Master Thesis

Exceeding Reverse Logistics Barriers

A Case study in the Greek Business Environment

MSc in Economics and Business Administration – Supply Chain Management

Written by

Athanasios Bekiaridis (125231)

Nikiforos Kefalas (125214)

Supervisor: Professor, PhD Juliana Hsuan

Number of characters: 272.352

Number of pages: 120

14 May 2020

CBS

Contents

1. Abstract

This paper explores the barriers that hinder reverse logistics implementation in the Greek context. The problem is that many Greek organizations are struggling to get involved in reverse supply chains and enhance their operations. To answer this question, primary data were collected from Greek companies and a thorough investigation was conducted to identify the reasons that impede reverse logistics practices from being implemented successfully. The methodology includes an in-depth literature review of reverse logistics and a qualitative analysis of three interviews to conclude in solid results. The results indicated that organizational resistance is the core barrier and interferes with the efforts towards reverse logistics. The paper concludes, proposing a conceptual framework aiming to support managers to make a step forward regarding reverse logistics.

2. Introduction

The last decades globalization has expanded, and firms started operating in an environment of fierce competitiveness which is characterized by several new innovations and technological breakthroughs (Ali et al., 2018)**.** As a result, companies started the mass production of new products, causing the continuous use of more raw materials but also the production of huge amounts of waste (Waqas et al., 2018). The deficiency in valuable raw material led businesses to seek methods that support the reduction of raw materials, the consumption of energy and practices that lessen the environmental disaster (Pacheco et al., 2018).

The efforts of organizations to reuse, recycle and remanufacture end-of-life products to achieve those goals, brought to the fore the concept of Reverse Logistics (RL) (Chan et al., 2010). The concept of reverse logistics became a point of interest in the literature in the 1970's, however references about processes and practices of reverse logistics had been mentioned earlier (Ali, 2017)**.** The last decade, reverse logistics have received the attention from academics and practitioners because they are associated with the wider context of sustainable supply chain management which nowadays thrives (Bai and Sarkis, 2013)**.** The fact that reverse logistics have been distinguished in recent years is also evident from their

conjunction with other areas of interest such as warehousing, information technology and many others (Mahadevan, 2019).

Reverse logistics activities derive from the materials that arrive from end users to the supply chain, namely products that are unsold, used or with damaged packaging (Škapa, 2011). Along with the materials, reverse logistics flows also consist from cash and information flows (Badenhorst, 2016). The long-term goal of supply chains is to meet the needs of customers while increasing their profitability (Moktadir et al., 2019).

Therefore, the implementation of reverse logistics practices is vital since it affects the product sales level and the profitability of organizations (Lamba et al., 2019). In a broader sense, organizations are trying to implement reverse logistics to meet the requirements of customer's needs, legislation and governments, and improve their environmental performance (Bai and Sarkis, 2013). In essence, organizations desire to develop a corporate citizenship and operate as responsible citizens (Škapa, 2011).

The need for corporate responsibility stems from the fact that various stakeholders and in general societies put pressure on organizations to adopt sustainable processes and design environmentally friendly products (Waqas et al., 2018). The interest for such processes has led the global community to enforce legislation to ensure that businesses will adopt them (Guarnieri et al., 2016).

For instance, the European directive (2002/96/EC) obligates manufacturers of electrical devices to adopt waste management policies in order to handle their end-of-life products (Govindan et al., 2015). As we have pointed out above, in addition to the pressure they receive, companies apply reverse logistics to improve their performance. Even though researchers suggest to the organizations multiple methods to measure the performance of their forward supply chains, they do not emphasize on the measurement of reverse logistics performance (Mahadevan, 2019).

Estimating the performance of reverse logistics is crucial as it enables firms to improve their processes and eliminate their overall cost (Hazen et al., 2015). In addition, it is vital because it affects the aggregate of actors that are involved in supply chains (Halldórsson et al., 2009). Evaluating the performance of reverse logistics is a difficult process, as the

validity of reverse logistics metrics is debatable in the literature (Hazen et al., 2015). However, several researchers agree that reverse logistics management achieves better environmental performance rather than economic performance for businesses (Khor et al., 2016).

The paradox we encounter is that while in the literature researchers recognize the value of reverse logistics, businesses focus mainly on forward logistics. Generally, organizations are more likely to invest in forward processes rather than in reverse logistics practices because they entail uncertainty and their economic benefits are not clear (Bouzon et al., 2018). The functions of forward logistics are undeniably significant for supply chains, but businesses should not underestimate the capabilities of reverse logistics activities (Bai and Sarkis, 2013). Badenhorst (2016) states that forward logistics offer less capabilities than reverse logistics. On the other hand, reverse logistics practices can close the loops of supply chains and optimize them, reshaping crucial activities such as the design and the recovery of products (Škapa, 2011).

Organizations that consider reverse logistics as a strategic function can obtain competitive advantages which strengthen them against their competitors (Mahadevan, 2019). In addition, the application of reverse logistics provides firms the capability to reclaim value from aged products, diminishing the utilization of scarce resources allowing them to remain sustainable (Meyer et al., 2017). However, the capabilities of reverse logistics vary depending on the industry and the country in which they are applied. The literature of reverse logistics in developing countries is mostly focused on industries that recover and recycle electronic waste without giving emphasis on other industries such as the plastics sector (Peña Montoya et al., 2015).

On the contrary, in developed countries the researchers focus on industries that produce high-tech products such as the automotive and the e-commerce sector (Lamba et al., 2019). While in developed countries recycling and product reuse are consolidated, the majority of products in developing countries end up in landfills (Bouzon et al., 2018). As a result, the capabilities of reverse logistics in certain industries and countries are more obsolete than in others, since important information and practices are missing (Ali, 2017).

Additionally, the capabilities of reverse logistics are also affected by other factors which are related with the reverse flows of businesses (Pumpinyo and Nitivattananon, 2014). Namely, the size, the volume of products or waste that enters the reverse flow, the distance between the collection point and the processing point, the stakeholders that facilitate the procedure (Pumpinyo and Nitivattananon, 2014). While in some industries the return rate of products reaches fifty percent, in other industries it reaches only five percent (Mahadevan, 2019). The above numbers are enough to determine the significance of reverse logistics flows within organizations.

According to the reverse logistics executive council, businesses in the USA allocate billions of dollars on a yearly basis for their reverse logistics activities, that account for half of the GNP (Škapa, 2011). Only the value of the returned products in this particular country is estimated to be one hundred billion annually (Mafakheri and Nasiri, 2013). As demonstrated by the literature, reverse logistics implementation should be part of companies' strategic planning in order to survive in the market (Chileshe et al., 2015). Nevertheless, sixty per cent of the firms are not satisfied with their reverse logistics strategies and processes (Škapa, 2011). Therefore, it is figured out that there is a huge potential for development in this sector.

2.2 Scope and objectives of the study

The significance of reverse logistics capabilities is widespread around the globe however many firms are afraid to implement such activities (Badenhorst, 2016). The hesitation of companies exists because the development of reverse logistics activities is accompanied by many barriers (Raci and Shankar, 2005). Consequently, it is important to mention the barriers and the problems that hinder reverse logistics implementation. Particularly, high investment costs, high uncertainty, the quality of returned products and the willingness of consumers to recycle, are major problems that prevent companies to adopt reverse logistics practices (Pumpinyo and Nitivattananon, 2014).

Uncertainty refers to the volume of returned products, whereas the willingness of consumers to recycle refers to the fact that a proportion of them tends to accumulate products rather than sending them back to manufacturers (Dixit and Vaish, 2015). The return of damaged products and packaging also affects the application of reverse logistics (Lamba et al., 2019). Another factor that has an impact on reverse logistics implementation, is the inexperience of organizations to manage the reverse logistics activities (Bai and Sarkis, 2013). Other barriers that influence the application of reverse logistics are the lack of management's awareness, the lack of human and financial resources, organizational legislations and many others (Raci and Shankar, 2005). All those barriers inhibit the implementation of reverse logistics practices but also facilitate the existence of other barriers (Raci and Shankar, 2005).

Given the above, the following question arise: Why cannot companies overcome reverse logistics barriers despite the fact that they acknowledge them? This paper will try to identify possible answers to this question and provide a basis for further investigation. Specifically, the lack of knowledge of reverse logistics barriers as well as the ineffectiveness of business tools that are used by companies will be assessed as a starting point to trigger a deeper investigation for the valid reasons that impede reverse logistics implementation in modern organizations.

As Lamba et al. (2019) summarizes, businesses are incapable of identifying the critical barriers which might act as the main cause of reverse logistics implementation failure. In addition, the lack of business tools or their ineffective use can lead to unsuccessful reverse logistics implementation (Khor et al., 2016). Those concerns along with literature gaps motivated us to explore those issues and formulate the following research question:

" Which are the barriers that organizations confront and how they can successfully overcome them to implement reverse logistics practices? "

This study attempts to bridge the gap between the theory which provides solutions that weaken reverse logistics barriers, and the practice where managers attempt to implement

reverse logistics activities. Thus, this study struggles to inspire the managers and provide them a theoretical framework that could be utilized as a tool for the successful implementation of reverse logistics. The literature often addresses reverse logistics issues in a country or an industrial level. Moreover, it has been observed that there are low registered entries over the Balkan region. Therefore, this study examines reverse logistics in the Greek economic environment and Greek companies aiming to provide a more holistic view over reverse logistics literature.

