



INTERNATIONAL  
HELLENIC  
UNIVERSITY

# **The importance of Green Logistics for the environmental and economic sustainability of the firms**

**Tsatalis Athanasios**

**SCHOOL OF ECONOMICS, BUSINESS ADMINISTRATION & LEGAL STUDIES**

A thesis submitted for the degree of  
***Master of Science (MSc) in Management***

December 2018  
Thessaloniki – Greece

Student Name:	Tsatalis Athanasios
SID:	1102160022
Supervisor:	Prof. Maria Argyropoulou

I hereby declare that the work submitted is mine and that where I have made use of another's work, I have attributed the source(s) according to the Regulations set in the Student's Handbook.

December 2018  
Thessaloniki - Greece

## **Abstract**

The past 50 years, Logistics has become a key factor of business productivity, efficiency and profitability, affecting all the important functions of the firms massively. Over the last years, increasing public and government concern about the environmental and social issues forced the companies to take action and minimize the impact that their logistics procedures have on the environment. Green logistics analyzes the environmental effects of the activities involved in the storage, handling and transport of products as they move through the supply chain.

The main goal of this research, named “The importance of Green Logistics for the environmental and economic sustainability of the firms”, is to present the detailed explanation of the green logistics concept and to track down the existing policies that the firms implement in order to comply with the public and government requirements for reduction of the environmental impact of their logistics operations. Furthermore, the research examines the best alternative and innovative policies that firms could establish to improve their environmental performance, enhance the link between green supply chains and CSR (Corporate Social Responsibility) and, as an outcome, improve their economic results.

As far as the empirical part of this research is concerned, we present some useful conclusions which were drawn by the analysis of the data collection through telephone interviews which were carried out with senior executives of Lidl Hellas and Metro Cash & Carry. There is a further research of these two real Greek firm cases which aims to track down the green Logistics philosophy of two of the most important Greek wholesale and retail firms and their employees’ perception about the relationship of green logistics and firm sustainability.

At this point, I would like to thank my supervisor, Dr. Maria Argyropoulou, for the valuable help that provided to me in order to successfully complete my work. I would also like to thank all the professors of the International Hellenic University who have shared with me knowledge and experiences which greatly helped me to develop myself professionally and personally. I would like to thank the manager of Msc in Management, Mrs Angeliki Chalkia, for the inestimable help that provided to me these two years. Furthermore, I want to thank the executives of Lidl Hellas and Metro Cash &

Carry, who were more than willing to cooperate with me by participating in the telephone interviews and providing me all the necessary information to complete my research. Finally, I would like to thank my family and all my friends that supported my effort.

Keywords: green logistics, corporate social responsibility, sustainable development, Lidl Hellas, Metro cash & Carry

Tsatalis Athanasios

31/12/2018

This dissertation was written as part of the MSc in Management at the International Hellenic University.

## Table of contents

Abstract.....	3
Table of figures and tables.....	6
Introduction .....	7
1. Logistics and Supply Chain .....	8
1.1 Review of the term Logistics .....	8
1.2 Scope and Elements of Logistics .....	9
2. Environmental Problems .....	11
3. The impact of Logistics on the Environment .....	12
3.1 Atmospheric Emissions .....	12
3.2 Carbon footprint .....	14
4. Green Logistics .....	14
4.1 Green Logistics Definition .....	14
4.2 Content of Green Logistics .....	15
4.2.1 Reverse Logistics .....	15
4.2.2 Green Product .....	16
4.2.3 Green Transport Modes.....	17
4.2.4 Development of greener vehicles, ships and aircrafts.....	18
4.2.5 Green Warehousing .....	18
5. Sustainable development and distribution .....	19
6. Corporate social responsibility (CSR) .....	20
7. Legislation and Environment standards .....	21
7.1 Mandatory standards.....	21
7.1.1 Euro 5 (September 2009) .....	22
7.1.2 Euro 6 (September 2014) .....	22
7.1.3 EU Sulphur Directive .....	22
7.2 Voluntarily/management standards.....	23
Environmental management standards (EMS) .....	23
7.3 Legislation in Greece .....	23
Recycling .....	23
8. Benefits of Green Logistics .....	24
9. Key factors for adopting Green Logistics .....	25
10. Overview of Lidl Hellas and Metro Cash & Carry.....	26
10.1 Lidl Hellas .....	26
10.2 Metro AEBE .....	27

10.3 Metro Cash & Carry.....	28
11. Empirical Research.....	29
11.1 Purpose and methodology of the research .....	29
11.2 Data collection .....	30
11.3 Analysis of results.....	31
11.3.1 Lidl Hellas .....	31
11.3.2 Metro Cash & Carry.....	33
11.3.3 Common views.....	34
12. Conclusions of Empirical Research .....	35
13. References .....	36
13.1 Bibliography .....	36
13.2 Web references.....	36
14. Appendix .....	40
Questionnaire.....	40

### **Table of figures and tables**

Table 1- 2018 LPI Rankings (Logistics Performance Indicator Rankings) .....	10
Figure 1- The procedure of calculating the carbon footprint .....	14
Figure 2- The concept of sustainable development .....	20

## **Introduction**

Nowadays, logistics and supply chain management are greatly affected by the sustainable policy challenge. Managers seek for innovative approaches in order to organize and coordinate the logistics processes so that they can pollute less. Companies have to redefine their environmental objectives and start implementing programs to reduce adverse impacts on the environment. This research intends to provide an overview of economic, technical and policy aspects of green logistics. The first 9 chapters of the research analyze the term of logistics, the term of green logistics and its benefits, the environmental problems that our planet is facing and the impact of the logistics procedures on the environment, the tight connection between Corporate Social Responsibility (CSR) and the sustainable development of the companies, as well as regulations and legislation that companies have to comply with. Chapter 10 presents an overview of Metro Cash & Carry and Lidl Hellas, while in chapters 11 and 12, with the valuable help of the respondents of the telephone interviews, there is an effort to find out about the main activities and practices the two companies implement in order to reduce their adverse environmental impact and what could be done differently in order to improve their sustainability. Chapter 13 includes the bibliographical references and the web sources which were used to carry out this dissertation and, finally, Chapter 14 contains the questionnaire that was used to guide the telephone interviews for the empirical research.

# 1. Logistics and Supply Chain

## 1.1 Review of the term Logistics

The word logistics is Greek and was first used by Leo VI the Wise, who was the Byzantine Emperor from 886 to 912, to describe the timely supply of the army with clothing, food weaponry and anything else they needed. Logistics nowadays is a term which has been globally used for many years to describe “the transport, storage and handling of products as they move from the raw material source, through the production system to their final point of consumption” (Sifniotis, 1997). The elements of logistics and supply chain have always been very important to the manufacturing, movement and storage of products, but it is only recently when they started to be recognized as vital functions of the businesses and the economic environment.

In the 1960s and 1970s managers of big corporations started to realize that there was a number of physical activities, such as handling, packaging, storage and transport of products which could be linked together and be managed more successfully. 1970s in particular was the decade when a major shift in the structure and of supply chain management occurred. There was a decrease in the number and power of manufacturers and suppliers, as well as a significant increase in that of the retailers. Moving on to 1980s, in this decade the majority of big enterprises conceive as high priority the improvement of their informational systems and the link with the supply chain management, in order to further upgrade their Logistics services (Rushton, Croucher, & Baker, 2010). The emergence of personal computers in the early 1980s provided much better access and a new graphical environment for planning to the supply chain managers. Logistics procedures continued to develop during 1990s by the introduction of Enterprise Resource Planning (ERP) systems. By 2000 most important organizations decided to install ERP systems and, as a result, this action provided to them much better access to the huge amount of data they needed. <sup>1</sup>

---

<sup>1</sup> <https://cerasis.com/2015/01/23/history-of-supply-chain-management/>

## 1.2 Scope and Elements of Logistics

The basic elements of Logistics, as well as the daily tasks logistics management has to carry through with are:

- Purchasing
- In bound transport
- Stock control
- Inventory Management
- Warehousing
- Outbound transport

Logistics is a principal function which supports the production and marketing systems of corporations. It intends to satisfy all the corporate goals by minimizing the costs. More specifically, logistics management strives to distribute the proper products, in the proper quantity, on the proper time, at the proper place, with the minimum cost. It is obvious that in order to be effective, logistics must satisfy two criteria. The first criterion is the quality of services that it offers and the second criterion is the low cost which accompanies the quality of services (Sifniotis, 1997). There are many quality elements of logistics and the main of them are the following:

- *Availability:* Availability refers to the capability of the logistics system to have always enough stock to satisfy the needs of production and those of the clients.
- *Capacity:* Capacity refers to the capability of the logistics system to deliver, in the determined time schedule the demanded quantity of products.
- *Consistency:* The third quality element is consistency, which is the capability of the logistics system to deliver constantly, in a daily basis to the users of the system the demanded products, in the proper condition, with the right notifications and without flaws, so that they receive the right products of excellent quality.

