ships

Category of pollution	Type of emission
Greenhouse gases (GHGs)	Carbon dioxide (CO ₂)
	Methane (CH ₄)
	Nitrous oxide (N ₂ O)
	HFC _s
	PFC _s
	SF ₆
Non greenhouse gases	Sulphur oxides (SO _x)
	Nitrogen oxides (NO _x)
Others	Particulate matter (PM)
	Volatile organic compounds (VOC)
	Black carbon

Source: Psaraftis and Kontovas (2013), Buhaug et al. (2009)

Other form of marine pollution is related to the ballast water management. The ship always carries some amount of ballast water in order to improve the stability. If the ballast water carried from a specific port is discharged on the other port, it will result a substantial problem towards the ecosystem in the discharging port. Aquatic organism carried inside the ballast water will be released into new habitat and establish their life there. It potentially causes a dramatic shift in the food webs, chemical cycling, disease outbreaks and finally it will have a predatory effect to the indigenous species (DNV, 2012). To minimize the negative effects of ballast water disposal, since February 2004, the IMO has provided the regulation in the form of Ballast Water Management (BWM) Convention. Basically under this BWM Convention, the IMO requires all ships to have and implement the ballast water and sediments management plan (IMO, 2014).

Manifesting the green shipping and the barriers

Among various types of pollution in maritime industry, emission is considered as the biggest concern. Therefore, the primary element to manifest an environmental friendly shipping is by reducing her bio-fuel (fossil based fuel) emissions. Krozer et al. (2003), explain that the emissions can be minimized by the pre-treatment of bunker oil, proper tuning of engines and the use of anti-fouling agents. In addition, Armstrong (2013), elaborates that the actions to minimize the carbon emission in shipping can be classified into three major categories namely: operational optimization, technical optimization, and commercial optimization. The examples of each optimization type can be seen in the Table 3 below.

Table 3. Examples of actions taken to minimize emissions

Optimization type	Example
Operational	1. Optimizing the hull and propeller performance
	2. Optimizing the main engine performance
	3. Cargo heating management
	4. Optimizing the trim
Technical	1. Retrofit the propeller boss cap fin (PBCF)
	2. CPP programming
	3. Upgrading the fuel slide valve
	4. Optimizing the cylinder oil consumption
	5. Installing the sonic cleaning of optimizer
	6. Applying pre-treatment of bunker oil
	7. Proper tuning of engines
Commercial	1. Slow steaming
	2. Modifying the speed and fuel consumption matrix

Adapted from: (Armstrong, 2013; Krozer et al., 2003)

On the other hand, Bengtsson, Fridell, and Andersson (2012) have mapped out and presented that there are two main pathways in minimizing the bio-fuel emissions, specifically: the diesel route and the gas route. The diesel route is basically substituting the bio-fuel with other type of bio-fuel which is more environmental friendly. The ships are using the original engine system and no technological upgrades are required. Most of the current ships' propulsion are consuming heavy fuel oil which is the cheapest bio-fuel available. However, it contains a very high level of sulfur and results high emissions (J.

Corbett & Winebrake, 2008). Under the diesel route, the ships usually replace the heavy fuel oil (HFO) with marine gas oil (MGO), marine diesel oil (MDO), or even biodiesel in order to reduce the pollution rate.

Under the gas route, the ship needs to be modified so she can be fueled by liquefied natural gas or liquefied biogas. The gas route is proven to be more environmental friendly than the diesel route (Bengtsson et al., 2012). However, at the same time it requires greater initial investment as it involves a technological upgrade on-board the ship as well as the on-shore based supporting facilities such as the bunker terminal.

From the above mentioned alternatives, it can be seen that there are various alternatives for the ship-owner and the ship operator to be environmental friendly. However, all of the options available need relatively high capital invested or increase the operation cost. For example, although substituting HFO by MGO could enhance the environmental friendliness, yet it will raise the ship's daily operational cost as the price of MGO is higher. With regards to the ballast water management system, there is one vital barrier for the shipping companies to apply the system, namely the high investment. In order to install the ballast water management system, the required initial investment is several million US Dollars per ship (DNV, 2012).

The alternative that yields the maximum effectiveness with lowest level of investment in order to be green is slow steaming. However, this alternative has a substantial economic implication which has to be considered. When a ship is reducing her speed to minimize emissions, the total number of deliveries from port to port will be fewer. In other words, it will raise an opportunity cost to the carrier equal to the loss of opportunity profit the carrier could have earned. It is confirmed by the finding of J. J. Corbett, Wang, and Winebrake (2009) that the marginal operating cost is increasing when a ship is required to reduce her speed beyond the profit-maximizing point.

Finally, this sub chapter underpins that business firms need to be settle economically before they can accomplish environmental performance especially in the context of maritime logistics providers. Krozer et al. (2003), underlined that in the context of shipping industry, it might need a high level of investment in order to upgrade the shipping system that support the environmental aspects.

Third Party Logistic Providers and Environmental Performance

In conjunction with the intense competition between business firms, supply chain has become globalized. This aims to provide the firms with access to cheap labor and raw

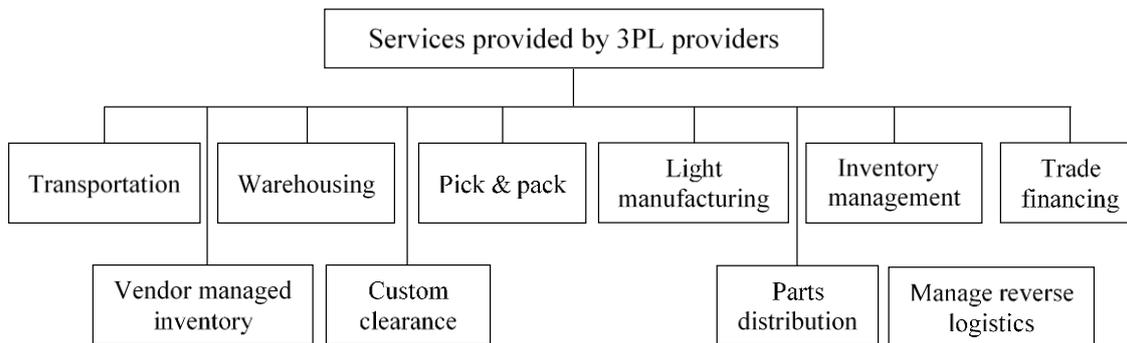
materials, availability of financing opportunities, larger product market, more favorable governmental regulation, and minimizing taxes which the final goal is increasing efficiency and competitiveness (Manuj & Mentzer, 2008). Accordingly, business firms also often outsource the activities which are not their main area in the business. One of the activities which are common to be outsourced is logistic activities, inter alia: transportation, warehousing, order processing, and related information technology support (Bolumole, Frankel, & Naslund, 2007).

The Council of Supply Chain Management Professionals (CSCMP) defined the term logistics itself as “*part of supply chain management that plans, implements, and controls efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements*” (CSCMP, 2013, p. 117). Additionally, CSCMP (2013) elaborates that logistics management activities encompass several activities such as: transportation and fleet management, warehousing, materials and cargoes handling, order fulfillment, logistics network design, inventory management, supply/demand planning and the management of 3PL providers.

Logistics outsourcing, means transferring the logistics management activities from in-house to be done by external parties (the third-party logistics providers or 3PL providers) has attracted many firms (Hofenk, Schipper, Semeijn, & Gelderman, 2011) and has become the norm across most industries (Laarhorven et al., 2000). Outsource the logistic activities to the 3PL providers, together with trust, commitment, willingness to invest, recognition of dependency between parties and communication are believed to finally enhance firm's competitive advantage and sustainability (Knemeyer, Corsi, & Murphy, 2003).