First, an in-depth literature review was conducted to record the barriers, benefits and possible solutions over reverse logistics implementation. Second, a primary dataset was collected through interviews with Greek companies and analyzed using the thematic analysis approach. Through intensive analysis, the most critical barriers as well as the most popular benefits that drive reverse logistics implementation in this specific region were identified. Afterwards, a conceptual framework was developed to alleviate the barriers and facilitate reverse logistics application.

Therefore, the objectives of this study are to:

a. Explore the barriers of reverse logistics that restrain organizations to implement reverse logistics practices

b. Explore the suggestions that literature proposes in order to overcome those barriers

c. Provide a conceptual framework that enables organizations to confront reverse logistics barriers and successfully implement reverse logistics practices

To address the objectives of this study, the sections are organized as follows. Initially the literature presented was divided into four parts. The topics addressed are the activities, drivers, barriers and solutions over reverse logistics in multiple countries and industries. In those sections, we present significant parts of reverse logistics and we highlight gaps of the literature.

Then we describe the methodological background of the study used to collect and analyze the primary data. This is followed by the analysis of the dataset and the results drawn. Afterwards, a conceptual framework was developed and proposed as a possible path

towards reverse logistics implementation. Finally, we present some conclusions and limitations that emerge from our research.

3. Literature Review

3.1 Reverse Logistics Processes and Definitions

The concept of reverse logistics is not entirely new, and several different definitions have been developed by scholars as this function continuously becomes more and more essential for companies. Reverse logistics is a mandatory function for successful organizations and can lead to significant economic and strategic benefits (García-Rodríguez et al., 2013).

Many members of top management believe that reverse logistics start when the product life cycle comes to an end and thus, they must deal with the waste by either recycling or disposing it in an environmentally friendly way. However, this perception has been proved wrong. Reverse logistics activities should consider the entire life cycle of a product, from product design and manufacture till the return and the proper recycle or disposal (Guarnieri et al., 2016).

The life cycle of a product consists of five stages: "*development stage, growth stage, shakeout stage, maturity stage and decline stage*" (Chan et al., 2010, p. 6298). As technology evolves, product life cycles become shorter and shorter and thus reverse logistics become a more relevant function for the modern business models. As a result, it is critical for organizations to implement or enhance their reverse logistics systems to remain competitive (Chan et al., 2010). Consequently, there is an obvious demand for further exploration in this area (García-Rodríguez et al., 2013).

Apart from proper disposal and recycling, products that are unwanted by customers can be returned to go through a process of downcycling. Those products can either be processed to extract valuable components or to be completely remanufactured. Moreover, the need for disposal can be reduced and the product's life can be extended. As a result, the

disposition of products is a core element of reverse logistics activities. Additionally, product disposition not only includes the necessary activities linked with the decisions of product treatment but also the facilities, information systems and transportation needed (Khor et al., 2016a).

Returned products can be recovered with five distinct processes: "*repair, refurbishing, remanufacturing, cannibalization, recycling*" (Chan et al., 2010, p. 6294). Specifically, when end of life products entail remaining value can be handled with various processes such as remanufacturing, recycling, repairing, whereas disposal is mostly used when the products cannot generate further value (Bouzon et al., 2016). However, the five most frequent disposition options that are adopted by companies are: repair, recondition, remanufacture, recycle and disposal (Khor et al., 2016b):

Repair stands for the activities that are necessary to fix or replace parts and modules so that a product can fully function again.

Recondition involves the actions of restoring a product to its working condition. Specifically, reconditioning refers to the actions of testing, repairing and replacing components of an existing used product which is damaged or may fail soon. Recondition can be perceived as a higher order option than repair.

Remanufacture includes the disassembly, the testing and the replacement of a broken part and the rebuilding of an entire product. This option aims to restore a product to its original form. Remanufacture is a higher order option that recondition.

Recycling contains the activities of gathering, separating, categorizing and dealing with reusable materials that have been extracted by returned products. The goal of recycling is to provide organizations with raw materials for manufacturing new products.

Disposal is picked after the above listed options are analyzed and proved to be complex and financially inefficient. Furthermore, it involves the actions of environmentally friendly landfilling and burning the remaining waste of a used product.

Special attention should be given when we analyze remanufacturing as it is the highest order option compared with recondition and repair. Significant requirement for the implementation of remanufacturing processes is the redesign of products, so that they meet

specific standards that enable them to be remanufactured. This could be achieved by designing products that consist of certain modules and components.

In addition, organizations are obliged to change the structure of the supply chain to accommodate the activities that are related with the remanufacturing process. El korchi and Millet (2011) state that those activities such as dismantling, product separation and cleaning, are factors that can potentially affect the product design. Therefore, organizations should redesign their supply chains taking into consideration the structure, the activities and the design of products to integrate remanufacturing processes (El korchi and Millet, 2011).

Reverse logistics definitions are built in two different ways: First, they describe reverse logistics as the opposite flow of the traditional logistics and second, they are focusing on the activities of reverse logistics function (Ye et al., 2013). In the first set of definitions, reverse logistics are described as the mechanism by which end of life products are returned from consumers to organizations to recapture the remaining value or properly dispose them. In other words, designing, monitoring and achieving the backwards flow of products, materials or even packaging components having the purpose to recover value is called reverse logistics.

However, it is very important to understand that when reverse logistics is defined as the opposite flow of goods, all activities operate in reverse. Therefore, the starting point in a reverse chain is the point of consumption and thus, the process of planning, implementing and controlling along with information gathering must be done accordingly (Mahadevan, 2019).

Furthermore, forward logistics practices will not be efficient and effective when applied unchanged to support reverse logistics operations. Specifically, forward channels are not designed to handle goods coming from the opposite direction. For example, end of life or unwanted products that are coming backwards cannot be transported, stored or handled in the same way as the finished products that are leaving the organization through traditional logistics channels (Bai and Sarkis, 2013).

In the second set, there are a lot of definitions moving around reverse logistics activities and the disposition options listed above (Chan et al., 2010). Reverse logistics is every

action related with the collection of used products. Those actions imply the areas of reclaiming, reuse and correct disposal (Bouzon et al., 2016). Another definition of the same approach says that reverse logistics includes all the operations associated with the reuse of used products from collection to disassembly and every process till the production of a new product (Ravi and Shankar, 2005). Furthermore, the five main processes identified in a standard reverse supply chain are product acquisitions, tests, inventories, reprocessing and remarketing (Mafakheri and Nasiri, 2013).

From another point of view, there are four key processes involved in reverse logistics activities. The first one is collection which refers to the collection points and warehouses. The second is distribution which is related to optimizing transportation, planning, routing. Third, is the inventory management which concentrates on control of stock levels. Fourth, is remanufacturing which covers material recovery from returned products and restore products into resealable state (Chan et al., 2010).

Reverse logistics functions and activities.

Reference	Functions or activities
Blumberg (1999)	Storage and warehousing
	Collection and sorting
	Substitution
	Transportation and distribution
	Disposal
	Depot repair and remanufacturing
	Recertification
Rogers and Tibben-Lembke (1999)	Gatekeeping
	Collection
	Sortation
de Brito and Dekker (2002)	Collection
	Inspection/selection/sorting
	Reprocessing or direct recovery
	Distribution
Goldsby and Closs (2000)	Collection
	Handling
	Storage
	Intermediate processing
	Movement
	Administrative control
Serrato et al. (2007)	Collection
	Selection
	Reprocessing
	Disposal
	Redistribution
	Reuse
Genchev et al. (2011)	Initiate returns
	Determine routing
	Receive returns
	Select disposition
	Credit customer/supplier
	Analyze returns and measure performance

Table 1: Revere logistics functions and activities by Bai and Sarkis (2013)

The majority of reverse logistics processes have been collected and depicted by Bai and Sarkis (2013) in the Table 1. Additionally, Badenhorst (2016) described those functions with six major characteristics: a) RL is the physical link that customers utilize to return the products to the firms b) RL entail products and materials in different conditions c) RL brings the products from the downstream to upstream supply chain d) RL entails information flows about the condition of the products e) RL is related with the scope of reducing cost and gaining more profits f) RL management is demanding due to its complexity.

The processes that each organization utilizes is based on particular criteria, namely "s*trategic, tactical and operational decision variables*" (Govindan and Soleimani, 2017, p. 379). Govindan and Soleimani (2017) examined in their study which of those variables organizations and researchers mostly take into consideration. The results showed that organizations' decision-making is mostly based on operational variables whereas little emphasis is given on strategic variables (Govindan and Soleimani, 2017).

Besides those two seemingly similar but different approaches there are definitions that combine both perspectives. They state that reverse logistics is a new concept which involves planning, implementing and controlling the opposite flow of goods from customers to organizations. Furthermore, reverse logistics is a strategy and a list of activities which take place in the opposite flow. These activities include collection, inspection and then recycling, renewing and remanufacturing or proper disposal of the returned unwanted products (Pacheco et al., 2018). The concept of remanufacturing, recycling and refurbishing products is relatively modern as firms were struggling to realize the economic incentives of those processes (Lee and Lam, 2012).