The worldwide trends indicate that the competition in the area of logistics will rise and all corporations have to adapt and upgrade all the functions which affect the performance of their logistics system. According to 2018 LPI Rankings (Logistics Performance Indicator Rankings), which is a tool created to aid the countries identify

the challenges they face in their performance on trade logistics and what actions they can implement in order to improve their performance. LPI measures the performance of the most significant elements of a country's logistics system, such as the international shipments, the timeliness and the quality of infrastructure. The LPI 2018 allows for comparisons across 160 countries and Greece's rank is 42. Germany is the country with the best logistics system performance. Table 1 shows the top 10 countries and Greece's position in LPI 2018<sup>2</sup>.

*Table 1: LPI 2018 (<https://lpi.worldbank.org/international/global>)*

<b>Country</b>	<b>Year</b>	<b>LPI Rank</b>	<b>LPI Score</b>
<b>Germany</b>	2018	1	4.20
<b>Sweden</b>	2018	2	4.05
<b>Belgium</b>	2018	3	4.04
<b>Austria</b>	2018	4	4.03
<b>Japan</b>	2018	5	4.03
<b>Netherlands</b>	2018	6	4.02
<b>Singapore</b>	2018	7	4.00
<b>Denmark</b>	2018	8	3.99
<b>United Kingdom</b>	2018	9	3.99
<b>Finland</b>	2018	10	3.97
<b>Greece</b>	2018	42	3.20

Although Greece remains a relatively weak country in the logistics sector, the functioning location of the warehouses, the upgraded access to the ports and the competitive prices of rentals create hopeful prospects for the reinforcement of the role of Greece as a global commerce center. According to a survey conducted by Greek Company of Logistics(GCL) on 2017, logistics sector is one of the most vital sectors of Greek economy, representing 10,85% of GDP (19,8 billion €)<sup>3</sup>. From 2009 and then, logistics sector in Greece shows growth of 4,5% per year. The significant decrease of consumption and industrial production redirected Greek constructors to assign the basic Logistics functions to external service providers (3PLPs), resulting in a significant market share increase for these companies. According to the same survey, on 2014 the

<sup>2</sup> <https://lpi.worldbank.org/international/global>

<sup>3</sup> [www.eel.gr](http://www.eel.gr)

financial turnover of the 163 biggest 3PLP companies in Greece reached 840 million €, while on 2013 the financial turnover of these companies was 814,63 million €. (3,1% increase)<sup>4</sup>.

## **2. Environmental Problems**

The function of every production system is defined to a large extent by its external environment, which consists of all the external factors that are affecting the production system. These external factors are economic, political, technological and social and are very hard to be controlled by a corporation. For this reason, they must be very seriously and carefully considered during the procedure of strategy formulation and the decision making of every corporation. During the last decades, another external factor of great importance, which is greatly affecting the production systems, has been added to the already existing external factors that corporations have to manage. This factor is the natural environment.

The natural environment is constantly changing. Globalization resulted in very important effects on the way people live, leading to faster easier and cheaper access to technological means, as well as improved communication. Globalization has played a massive role in bringing together people of different cultures and has greatly helped the improvement of the economic prosperity of the nations and the development of supply chain channels. However it has also resulted in the extensive disaster of the natural environment.<sup>5</sup> Globalization, combined with the population increase have resulted in a significant increase of the product consumption, which has affected the ecological cycle. Increased consumption has consequently resulted in an increase of the production of goods and constantly tests the resistance of the environment and the availability of natural resources. Globalization has also provoked a boom in transportation of goods and raw materials from place to place. During earlier time periods, people consumed food which was mainly produced in their place of residence, while nowadays they tend to consume products developed in foreign countries.

---

<sup>4</sup> <http://www.capital.gr/epixeiriseis/3250820/-sosibio-gia-tin-oikonomia-o-klados-ton-logistics>

<sup>5</sup> <https://www.environment.co.za/environmental-issues/globalization-and-its-impact-on-the-environment.html>

Furthermore, the amount of fuel that is consumed for the transportation of raw materials and final products has led to an increase in the air pollution levels, noise pollution levels and landscape intrusion. Aircrafts emit gases which have consequently caused depletion of the ozone layer and increased the greenhouse effect<sup>6</sup>. Oil spills and other chemical components that come of the cargo transport by lorries and ships, particularly tankers, contribute significantly to soil pollution, water pollution and huge disaster of the living organisms, not only in the event of accidents but also in their day-to-day operation.

Because of the globalization and industrialization, different kinds of chemicals have been thrown into the soil, caused the growth of a significant amount of noxious weeds and plants and provoked very serious damage to them by interfering in their genetic code. Despite plastic is among the most important toxic pollutants because it is non-biodegradable, it is extensively used by companies in order to package and preserve products that are intended for export. The significant use of plastic has caused widespread environmental pollution all over the planet during the last 30 years<sup>7</sup>.

### **3. The impact of Logistics on the Environment**

#### **3.1 Atmospheric Emissions**

Logistics is responsible for serious environmental problems, with the most important of them being air pollution, noise pollution, land take and accidents during transportation. The impact of logistics on climate change has attracted increasing attention because researchers have recently disclosed that global warming is a greater threat than people used to think during the previous years.

The emissions which are a result of freight transport depend on which type of fuel the vehicles use. Most of the times organizations prefer to use diesel-engine trucks and vans, while less movements of freight take place with the use of petrol-engine

---

<sup>6</sup> <https://www.conserve-energy-future.com/15-current-environmental-problems.php>

<sup>7</sup> <https://www.environment.co.za/environmental-issues/globalization-and-its-impact-on-the-environment.html>

vehicles. Diesel and petrol contain both hydrogen and carbon. If there was a perfect combustion, all the amount of hydrogen would be converted into water and all the amount of carbon into CO<sub>2</sub> (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015). However, the final result is an incomplete combustion which results in emissions like carbon monoxide, nitrogen oxides and hydrocarbons (Holmen & Niemeier, 2003). Carbon dioxide is a colorless gas emitted from fossil fuel combustion in power plants and cars. It is responsible for increasing the global average temperature because it "traps" the heat of the sun and is characterized as the main gas implicated in climate change. The United Nations Intergovernmental Panel on Climate Change lists 27 greenhouse gases which are placed into 6 categories in 1997 when the Kyoto Protocol was agreed (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015):