The more precise definition of 3PL providers is proposed by Lieb (1992, p. 29) as the following: “*the use of external companies to perform logistics functions that have traditionally been performed within an organization. The functions performed by the third party can encompass the entire logistics process or selected activities within that process*”. 3PL providers are slightly different from 2PL providers. 2PL providers are mostly asset-based carriers, which deliver physical logistics services by utilizing their own assets/fleets (Razzaque & Sheng, 1998). On the other hand, the services provided by 3PL providers are broader than that. Mangan, Lalwani, Butcher, and Javadpour (2012), furthermore explain that the 3PL providers are usually the freight companies which provide a broader and integrated range of services, as shown in the Fig 3 below.

Fig 3. Services performed by 3PL providers



(adapted from: Mangan et al., 2012)

In running the business activities, 3PL providers will interact closely with shipping companies and/or other transportation companies. Some ship-owning companies have expanded their services, by not only transporting freight but also offering logistics services (for instance by developing freight forwarding business unit). These kind of companies hold the role of 2PL providers and 3PL providers at the same time. Adapting the term by Razzaque and Sheng (1998) those companies are called hybrid logistics service providers.

The attraction in utilizing the services of 3PL providers is driven by several factors which lie in four major categories: organizational factors, financial factors, service factors and physical factors (Rushton, Croucher, & Baker, 2010). The principal of the first driver is the globalization of business has created some competitive consequences which raise the demand towards business firms to deliver the needs of the customers all around the world rapidly (Choy et al., 2008). Hence, business firms need to focus on their own core competences and managerial expertise (Rushton et al., 2010).

Furthermore, Fuller, O'Connor, and Rawlinson (1993) explicate that the globalized supply chain has made the business firms need to apply the approach of logistically distinct business to remain competitive. It means that different group of customers may have different demand and requirement of logistic activities. Lack of expertise in understanding the specific knowledge in logistics activities, for instance the custom clearance procedures in destination countries, might be a problem for the business firms (Razzaque & Sheng, 1998). Therefore, acquiring the services offered by 3PL providers will help them in fulfilling those needs.

The next driver is financial factors. The utilization of 3PL providers may help the business firms to reduce the capital cost and eliminate the assets ownership (Marasco, 2008). With the reduction in the capital cost, at the same time the operational cost of the company will be lower. Additionally, from the managerial accounting point of view, the use of 3PL providers will be able to convert fixed costs to variable costs which made it attractive to business firms (Rushton et al., 2010). Further, by acquiring the services of 3PL providers, business firms can reduce the costs related to the training for their employees in terms of specific knowledge of logistics activities. Consequently, the elimination of these opportunity costs might give broader opportunities to the business firms for investing their capital in the instruments which can directly support their core competences.

The third driver, service factors, emphasize that by transferring the logistics management activities to 3PL providers will enable business firms to be more flexible in their business activities. The constraints of developing new products/services, new target market and geographical coverage will be reduced because the 3PL providers will take over those barriers (Rushton et al., 2010). This higher flexibility will finally increase the speed of services and the possibility of business firms in achieving competitive advantage, therefore this becomes incentive which will make more business firms interested in outsourcing their logistics management activities to 3PL providers.

The last driver, physical factors, explain that the 3PL providers have an important role in helping the business firms to reduce the complexities of their business by taking over the logistics management activities. The 3PL providers have better knowledge, experiences and competence in doing the physical activities such as: choosing the best routing, the best mode of transportation, helping the business firms in dealing with custom procedures, various depot types and various delivery characteristics (BIFA, 2008).

From the trend of outsource the logistics management activities to the third-party, we are increasingly able to see that 3PL providers are integral part of supply chains due to its position which link different parties along the supply chain. Accordingly, 3PL providers play a vital role in the attempt of developing a greener supply chain; therefore they need to be more aware of accomplishing environmental performance. The need to raise awareness can be justified by the fact that 3PL providers is one of the most environmental unfriendly business sector (Lin & Ho, 2008).

Furthermore, it is an increasingly widely-diffused practice that the clients of 3PL providers, through their supplier selection criteria, might require them to be environmental

friendly. More importantly, those customers are in a strategic position to exert significant influence on the environmental behavior of their suppliers which also means the 3PL providers which will be chosen are those who can satisfy the buying parties' environmental assessment requirements (Andiç, Yurt, & Baltacıoğlu, 2012).

Environmental Performance and Its Underlying Motives

Looking back to the history, scholars believed that the firm's environmental efforts can be categorized as its social responsibility which will create a burden towards its financial and operational performance (Friedman, 1970). However, as the time goes by, this premise has been a subject of debate among scholars. In the more updated view, scholars had shifted the paradigm of social responsibility (includes environmental issues) and argue that commitment to social responsibility is an integral element in strategic and operational business management without necessarily result negative impacts towards financial and operation performance (Mulligan, 1986). Furthermore, eco-efficiency perspective proposes the idea that productivity is benefited by the pollution reduction, considering that pollution is a form of economic inefficiency (King & Lenox, 2002).

In parallel with that paradigm shifting, there is an escalating concern and expectation from the international community to the business enterprises regarding environmental issues and make the entire supply chain greener (Lai & Wong, 2012). More regulatory and governmental bodies, as well as nongovernmental organization (NGO) and even fellow enterprises, increasingly vociferous demand the business firms to be more environmental friendly (Walker et al., 2008). This means business firms are expected to reduce their negative impacts towards environment, e.g., pollution reduction, resources conservation and firms' environmental reputation. It can be achieved by the coordination between its business and environmental concerns (Lai & Wong, 2012). When more firms are improving their environmental performance, the idea of greening the supply chain will be manifested.

Based on the aforementioned discussion, there are several motives why business firms intend (or need) to enhance the environmental performance. Those various motives are e.g., some firms improve the environmental performance as a result of their own selves' initiatives and consciousness on the environmental matters; others may perform green practices just to conform to the rules and regulation; while some others accomplish environmental performance as a tool to increase their competitive advantage.

It is reported that the prime motivation for accomplishing environmental performance is ethical motivation and/or commercial motivation (Testa & Iraldo, 2010). Ethical motivation is the philosophy of the firms' top management and owner, which view that the environmental aspect of the business can be a stimulus for innovation and more efficient allocation of business resources. Firm with this philosophy is enhancing its environmental performance not just for complying the related rules and regulation. This philosophy also will influence the firms' behavior *vis-à-vis* environment and the involvement of top and middle management in the firms (Zhu & Sarkis, 2006).

In the other hand, commercial motivation view that by accomplishing greater environmental performance will enable business firms to raise operational and economic benefits. The operational performance in this context includes: productivity, safety, cycle time, reduction in production defects, increase the capacity utilization, and minimizing waste (Ittner, Larcker, & Randall, 2003).

Those benefits from environmental performance has been emerged as an approach to increase firms' level of competitiveness (Narasimhan & Carter, 1998). Other study reveals that there is a positive relationship between firms' level of environmental friendliness and overall business performance (González & González, 2005). The common question which often being asked is how firms can reach competitive advantage by accomplishing environmental performance. The appropriate answer for that question might be, firms which have greater level of environmental performance have more possibility to: 1) receive more recognition for their efforts compared to the firms with less environmental friendly products and services (Igarashi, de Boer, & Fet, 2013) and can result higher overall performance outcome (Zhu, Sarkis, & Lai, 2007); 2) reduce the cost of production, distributions, disposal, emissions, waste and hazardous materials (Carter & Dresner, 2001); 3) gain governmental subsidies and reduce (or prevent) costs which may incurred by the fine caused by violation towards regulation (Berry & Rondinelli, 1998).