Finally, modern definitions are adopting an environmental perspective. They describe reverse logistics as a way to improve productivity reducing the negative environmental impact. Reverse logistics is an effective way to boost both business and environmental performance providing a unique opportunity for competitive advantage (Ye et al., 2013). Additionally, reverse logistics efficiency relies on the responsibility of both producers and customers towards waste minimization utilizing the techniques of recycle, reuse, remanufacture and safe disposal of used products. Those actions will enhance the

regenerative ability of the planet and will solve the resource deficiency contributing to sustainability (Bouzon et al., 2016).

Summarizing the definitions of reverse logistics, the most popular among scholars is the one given by Rogers and Tibben-Lembke who define reverse logistics as *"the process of planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods and related information from the point of consumption to the point of origin for the purpose of recapturing value or proper disposal"* (Khor et al., 2016, p. 97).

Last but not least, one more attribute of reverse logistics is that its activities are linked across many other functional areas within an organization. They are directly involved in distribution, transportation, marketing activities and manufacturing operations (Dowlatshahi, 2012). Despite the fact that reverse logistics processes have an impact on the majority of organizational operations, they especially affect forward logistics and marketing functions (Hazen et al., 2015).

3.2 Reverse Logistics Benefits and Drivers

In general, reverse logistics are perceived as an unviable financial function. However, top management must deal with the huge pressure that forces organizations to green their supply chains (Ali et al., 2018). The first step to get organizations motivated about reverse logistics is to make them realize the potential benefits. Yet, the leading reverse logistics drivers are not obvious and not well known (Bouzon et al., 2018).

When we consider the waste generation and the conversion into useful raw materials, reverse logistics can be described as a tool towards value creation and competitiveness. As a result, reverse logistics should not be perceived as a source of additional cost but as a function that generates competitive advantages (García-Rodríguez et al., 2013).

Moreover, reverse logistics turned out to be a promising approach when companies try to build up their sustainability and environmental responsibility (Meng et al., 2017). The determinant factors that may force organizations to develop reverse logistics operations

are product returns, environmental protection policies and reusable materials (Govindan et al., 2012). The implementation of reverse logistics can improve the socio-economic conditions for both enterprises and societies, enhance green marketing strategies and solve problems concerning the remanufacturing of products (Waqas et al., 2018).

Organizations receive valuable contributions applying reverse logistics practices either they operate in a developed or in a developing country (Moktadir et al., 2019). On the one hand, societal pressure, consciousness about environmental problems and willingness to build a sustainable national economy, enables developed countries to apply reverse logistics practices effortlessly (Lamba et al., 2019). On the other hand, the value of reverse logistics is underestimated in developing countries due to the small quantity of recycled waste and the deficiency of expertise on product remanufacturing (Pena-Montoya et al., 2015).

Reverse logistics activities are becoming a niche in developing countries if we consider the fierce competitive environment that organizations are involved in. Specifically, the multiple producers and the numerous goods in those gradually growing markets will allow reverse logistics to flourish (Ali, 2017). Last but not least, industries with low profit margins can be benefited from reverse logistics, as their object, apart from the preservation of the environment, is the generation of profits (Ali, 2017).

Govindan and Bouzon (2018) analyzed in their study the drivers that stimulate the organizations to adopt and develop their reverse logistics strategies. Specifically, they identified three internal and three external drivers that motivate organizations. The economic drivers are probably the most significant internal drivers, as the implementation of reverse logistics creates favorable circumstances for the firms to curtail production costs and increase their revenues, recovering value from products.

Furthermore, competitive drivers and operational performance drivers are of significant importance as well. Competitive drivers are those that enable firms to minimize inventory cost and simultaneously offer consumers a product with reduced price, enhancing the brand's reputation. Operational performance drivers allow firms to reduce cost regarding product transportation and storing. Those drivers enable organizations to eliminate their operational cost and enhance their overall performance (Govindan and Bouzon, 2018).

Nonetheless, external drivers are equally critical with the internal drivers. Legal drivers and specifically rigorous environmental policies are factors that force organizations to conform to legislations that concern reverse logistics practices (Govindan and Bouzon, 2018). The need of firms to recover products to eliminate their emissions, decrease the levels of energy consumption, boost their reputation among consumers, declares the magnitude of environmental drivers. Lastly, organizations are influenced by social responsibility and corporate citizenship drivers that derive from various stakeholders' pressure demanding sustainable products. Those drivers can positively impact marketing and raise customer loyalty (Meyer et al., 2017).

Another classification has been made by Hsu et al. (2016) who categorized reverse logistics drivers as tangible and intangible. On the tangible side, benefits such as the extracted value from returned goods, the reduction of wasted time and manpower, and the increase of product life cycle are listed. Additionally, financial benefits can be generated when remanufactured products are resold in secondary channels. On the intangible side the benefits listed focus on customer satisfaction and loyalty, as customers tend to react positively to sustainable and environment friendly products.

Moreover, the customer feedback and information which is obtained from product returns can also drive reverse logistics implementation. In particular, reverse logistics can reduce the volume of defective products increasing companies' earnings (Pacheco et al., 2018). Furthermore, Pacheco et al. (2018) adopt a similar approach on reverse logistics driver classification stating that organizational practices can have both qualitative and quantitative benefits. However, they mostly focus on the qualitative and intangible side and specifically in market competitiveness.

Furthermore, a more extensive classification was made by (Bouzon et al., 2018) who identified eight categories of reverse logistics drivers. The first one is related to policy issues. This category entails the laws and regulations that push organizations into adopting reverse logistics practices. Second, is the governance and supply chain process category. This cluster includes the potential cooperation with business partners. The third category involves managerial drivers which refer to employee satisfaction and department integration. Market and competition drivers are included in the fourth category. This group

of drivers includes customer satisfaction, the potential of developing competitive advantages and market pressures.

The fifth category has to do with technology and infrastructure issues. This type of drivers refers to information technology, designing and recovery technologies. The next category is the economic group which includes the financial drivers related with reverse logistics. The seventh category has to do with knowledge related drivers like organization's awareness over sustainability and reverse logistics. The last group of drivers refers to public awareness over environmental issues and societal pressures.

After reviewing the literature several distinct classifications of reverse logistics drivers emerged. However, García-Rodríguez et al. (2013) consider the environmental and financial drivers as the most important and unique motives towards reverse logistics implementation. Similarly, Prakash and Barua (2016) agree that two of the numerous benefits that reverse logistics offer to organizations are of environmental and financial nature. Nevertheless, Pena-Montoya et al. (2015) state that firms focus to a great extent on economic factors, giving little importance on environmental factors because they consider only the immediate benefits obtained by reverse processes.

Adopting reverse logistics activities is related to the improvement in the financial state of organizations. Reverse logistics can have a significant contribution in profit growth, cost minimization and value creation, improving customers satisfaction (Ye et al., 2013). Moreover, reverse logistics has been found to increase market share and the overall financial performance (Barriers to implementing reverse logistics in). In addition, the most dominant economic reverse logistics benefits that organizations seek are the reduction of massive inventories, the increase of organization's profitability and the acquisition of competitive advantages (Škapa, 2011).

Studies proved that the disposition options such as repair, recondition, remanufacture, recycle are creating profit for companies and help in sales growth (Khor et al., 2016). Nonetheless, their empirical study showed that the only disposition option that can improve economic performance are recycling and disposal. The same study also proved that reverse logistics are related with considerable cost reduction but not improved economic results. This can be justified by the cost reduction in the manufacturing process, but the savings are not enough to exhibit reverse logistics profitability (Khor et al., 2016).

Nevertheless, organizations can achieve reduction in operating costs by reducing the material and energy procurement requirements. Specifically, when organizations gather used and unwanted products from customers or collection points, they can disassemble and collect useful parts using them as raw materials in the manufacturing process. As a result, organizations can generate value by reducing costs (Ye et al., 2013). Specifically, designing the process of handling the defective parts is critical as it minimizes the overall cost and increases the profits of organizations (Khor et al., 2016).

Pumpinyo and Nitivattananon (2014) say that the essential motive of reverse logistics implementation is that product recovery management can boost organizations' cost-effectiveness. Furthermore, efficient reverse logistics can increase customer satisfaction, reduce additional investments and eliminate warehousing and transportation cost (Govindan et al., 2012). However, Govindan et al. (2015) believe that reverse logistics can mostly enhance the revenue for producers, rather than being implemented as a method to reduce the cost**.** Specifically, adopting reverse logistics practices, firms are enabled to raise their revenues and curtail their operational cost in order to reinforce their shareholders value (Pumpinyo and Nitivattananon, 2014).

On the other hand, there are the environmental motives. This category of motives has received the least of attention by top management, but it is as critical as the others. The appropriate implementation of reverse logistics practices can offer important environmental advantages that sometimes are also related with cost reduction. For instance, those benefits include the reduced emissions from manufacturing and transportation, the reduced energy utilization and generally the reduced air and water pollution. Moreover, Chan et al. (2012) indicate that apart from the environmental contribution, reverse logistics could also commit to materials sustainability and offer the valuable opportunity to produce goods with raw materials closer to their natural condition.