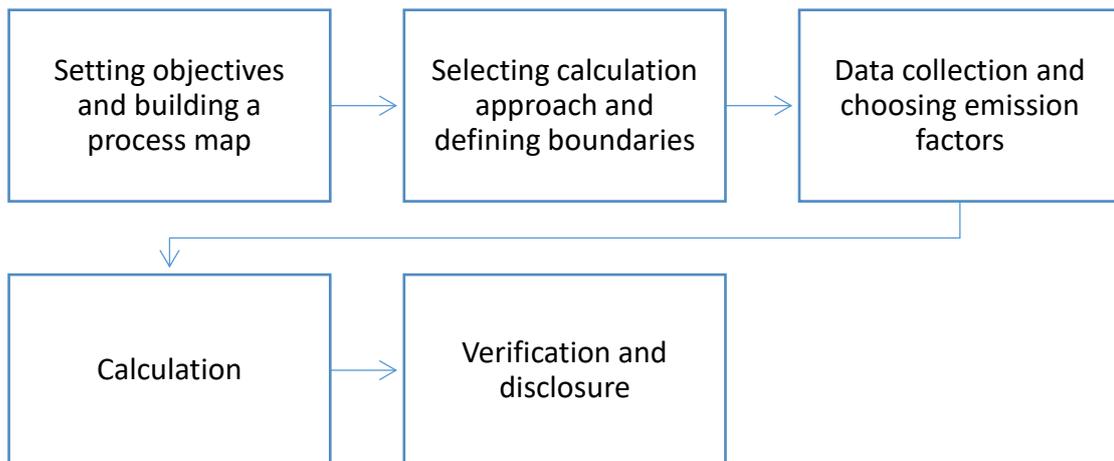
- carbon dioxide (CO<sub>2</sub>)
- perfluorocarbons (PFC)
- hydrofluorocarbons (HFC)
- nitrous oxides (NO<sub>x</sub>)
- Sulphur hexafluoride (SF<sub>6</sub>)
- Methane (MH<sub>4</sub>)

Smaller amounts of freight are moved in vehicles that are electrically powered and in freight trains. In this cases, the pollution arises at the point where the electricity is generated and the nature of that pollution depends on the source of energy used. These sources of energy are nuclear, fossil and renewable sources, like solar energy, biomass, hydro energy, wind energy and geothermal energy. In Scandinavian countries, where renewable sources of energy are mainly used, the amount of carbon is significantly lower than in other countries of the world that mainly use fossil energy (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015). Each means of transport has different emission levels and therefore different carbon footprint, which means that throughout the supply chain of a product from the supply stage and its production to its storage and distribution to the final consumer, it is achievable for every organization to choose a more environmentally friendly means for raw material and product transport, taking account of each case.

### 3.2 Carbon footprint

A common tool of measurement which enables a comparison of greenhouse gas emissions from different functions of the organizations is the carbon footprint. A carbon footprint is the total amount of carbon dioxide and other GHGs emitted from an entity. Carbon footprint reports are supported by several bodies in private and public sectors. Organizations carry out carbon footprint reports mainly in order to report GHG emissions internally and externally to a third party, such as consumers, regulatory bodies or supply chain partners. Furthermore, carbon footprint reports provide all the necessary information for better carbon management. The measurement of the carbon footprint of an entity can indicate opportunities for reducing it in the future, so it must be perceived as long-term project (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015). Figure 1 shows the procedure of calculating the carbon footprint.

Figure 1( (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015)



## 4. Green Logistics

### 4.1 Green Logistics Definition

Green logistics term describes all the efforts of the organizations worldwide to measure and minimize their adverse impact on the environment. The fruitful results of these efforts can help the organizations to be sustainable and have a balance of environmental and economic efficiency. American Reverse Logistics Executive Council (RLEC) conceives green logistics as the procedure of comprehending the ecological impact of the sector of Logistics. According to Wu and Dunn (1995), green logistics is

an environmentally responsible system which includes the implementation of the “forward” logistics procedures, such as the acquirement of raw material, production, packaging and distribution of goods and the reverse logistics procedures, such as receiving and packaging waste for reuse.

## **4.2 Content of Green Logistics**

### **4.2.1 Reverse Logistics**

Reverse logistics refers to actions related to the reuse of products and raw materials by companies. More specifically, it is the process of planning, implementing and controlling the efficient and cost effective flow of raw materials, in process inventory, finished goods and all the related information from the point of consumption to the point of origin in order to regain value or proper disposal<sup>8</sup>. Many companies stop measuring the success of their goods once the distribution of them to the consumers finishes on time. While this can be an accurate measurement of customer satisfaction and profit, it does not always account. In some incidents, the customers may receive an incomplete order or, especially when it comes to e-commerce, feel that the item they bought does not match the product description.

The functions included in the reverse logistics are in chronological order to collect, control, sort, store, reduce volume, process and rebuild. In other words, reverse logistics is the reverse flow of products flowing from production and storage points to final consumers, and which is now being made by consumers to business and warehouse. Reverse logistics also includes return of waste product and packaging for reuse, recycling and disposal. In many industrialized countries of Europe, responsibility for the products which have completed their life cycle has been transferred to the manufacturers of the products through environmental legislation. They are obliged to incorporate their industrial waste and their used products in the reverse supply chains. Companies using reverse logistics can achieve indirect and immediate profits. Indirect profits come from reducing costs. This is because there is no need to allocate funds to raw materials, spare parts and accessories and these funds remain in the company and can be spent elsewhere. Furthermore, direct profits come from direct sales of

---

<sup>8</sup> <https://cerasis.com/2014/02/19/what-is-reverse-logistics/>

products. Apart from the direct and indirect profits of businesses, the implementation of a reverse supply chain leads to benefits for the natural environment. Environmental management is constantly gaining interest and the ecological image of environmentally friendly product production has become an important marketing element that has prompted companies to discover options to recover and restore their products.<sup>9</sup>

#### 4.2.2 Green Product

A green product as the one that has reduced environmental impact than the traditional product equivalent. It is very difficult to find products which are 100% green, because the development of all products has some impact on the surrounding environment<sup>10</sup>. Green products and services have some specific characteristics<sup>11</sup>. They are:

- Biodegradable and easily reused either in part or as a whole.
- Made from recycled or reclaimed materials
- Easily reused or rebuilt
- Products with environmentally friendly packaging
- Obtained from local manufacturers or resources.

Green product design focuses on production processes that adopt environmentally friendly specifications. Manufacturers of products should adopt green production methods and take environmental factors into account when choosing raw materials. On the other hand, the retailer has to take into account not only the degree to which a product is green but also the environmental friendliness of its packaging in the procurement process. Consumers seek products that can allow them to maintain a life-style that is less harmful to the environment, as they become more aware of environmental issues. Therefore, the nature of products as people knew it the

---

<sup>9</sup> <https://www.newcastlesys.com/blog/the-importance-of-reverse-logistics-in-your-supply-chain>

<sup>10</sup> <http://www.isustainableearth.com/green-products/what-is-a-green-product>

<sup>11</sup> <https://caribbeanclimateblog.com/?s=green+product&submit>

previous years is about to change and become smaller, lighter and more durable so that they are able to consume fewer resources during the production process and use less space when they are disposed of. New technologies and emerging industries, should be able to offer products that have reduced environmental impact.<sup>12</sup>.

#### 4.2.3 Green Transport Modes

Rail and waterborne modes of transport cause fewer environmental problems than road haulage, as emissions from the two other ways of product transport are much less. Air has significantly greater emissions, so it is undesirable to encourage greater use of air freight for the years coming. For the years coming, greater use of electric traction may provide important environmental protection, especially if renewable sources can be used for the production of electricity, although moving in this path requires investment in additional railway electrification (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015).

There are some arguments that can encourage organizations which use freight transport to consider using environmentally friendlier transport modes (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015):

- Companies could reduce environmental impacts and generate cost savings, especially at times when oil prices are high, since they affect road haulage costs more than those for the rail and water modes.
- The use of rail and water network paths gives greater precision of transport time, arrival time at the destination and distribution time, as users of road network often face congestion problems.
- Companies could benefit from marketing their use of environmentally friendly modes of transport as part of their corporate social responsibility (CSR) strategy, something that could help them increase their profits.

---

<sup>12</sup> <https://www.encyclopedia.com/environment/encyclopedias-almanacs-transcripts-and-maps/green-products>

#### 4.2.4 Development of greener vehicles, ships and aircrafts

The rapid evolution of technology has given the opportunity for the manufacture of environmentally friendlier vehicles, aircrafts and ships. The use of higher capacity vehicles can reduce the amount of truck traffic on the roads, resulting in benefits for safety and the protection of the environment. Furthermore, the improvement of the aerodynamic profiling along with the maintenance of their capacity can additionally boost the efficiency of the vehicles. Vehicle manufacturers have been obliged by strict emission standards to redesign truck engines over the last years. (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015).