Since the rules and demand to be environmental friendly keep growing almost in every country of the world, the buyer side actors (customer and consumer) will require higher environmental standard in the products and services in terms of the materials, processing, and also delivery. Recently, there is a tendency that buying firms are not only assessing and investigating their first-tier suppliers but also their second-tier suppliers (Zhu, Sarkis, & Geng, 2005).

In the procurement process of goods and services, more business enterprises have shifted from not only by multiple sourcing and competitive bidding but also by choosing

the suppliers which have more long-term, traceable partnership, and can accomplish the certain required standard of environmental performance (Lai & Wong, 2012).

Furthermore, firms with high level of environmental performance has a “spill-over effect” (Lai & Wong, 2012) by indirectly educating the customers, shaping their behavior and consciousness in choosing products and services in the long run. Thus, it showed that there is a collective effort among different stage in the supply chain to green the entire supply chain and the firms who are not able to adjust to this trend are more vulnerable to be out of competition.

In the case of Turkey, since May 2004, Turkey involved in Annex-I party in the United Nations Framework Convention on Climate Change (UNFCCC) and also Kyoto Protocol in 2009. As the consequences, Turkish government has been setting up stricter rules, regulations and law-enforcement towards environmental issues. This can be seen from the fact that Turkey has a very high revenues generated from “environmentally-related” taxes as a share of GDP, higher compared to other countries and this can be an indication of the commitment of Turkish government in greening their environment (OECD, 2012).

Furthermore, the carbon footprint and annual greenhouse gas emissions in Turkey are relatively low compared to the EU average. Yet, OECD (2012) presents the fact that the pollution and emission intensity becomes significantly higher when it comes to the pollution produced by some segments such as: energy, dwelling, manufacturing, and transportation. In addition, according to Tzannatos (2010), minimizing the pollution from the shipping sector (which holds a vital role is logistics activities), particularly its emission, has become the cynosure of international and European community in protecting the environment. Therefore, environmental issue of the 3PL providers in Turkey become interesting as this segment contributed a large proportion to the pollution problem which the government face and has become the cynosure of international and European community.

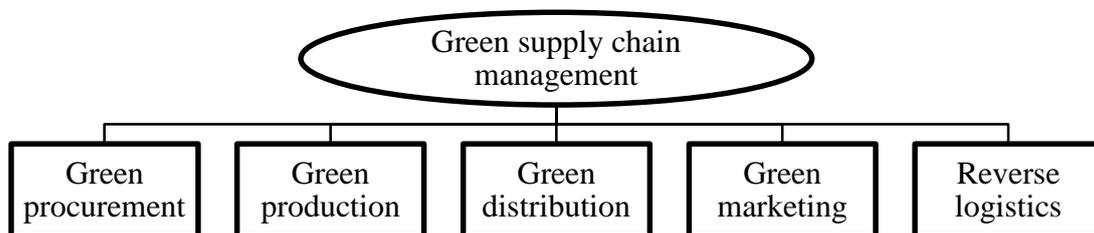
Green Supply Chain Management and Environmental Performance

Firstly, it is important to begin with the definition of supply chain management itself. Supply chain management is defined as “*the coordination and management of a complex network of activities involved in delivering a finished product to end-user or customer*” (Hervani, Helms, & Sarkis, 2005, p. 331). Due to the greater consciousness towards environmental aspects, firms are expected to be “greener”, means minimizing the negative

impacts of their activities to the environment. This “green” expectation is not addressed to a single stage of the supply chain only; it is addressed to all parties along the supply chain instead. That has created one term namely green supply chain management which can be interpreted as: innovation in the supply chain management in which, environmental friendliness factor is being considered (Green, Morton, & New, 1996).

Green supply chain management practices encompass several steps, starts from environmental friendly purchasing to integrated supply chains flowing from suppliers, to manufacturers, to customers, and reverse logistics, which is known as “closing the loop” (Zhu & Sarkis, 2006). One of the comprehensive definitions of green supply chain management is an *“integrating environmental thinking into supply-chain management, including product design, material sourcing and selection, manufacturing process, manufacturing processes, delivery of the final product to the consumers as well as end-of-life management of the product after its useful life”* (Srivastava, 2007, p. 54). The aforementioned definitions are summarized in the Fig 4.

Fig 4. The green supply chain management



Green supply chain management practices generally involve two important actors from the buyer sides (organizations as well as retail customer) and the seller sides (suppliers). From the buyer perspective, it becomes more common that they required their suppliers to accomplish a certain level of environmental friendliness. Green et al. (1996), in their findings, confirmed that from the buyer sides’ point of view, having a formal supplier selection and assessment method in the procurement process is the gateway to accomplish environmental performance and green the supply chain.

On the other hand, the suppliers, sometimes with their own intention, inform the buyers about to which extent their products and services are environmental friendly (Darnall, Jolley, & Handfield, 2008). As now the environmental sustainability issue become more substantial, the importance of firm in selecting a supplier is not only placed

at the accuracy level of the products and services being delivered (right quality, right delivery time, and at desirably cost) but also in terms of how the supplier could improve its environmental performance (Igarashi et al., 2013).

To be successful in implementing green supply chain management practices, business firms should have an environmental commitment, which means environmental friendly should be treated as part of the main corporate value and providing clear policy statement related to green awareness in every area of the business (Large & Thomsen, 2011). Rules and regulation regarding environmental friendly practices are still playing an important role. To create a “greener” supply chain, cooperation with both suppliers and customers has become extremely important (Zhu, Sarkis, & Lai, 2008). Firm has to be able to build good collaboration with other parties along the supply chain since through good collaboration among supply chain members, higher overall performance can be achieved.

There are two major perspectives in viewing green supply chain management: the revisionist and the traditionalist perspective (Wagner, Nguyen, Azomahou, & Wehrmeyer, 2002). The revisionist perspective, pioneered by Porter and Van der Linde (1995), is suggesting a new concept which frame the environmental performance and green supply chain management practices as a potent tool to achieve higher competitiveness. In other words, this so-called Porter hypothesis, stated that there will be a win-win situation between environmental performance and competitiveness. On the other hand, the traditionalist perspective is in line with the conventional neoclassical economic theory which view that the effort to improve environmental performance by applying green supply chain management practices will raise opportunity costs for the business firms and most likely will have negative impacts to the competitiveness.

The Gap in the Existing Literature

Most of the prior literatures in green supply chain management has adopted the revisionist perspective. The study by Rao and Holt (2005) supported that in the context of leading business firms in South East Asia region, the implementation of green supply chain management practices will significantly improve the integration among parties in the supply chain and finally lead to higher level of competitiveness and economic performance. Next, Bose and Pal (2012), also confirmed that the adoption of green supply chain management practices have positive effect on the stock price of the business firms which is also an indication of improvement in financial performance. It is also reported by the study by Yang et al. (2013) that in the context of container shipping industry in

Taiwan, green supply chain management practices are able to improve the firms' overall competitiveness significantly.