Moktadir et al. (2019) claim that end-of-life products that are irresponsibly disposed can have serious implications for the environment. They also declare that reverse logistics can reduce those implications when products are properly recycled. Summarizing, reverse logistics strategies can eliminate the environmental effects that firms cause and at the same time safeguard firms' productivity.

Apart from economic and environmental drivers, it has been acknowledged that the role of customers is important and affects the decision of reverse logistics implementation. As customers becoming more and more critical in their decision regarding their purchases, they demand and increasingly heading towards sustainable and innovative products (Pacheco et al., 2018). Consequently, companies should take into consideration that consumers' choices are moving towards sustainable products and take advantage of it. Organizations that acknowledge their environmental impact and accept their responsibility are focusing more on sustainable practices. As a result, their products are modified or designed to be eco-friendly and sustainable, creating a new market niche that contributes to organizations' profit (Pacheco et al., 2018).

An important thing that should be mentioned and is often neglected by organizations is the contribution of returned products to the manufacturing process. As companies are implementing reverse logistics to satisfy customers demand, they should expect an increase in product returns. Furthermore, product returns increase the complexity and the cost of inventory management, as they entail returned materials (Zerhouni et al., 2013). Therefore, managers should incorporate those returns to their manufacturing plan and examine how they can affect their supply chain.

Zerhouni et al. (2013) state that top management do not consider the returned products as resources to fulfill the upcoming demand and do not correlate the returns with sales requirements. However, reverse logistics implementation should integrate and consider returns as valuable resources. A successful reverse logistics application could provide a unique competitive advantage translated into a new market niche while an ineffective one could deteriorate the relationships with customers and threaten the brand prestige (Ali et al., 2018). According to Lee and Lam (2012) the successful implementation of reverse logistics will eventually reduce inventory and distribution costs, increasing also the diversity of products that are available to customers (Moktadir et al., 2019).

Another factor that forces organizations towards the adoption of environmental initiatives are regulatory pressures that derive from governments. This can either act as a pressure or as a motivation. According to Pacheco et al. (2018) financial and environmental forces act in parallel with regulatory factors to push organizations into reverse logistics implementation (Pacheco et al., 2018). Similarly, Ravi and Shankar (2005) agree that

besides economic and environmental reasons, there are also legislative factors which lead organizations to the reverse logistics adoption scenario.

According to several studies, legislative factors are by far the most dominant driver among others that force organizations to implement sustainable practices. Furthermore, the second most mentioned driver is green consumerism which illustrates once more the shift of customers' attention towards the environment. The third place goes to economic drivers which depict the reluctance of organizations to encompass product return practices unless it is economically viable (Bouzon et al., 2018). Other studies that investigated the reverse logistics drivers reveal that environmental, operational and social benefits are greater than the benefits received by organizations, when they conform to government regulations (Yusuf et al., 2017).

Having identified which are the most critical drivers that motivate reverse logistics implementation, it is vital to mention how they impact organizations. Pacheco et al. (2018) summarized the organizational implications and suggested various benefits. Firstly, from an operational perspective, organizations can save a considerable amount of resources from disassembly and recycling processes.

In addition, those drivers are in harmony with environmental benefits. They can lead to waste and emission reduction, the minimization of water and air pollution and contribute to the sustainable use of raw materials. Reverse logistics practices can upgrade the product quality and enhance their value, supporting customers' social consciousness and environmental responsibility (Pacheco et al., 2018).

An example that presents the holistic view of reverse logistics advantages, is given by Yusuf et al. (2017) and refers to returnable packaging. Yusuf et al. (2017) state that firms have several motives to utilize returnable transport packaging, investing in their reverse logistics activities. Initially, firms have the possibility to eliminate the cost of operations and scale down the environmental impact of their operations, becoming more sustainable. The utilization of such packaging can safeguard the secure transportation of the products that reduces the possibilities of receiving returns with damaged products.

Furthermore, the usage of returnable transport packaging decreases the warehousing cost and the waste that customers must handle. The design of the packaging enables firms to

trace and track information about the position and the situation of the products, making also more convenient the recycling of them when they reach their end of life. Lastly, returnable transport packaging provides competitive advantages that usually are utilized in marketing campaigns concerning the environmental profile of the brands. However, Yusuf et al. (2017) mention that if firms desire to obtain all those advantages, they need to examine and settle the reverse logistics barriers that could create obstacles.

In addition, returnable packages could diminish the volume required and the weight of products during their shipment to customers (forward logistics). As a result, they could curtail the total spent on transportations. As Guarnieri et al. (2016) claim, the cost of utilizing returnable packages is relatively low compared to the profits that firms receive in the long-term implementing such solutions. Apart from the long-term benefits, returnable packaging is inferior in comparison with disposable packaging in terms of economic and environmental cost.

Summarizing, a properly controlled reverse logistics strategy could contribute to cost reduction, increase organizational revenue and customers' satisfaction. Moreover, this strategy can lift the corporate profile and corporate social legitimacy, offering significant competitive advantages. In other words, reverse logistics attempt to accomplish a relationship between environmental responsibility and profit through numerous practices, generating various competitive advantages. Firms that are capable of clarifying these advantages, can empower the willingness of the top management to invest in reverse logistics without underestimating their value (Meyer et al., 2017). Finally, according to Hsu et al. (2016), a strategic adjustment of the entire organization is required to obtain the benefits that derive from reverse logistics implementation.

3.3 Reverse Logistics Barriers

Although the implementation of reverse logistics can boost organizations in terms of economic and environmental performance, it entails various barriers (Ali, 2017). Lamba et al. (2019) assert that the majority of companies encounter related barriers in their effort to apply reverse logistics practices. Nevertheless, Lamba et al. (2019) mention that certain

policies, socioeconomic factors and distinct frameworks that exist in various countries, may influence the importance of particular barriers and generate new ones. Waqas et al. (2018) agree that problems stem from warranty policies, however they consider end of life and end of use returns, suspended products, and the need for proper waste management as factors that create reverse logistics barriers.

Moktadir et al. (2019) argue that the recognition of reverse logistics barriers is a complicated process because the number of different barriers is huge. Škapa (2011) believes that the majority of the barriers in the literature derive from the internal nature of the firms. However, this view is partially true if we consider that in the literature there are several cases where industries are primarily affected by external barriers.

Waqas et al. (2018) assert that the interest of the researchers on reverse logistics barriers and drivers is primarily focused on developed countries and not so earnestly in developing ones. On the contrary, Peña Montoya et al. (2015) state that literature of reverse logistics mostly examines the barriers in the Asian market and developing countries, mainly focusing on the electronic industry in small and medium enterprises. During our literature research we detected that the statement of Waqas et al. (2018) is not reliable. The majority of researchers in fact study cases and industries in developing countries as their context is deemed as unexplored and as authors massively believe that there is more space for potential development in such context.

It is vital to mention that certain industries attract the interest of researchers independently from their location. Those industries are the automobile, the electronic and the computer industry. Chan et al. (2012) who studied the barriers in the automobile industry, identified three types of barriers that mainly affect the establishment of reverse logistics. Those barriers are related with the management of reverse logistics, technical issues and constraints, perceptions and considerations of both customers and manufacturers (Chan et al., 2012).

Ali et al. (2018) declare that the majority of the researchers focus on the identification of reverse logistics barriers, however they do not investigate the correlations between those barriers and the interaction between them. Ali et al. (2018) examined the dependency between the reverse logistics barriers in the computer industry in Bangladesh, applying the ISM technique in order to categorize the reverse logistics barriers.

Ali et al. (2018) selected the seven most critical barriers for their research and classified them to four clusters. Authors concluded that financial constraints and top management's lack of interest for reverse logistics, were the most crucial barriers with strong driving power that affect other barriers. Therefore, they proposed that emphasis should be given to overcome those financial barriers (Ali et al., 2018).

The ISM model was also applied from Raci and Shankar (2005) that wanted to analyze the correlations of eleven reverse logistics barriers. Their study determined that some of the barriers are dependent and less dependent to other barriers (Raci and Shankar, 2005). The independent and most powerful barriers are "*the lack of awareness of reverse logistics, the lack of commitment by the top management, the problems with product quality, the lack of strategic planning and the lack of financial resources*" (Raci and Shankar, 2005, p. 1027).

Ali (2017) studied the reverse logistics barriers of pharmaceutical manufacturing in Egypt applying the ISM methodology and classified them using the MICMAC analysis. The classification was made in four categories based on two parameters, the driving power and the dependence power of each barrier (Ali, 2017). Interestingly, the author concluded that nine driving barriers influence eight dependent barriers without identifying any autonomous or linkage barriers.

The barriers that have the most driving power with the least dependency on other barriers were "*the lack of regulation enforcement and the lack of public awareness regarding the importance of reverse logistics*" (Ali, 2017, p. 8). However, it is worth mentioning that "*lack of economic support from the government and financial constraints*" were found to be of critical importance (Ali, 2017, p. 9).