The rail is also gradually improving its knowledge of energy use, both diesel fuel and electricity. A huge goal of European Union is to maximize the use of electric traction and minimize freight carbon emissions by promoting the use of non-fossil fuel sources for electricity production. The transport of freight by air is has the most adverse environmental impact of all surface freight modes. IATA (International Air Transport Association), representing over 140 airlines worldwide, has set a target of capping CO<sub>2</sub> emissions from aviation (both passenger and freight) by 2020 and ensuring that further air traffic growth would be carbon neutral. This can be achieved by advances in engine and airframe technology, aircraft renewal, more efficient air traffic control and use of biofuels. International shipping owns a 2.5 % share of total global emissions, which is almost the same with that of the aviation (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015). Recent decreases in emissions have been achieved with the introduction of innovative and more effective ships and the adoption of fuel-efficient operational activities, such as reducing speed of vessels.

#### 4.2.5 Green Warehousing

A warehouse is the place in a company where products are stored for a long period of time. Nowadays, a warehouse is mainly associated with the movement, the provision of customizing and value-adding services and the proper fulfilment of customer orders (Baker & Canessa, 2009). Buildings account for a substantial proportion of global energy use, estimated at 32 % by the International Panel on Climate Change (IPCC,2014). Over the global economy, greenhouse gas emissions from buildings

exceed those from transport. As a result, while warehousing has important impact within a corporation it is not surprising that more management focus has been directed towards reducing transportation costs and emissions (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015).

Fuel oil or gas is usually the main primary source of energy for heating a company's warehouse, while electricity is the main source used for cooling. The amount of the energy consumed is depends on the temperature requirements that exist in order to maintain the stored products in the proper condition and by the background temperature of the internal space required for operatives to perform their work in comfort in relation to the location of the task being undertaken. Significant savings of energy use can be achieved with the use of time-controlled thermostats, close-fitting door locks, fast-acting doors and plastic strip barriers in places where forklift trucks usually move.

## **5. Sustainable development and distribution**

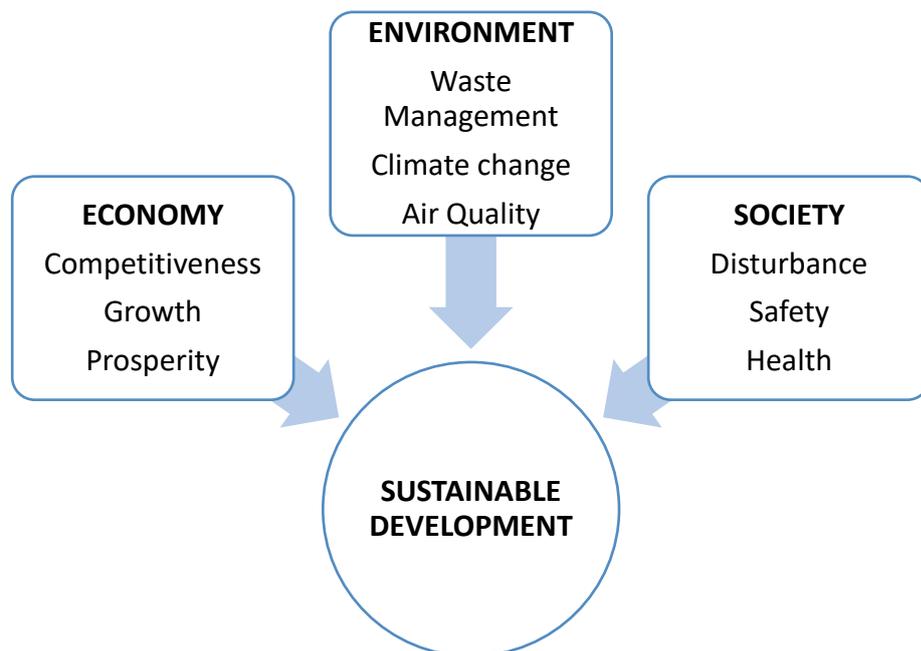
Sustainable development is usually referred to as the 'triple bottom line' in the corporate decision-making process ( *Figure 2*). This concept proposes that companies have to include ecological and social performance along with the corporate financial results in order to measure the company's overall performance effectively. (Elkington, 1998). Both human and ecological sustainability can help companies to achieve their long-term goals rather than concentrate on short-term goals, which is an element that can guarantee their business success and the survival of the environment. The responsibility for sustainable development is shared between regulatory agencies, national governments, local authorities, businesses, consumers and research and educational institutions.

According to the European Union Strategy for Sustainable Development, as adopted for the first time at the European Council in Goteborg in 2001 and as it is developed in subsequent related documents, sustainable development is a continuous process of change and adaptation rather than a static situation , to meet the needs of the present, but without diminishing the ability of future generations to meet their own needs through the balanced and equitable pursuit of all three pillars of sustainable

development: Economy - Environment - Society. This can be achieved through coexistence of economic development, environmental protection and social cohesion. However, this synergy and the three pillars of sustainable development is not and the main requirements for success are:

- Combined weights of many factors at different levels, often between sides with opposing interests
- A frank, substantiated and constructive dialogue and stakeholder consultation, involving the creation of frameworks and the establishment of rules within which interested parties can engage in conversation and dialogue.
- Coordinated actions involving and empowering all sides involved: State, corporations, non-governmental organizations and bodies that represent civil society in general.

Figure 2( (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015)



## 6. Corporate social responsibility (CSR)

Corporate social responsibility is the decision of companies to contribute to a better society and a safer and cleaner environment voluntarily. CSR includes the business actions guided by codes of conduct that surpass minimum standards which are related to environmental problems and problems of the society. CSR and Sustainable

development are two closely related concepts, so they have the same key elements. Companies have to include economic, environmental and social considerations in the process of decision making if they want to be considered as socially responsible (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015).

- Economic responsibility concerns not only economic growth and shareholders' profits. Other important aspects include how the money is earned and divided between parties involved in a deal. Examples of economical responsibilities are fair pricing and purchasing policies and actions and policies against bribery and corruption.
- Social responsibility refers to the treatment of the people within and outside the organizations. Companies can demonstrate social responsibility by actions such as the use of core labor standards set by the International Labor Organization, the respect of human rights and the assurance of the decent working and living conditions for employees (labor rights, freedom of association, maximum working hours, fair treatment).
- Environmental responsibility focuses on how the business activities affect the planet. Precautionary approaches to prevent the adverse impact on the environment and development of environmentally friendly technologies are some examples of environmentally friendly practices.

## **7. Legislation and Environment standards**

One of the major tasks of each nation's government is to protect the environment. The role of the government is to act as a regulator and set various rules and laws, such as exhaust emission regulations, noise control and recycling requirements at both local and international level. Governments in the United States and Europe have also set stringent standards for reducing raw material sources, reusing materials and recycling waste.

### **7.1 Mandatory standards**

Since 1990, emissions from vehicles with diesel engines which are used for the product transportation have been tightly controlled by the legislation of European Union. The environmental performance of these vehicles has been measured by specific

environmental standards, named EURO emission standards. These strict standards mainly exist in order to manage the emissions of nitrogen oxides of the vehicles. The most recent EURO emission standards are the following<sup>13</sup>:

#### 7.1.1 Euro 5 (September 2009)

Euro 5 tightened the limits on particulate emissions from diesel engines so that vehicles needed specific filters to be in line with the requirements. Euro 5 imposed also 28% reduction of Nitrogen Oxides (NOx) limits compared with the previous Euro 4 as well as a specific limit for petrol engines. With regard to small trucks and light commercial vehicles intended for the carriage of goods, the Regulation includes three categories of emission limit values according to the reference mass of the vehicle: under 1.305 kg, from 1.305 kg to 1.760 kg, over 1.760 kg.