Unlike the revisionist perspective, there are still limited number of studies which adopted the traditionalist point of view. However, it is reported by Wu and Pagell (2011) that not all of the green practices will lead to higher competitiveness and some of them even increase costs. Furthermore, Krozer et al. (2003), underlined that in the context of shipping industry, it might need a high level of investment in order to upgrade the shipping system that support the environmental aspects.

Accordingly, although most of the modern literatures in relation to environmental performance and green supply chain management has adopted the revisionist perspective, for the context of capital intensive business segment such as maritime logistics providers, the traditional perspective is considered more realistic and appropriate. Therefore, the traditionalist perspective is chosen as the conception starting point for this study. In other words, the starting point of view of this study is the attempt of improving environmental performance will increase the level of opportunity costs for the business firms. Thus, business firms might need to have good operational performance, economic performance and internal green supply chain management practices as the pre-requisites in accomplishing environmental performance.

This thesis aims to fill this gap in the existing literature. In the next chapter the research model and the hypotheses are then formulated and presented.

Chapter 3. Research Model and Hypotheses

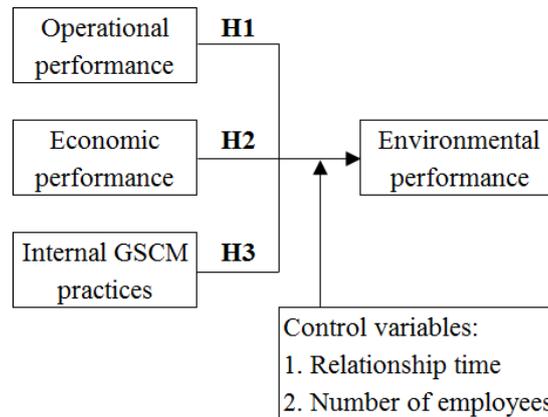
According to the literatures review and the gap in the existing literature presented in the previous chapter, a conceptual framework for this research is developed. Furthermore, the hypotheses for this thesis are then formulated.

The previous chapter shows the existing literature regarding green supply chain management, environmental performance, the demand from the buying side actors to be green and how this field applied in the 3PL providers and have positive influence in enhancing firm's competitiveness. From those literatures review, it is found that there is one important area which still has not been explored by most scholars, namely the pre-conditions which will trigger and encourage business enterprises to enhance their environmental performance. This dimension is in fact no less important.

Therefore, the gap in this field will be the point of view of this study. This is supported by the argument that the attempt to improve environmental performance requires great level of investment with high uncertainty of the payback (Walker et al., 2008). In addition, Wu and Pagell (2011), stated that the pay-back period of proactive green investment might be for decades. For example, usually a ship-owning company and 3PL providers retrofit their fleets to be more eco-friendly. Fleet retrofitting definitely requires high capital invested.

For the purpose of this paper, three preconditions are considered as the most important in enhancing environmental performance namely: operational performance; economic performance; and internal green supply chain management practices. Those three variables become the independent variables in this study. On the other hand, the dependent variable is the firm's environmental performance. The model in this thesis is presented in the Fig 5.

In the model presented, two variables are controlled statistically. The effect of relationship period interval is the first control variable in the model. This first control variable is made by taking the natural logarithm (\ln) of the firm's time interval in doing business with its most important customer. This is important because the longer time they do business together, the higher the level of trust between both parties and it will affect the firm's willingness to enhance its environmental performance (Hoejmose, Brammer, & Millington, 2012). The second control variable in this model is the firm's number of full time employees. This is also important as it indicates the financial strength of the company.

Fig 5. The conceptual framework

Relationship between Environmental Performance and Operational Performance

Operational performance encompasses four major areas namely: delivery speed, the products/services quality, flexibility and cost (Wong, Boon-itt, & Wong, 2011). Lai and Wong (2012) define operational performance as a performance which related to the productivity gains. For example, re-design the product and production processes, distribution and disposal process, could make the whole business becomes more efficient and at the same time less polluting. Higher operational performance means that the business firm has higher efficiency and finally it is expected to help the firm in achieving competitiveness. Amid increasingly fierce competition among 3PL providers, each business firm will strive to be more efficient.

The importance to improve operational performance in 3PL providers is supported by the finding of (Banomyong & Supatn, 2011) which show that from the shipper's perspective, the selection of 3PL providers is significantly influenced by the service reliability, the cost, the service quality and the responsiveness that they offer. In other words, in order to survive in the tough competition, all 3PL providers have to find a way to enhance their operational performance.

Furthermore, there is body of research which states that competitiveness can be achieved by proactively improving firm's environmental performance (Yang et al., 2013; Zhu, Sarkis, & Lai, 2013). Those studies found that higher environmental performance (by applying green supply chain management practices) will help the business firms to improve operational performance in the form of cost savings, higher quality assurance and increase the productivity level.

Based on eco-efficiency perspective, it is indeed acknowledged that an efficient business operation will run concurrently with its environmental performance. However, this perspective is not stating that it is the environmental performance which will improve operational performance. This perspective primarily argues that the firm's attempt to reduce its operational cost and increasing overall efficiency will simultaneously enable it to enhance its environmental performance (Korhonen & Seager, 2008).

Hence, it cannot be directly generalized that environmental performance will lead to higher operational performance. Especially it is known that not all of the green supply chain management practices will lead to cost savings. Some of them will even increase cost (Wu & Pagell, 2011). However, most of business firms will attempt to improve the operational performance regardless whether they are trying to be environmental friendly. When the operational performance is improved, their environmental performance will automatically be improved. Thus, operational performance is chosen to be the first independent variable which will affect environmental performance as the dependent variable. Based on this argument, the first hypothesis is proposed as follows:

Hypothesis 1. There is a positive association between operational performance and environmental performance in the context of third party logistics providers.

Relationship between Environmental Performance and Economic Performance

While the first hypothesis suggests that the increase of operational efficiency will simultaneously improve environmental performance, in this section the relationship between economic and environmental performance will be presented. Economic performance is chosen as the second independent variable. Economic performance is associated with the financial impact of green supply chain management practices. This performance is the ultimate goal that every business owner and manager aim to achieve. Several studies have found that firms' environmental performance have a positive relationship to its economic performance (Rao & Holt, 2005) and competitiveness (Yang et al., 2013).

However, the study by Zhu et al. (2013) has shown that not all of the green supply chain management practices (as a key determinant in achieving environmental performance) have positive association with the economic performance. Ye, Zhao, Prahinski, and Li (2013) have found that some green supply chain management practices are even have negative impacts to firm's economic performance. Additionally, Altman (2001) also states that the private sector cannot be expected to be environmental friendly

as it does not necessarily contribute an economic advantage for them. The underlying reason is because green supply chain management practices need a great deal of investment. Such investment like: acquiring new/upgrading physical assets, high quality of firm's human resources, technological expertise are required in order to enable the business firm to adopt green practices which finally will result to the improvement of environmental performance (Lin & Ho, 2008).

In the context of 3PL providers, in order to improve the environmental performance, the firms need to take actions such as: retrofitting their transportation fleet or acquire the new fleet which less polluting, implementing more sophisticated information technology system in order to increase operational efficiency and be more profitable. Whereas, not all 3PL providers have adequate financial strength to invest in this aspect. Schaltegger and Synnestvedt (2002), stated that there is a view which suggests that environmental performance can only be achieved once the business firm has been settled economically.

The evidence that there is a relationship between economic performance and environmental performance is also endorsed by the study by Akbostancı, Türüt-Aşık, and Tunç (2009), which found that in Turkey, the areas with income per capita less than 2000\$ have more tendency to be polluted compared to other areas with higher income per capita. It shows that the higher the income earned by business firms, the higher their financial strength and ability to apply environmental friendly practices.