Taking into consideration the literature that analyzed the correlation of reverse logistics barriers in different frameworks, we can safely conclude that there is a pattern among the barriers that have the most driving power. In a general context, the barriers that can influence or generate new reverse logistics barriers are the lack of financial resources, the lack of awareness about reverse logistics practices and the lack of top management's interest.

Furthermore, Peña Montoya et al. (2015) mention the dependence between various barriers in developing countries. Authors state that financial barriers affect the lack of investment

in personnel, the lack of infrastructure and the lack of IT systems. In addition, authors claim that the lack of legislation has straight connection with the three barriers that were mentioned above. Consequently, organizations refuse to make investments in a context where there is a deficiency of supportive legislation (Peña Montoya et al., 2015).

Škapa (2011) investigated the existence of discrepancies of perceptions about reverse logistics barriers and their importance between experts and the top management. Interestingly, the research concluded that there is no difference in perceptions of the two targeted groups except from one barrier that concerns the top management prioritization of reverse logistics activities (Škapa, 2011). The results of this research nominate that top management has full awareness of reverse logistics issues and barriers. However, the findings are contradictory with the results of multiple other authors that point out top management is usually a significant barrier itself to reverse logistics implementation due to lack of knowledge.

In the literature we observed that many researches incorporate various models and methods to explore reverse logistics barriers. Bouzon et al. (2016) applied the Analytic Hierarchy Process (AHP) approach and the fuzzy Delphi method to analyze thirty-six reverse logistics barriers that were classified in seven major categories. Correspondingly, Prajapati et al. (2019) applied SWARA approach and WASPAS method to analyze the importance of six main categories that consist of thirty-four reverse logistics barriers cumulatively. Despite the fact that the researchers from both studies mention almost the same barriers as critical, Prajapati et al. (2019) illustrate that the findings of studies usually come up with contradicting results due to the natural differences of industries and countries.

Throughout our research we indicated that the AHP approach was applied by several authors. Since it is a widespread approach we decided to focus and analyze their results. Applying the AHP approach, which is a decision-making support device, Lamba et al. (2019) studied the reverse logistics barriers of e-commerce in India to identify the most significant barriers in this industry. The research highlighted that those barriers are sixteen in total, thus Lamba et al. (2019) classified them in five categories, namely: "*management, coordination, policy, infrastructural* and *economic*" barriers (pp. 5-7). Sirisawat and Kiatcharoenpol (2018) also used the fuzzy AHP to prioritize the importance of reverse logistics barriers and plan which of them should be addressed immediately. In this study,

Sirisawat and Kiatcharoenpol (2018) categorized the barriers in eight categories and identified twenty-nine barriers.

Moreover, we focus on the results of the study of Lamba et al. (2019) as it encloses more insights about reverse logistics barriers. Economic and coordination barriers were proven to be the most significant as they represent the lack of investment in reverse logistics, the lack of awareness about reverse logistics best practices, the lack of economies of scale, uncertainty in forecasting and the lack of infrastructure (Lamba et al., 2019). Nevertheless, Lamba et al. (2019) state that the establishment of an accurate ranking system that prioritizes reverse logistics barriers according to their criticality, is a complicated process.

Moktadir et al. (2019) used the AHP approach and multi-criteria decision analysis (MCDA) to study the reverse logistics barriers that leather footwear industries face in Bangladesh. They identified a total of eighteen barriers utilizing the AHP approach. Moreover, Moktadir et al. (2019) classified those barriers in five categories: "*technology and infrastructure, knowledge and support, organizational policy, financial constraints, operational issues*" (p. 13). Their research proved that knowledge and support barriers are those with the highest impact among the others (Moktadir et al., 2019).

Those categories entail barriers such as the lack of interest of top management to implement reverse logistics and the lack of knowledge concerning environmental issues and reverse logistics processes (Moktadir et al., 2019). Apart from knowledge and support barriers, it is important to mention that barriers related to the organizational policies were found to be also essential obstacles in reverse logistics implementation (Moktadir et al., 2019).

One more generally accepted method that authors use to identify reverse logistics barriers measuring their criticality and distinguishing their origin is by classifying them in two categories. Those categories are external and internal barriers. Internal barriers refer to those barriers that arise from the organization itself, whereas external barriers are those that stem from the environment of the organizations (Škapa, 2011).

Meyer et al. (2017) collecting data from twelve semi-structured interviews, studied the internal and the external barriers that groceries stores face in South Africa during reverse logistics implementation. In their study, Meyer et al. (2017) identified 4 internal barriers

that derive from organizational operations. Those barriers are the "*lack of functional integration, the top management's posture on reverse logistics, financial barriers and the lack of information systems*" (Meyer et al., 2017, pp. 5-6). On the other hand, the external barriers that Meyer et al. (2017) comprised in their study were the lack of supply chain partner integration, the lack of accurate forecasting and the lack of government support and policy.

Škapa (2011) identified eight internal barriers and six external barriers that hinder the implementation of reverse logistics in Czech Republic. The most significant internal barriers are the low priority that is given to reverse logistics in comparison with other activities, the lack of systematic management and the unskilled personnel. The latter according to Škapa (2011) stems from the previously mentioned barriers. Regarding the external barriers, Škapa (2011) found that customers are perceived as the most important barrier due to their manipulation to products and their pressure on price reduction. Similarly, suppliers and financial resources are other critical external barriers.

Peña Montoya et al. (2015) studied the barriers of small and medium sized enterprises in Colombia. Specifically, their research concerned the industry of plastics and the analysis included both reverse logistics drivers and barriers of the internal and the external environment within the context of the country. Peña Montoya et al. (2015) concluded that the most critical barriers derive from financial constraints. Particularly, those are the lack of investment, the lack of infrastructure and IT systems, and the lack of personnel's training.

A similar approach was used by Abdulrahman et al. (2014) that analyzed the barriers of manufacturing industry in China. Abdulrahman et al. (2014) detected several reverse logistics barriers and separated them in external and internal groups. In that case, authors included in the category of internal barriers those that relate to managerial, infrastructural and financial aspects of the manufacturing sector.

On the contrary, regarding the external barriers they introduced policy related barriers. It is imperative to mention that even though policy barriers are considered as external barriers, they concern both internal and external stakeholders of organizations (Abdulrahman et al., 2014). Taking into consideration those researches, we observe that

even though the philosophical background used by authors is identical, the findings of studies vary since they are highly dependent on the context they are applied to.

In the extensive literature review of reverse logistics, we found that several scientists attempted to build linkages with other parts of the bibliography to determine the origins of reverse logistics barriers. For instance, Bouzon et al. (2018) evaluated which stakeholders act like barriers in reverse logistics implementation. Initially, Bouzon et al. (2018) summarized twenty significant barriers and determined whether those derive from the internal or the external environment of the organization. Afterwards, having classified those barriers, they analyzed the relationship and involvement of stakeholders with those barriers (Bouzon et al., 2018). Their research concluded that five categories of stakeholders can inhibit reverse logistics implementation, namely the organization itself, the employees, the customers and the suppliers of the organization and the government (Bouzon et al., 2018).

Another review where researchers attempted to detect the origin of numerous reverse logistics barriers was the study of Govindan and Bouzon (2018) who identified thirty-seven barriers. In this study, Govindan and Bouzon (2018) correlated each barrier to seven particular clusters. With this connection authors came to the conclusion, linking reverse logistics barriers with the clusters that they derive from. Even though both studies entail useful insights, the attempt of authors to create a linkage between barriers and certain stakeholders or clusters, did not commit in the identification of uncharted reverse logistics barriers.

Dixit and Vaish (2015) studied the reverse logistics barriers and the factors that influence the behavior of consumers in India. The authors conducted their study considering consumers as the starting point that determines the successful implementation of reverse logistics practices. Dixit and Vaish (2015) identified that behavioral barriers are the most significant barriers in reverse logistics, as they affect the decision of consumers to return their products. The decisions are influenced by seven factors such as the lack of financial incentives, the lack of trust on recycling companies, the high cost to return the products, the lack of information concerning the location of recycling companies and others (Dixit and Vaish, 2015).

As stated by the authors earlier, it is a fact that those behavioral barriers affect the functions of organizations creating new operational barriers. Badenhorst (2016) developed a theoretical framework identifying four operational reverse logistics barriers in South Africa. Moreover, they examined whether specific practices could be implemented to alleviate those barriers.

Namely, those barriers were inconsistent product quality, limitations concerning the forecasting and visibility, insufficient IT systems and information, and developmental barrier (Badenhorst, 2016). Considering the findings of the study, the operational barrier that seems to stem from behavioral barriers is the inconsistent product quality. This result emerges from the fact that inconsistent product quality of returned goods is directly related to customers behavior.

At this point we need to examine the origin of developmental barriers that Badenhorst (2016) mentioned previously. The development of reverse logistics activities relies on transportation systems that have been already established for the activities of traditional logistics (Chan et al., 2010). As a result, the need for optimizing the current network is vital (Chan et al., 2010). The optimization entails additional cost, demotivating firms to invest in new distribution networks.