#### 7.1.2 Euro 6 (September 2014)

For all vehicles equipped with a diesel engine the entry of Euro 6 imposes the obligation to reduce significantly the emissions of nitrogen oxides. For example, emissions from passenger cars and other vehicles intended for transport is subject to a maximum limit of 80 mg / km, which is an additional reduction of more than 50% compared to the Euro 5 standard). The combined emissions of hydrocarbons and oxides of nitrogen from diesel vehicles will also be reduced in order to set specific maximum limits. Euro 5 and Euro 6 also establish specific procedures, tests and requirements regarding exhaust pipe emissions, including test cycles, low ambient temperature emissions and vacuum engine emissions.

#### 7.1.3 EU Sulphur Directive

The Sulphur Content of Liquid Fuels Directive (2016/802/EU) regulates Sulphur emissions from ships by imposing limits in the maximum Sulphur content in marine fuel. This directive's main task is to minimize the emissions of Sulphur dioxide coming from the combustion of liquid fuels and reduce the harmful effects of the emissions on

---

<sup>13</sup> <https://www.theaa.com/driving-advice/fuels-environment/euro-emissions-standards>

the environment. The Directive is a codification of Council Directive 1999/32/EC, which has been substantially amended several times since then<sup>14</sup>.

## **7.2 Voluntarily/management standards**

Environmental management standards (EMS)

The institute of Environmental Management and Assessment defines an EMS as a “structured framework for managing an organization’s significant impact on the environment”. Recognition of EMS can be achieved through certification to one or more of the main standards available. The most important standards are the Eco-Management and Audit Scheme (EMAS) and the ISO 14001. (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015)

EMAS is a voluntary standard introduced by the European Union and applied to all European countries. Participating organizations have to make a public environmental statement, which is checked by an organization that operates as a verifier and reports the environmentally friendly performance of the companies (Mc Kinnon, Browne, Piecyk, & Whiteing, 2015). ISO 14000 is a series of voluntary standards and guideline references for organizations that have the goal to limit their impact on the environment. The objective of ISO 14001, which is the main standard of the series is to establish control mechanisms and continually improve the environmental impact of the operation of an industrial plant while being designed to be compatible with the ISO 9000 series standards. Through a systematic approach an organization recognizes the impact of its activities on the environment and sets objectives, targets and programs to monitor and mitigate these impacts. <sup>15</sup>.

## **7.3 Legislation in Greece**

Recycling

Modern practices for the management of municipal solid waste dictates the exploitation of useful materials such as glass, paper, aluminum, plastic, wood and

---

<sup>14</sup> <https://rod.eionet.europa.eu/instruments/663>

<sup>15</sup> <https://www.iso.org/iso-50001-energy-management.html>

metal either by re-use or by recycling and using them in new applications, saving huge quantities of raw materials and energy. Law 2939/2001 on Packaging and Alternative Management of Packaging and Other Products, as well as the relevant executive Presidential Decrees and Joint Ministerial Decisions on Alternative Management of Other Products (used tires, end of life vehicles, , waste batteries and accumulators, excavation, construction and demolition waste, lubricating oil waste) introduce "extended producer responsibility" with mandatory participation of managers and producers of the relevant products in "Alternative Management Systems". Furthermore, with the implementation of Law 4042/2012, a new strategy for waste management is defined. The main objective is to establish national standards for the setting of terms and conditions for alternative management, quantitative targets, the prohibition or restriction of the use of certain materials and the imposition of necessary legislative measures and investment programs for the protection of the environment <sup>16</sup>.

## **8. Benefits of Green Logistics**

Although transforming their logistics operations to green logistics operations may be costly in the beginning for the companies, the benefits of such an investment can be much more. The adoption of green logistics activities, such as the ecological way of driving the corporations' vehicles can greatly reduce the fuel consumption and, therefore, the economic costs of the organizations and the environmental costs of the planet. The implementation of an effective reverse logistics system is another example of a green activity that can directly help the organizations to reduce environmental and economic costs by reusing waste that otherwise would be useless after the consumption of the materials and final products.

The public concern for the environment is constantly increasing, and that is another incentive for the organizations to adopt green activities. The provision of green products and services to the public can help the organizations to create a likable and responsible image and, as a result, gain the trust of the consumers. Actions like the

---

<sup>16</sup> <http://www.ypeka.gr/Default.aspx?tabid=239>

development of carbon footprint reports enable the consumers to check the procedure of the production and distribution of the products, as well as the implications of these procedure and the to the environment. Companies which are sensitive to environmental issues make customers feel that they are trustworthy organizations. The competition between the same sector organizations is intense, so corporations that produce very similar products and distribute them in the same price can acquire an indispensable competitive advantage by adopting green operations.<sup>17</sup>

In addition to the increasing public concern for the environment, the government concern about environmental matters is also increasing. Local, national and global government bodies demand from the organizations to adopt specific production, warehousing and distribution standards. Organizations have to comply with the rules that the government bodies impose, because otherwise they could pay high fines or their production activities could be restricted. There are also tax credits that companies can exploit if they make efforts, such as reducing the vehicle emissions and using of renewable sources of energy to improve the adverse impact of their logistics activities<sup>18</sup>.

## **9. Key factors for adopting Green Logistics**

Organizations nowadays can benefit by developing environmentally friendly and more sustainable logistics activities. The implementation of green supply chain management can help the organizations to reduce the legal, financial, and reputational risks to which most supply chains are exposed. Consumers expect companies to ensure that they are making their best efforts to responsibly source and produce their products. The most crucial steps that every organization has to follow in order to adopt Green logistics are the following<sup>19</sup>:

---

<sup>17</sup> <https://smallbusiness.chron.com/benefits-going-green-business-3225.html>

<sup>18</sup> <https://www.entrepreneur.com/article/276978>

<sup>19</sup> <https://www.inboundlogistics.com/cms/article/19-steps-for-creating-a-lean-and-sustainable-supply-chain/>

- Organizational encouragement by the leadership of the company is a very important factor for adopting green logistics activities. The top management has to infuse the rest employees with environmentally friendly perception and persuade them for the advantages of implementing green policies throughout the company, while the firms have to provide all the needed organizational support, such as extra resources and training.
- Exploitation of the relative benefits of new technologies and innovations. Top management has to comprehend if the technological factors are well suited to a firm's needs and decide whether green technology and practices are well suited to the functions of the logistics department or not.
- Governmental support is the last factor that can greatly affect the adoption of green logistics in an organization. Government bodies have the ability to fund and even support with promotional activities companies that have the intention to handle, warehouse and distribute their products by using environmentally friendly practices.

## **10. Overview of Lidl Hellas and Metro Cash & Carry**

### **10.1 Lidl Hellas**

Lidl Hellas started its operations in Greece for the first time in 1999 with a shop in Sindos, Thessaloniki, under the name Lidl Hellas & Co. In Cyprus, the company has been operating since 2010. Today it is the fourth largest supermarket chain in Greece, retail sector, followed by the three largest Sklavenitis, AB Vasilopoulos and Masoutis. Within less than 20 years it counts 221 stores and 5 distribution centers across Greece, employing over 5,466 associates. By the end of the current year its network will have been boosted by two more stores, one in Thessaloniki and one in Larissa, bringing the total number of stores out of 221 currently in 223. The company's total contribution to state revenue reached 264 million €, while its contribution to the country's GDP was estimated at 679 million € in 2017 from 59 million € in the first years of its presence in Greece<sup>20</sup>. Lidl was awarded as the Top Greece employer for two consecutive years

---

<sup>20</sup> <http://www.kathimerini.gr/996615/article/oikonomia/epixeirhseis/ependyseis-yyoys-100-120-ekat-sxediazeti-h-lidl-ellas-gia-to-2019>

(2017, 2018) by the independent Amsterdam-based "Top Employers" Institute, which annually certifies the world's top global employers who are dedicated to supporting their employees and the development opportunities they offer<sup>21</sup>.

From 2016 until now, Lidl is running in Greece an investment plan worth more than 100 million € to develop its network of stores, expand its warehouses and modernize its existing stores. At the same time, it launched its new generation of stores, a more attractive and modern architecture, that gives consumers a pleasant, comfortable and upgraded shopping experience. According to Ioannis Karanatsios, who is the Purchasing Manager of the company, "we have a different approach from the rest of the market. We have the most competitive prices and this is our core business principle. At these already low prices, we continue to offer products in great promotions, promotions of branded and private label products, and about 500 codes for less than 1 euro"<sup>22</sup>.