Accordingly, this study is in the point of view which suggests that the economic performance will influence business firms' environmental performance, not the other way around. Thus, it is assumed that achieving higher level of economic performance is one of the determinants to accomplish higher environmental performance and proposing the second hypothesis:

Hypothesis 2. There is a positive association between economic performance and environmental performance in the context of third party logistics providers.

Relationship between Environmental Performance and Internal Green Practices

Internal green supply chain management practices are important elements in enhancing firms' environmental performance. The internal green practices is defined as practices that reflect the firm's decision to act environmental friendly and deployed by the firm in its daily internal operations (Azevedo, Carvalho, & Machado, 2011). Chieh-Yu Lin and Ho (2008), discovered that there are some predecessors required in order to encourage the logistics providers in implementing green supply chain management practices, namely:

an adequate ability in terms of technological, organizational, quality of the human resources, knowledge and expertise.

Internal green supply chain management practices in this study are measured by several items: the company has a clear environmental management system; the top and middle managers of the firms are supportive towards environmental issues; the company held an internal environmental friendly practices evaluation regularly; the company has a clear internal environmental compliance and audit program; the company has a close internal cross-functional cooperation for enhancing the environmental performance.

The study conducted by Potoski and Prakash (2005) have confirmed that a clear environmental management system will positively affect the firm's environmental performance. A major challenge in accomplishing environmental performance is related to the change in organizational culture. Without a clear leadership and active support from the firm's top management, such required changes in organizational culture will be hardly manifested (Pujari, Peattie, & Wright, 2004). Therefore, the support from the firm's top management is a crucial driver in enhancing environmental performance (Hoejmose et al., 2012). Flynn, Huo, and Zhao (2010) reported that there is a positive impact of close internal cross functional cooperation on the firm's performance.

The evidence proving that the implementation of internal green practices will positively influence the environmental performance is also supported by the findings of Yang et al. (2013) in the context of container shipping in Taiwan; Lai, Lun, Wong, and Cheng (2011) in the context of shipping industry, and Lun (2011) in the context of container terminal industry. Accordingly, it is proposed that the higher the level of internal green practices implemented by business firms, the higher the level of environmental performance will be achieved, and presented in the following hypothesis:

Hypothesis 3. There is a positive association between internal green supply chain management practices and environmental performance in the context of third party logistics providers.

In the following chapter, the research design and research methodology adopted to achieve the research objective will be elaborated.

Chapter 4. Research Design and Methodology

The purpose of this chapter is to elaborate the research design and methodology adopted in this thesis. Further, different stages in the research methodology are also presented.

Research Design and Methodology

Two methods in conducting a research are: quantitative and qualitative methods. The distinction between the two methods lies on the procedures and suitability rather than quality (Ghauri & Grønhaug, 2002). Therefore, in determining which method is more appropriate to be adopted, the objective of a research must strongly be considered.

In general, the data collection and analysis in a quantitative research strategy must be quantifiable to make the statistical testing possible. On the other hand, the data in a qualitative research is usually in a descriptive form. However, the difference between both methods are not only limited to the type of data. While quantitative research emphasizes on the testing of research's hypotheses, qualitative research emphasizes more on the understanding deeply about a social or behavioral phenomenon.

Furthermore, Ghauri and Grønhaug (2002), suggest that the approach in a quantitative method is more logical (usually based on the statistical testing) and the point of view of the researcher is more objective. In contrast, the approach in a qualitative method is more rational, explorative and intuitive. The point of view of the researcher in qualitative method is more subjective because the researcher's past experiences will strongly influence the analysis. The characteristic comparison of quantitative and qualitative methods is summarized in the Table 4.

Table 4. Comparison between quantitative and qualitative research methods

	Quantitative Methods	Qualitative Methods
Emphasis on:	hypotheses testing and verification	understanding a phenomenon
Focus on:	fact and reason for social events; hypothetical testing	understanding from respondent's point of view
Approach:	logical, critical, based on the numerical and statistical value	interpretation and rational approach
View:	objective outsider view	subjective insider view
Orientation:	hypothetical-deductive; result oriented	inductive, explorative orientation; process oriented
Generalization:	by population membership	by comparison of properties and context of individual organism

Adapted from: (Riechardt & Cook, 1979)

The main objective of this thesis is to examine whether operational, economic performance and internal green supply chain management practices of the business firms are having positive association with their environmental performance. Three hypotheses are developed for this research and those hypotheses will be tested statistically to accept or reject each proposed hypothesis. Furthermore, the orientation of this thesis is more hypothetical deductive because the hypotheses are formulated based on the review of prior literature and the gap in the existing studies. As the focus of this thesis is to empirically examine the relationship among those variables and the hypothetical deductive orientation, thus, a quantitative research method is more appropriate to be adopted in this thesis.

In terms of the research design, Bryman and Bell (2011) categorize five types of research design namely: experimental design, cross-sectional design, longitudinal design, case study design and comparative design. The cross-sectional design is applied in this thesis. A cross-sectional design is basically collecting quantifiable data at the same point of time order to observe the association between variables (Bryman & Bell, 2011). The data collection was done by distributing a survey questionnaire to conducting 3PL business firms in Turkey. Initially, the region of Izmir was selected. Due to the high rate of refusal to participate in the survey, the survey was also sent to selected firms operating in Ankara and Istanbul.

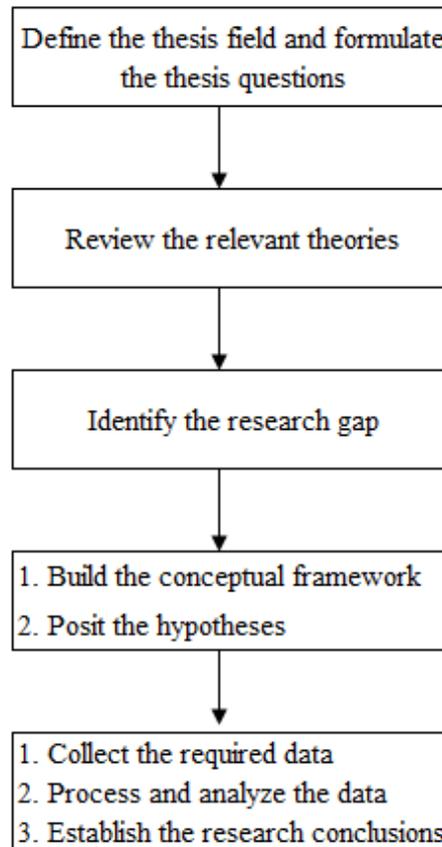
The Stages in the Research Methodology

The stages in the research methodology are summarized in the Fig 6. The first stage of this thesis is defining the field of research, namely the green supply chain management and firms' environmental performance. The thesis question is then formulated based on the specific area in the chosen field. Tharenou, Donohue, and Cooper (2007), define a research question as a question which is limited to the specific area of interest in the related field, thus becomes the core focus of the research. The research question of this thesis is formulated as the following: "Do the firm's operational performance, economic performance and internal green supply chain management practices have significant positive association with its environmental performance?"

Among different types of a research question proposed by Denscombe (2009), the thesis question above lies on the type which aims to test the causes and the consequences of a specific phenomenon (is y affected by x ?). In other words, the proposed thesis question have a purpose to test and explain the nature of certain relationship among

variables. Thus, based on the type of the research question, this thesis can also be categorized as a hypotheses-testing research (Sekaran, 2003).