Therefore, firms utilizing their existing structures are not capable of gathering valuable information about their reverse logistics activities (Chan et al., 2010). Furthermore, Ye et al. (2013) mention that the optimization of distribution channels is also affected by other factors. Specifically, Ye et al. (2013) focus on barriers such as the lack of supply chain collaboration and the limited timeframe that turn network optimization into a process with zero benefits for the organization.

During our research we found several studies that were investigating reverse logistics barriers in a specific industry, considering the barriers that were identified in identical industries of other countries. A good illustration is the study of Chileshe et al. (2015), that investigated reverse logistics barriers in the construction industry of Australia. Even though Australia is a developed country, Chileshe et al. (2015) identified similarities in barriers with the construction industry of China which is considered a developing country. Guarnieri et al. (2016) did accordingly, analyzing reverse logistics barriers that affect the recycling process of e-waste in Brazil. Guarnieri et al. (2016) utilizing the Strategic

Options Development method investigated the barriers in Brazil, considering e-waste recycling barriers of Morocco, Colombia, Mexico and South Africa.

Withal, the most interesting part is the study of Chileshe et al. (2015) that examined the constraints that managers face when they implement reverse logistics. Those constraints are the lack of support from the top-management and customers, the high cost and the problem of communicating reverse logistics practices, time limitations concerning the implementation of reverse logistics activities (Chileshe et al., 2015).

Waqas et al. (2018) explored the barriers of reverse logistics in Pakistan utilizing the Structural Equation Modeling (SME) and the Delphi Method. In their study, they identified forty-seven barriers and classified them in eight categories, concluding that the categories of financial-economical and knowledge-experience barriers are those that mostly affect reverse logistics activities (Waqas et al., 2018). The most significant barriers found to be the lack of capital, the lack of experienced personnel, the lack of IT systems, the lack of social pressure and the existence of policies counter to reverse logistics practices.

Also, Waqas et al. (2018) made a comparison between the top reverse logistics barriers of Pakistan and the most important barriers of other countries, such as Brazil, China and India. The results showed that the criticality of each barrier is considered differently in each country (Waqas et al., 2018). However, it is vital to mention that three barriers were considered to be among the top ten barriers in terms of importance for all the countries. Those barriers were the "*lack of initial capital, the lack of skilled professionals in reverse logistics and the lack of technology and IT systems*" (Waqas et al., 2018, pp. 17-18).

Additionally, we examined studies that were investigating reverse logistics barriers not only in the same industry but also in the same country. Pumpinyo and Nitivattananon (2014) examined the barriers that affect waste management in Thailand for franchise and non-franchise separation centers. Analyzing the local context, Pumpinyo and Nitivattananon (2014) identified fourteen barriers and classified them in five categories: "*finance, market competition, management, labor, government policy*" (p. 7057).

Barriers related to finance and market competition were found to be the most critical for both types of enterprises (Pumpinyo and Nitivattananon, 2014). Even though those barriers apply for both of those types, franchise separation centers were found to be more

productive as they exploit economies of scale that enable them to be more profitable (Pumpinyo and Nitivattananon, 2014). Hence, we realize that firms with the same operations, facing the same barriers in the same context, do not always perform respectively.

Prakash et al. (2015) investigated the reverse logistics barriers in the electronic industry of India and classified them in five major categories. Specifically, Prakash et al. (2015) detected twenty-one barriers and categorized them in "*strategic, economic, policy, infrastructural* and *market barriers*" (pp. 93-94). Similarly, Prakash and Barua (2016) attempted to identify the barriers of reverse logistics in the same industry of India and classified the barriers in seven section. Four of those sections were similar with the categories that Prakash et al. (2015) studied.

Nonetheless, Prakash and Barua (2016) recognized thirty-seven barriers in total and introduced three new categories, namely "*organizational*, *marketing* and *technological*" barriers (pp. 1110-1111). According to Prakash and Barua (2016) the most critical barriers for the Indian electronic industry are those involved in the marketing category. This category entails the lack of customers knowledge about reverse logistics, the lack of coordination between supply chain actors and the uncertainty of returned products in terms of quality. We observe that even though two distinct studies investigate reverse logistics barriers in the same context, they imply different aspects concerning the aggregate and the classification of reverse logistics barriers.

Besides Prakash and Barua (2016) the issue of returned products quality is a matter of great concern to many researchers. Quality influences positively the decision of enterprises to recover value from returned products as they have the possibility to decrease the cost of raw materials (Meng et al., 2017). Quality levels vary since enterprises must deal with numerous products, consisting of several parts that are in different conditions (Meng et al., 2017). Meng et al. (2017) mention the importance of evaluating accurately the quality of products, as an ineffective assessment could cause detrimental effects such as increased expenses and resources. Therefore, Meng et al. (2017) state that enterprises must take into consideration the quality of returned products because it determines their recovery options.

Along with the issue of the quality, returnable packaging seems to be a crucial factor in reverse logistics implementation. Yusuf et al. (2017) investigated the barriers that

organizations face when they utilize "*returnable transport packaging*" in Nigeria and South Africa (p. 630). In addition, Yusuf et al. (2017) identified eleven barriers and examined their correlation with the annual turnover of firms. Considering turnover as a financial barrier, Yusuf et al. (2017) states that the decision of firms to adopt reverse logistics activities is influenced by the level of the annual revenue.

Consequently, authors believe that annual revenue is strictly related with the level of investments required for reverse logistics adoption. In contrast, the results showed that there is low correlation between the majority of other barriers and the annual revenue (Yusuf et al., 2017). Therefore, on the contrary with the perception of many researchers, we could conclude that in some cases financial barriers do not have significant driving power to influence organizational decisions and affect other barriers.

Recording the reverse logistics barriers that we encountered in the literature, we noticed that many researchers reported on uncertainty. Specifically, uncertainty in the context of reverse logistics as stated by García-Rodríguez et al. (2013) has two dimensions. One dimension of uncertainty entails issues concerning the volume, the variety and the quality of returned products (García-Rodríguez et al., 2013). The second, includes issues related to reverse logistics processes such as the assortment, the categorization and the dismantling of returned products (García-Rodríguez et al., 2013).

Even though each category requires a different approach, the authors state that both dimensions are obstacles that impede the effective production and financial planning of firms. Furthermore, the level of uncertainty in the reverse logistics context is affected by various factors. For instance, infrastructural or "*developmental*" barriers as reported by Bai and Sarkis (2013), apart from the operational problems they occur, they escalate the uncertainty in the context of reverse logistics (p. 307).

Apart from the production and the financial planning, uncertainty can affect various functions of organizations. As stated by Chan et al. (2010), the establishment of suitable IT systems to control and manage reverse logistics activities is challenging due to high levels of uncertainty in reverse logistics processes. Firms have the tendency to utilize the extant IT systems which control their forward logistics activities in reverse logistics (Chan et al., 2010). Consequently, the lack of appropriate IT systems does not enable firms to

track and register significant information regarding reverse logistics activities (Chan et al., 2010).

Although Mahadevan (2019) recognizes the importance of advanced IT systems, indicates that the lack of supply chain visibility is a crucial reverse logistics barrier. Mahadevan (2019) states that even though IT systems and collaboration in supply chains could potentially reduce several problems, the insufficient visibility within supply chains impedes the application of resolutions that surpass reverse logistics barriers.

Throughout our research, analyzing several studies on reverse logistics barriers we come up with some generic conclusions. We noticed that the barriers that organizations face are largely homogeneous. As Škapa (2011) states, regardless of the nature, the profitability and the complexity of activities, organizations do not confront different barriers from one another. In addition, reverse logistics barriers remain the same in developing and developed countries. However, barriers demonstrate different intensity in different contexts. For instance, we detected that particular barriers, such as the lack of financial resources, have a greater effect on developing countries. Lastly, it has been proved that many researchers have mistaken perceptions about several issues that concern this area of expertise. Realizing this fact, we understand the complexity of the topics that are addressed, and we apprehend the reason that there is a wide range of reverse logistics barriers in the literature.

3.4 Reverse Logistics Implementation Solutions

Reverse logistics barriers within organizations are not always given the significance and the antecedence needed (Waqas et al., 2018). This phenomenon is explained by the fact that the confrontation of barriers requires different levels of resources, organizational capabilities and actions (Waqas et al., 2018). Therefore, it is vital to determine the importance of reverse logistics barriers and the issues that entail, before attempting to implement successful reverse logistics activities.

The advantages that companies obtain from innovative solutions applied in reverse logistics can solely be perceived in the long run (Lee and Lam, 2012). Nevertheless, having

analyzed the drivers, we understand the need to investigate solutions and actions to mitigate reverse logistics barriers. In this section, we analyze all the propositions suggested by several authors to confront the issues that we examined in the section of reverse logistics barriers.

Moktadir et al. (2019) asserted that firms should do specific activities to respond and overcome reverse logistics barriers. Specifically, Moktadir et al. (2019) recommend firms to obtain "*proactive, active and reactive actions*" (pp. 20-23). Proactive actions refer to the redesign of processes and products so that firms can mitigate barriers such as the lack of progressive technological equipment and cost that relates to the operations of the firm (Moktadir et al., 2019). Active actions appoint the processes with which firms standardize and align their practices to resolve barriers. Those actions involve the confrontation of barriers such as the lack of managerial interest and support, the lack of knowledge about the regulations, the lack of environmental responsibility and the lack of comprehending favorable reverse logistics practices (Moktadir et al., 2019).