In the current year, Lidl Hellas, which is the only hard discounter in the sector of organized food retail in Greece, is investing 85-100 million €. For the 2020-2021 period, the company plans to set up two more branches, while in the long run the goal is to reach 300 stores. As far as the Lidl Hellas product portfolio is concerned, the target of the company in 2019 is to include 250 new codes, of which 50% will be Greek products and 30% cooler products. Today, the company works with 2,893 Greek suppliers, with the relevant codes being 2,300. The top management of the company seeks the use of local products when possible and they manage this through the cooperation with local producers and suppliers.

## **10.2 Metro AEBE**

METRO AEBE is a 100% Greek company that first developed in 1976 the institution of cash & carry stores in the country, adapting it from time to time to the needs of the market. The company's turnover comes from two main categories of sales, wholesale sales through the chain METRO Cash & Carry and retail sales through the chain My

---

<sup>21</sup> <https://www.lidl-hellas.gr/el/H-Lidl-Hellas-Top-Employer-gia-deyterh-synexomenh-xronia.htm>

<sup>22</sup> <http://www.kathimerini.gr/951902/article/proswpa/synentey3eis/ependyseis-80-ekat-sthn-ellada-apo-th-lidl>

Market. In 2016, METRO AEBE acquired sole control over the business activities of the big company Veropoulos, thus significantly increasing its retail network and spreading strategically throughout Greece. In 2017, the group attributed to the Greek state taxes and contributions amounting to 52.1 million €. It employs 10,526 employees, while at the end of 2015, the corresponding figure was 4,543<sup>23</sup>.

### **10.3 Metro Cash & Carry**

The long experience in wholesale, organizational structure and respect for the needs of the professional, coupled with the deep desire for impeccable service, have been some of the points of reference that helped the company to succeed and stay firmly the first and greatest network in Greece. As a pure Greek business, Metro cash & Carry supports Greek entrepreneurship, with a special focus on small Greek producers from all over the country, thus stimulating local communities.

METRO Cash & Carry, with 49 sales stores, is the chain with the largest wholesale network in the country and owns the largest share of sales in the industry. In 2019, the first Metro Cash & Carry store will be completed in Limassol, Cyprus. One more store is about to operate the same year in Zakynthos, while it is estimated that over time there will be ground for the development of ten small Cash & Carry stores. The company aims to build relationships with professionals from both the reseller (mini market, haberdashery, grocery) and manufacturing (taverns, restaurants, pizzerias, hotels) sectors. METRO Cash & Carry is housed in areas of 2,000 m<sup>2</sup> up to 3,500 m<sup>2</sup> and is located in key places, within the city or at its borders, with convenient parking, thus ensuring convenient access even to those who are in a 50-80 km radius. The product mix offered by METRO Cash & Carry is enriched and constantly redesigned to meet the needs of the professionals, with more than 20,000 choices in items available<sup>24</sup>.

In 2014, the total amount of METRO AEBE investments was approximately 12 million €, while 3 years later during the year 2017, METRO AEBE totally invested the amount of

---

<sup>23</sup> <http://www.fortunegreece.com/article/metro-aeve-ependisis-ipsous-40-50-ekat-evro-etisios-gia-ta-epomena-chronia/>

<sup>24</sup> <http://www.kathimerini.gr/948861/article/oikonomia/epixeirhseis/ependytiko-programma-50-ekat-apo-metro-to-2018>

47 million € for the operations of the Metro Cash & Carry and My Market. The total turnover of METRO AEBE in 2014 was approximately 700,000 €, increasing to 1.170 million € in 2017, while the gross profit of the company more than doubled from 2014 to 2017, being approximately 144 million € in 2014 and 298 million € in 2017<sup>25</sup>.

Although METRO AEBE invests substantial capital annually for its organization and expansion (most of its new branches are privately owned), reinvesting its high profits allows the company not to resort to bank lending, while its suppliers' payment days are among the fewer in the industry.

## **11. Empirical Research**

### **11.1 Purpose and methodology of the research**

In view of the above, we can conclude that Lidl Hellas and Metro Cash & Carry develop their operations rapidly and are both leaders in their sectors. These two companies deliver their products through an extensive distribution network and participate in fully organized supply chains, thus it will be very useful to explore the ways that the two companies are applying environmentally friendly transport, storage and production processes as well as their policies on recycling, energy saving and resource handling. Furthermore, it is also important to seek the companies' core activities to protect the environment through the functions of a green supply chain, part of which are the suppliers, the customers and the co-operating distributors of their products.

Qualitative method of research is the one that is used in this dissertation. Apart from the detailed analysis, the qualitative methods of research record the participant's "voice" and expressions. Consequently, qualitative research is more exploratory in nature and provides insight into how individuals understand specific aspects of their reality<sup>26</sup>. In this research, it is of utmost importance to understand and deepen the experience described by the participants as through this process we can explore the philosophy and their way of thinking on issues related to green logistics and corporate social responsibility.

---

<sup>25</sup> <https://www.metrocashandcarry.gr/Alisida/Oikonomika-stoixeia>

<sup>26</sup> <https://www.statisticssolutions.com/qualitative-research-approach/>

The purpose of this research is to investigate the implementation of environmentally friendly logistics practices, the way these practices are linked to a company's Corporate Social Responsibility and how companies can achieve the establishment of a green supply chain. It is essential to understand the perceptions of employees and, more importantly, of senior executives as they should provide incentives not only to employees but also to their partners for adopting green practices and creating a green supply chain. For these reasons, the qualitative is the method that will be used to carry out this research, and more specifically the case study of Lidl and Metro Cash & Carry.

### **11.2 Data collection**

The initial plan for the data collection was to be carried out by interviewing two senior executives of Metro Cash & Carry and two senior executives of Lidl Hellas in their workplace. Eventually, this plan was reconsidered and the data collection was carried out by interviewing two senior executives of Metro Cash & Carry, as well as a former and a current senior executive of Lidl Hellas via telephone and with the aid of a questionnaire which was used to guide the telephone interview. The reconsideration of the data collection method and the selection of the interview respondents of Lidl Hellas occurred for reasons of difficulties in transportation and meeting the selected respondents in person and for reasons of difficulties to get in touch with two senior executives that are currently working in Lidl Hellas respectively.

Although telephone interviews do not have the endorsement enjoyed by face to face interviews, they allow respondents to disclose sensitive information more freely<sup>27</sup>. The questionnaires were initially sent by e-mail to selected senior executives and employees of the companies, so that they could prepare for the subsequent telephone interview. The questionnaires used to aid the data collection of this research consist of open-ended questions. Open-ended questions are constructed without a predetermined set of responses, which is a characteristic that enables respondents to include more useful information in the answers, like feelings, attitudes and their perception on the subject<sup>28</sup>. The questionnaires which guided the telephone

---

<sup>27</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3238794/>

<sup>28</sup> <https://research-methodology.net/research-methods/survey-method/questionnaires-2/>

interviews are exactly the same for the two companies. There are 21 same questions that have to do with subjects such as the use of renewable sources of energy, the practices of the companies to reduce GHG emissions, the ways they handle the waste, the connection between the economic sustainability of the companies and the CSR activities and the initiatives given from government bodies to the companies and from the companies to the employees to adopt environmentally friendly perceptions and ways of operating.

### **11.3 Analysis of results**

#### **11.3.1 Lidl Hellas**

The telephone interviews were carried out by getting in touch via telephone with Panagiotis Tsooumpas, who was working as Buying Manager during the period 2013-2017 at the Head Offices of Lidl Hellas in Sindos, and Pantelis Gioulekas who is currently working as a Logistics Manager at the Head Offices of Lidl Hellas in Sindos. They were more than happy and willing to share very useful information about the logistics procedures and the activities of the company to make all the operational procedures environmentally friendlier and enhance the Corporate Social Responsibility.