Fig 6. The stages in the research methodology



The next stage is reviewing and mapping the various existing literatures. This stage is essential because by reviewing the literatures, the insight of what is already known in the related field will be obtained. Therefore, it avoids what is called by Bryman (2012) as “reinvent the wheel”. The method used for the literatures review is the systematic review. Systematic literature review is distinct from the conventional narrative review which is more uncertain process of discovery because it emphasize on the generating understandings in order to enrich humans’ discourse (Bryman, 2012).

In contrast, systematic review is more effective and has a lower level of uncertainty as the goal of reviewing the literatures is clear from the beginning and narrowed by the existence of the thesis question. The exact definition of systematic literature review is *“adopting a replicable, scientific and transparent process, that aims to minimize bias through exhaustive literature searches of published and unpublished studies and by providing an audit trail of the reviewers’ decisions, procedures and conclusions”*

(Tranfield, Denyer, & Smart, 2003, p. 209). Furthermore, based on the literature review process, the area of research which has not been explored by most scholars can be discovered.

The next stages are building the conceptual framework and posit the hypotheses according to the previous stages. Within the conceptual framework (showed in the previous chapter), the relationship between the independent variables and the dependent variables are presented. Through this conceptual framework, the hypotheses posited are more understandable.

To be able to answer the formulated research questions and test the proposed hypotheses, a data collection process needs to be done. Among the various data collection methods, a self-administered questionnaire is chosen. According to Denscombe (2010), a self-administered questionnaire offers several advantages in terms of economical saving, easiness to arrange, standardization of the answers, pre-coded answers and the accuracy of the data. Furthermore, Bryman (2012) elaborates that through this method the interviewer effects can be absented. Therefore, the variability caused by the interviewer can be suppressed. Within the questionnaires, a Likert scale is used as the tool of measurement. Likert scale is a tool consists of multiple scales (usually from 1 to 5 or 1 to 7) where each item represents the degree of agreement to every statement given in the questionnaire (Bryman, 2012). All the information gathered from the questionnaires are treated as strictly confidential.

Once the self-administered questionnaires are gathered, the data is summarized using software IBM Statistics SPSS 20 and a multiple regression analysis is then used to test the hypotheses. The result of this analysis will show whether the hypotheses proposed are accepted or rejected and summarize that in the conclusions. In the next chapter, more detailed regarding the samples, data reduction methods and the empirical findings will be presented.

Chapter 5. Empirical Findings

This chapter describes the sample, the data reduction process and the data reliability. Further, the result of ordinary least squares analysis and correlation between each variable are presented. Finally, the interpretation of each statistical value are elaborated.

Sample

Within the data collection process, as the information about the financial status of the each business firm was not public, the selection of 3PL providers was done by asking verbal questions about their daily business operations and taking into account the number of permanent employees. The number of full time employees who works in the company might be an indication of its financial strength. The final sample is composed of 181 business firms. This number of final sample is adequate in order to use multiple regression analysis. Tabachnick and Fidell (2013), suggest that the ideal number of samples required should be greater than $50 + 8 \times \text{number of independent variables}$. In this case, as there are three independent variables, thus the minimum number of samples should be 74 samples ($50 + 8 \times 3$). The profile of respondents is presented in the Table 5.

Table 5. Profile of business firms ($n=181$)

Firm characteristics	Number	Percentage
<i>Number of years in doing business</i>		
1-10	47	26%
11-20	63	35%
21-30	37	20%
31-40	21	12%
41-50	6	3%
> 50	7	4%
<i>Number of full time employees</i>		
1-20	54	30%
21-50	59	33%
51-100	34	19%
101-150	9	5%
151-200	3	2%
> 200	22	12%

The questionnaires were asking about various pre-conditions that will triggered business firms to enhance environmental performance. In general, the respondents are expected to evaluate each item being asked. To measure the environmental performance, the respondents were asked whether they are able and success to improve their

environmental performance. For economic and operational performance, the respondents were asked whether the firms gain specific benefits from environmental friendly practices. Furthermore, the respondents were also asked whether the firms have applied internal environmental-related practices. The respondents are then expected to give their responses by choosing one out of five-point-Likert scale (1 for strongly disagree, 5 for strongly agree).

Data Reduction Method

Once the filled questionnaires had been collected and sorted, a factor analysis, more specifically principal-component-analysis (abbreviated as PCA) is used to reduce the data and group them into specific set of components. In PCA, *“the original variables are transformed into a smaller set of linear combinations, with all of the variance in the variables being used”* (Pallant, 2011, p. 182). Furthermore, this analysis was chosen as it is a common statistical technique used for clustering variables into some coherent subsets that are relatively independent of one another (Tabachnick & Fidell, 2013).

Table 6. Result of KMO and Bartlett's test

KMO Measure of Sampling Adequacy	0.875
<u>Bartlett's Test of Sphericity:</u>	
Approx. Chi-Square	2461.546
df	171
Sig.	0

With regards to this factor analysis, first of all, a Kaiser-Meyer-Olkin (KMO) and Bartlett's test are done (see Table 6). Both of the KMO measure and Bartlett's test indicate the suitability of using factor analysis as a tool for data reduction. KMO measure showed a value of 0.875. $KMO > 0.8$ is categorized as very good and in the case when $KMO < 0.5$, it might be an indication that factor analysis is not appropriate to be used for data reduction tool (Frochlich & Westbrook, 2001). Additionally, the Bartlett's test of sphericity showed a value of 2461.546 and significant at $p < 0.05$. Furthermore, the principal component analysis was done using variance-maximizing procedure (VARIMAX) as the rotation method, which *“maximize the variance of factor loadings by making high loadings higher and low ones lower for each factor”* (Tabachnick & Fidell, 2013, p. 625).

Table 7 presented below is the total variance explained. It showed that the first four components have initial eigenvalue equal to or greater than 1.0 (component 1 = 7.63,

component 2 = 2.94, component 3 = 1.78, and component 4 = 1.35). The eigenvalue shows the amount of variance which can be explained by the component, and eigenvalue equal to or greater than 1.0 is required (Pallant, 2011). Thus, these four components will be retained for further investigation. Furthermore, these four components explain 72.06% of the total variance, which showed by the extraction sums of squared loadings and a value greater than 60%, is required.

Table 7. Total variance explained

Comp	Initial Eigen Values and Extraction Sums of Squared Loading			Rotation Sums of Squared Loadings		
	Total	% variance	Cumulative%	Total	% variance	Cumulative%
1	7.63	40.14	40.14	4.49	23.63	23.63
2	2.94	15.45	55.6	3.48	18.31	41.93
3	1.78	9.37	64.97	2.88	15.15	57.08
4	1.35	7.08	72.06	2.85	14.97	72.06

Extraction Method: Principal Component Analysis.

The four components and the rotated component matrix which are extracted from the principal component is presented in the Table 8 below. These components are: environmental performance, operational performance, economic performance, and internal green supply chain management practices.

The first component, environmental performance, consists of four items namely: environmental friendly supply chain practices have helped improving the environmental image of the company (ENP1); environmental friendly supply chain practices have led to the reduction of liquid wastes (ENP2); environmental friendly supply chain practices have led to the reduction of solid wastes (ENP3); and environmental friendly supply chain practices have led to the reduction of hazardous materials (ENP4).