Lastly, reactive actions are those that entail the adjustment of transparent organizational conditions to control barriers. Specifically, those actions confront the lack of developed transportation and storage infrastructure. Furthermore, they address the uncertainty that is linked with economic factors, and R&D innovation that affects the recovery process of products (Moktadir et al., 2019). Especially the issue of uncertainty was mentioned multiple times in the literature of reverse logistics barriers, thus several authors investigated solutions to face its implications.

Bai and Sarkis (2013) state that uncertainty in the context of reverse logistics can be addressed by enhancing the flexibility of reverse logistics practices. Bai and Sarkis (2013) suggestion is that firms must keep higher safety stocks in inventories, establish new contracts and procure materials from a broader range of available suppliers. Furthermore, they suggest organizations to design modular products, make investments in automated processes and develop new competences. Altogether, the suggestions of authors can increase the capability of firms to respond faster, thus reducing the cost and time required to possible changes (Bai and Sarkis, 2013).

García-Rodríguez et al. (2013) claim that establishing frequent contacts with consumers can contribute to uncertainty reduction of returned products. Apart from this proposal,

García-Rodríguez et al. (2013) emphasize that companies should develop forecasting methods for product returns. Moreover, they claim that storing additional inventory can diminish problems caused by increased delivery times and product returns volatility. Finally, Lee and Lam (2012) agree that reverse logistics uncertainty can be eliminated through precise forecasts, appropriate planning and inventory control techniques.

Apart from the concern regarding reverse logistics uncertainty, authors highlighted the importance of operational barriers. Badenhorst (2016) mentions that even though many researchers explore barriers, only the minority of them investigate the practices to overcome barriers and enhance reverse logistics processes. Badenhorst (2016) proposed nine practices from the literature that firms could apply in response to operational reverse logistics barriers.

Utilizing a gap analysis and an opportunity analysis, Badenhorst (2016) compared the contribution of each practice and the difficulty of their implementation. The authors concluded that four practices can have great contribution to reverse logistics application. Those practices are "*establish clear policies for logistics*, *standardize the reverse logistics process, share information and collaborate with partners*, *establish a gatekeeper at the start of the reverse logistics process*" and can encourage firms to overwhelm operational barriers (Badenhorst, 2016, pp. 5-6).

Dowlatshahi (2012) studied how the warehousing function can affect the reverse logistics implementation. The author identified two basic prerequisites for the efficient warehousing operations. Initially, the awareness of firms about sorting procedures enhances warehousing function. Secondly, zone picking which is closely related with the collection of returned products plays a decisive role. Another critical factor is the party that warehousing operations are assigned to. Specifically, Dowlatshahi (2012) states that firms at an early stage should utilize their current warehouses. On the other hand, the author suggests that organizations should outsource their warehousing activities to third-party warehousing providers if they are not capable of exploiting them efficiently.

In addition, organizations must break down the total inventory cost, for both new and returned products. Moreover, emphasis should be given on the layout of warehouses that enables organizations to increase their productivity (Dowlatshahi, 2012). Lastly, the author

recommends that firms should establish their warehouses in convenient locations that provide access to customers and remanufacturing markets (Dowlatshahi, 2012).

Similarly, attempting to investigate how reverse logistics practices can successfully be implemented, Hsu et al. (2016) identified three reverse logistics strategies, "*green purchasing, green manufacturing and green packaging*" (p. 94). The first strategy entails the procuring of ecological materials and the recovery of products (Hsu et al., 2016). The strategy of green manufacturing promotes the redesign of manufacturing operations so that firms can replace the utilization of virgin materials with reused materials (Hsu et al., 2016). The third strategy, green packaging, promotes the reuse and the reduction of packaging, to diminish distribution cost (Hsu et al., 2016). Most of the literature presented in the following paragraphs suggest solutions focusing mainly on the first two strategies.

Significant requirement for the beneficial implementation of remanufacturing processes is the redesign of products, so that organizations meet specific standards that enable products to be remanufactured (El Korchi and Millet, 2011). This could be achieved by designing products to consist of certain modules and components (El Korchi and Millet, 2011). In addition, organizations must change the structure of their supply chain to accommodate the activities that are related with the remanufacturing process (El Korchi and Millet, 2011). El Korchi and Millet (2011) state that activities such as dismantling, product separation and cleaning, are factors that can potentially affect the product design.

Therefore, organizations should redesign their supply chains taking into consideration the structure, the activities and product design integrating remanufacturing processes (El Korchi and Millet, 2011). To this argument, Silva et al. (2013) complement that firms must improve all their processes simultaneously. A good illustration of what Silva et al. (2013) mention is that a potential improvement in cycle time without accelerating the recovery processes could lead to increased work-in-process products and time delays. Those factors affect the ability of firms to meet customer demands.

The issue of quality is another reverse logistics barrier that relates and impacts recovery processes. Meng et al. (2017) propose organizations to establish the concept of "*remaining useful life*" (p. 4725). As the authors claim, the implementation of this concept allows firms to estimate the profit that derives from recovered products and the cost of recovery processes in correlation with product quality. This concept also facilitates consumers to

assess the aggregate value of the products lifecycle, enabling firms to adapt their manufacturing and remanufacturing processes (Meng et al., 2017).

As we have noted in the preceding paragraphs, authors mention the importance of changing and redesigning the supply chain to implement favorable recovery processes. This undoubtedly requires effective collaboration between supply chain members. Therefore, we investigated applicable solutions that enhance supply chain collaboration in the context of reverse logistics. Mafakheri and Nasiri (2013) state that sharing authorities with supply chain partners and providing benefits to them, can enhance coordination and contribute to the successful selection of best reverse logistics practices. Ali (2017) countersign this statement, declaring that sharing risks, costs and rewards with partners, organizations can align their goals and reformulate the relationships with their partners.

Pumpinyo and Nitivattananon (2014) disclose that fostering a climate of trust with supply chain partners and building strong relationships with customers could also contribute to the successful implementation of reverse logistics. Having the same philosophy, Hazen et al. (2015) suggest building trust and close collaboration with reverse logistics partners can enhance their capability to generate new ideas that could potentially boost the value of reverse logistics. Ali (2017) declares that controlling opportunism among the supply chain partners can reduce the uncertainty in the context of reverse logistics. Opportunism could be controlled by settling rules and regulations that will be validated from contracts, supervising partners behavior and providing incentives when their objectives are contradictory (Ali, 2017).

Waqas et al. (2018) suggest that organizations' personnel should be driven from strong collaboration in every level including the top management. In addition, Waqas et al. (2018) propose the prioritization of solutions, classifying the barriers of primary importance as organizations are not capable of resolving all the barriers alongside. We observe that the concept that the author mentioned has already been used several times in the literature of reverse logistics barriers. As it follows, this concept has not been widely applied in finding the most effective solutions for reverse logistics barriers.

The first study that analyzed and prioritized the most effective solutions for reverse logistics implementation using the AHP approach was conducted by Sirisawat and Kiatcharoenpol (2018). The authors identified fourteen solutions in total, however it is

important to mention the most critical ones. Hierarchically, the most significant solution regarding reverse logistics activities is the development of "*top management awareness"* (Sirisawat and Kiatcharoenpol, 2018 p. 314). This improvement enables organizations to acknowledge the benefits of reverse logistics practices and the competitive advantages against their rivals (Sirisawat and Kiatcharoenpol, 2018).

The second solution that Sirisawat and Kiatcharoenpol (2018) classified as critical, is the establishment of reverse logistics practices as a "*part of their sustainability program*" (p. 314). Moreover, those practices can contribute to sustainable development. Finally, the authors suggest that organizations should invest in reverse logistics technologies and enhance the current ones to support reverse logistics activities, integrating other supply chain actors (Sirisawat and Kiatcharoenpol, 2018). Likewise, Prajapati et al. (2019) prioritized the solutions to overcome reverse logistics barriers. In this study, Prajapati et al. (2019) identified twenty-one solutions in the literature. Similarly, our attention is given to the three that were classified as most effective.

The first solution that Prajapati et al. (2019) suggest is the establishment of a policy framework that regulates the processes of handling product returns. The other two solutions that organizations could realize are the "*integration of reverse logistics cost to product cost*" and the "*design of products for environmental sustainability*" (Prajapati et al., 2019, p. 10). Apart from the difficulty of implementing those solutions, we believe that the latter suggestions are more applicable and practical compared to the first which is dependent on external factors.

Peña Montoya et al. (2015) indicate that during the initial stages of the reverse logistics implementation, firms must confront the aggregate of both internal and external barriers. Peña Montoya et al. (2015) mention that organizations can encounter more effectively the internal rather than the external barriers due to lack of power and resources. However, organizations do not focus on the internal barriers, especially when they deem that external barriers have more influence on them.