Initially, the company is certified to the ISO 50001 Standard and this is an indication that the energy consumption inside the company is responsible and continuously improved. Solar panels are used to heat water and air-conditioning with integrated heat recovery system is used to further decrease the demand of energy. Furthermore, Building Management Systems regulate the operation of all lights of the stores and motion sensors are used to conserve energy, while recently the company replaced the R22 refrigerant with a more environmentally friendly R134A refrigerant. The refrigeration units of warehouses and stores are constantly controlled to ensure their environmentally friendly operation and the conservation of energy.

As far as the logistics activities are concerned, the company implements a just-in-time model that helps to minimize the stock of warehouse in the organization. The delivery structure allows Lidl Hellas to provide freshness of its products and allows the company to organize transportation efficiently and in an environmentally friendly manner. The logistics senior executives measure logistical data for store deliveries in

order to make sure that organization of the pallets which are used for distribution is cost effective. Delivery vehicles back-haul materials to the distribution centers so that they can be recycled. All the logistics activities are organized for the best possible vehicle utilization and reduced fuel consumption. The company does not own the vehicles (mainly trucks) that are used for the distribution of the products. These vehicles belong to Third Party Logistics Providers (3PLP'S) and most of the times have diesel engines.

Top management along with the senior executives are making serious efforts to develop effective ways of managing the waste streams in order to increase the recycling and reduce the overall waste. Large amounts of wood, plastic, cardboard and metal are already being recycled. A key future target of the company is to start creating energy from the organic waste.

Lidl removed the plastic bag from all its stores. The company replaced this bag with a new one, made up of 80% recycled material, 100% recyclable and in which 10kg products can be placed. It is more durable than conventional plastic disposable bags and can be used multiple times. By the end of 2019, the company will stop selling disposable plastic items such as disposable straws, disposable glasses and cutlery, as well as cotton sticks with a plastic strap in the 221 stores across Greece. Their position will take products from alternative and recyclable materials, for which the company already cooperates with its suppliers.

Consumers are able to recycle empty metal, plastic and glass packaging to, in 8 fixed recycling centers installed outside selected Lidl stores. For every aluminum packaging and for every three plastic or glass packaging, the company's partner named "Corporate Recycling" offers 0.01 €, in vouchers to the customers. There is a choice of redeeming the amount in Lidl stores or an automatic donation of the money in favor of the NGO "Mission". Furthermore, the company sponsors the first environmental education and recycling park in Athens. This is an innovative initiative as it is the first and only equivalent park in Greece and in Europe, which is fully in line with both the National Waste Management Plan of Greece and the European Commission's priorities for packaging recycling.

### 11.3.2 Metro Cash & Carry

The telephone interviews were carried out by getting in touch via telephone with Tsavdaridis Nikos, who is currently working as a General Store Manager at the Metro Cash & Carry store of Pylaia, and Zafiris Malakozis, who is currently working as a Cash Desk Manager at the Metro Cash & Carry store of Pylaia. The two senior executives of the company were really cooperative and shared all their knowledge about the practices that Metro Cash & Carry implements in order to protect the environment and reduce the impact of the company's operations on it.

Metro Cash & Carry has invested serious amount of money during the recent years with the aim of saving energy and, thus operating in an environmentally friendlier way. The company has established innovative technologies, such as photovoltaic systems for solar energy production, energy saving lamps, motion sensor lighting refrigerators with doors made of glass and skylights with reflective glass panes in order to reduce the buildings' energy consumption. The control of all electromechanical systems is carried out by the Building Management System (BMS) which controls the temperature, carbon dioxide levels and moisture levels inside the buildings. The company also uses recycled materials such as metallic elements and recycled wood that dominate the exterior surfaces of its buildings.

Metro Cash & Carry reduces carbon dioxide emissions through its centralized product transportation system. The process of ordering to the suppliers and delivering the whole of the products to the central warehouse has the effect of minimizing truck itineraries and reducing fuel consumption ,carbon dioxide emissions, noise pollution and traffic congestion.

As far as the waste management is concerned, the company cooperates with external partners to handle the waste of the stores and central warehouses, such as plastic packaging materials, liquid waste, as well as wooden and glass packaging. The company has also installed in the central warehouse in Inofyta special compaction machines for non-recyclable waste and presses for plastic packaging materials. All the materials of which the computer equipment is made (PC, modem, screens) are 100% recyclable.

Metro Cash & Carry implements an eco-action program named “I act”, which aims to raise awareness and encourage all the company's customers to participate in everyday actions of responsibility. Examples of such actions are batteries and electrical appliances recycling, recycling lamps and cooking oil recycling, use of the reusable bag and reduction the use of plastic bag use. As a counterpart, the company offers a system of customers’ moral reward that aims to raise money for environmental and social responsibility events organized by the company.

### 11.3.3 Common views

Both senior executives of Metro Cash & Carry and Lidl Hellas point out that the main reasons behind the difficulty of creating a green supply chain are three. The first is the high cost of investing in new environmentally friendly systems and vehicles, as well as the high cost of training programs. The second reason is the lack of environmental education of entrepreneurs, executives and employees and the third reason is the lack of Greek government support, which does not give the right incentives to the companies that operate in the country in order to adopt environmentally friendly practices. According to all of the respondents, Greek government could, at least, fund the purchase of environmentally friendly vehicles for companies which have proved in practice that put effort on reducing their impact on the environment.

An important weapon for the adoption of green logistics practices can be the intense training and the implementation of educational programs about the protection of the environment and the benefits it can bring for both the staff and the all the stakeholders of the companies. The senior executives and employees of Metro Cash & Carry and Lidl Hellas have positive opinion about environmental information programs and environmentally friendly logistics practices, and top management of the companies has to contribute in this direction through its incentives and educational actions.

## **12. Conclusions of Empirical Research**

Green Supply Chain Management (GSCM) and green logistics are an important sub-category of Corporate Social Responsibility (CSR). Corporate culture and ethics are the two factors that mainly influence the incorporation of green practices into corporate CSR (Golinska, 2014). Lidl Hellas and Metro Cash & Carry are both aware of environmental issues and their senior executives are distinguished for their strong will to adopt environmentally friendly practices. The top management along with the senior executives and the lower level employees of the companies have started to understand that the activities of their organizations, as well as those of their suppliers, affect negatively the natural environment and the opinion of the society as a whole. Thus, the two companies have introduced in their processes innovative systems that help them reduce and control energy consumption as well as effectively manage their waste.

Metro Cash & Carry also implement actions to raise awareness of society as a whole, thus enhancing its CSR. Furthermore, they both have adopted green logistics practices because the perception that prevails between the different management stages is that the companies can gain important economic benefits by reducing costs, improving their corporate profile reducing environmental impact of their operations and simultaneously providing high quality products to the consumers. Both companies have adopted green production methods, they recycle the packaging of their products and try to apply environmentally friendly practices both in transport and storage. The financial assistance of the Greek government, as well as the provision of training and educational incentives from the top management of the companies to employees and executives of all levels can be valuable and greatly help the efforts of Metro Cash and Carry and Lidl Hellas.

## 13. References

### 13.1 Bibliography

- Baker, P., & Canessa, M. (2009). *Warehouse design: A structured approach*.
- Blumberg, D. (2005). *Introduction to Management of Reverse Logistics and Closed Loop Supply Chain Processes*.
- Christopher, M. (2011). *Logistics & Supply Chain Management* (4th Edition ed.). Pearson Education Limited.
- Elkington, J. (1998). *Cannibals with Forks: The Triple Bottom Line of 21st Century Business*.
- Golinska, P. (2014). *Logistics Operations, Supply Chain Management and Sustainability*. Springer International Publishing.
- Holmen, B., & Niemeier, D. (2003). *Air Quality*.
- Mc Kinnon, A., Browne, M., Piecyk, M., & Whiteing, A. (2015). *Green Logistics: Improving the environmental sustainability of logistics* (3rd Edition ed.). Kogan Page Limited.
- Rushton, A., Croucher, P., & Baker, P. (2010). *The Handbook of Logistics & Distribution Management* (4th Edition ed.). Kogan Page Limited.
- Sifniotis, K. (1997). *Logistics Management*. Papazisi Publications.
- Wu, H.-J., & Dunn, S. (1995). *Environmentally responsible logistics systems*.