The second component, operational performance, consists of six items namely: environmental friendly supply chain practices have improved the overall efficiency of the company (OP1); environmental friendly supply chain practices have increased the delivery timetable (OP2); environmental friendly supply chain practices have improved the quality of products and services (OP3); environmental friendly supply chain practices have improved the capacity utilization (OP4); environmental friendly supply chain practices have reduced the operational waste (OP5); environmental friendly supply chain practices have minimized the level of inventory (OP6).

The third component, economic performance, consists of four items namely: environmental friendly supply chain practices have decreased the cost of energy consumption (EP1); environmental friendly supply chain practices have decreased the wastes treatment costs (EP2); environmental friendly supply chain practices have decreased the wastes discharging costs (EP3); and environmental friendly supply chain practices have reduced the fine occurred by environmental violations (EP4).

Table 8. Rotated component matrix

	Component			
	1	2	3	4
Component 1: Environmental performance (ENP)				
Environmental performance 1 (ENP1)	0.619			
Environmental performance 2 (ENP2)	0.683			
Environmental performance 3 (ENP3)	0.846			
Environmental performance 4 (ENP4)	0.829			
Component 2: Operational performance (OP)				
Operational performance 1 (OP1)		0.678		
Operational performance 2 (OP2)		0.888		
Operational performance 3 (OP3)		0.861		
Operational performance 4 (OP4)		0.837		
Operational performance 5 (OP5)		0.735		
Operational performance 6 (OP6)		0.675		
Component 3: Economic performance (EP)				
Economic performance 1 (EP1)			0.801	
Economic performance 2 (EP2)			0.884	
Economic performance 3 (EP3)			0.876	
Economic performance 4 (EP4)			0.737	
Component 4: Internal green practices (IGP)				
Internal green practices 1 (IGP1)				0.736
Internal green practices 2 (IGP2)				0.663
Internal green practices 3 (IGP3)				0.647
Internal green practices 4 (IGP4)				0.834
Internal green practices 5 (IGP5)				0.776

Finally the fourth component, internal green practices, consists of five items, namely: the company has a clear environmental management system (IGP1); the top and middle managers of the firms are supportive towards environmental issues (IGP2); the company held an internal environmental friendly practices evaluation regularly (IGP3); the company has a clear internal environmental compliance and audit program (IGP4); the

company has a close internal cross-functional cooperation for enhancing the environmental performance (IGP5).

Descriptive Statistics and Data Reliability Test

Based on the data reduction process through factor analysis, the descriptive statistics of the data is built (see Table 9). It consists the mean and standard deviation of each variable in this study. Further, the data reliability test is also needed in order to measure the data internal consistency. Testing the data reliability is very important as it will discover to which extent the scales are free from random error (Pallant, 2011). For this purpose, a Cronbach's alpha test will be used. The recommended value of Cronbach's α coefficient is greater than 0.7. Low value of Cronbach's α indicates that the correlation among items is poor, yet if Cronbach's α is too high, it implies that there is a possibility of items redundancy which show high similarities among items in the questionnaire (Tavakol & Dennick, 2011).

Table 9. Descriptive statistics

Variables	Variable type	Mean	St. Dev	N
Environmental performance (ENP)	Dependent variable	3.85	0.93	181
Operational performance (OP)	Independent variable	3.52	1.05	181
Economic performance (EP)	Independent variable	3.89	0.99	181
Internal green practices (IGP)	Independent variable	3.15	0.93	181
Length of relationship (LOR)	Control variable	1.73	0.78	181
Number of full time employees (NOE)	Control variable	3.90	1.37	181

Additionally, the value of corrected item-total correlation (CITC) is also presented. The value of CITC indicates the correlation of each item with the total score (Gliem & Gliem, 2003). The suggested value of CITC is above 0.3. In the case when item has CITC value below this suggested value, it is an indication that the related item is measuring something that different from the whole context (Pallant, 2011). If the value of both Cronbach's α and CITC are lower than the suggested, the item should be dropped.

The values in Table 10 show that all of the variables have no problem in terms of internal consistency. The values indicates that all items are consistent and reliable. The variable with smallest coefficient of Cronbach's α is the customer's dependency (0.792), which is still above the recommended value. Furthermore, the CITC values for all items in this study lie down on the range between 0.486-0.875.

Table 10. Result of internal consistency test

Variables	N of items	Cronbach's α	Range of CITC
Environmental performance	4	0.871	0.667-0.819
Operational performance	6	0.923	0.636-0.845
Economic performance	4	0.905	0.707-0.875
Internal green practices	5	0.792	0.486-0.705

The Ordinary Least Squares Result

The model has multiple correlation coefficients (R) of 0.703 and indicates that there is relatively strong linear relationship between the dependent and independent variables in this model. The R-square (coefficient of determination) shows that the whole model is able to explain 49.4% of the variance in the dependent variable. It means that the three independent variables (operational performance, economic performance, and internal green practices) and two control variables are able to explain 49.4% of the variance of dependent variable (environmental performance). This model is also quite strong as the adjusted R square is 0.479.

Table 11 below is the model's correlation matrix. The correlation matrix indicates the correlation between each variable consisted in the model. The correlations between dependent variable and each independent variable are suggested to be above 0.3, while the correlation between each variable is expected to be less than 0.7 (Pallant, 2011).

Table 11. The correlation matrix

	ENP	OP	EP	IGP	LOR	NOE
ENP	1.000					
OP	0.644	1.000				
EP	0.509	0.553	1.000			
IGP	0.316	0.042	-0.003	1.000		
LOR	0.043	-0.078	-0.082	0.337	1.000	
NOE	0.132	0.038	0.037	0.48	0.309	1.000

In this model, the aforementioned recommendation is fulfilled. The correlation between environmental performance (dependent variable) and independent variables are above 0.3 (operational performance 0.644, economic performance 0.509 and internal green practices 0.316). In addition, the correlation between each independent variable also fulfils the suggested value. The highest correlation between independent variable is between economic performance and operational performance (0.553) which is still <0.7.

The multiple regression analysis was used to predict the effect of operational performance, economic performance and internal green practices to environmental

performance (see Table 12 below). From the regression analysis, it is found that the operational performance has a positive significant association to environmental performance (H1, $\beta=0.512$, $t=7.887$, $p<0.001$). Further, the economic performance has a positive significant association to environmental performance (H2, $\beta=0.233$, $t=3.591$, $p<0.001$). The internal green practices also has a significant association to environmental performance (H3, $\beta =0.175$, $t=2.805$ $p<0.01$).

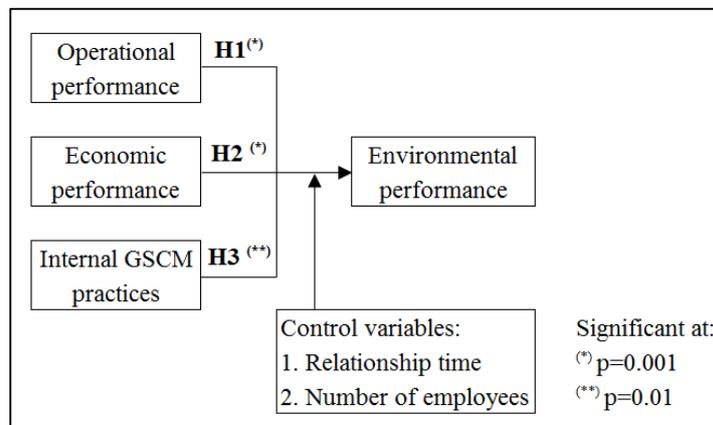
Table 12. The result of regression analysis

Independent variables	Unstandardized coefficients	Standardized coefficients	t	Sig
(Constant)	0.760		2.663	0.008
Operational performance	0.453	0.512	7.887	0.000
Economic performance	0.218	0.233	3.591	0.000
Internal green practices	0.174	0.175	2.805	0.006
Time of doing business	0.043	0.036	0.618	0.537
Number of employees	0.007	0.010	0.162	0.871

Dependent variable: environmental performance

In terms of the importance degree, the operational performance has the greatest influence towards the environmental performance as this variable has the greatest value of standardized β . The findings show that the statistical test has confirmed all the hypotheses proposed in this study. Further, the control variables, neither the length of relationship nor the number of employees have a significant contribution to the model. Finally, all of the aforementioned statistical analysis are summarized in the Fig 7. The result shows that all the testing has confirmed the hypothesis posited in this study.

Fig 7. The conceptual model and OLS result



The following chapter is presenting the discussion, the strategic relevance towards maritime industry and the managerial implication of this thesis. Finally, the conclusion and the further research direction are also suggested.

Chapter 6 Discussion and Concluding Remarks

This chapter summarizes the findings of this thesis. More specifically, this section contains the discussion and the strategic relevance of this research towards maritime sector, the managerial implications, the conclusions and finally the directions of further research.

Along with the fierce competition among business firms, environmental performance is expected to be an important driver in enhancing firms' competitiveness. Most of earlier researches in this field have adopted the revisionist perspective and concluded that the firm's environmental performance will positively affect its operational performance, economic performance and lead to higher level of competitiveness. However, the traditionalist perspective has argued that the attempts in accomplishing environmental performance might become burden to the firm as it requires high level of investment. In other words, in order to accomplish higher environmental performance business firms might need to have good operational performance, economic performance and internal green practices first.

Accordingly, the final objective in this thesis is to identify and examine the pre-requisites needed by the business firms in accomplishing environmental performance. There are three pre-requisites proposed namely: the operational performance (H1), the economic performance (H2) and the internal green practices (H3). The sector being analyzed in this study is the 3PL providers. Due to its vital role as an intermediary in facilitating a global trade, there has been a vast growth in this sector in terms of trade volume, cargo size and the number of fleets (Yang et al., 2013). This trend has critical consequences towards environmental impacts. In addition, in the era of globalization, firms from every part of the world will be involved in the international trade. The foreign trading partners, particularly from developed countries with high concern of environmental issues and high environmental requirements, often enforce their partners to have good environmental performances; otherwise the cooperation between them will not be made.

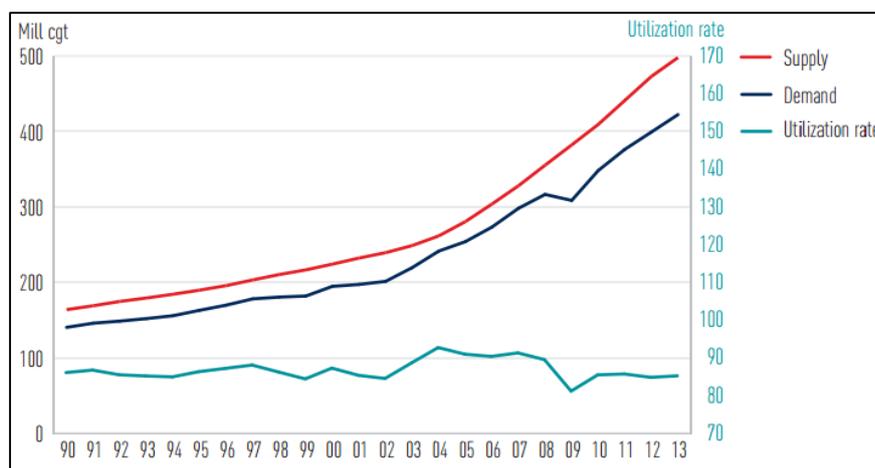
In many cases, most leading business firms from developed countries are not only assessing how the products and services being produced, but also how they are distributed, and delivered. In the case when the assessment result is not satisfying their requirements, other suppliers which are able to satisfy those requirements will be preferred. Therefore, international trade has become an important factor for business firms to improve their environmental performance (Christmann & Taylor, 2001). The above mentioned discussion also explains why accomplishing better environmental performance becomes

essential in this industry. Further, it is important to know what drivers which encourage the business firms in improving their environmental performance.

In analyzing the preconditions needed by the business firms to improve their environmental performance, particularly in the context of logistics providers and maritime sectors, the traditional perspective is more appropriate to be adopted. This is because the shipping and logistics sectors are still not fully recovered from the global financial crisis in 2008 and followed by European crisis afterwards. Despite the fact that the demand side of shipping industry is in the uptrend, the freight rates are still in the precarious level, due to the tonnages oversupply (see Fig 8). Most of the business firms in the industry are still struggling just to improve their cash flow and remain survive in the business.

With such a condition, improving environmental performance and manifesting green shipping will not be the priority for the companies for now. The rules and regulation regarding marine protection created by IMO or other governing institutions are not enough to minimize the environmental destruction within shipping industry significantly as long as there are no incentives that encourage the shipping firms to invest for improving their environmental performance (Wuisan, van Leeuwen, & van Koppen, 2012). However, when the shipping market is recovered with more stable freight, the shipping and logistics companies might start thinking to improve their environmental performance.

Fig 8. World merchant fleet supply, demand and utilization rate



Source: (Platou, 2014, p. 11)

With the datasets collected in Turkey, the ordinary least squares (OLS) was applied to test the hypotheses and assess the relationship among variables. The analysis has confirmed the proposed hypothesis and concluded that the firm's operational performance (H1), economic performance (H2) and internal green supply chain management practices

(H3) have positive significant association with the environmental performance. This conclusions is summarized in the Table 13.

Table 13. Conclusions

	Short description	β	<i>P</i>	Results
H1	Operational performance - environmental performance	0.512	0.000	Supported
H2	Economic performance - environmental performance	0.233	0.000	Supported
H3	Internal green practices - environmental performance	0.175	0.006	Supported

Based on this conclusion, it is suggested that the 3PL providers business firms need to advance their operational performance, economic performance and build a strong internal green practices in order to accomplish the environmental performance. Thus, operational performance, economic performance and internal green practices are the pre-conditions needed in accomplishing environmental performance. This finding is in line with the study by Walker et al. (2008) which reported high costs as the major barrier in improving environmental performance. Further, this finding is also supported by Xepapadeas and de Zeeuw (1999) who discovered that the attempt of accomplishing environmental performance will have a trade-off to the economic performance and competitiveness.

The findings of this study have a managerial implication. As environmental issues are on the rise, it is essential to analyze the pre-conditions needed by the business firms to be able to improve their environmental performance. Based on the findings, managers should focus more on achieving higher operational performance, economic performance and internal green supply chain management practices before aiming to achieve environmental performance. Without the existence of those three pre-requisites, a firm does not have an adequate financial strength to bear the costs of improving its environmental performance.

Finally, despite the fact that the objectives of this study have been accomplished and the hypotheses have been tested empirically, this study has some limitations that should be noted. First, the sample and dataset in this study is restricted to the 3PL providers and their clients in Turkey. To verify the finding of this study, in further research, the researcher can broaden the scope and include other sectors of business from other countries. Next, a cross-sectional approach was employed in conducting this research. In future research, a longitudinal approach can be applied so that the long term causal relationship between independent and dependent variables can be demonstrated more precisely.

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