### 13.2 Web references

- 1 Robinson, A., (2015), The Evolution and History of Supply Chain Management. *Cerasis<sup>tm</sup>*.  
Retrieved from: <https://cerasis.com/2015/01/23/history-of-supply-chain-management/>
- 2 (2018), LPI Global rankings 2018. *The world bank*.  
Retrieved from: <https://lpi.worldbank.org/international/global>
- 3 (2014), Η ΜΕΓΑΛΥΤΕΡΗ ΕΡΕΥΝΑ ΓΙΑ ΤΟΝ ΚΛΑΔΟ ΤΗΣ ΕΛΛΗΝΙΚΗΣ ΕΦΟΔΙΑΣΤΙΚΗΣ ΑΛΥΣΙΔΑΣ. EEL. Retrieved from: <http://www.eel.gr/η-μεγαλυτερη-ερευνα-για-τον-κλαδο-της-ελληνικης-εφοδιαστικης-αλυσιδα>

4 Delevegkos, D., (2017), "Σωσίβιο" για την Οικονομία ο κλάδος των logistics. *Capital.gr*.

Retrieved from: <http://www.capital.gr/epixeiriseis/3250820/-sosibio-gia-tin-oikonomia-o-klados-ton-logistics>

5 (2013), Globalization and Its Impact on the Environment. *Environment.co.za*.

Retrieved from: <https://www.environment.co.za/environmental-issues/globalization-and-its-impact-on-the-environment.html>

6 Rinkesh, 15 Current Environmental Problems. *Conserve Energy Future*. Retrieved from: <https://www.conserve-energy-future.com/15-current-environmental-problems.php>

7 Robinson, A., (2014), What is reverse logistics. *Cerasis<sup>tm</sup>*.

Retrieved from: <https://cerasis.com/2014/02/19/what-is-reverse-logistics/>

8 (2017), The Importance of Reverse Logistics in Your Supply Chain. *Newcastlesys*.

Retrieved from: <https://www.newcastlesys.com/blog/the-importance-of-reverse-logistics-in-your-supply-chain>

9 (2011), What is a Green Product. *iSustainableEarth*.

Retrieved from: <http://www.isustainableearth.com/green-products/what-is-a-green-product>

10 Marcus, A., Green Products. *Encyclopedia*.

Retrieved from: <https://www.encyclopedia.com/environment/encyclopedias-almanacs-transcripts-and-maps/green-products>

11 (2017), Limits to improve air quality and health. *Theaa*.

Retrieved from: <https://www.theaa.com/driving-advice/fuels-environment/euro-emissions-standards>

12 (2018), Legislative instrument details: Sulphur Content of Certain Liquid Fuels Directive. *Eionet*. Retrieved from: <https://rod.eionet.europa.eu/instruments/663>

- 13 (2018), ISO 50001 - Energy management. *ISO*. Retrieved from:  
<https://www.iso.org/iso-50001-energy-management.html>
- 14 ANAKYKΛΩΣΗ. *Ypeka*. Retrieved from:  
<http://www.ypeka.gr/Default.aspx?tabid=239>
- 15 Lamarco, N., (2018), What Are the Benefits of Going Green for a Business. *Chron*.  
Retrieved from: <https://smallbusiness.chron.com/benefits-going-green-business-3225.html>
- 16 Kulkarni, C., (2016), 9 Easy Ways Companies Can Save Money By Going Green.  
*Entrepreneur India*: Retrieved from: <https://www.entrepreneur.com/article/276978>
- 17 Kroll, K., (2017), 19 Steps to Creating a Lean and Green Supply Chain.  
*Inboundlogistics*.  
Retrieved from: <https://www.inboundlogistics.com/cms/article/19-steps-for-creating-a-lean-and-sustainable-supply-chain/>
- 18 Long, T., (2013), Driving Green Practice Adoption in the Logistics & Transportation Industry. *Supplychain247*. Retrieved from:  
<https://www.supplychain247.com/article/driving-green-practice-adoption-in-the-logistics-industry>
- 19 (2018), Επενδύσεις ύψους 100-120 εκατ. σχεδιάζει η Lidl Ελλάς για το 2019.  
*Kathimerini*.  
Retrieved from:  
<http://www.kathimerini.gr/996615/article/oikonomia/epixeirhseis/ependyseis-vyoys-100-120-ekat-sxediazai-h-lidl-ellas-gia-to-2019>
- 20 (2018), Η Lidl Ελλάς Top Employer για δεύτερη συνεχόμενη χρονιά. *LidlHellas*.  
Retrieved from: <https://www.lidl-hellas.gr/el/H-Lidl-Hellas-Top-Employer-gia-deyterh-synexomenh-xronia.htm>
- 21 Manifava, D., (2018), Επενδύσεις 80 εκατ. στην Ελλάδα από τη Lidl. *Kathimerini*.  
Retrieved from:

<http://www.kathimerini.gr/951902/article/proswpa/synentey3eis/ependyseis-80-ekat-sthn-ellada-apo-th-lidl>

22 (2018), Metro ΑΕΒΕ: Επενδύσεις ύψους 40-50 εκατ. ευρώ ετησίως για τα επόμενα χρόνια. *FortuneGreece*. Retrieved from: <http://www.fortunegreece.com/article/metro-aeve-ependisis-ipsous-40-50-ekat-evro-etisios-gia-ta-epomena-chronia/>

23 Manifava, D., (2018) Επενδυτικό πρόγραμμα 50 εκατ. από METRO το 2018. *Kathimerini*. Retrieved from:

<http://www.kathimerini.gr/948861/article/oikonomia/epixeirhseis/ependytiko-programma-50-ekat-apo-metro-to-2018>

24 (2018), Οικονομικά Στοιχεία. *MetrocashandCarry*. Retrieved from:

<https://www.metrocashandcarry.gr/Alisida/Oikonomika-stoixeia>

25 Qualitative Research Approach. *Statisticssolutions*. Retrieved from:

<https://www.statisticssolutions.com/qualitative-research-approach/>

26 Novick, G., (2008), Is There a Bias Against Telephone Interviews in Qualitative Research? *NCBI*. Retrieved from:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3238794/>

27 Dudovskiy, J., Questionnaires. *Research-Methodology*. Retrieved from:

<https://research-methodology.net/research-methods/survey-method/questionnaires-2/>

28 (2016), 5Cs Daily Tip: Green Product Certification. *Caribbeanclimateblog*. Retrieved from: <https://caribbeanclimateblog.com/?s=green+product&submit>

## **14. Appendix**

### **Questionnaire**

1. Does the company use renewable sources of energy?
2. What fuels are used and at what rate for vehicle movement and warehouse operation?
3. Does the company implement new technologies in order to reduce energy consumption?
4. Does the organization use new technology refrigerators that can reduce electric energy consumption?
5. What are the specific practices of the company to reduce GHGs emissions?
6. What is the exact way of handling the company's waste?
7. How does the company manage the products that have expired?
8. Do you have an environmental impact assessment system?
9. Does the company implement reverse logistics practices, such as the return of the empty bottles?
10. Does the company choose easy recyclable packaging materials?
11. Does the company reuse raw materials and products when possible?
12. What are the specific targets of the environmental policies of the company?
13. Does the company seek collaboration with suppliers that help it be more sustainable?
14. Does the company comply with some specific European environmental standards?
15. Are there some systems available to check if the vehicles are full when they are leaving from the company, so that they are properly exploited?

16. Does the perception that the environmentally friendly practices of the company are directly linked with better economic results prevail in the different management stages?

17. Are the employees of the company educated in the field of green logistics?

18. How does the company motivate the employees to engage with green logistics activities?

19. Which are the voluntary activities that the company implements for the preservation of the environment?

20. How does the company contribute to raising awareness and engaging in green practices for consumers and suppliers, affiliates, product traders?

21. Does the government give incentives (grants, tax breaks) for the implementation of green practices?