Guarnieri et al. (2016) state that proper implementation of reverse logistics requires that companies take specific actions. Guarnieri et al. (2016) classified those actions in four categories, namely "*strategic, economic, environmental and social actions*" (pp. 1113-1114). The most important category according to authors in this study, is the one related

with strategic actions. Guarnieri et al. (2016) propose that firms should control and agree to cooperate only with those affiliates that meet specific standards set by them. Furthermore, Guarnieri et al. (2016) suggest that organizations should develop strong partnerships with local governments, as they could obtain favorable agreements in the long-term, such as tax reductions schemes.

Although Guarnieri et al. (2016) deem that strategic actions are the most dominant to apply reverse logistics effectively, the center of attraction for many authors in the literature are the actions regarding economic and environmental performance. Initially we present the solutions proposed by authors that boost the economic performance and afterwards the solutions that enhance environmental performance.

Lee and Lam (2012) mentioned the significance of IT capabilities in reverse logistics performance. Advanced IT systems bring data that improve the service quality and the economic performance of reverse logistics, hence Lee and Lam (2012) urge companies to apply and invest in IT systems. However, Chileshe et al. (2015) state that firms must prepare a cost analysis to illustrate the overall picture of the investment before implementing reverse logistics activities.

From another point of view, Halldórsson et al. (2009) state that the return rate of products is barely determined by firms. Therefore, they propose the establishment of standards to evaluate the performance of reverse flows on a daily basis. Apart from the evaluation of the return rate, Mafakheri and Nasiri (2013) suggest that organizations must focus on remarketing to escalate the sales of remanufactured products and gain market share. Khor et al. (2016) agree that remarketing is a crucial organizational activity to achieve new earnings and boost the economic performance in terms of revenue and sales.

Hsu et al. (2016) state that establishing a sustainable development in the context of reverse logistics, firms can increase their environmental performance. Hsu et al. (2016) mention that this is a time-consuming procedure that can benefit organizations, gaining customers' confidence and boosting their prestige. In addition, Khor et al. (2016) claim that environmental performance can be enhanced by implementing recovery activities. However, this is not possible if there is a deficiency of a stable regulatory framework that determines reverse logistics processes (Khor et al., 2016).

Mafakheri and Nasiri (2013) claim that returned products' quality affects the environmental performance of reverse logistics. Particularly, low-quality products generate more waste and eliminate the quantity of the materials that could be recycled. Clean production according to Pumpinyo and Nitivattananon (2014), is the key to enhance the environmental performance of firms avoiding waste that possibly cannot be recovered. However, as Pumpinyo and Nitivattananon (2014) state, clean production requires the financing of advanced technological equipment.

In the previous sections we introduced a great number of strategic, economic and environmental solutions that organizations could put into action. Taking into consideration that several behavioral barriers were identified in the reverse logistics barriers section, it is vital to mention the social actions that companies should take to implement successfully the practices of reverse logistics. Dixit and Vaish (2015) mention that behavioral barriers should be confronted with a two-step plan.

Initially, firms should select the appropriate product collection models among the four most recognized in the literature. This is a strategic decision that enables customers to recycle their products (Dixit and Vaish, 2015). They believe that firms should provide economic, environmental and social incentives to motivate consumers to participate in recycling. In that way, organizations can regulate customers' behavior indirectly (Dixit and Vaish, 2015).

Awareness about the preferred collection methods and the incentives that consumers desire, enables organizations to overcome behavioral barriers and implement successful reverse logistics strategies (Dixit and Vaish, 2015). Mafakheri and Nasiri (2013) agree that granting economic benefits can motivate customers and increase the quantity of returned products. Furthermore, Mafakheri and Nasiri (2013) propose that building good customer relationships could preserve customers' product returns at a satisfactory level.

Organizations that inspire societies to support reverse logistics activities, sharing information with public institutions and establishing training programs that inform people about the benefits of reverse logistics practices, are more likely to realize rewarding practices (Pumpinyo and Nitivattananon, 2014). Furthermore, Ali (2017) acknowledged that the creation of public awareness campaigns about the reverse logistics benefits via media and communication actions could be effective (Ali, 2017).

In general, Chileshe et al. (2015) state that organizations need to augment information exchange with their stakeholders and point out the significance of recovering products. As mentioned by previous researchers, this could be accomplished by communicating the value of reverse logistics activities but also could be promoted by educating and training the personnel of firms (Chileshe et al., 2015).

Attempting to identify solutions for reverse logistics barriers, we have observed that many researchers point out the need for government support. For instance, Ali (2017) supports that regulation enforcement with strict ratifications would compel organizations to conform with legislative frameworks and avoid the high cost of non-compliance, adopting reverse logistics practices. Chileshe et al. (2015) indicate the significance of "*government support*" because it stimulates firms to apply reverse logistics processes providing economic motivations (p. 195).

Despite the fact that governmental support is vital in the general context of reverse logistics, we believe that organizations cannot do more than putting pressure on governments. As García-Rodríguez et al. (2013) stated, successful implementation and value creation in reverse logistics can only be achieved if companies focus on supply chain "*innovation, integration and coordination*" (pp. 585-586).

At this point, having already mentioned how supply chain coordination can contribute to reverse logistics, we emphasize on supply chain integration. García-Rodríguez et al. (2013) claim that integrating the activities of various departments is critical. In addition, the authors propose the establishment of relationships between the logistics and the marketing department because they can obtain new economic benefits for organizations. Moreover, García-Rodríguez et al. (2013) suggest the integration of forward and reverse logistics departments to reduce the overall cost of those operations. Mahadevan (2019) agrees that integrating reverse and forward logistics functions is an efficient strategy to manage reverse logistics activities. This integration is vital because organizations should emphasize on "*post sales services*" in order to assess and transform recovery processes based on products lifecycle (Mahadevan, 2019, p. 488).

Managers are also a source of value creation, competitive advantages and thus, they must not neglect the significance of reverse logistics operations (Hsu et al., 2016). As reported by Hsu et al. (2016), managers must focus on adopting eco-innovative and eco-friendly

practices that could accommodate reverse logistics implementation, instead of facing reverse logistics as a source of additional cost. According to Raci and Shankar (2005), managers should prioritize the most critical reverse logistics barriers and put emphasis on resolving them. Moreover, the resolution of those top barriers can drive changes in other reverse logistics barriers (Raci and Shankar, 2005).

According to Abdulrahman et al. (2014), "*knowledge and expertise*" and "*top management commitment*" are the most powerful factors that affect reverse logistics implementation (pp. 466-467). Especially the engagement of top management in reverse logistics activities can demonstrate the benefits of their application in the long-term (Abdulrahman et al., 2014). Consequently, Abdulrahman et al. (2014) highlight that top managers should participate in training that will develop further their expertise in reverse logistics.

The importance of IT systems is indisputable in the reverse logistics context. Badenhorst (2016) states that investing in IT systems can solve numerous problems that managers face towards reverse logistics implementation. Specifically, RFID and GPS technologies, bar codes and different types of sensors can reduce the complexity of decentralized organizations, supporting the real-time tracking of products and materials, enhancing information sharing (Badenhorst, 2016). Dowlatshahi (2012) agrees that information technology enables data exchange and the utilization of additional technologies, could boost the traceability of items.

Furthermore, IT systems can increase the transparency between the firm and its suppliers, facilitating the handling of reverse logistics activities (Mafakheri and Nasiri, 2013). Generally, those systems boost the visibility in supply chain operations and offer great economic benefits for organizations. Moreover, IT systems can eliminate holding and shortage costs (Badenhorst, 2016). Hazen et al. (2015) suggest the improvement of information system capabilities and the formulation of financial and operational metrics that measure the performance of reverse logistics. Those metrics can enhance and establish reverse logistics processes in organizations. Dowlatshahi (2012) proposes that controlling warehousing processes using computer technology eliminates the time required to execute them in the long-term.

Aitken and Harrison (2013) state that IT systems allow organizations to codify and standardize their transactions and processes, enabling the transmission of knowledge in

intra-firm networks. According to Chan et al. (2010), IT systems can gather useful information from customers concerning problems and malfunctions of returned products, providing firms the capability to improve their remanufacturing operations. In addition, they boost remanufacturing functions detecting the residual value of goods and parts that can be sent back in production lines (Chan et al., 2010). Additionally, IT systems accelerate managers' decision-making regarding inventory issues. Lastly, those systems support purchasing decisions concerning materials that will be forwarded to remanufacturing functions (Chan et al., 2010).

3.5 Literature Synopsis

After summarizing the most critical parts of the literature concerning reverse logistics, it is mandatory to clarify the connection between the information gathered and the scope of this paper. Initially, there were identified plenty of reverse logistics barriers. Moreover, there were different approaches and different classifications among the studies. Therefore, there was a need to reduce the complexity, keeping the most critical and valuable barriers. To begin with, the most popular categories were isolated from the rest of the literature, rendering them more manageable and ideal for the scope of this paper.

Despite the fact that a narrow frame of barriers was formulated, it was still difficult to cope with the plurality of barriers. This is due to the fact that the literature entailed barriers that were referring to both developing and developed countries. Given the fact that the primary dataset concerns Greece which is considered a developed country, the categories and the barriers were narrowed even more excluding those that refer to developing regions. On the other hand, attempting to keep a broad perspective on this study, the refinement of reverse logistics barriers using industrial criteria was not considered. As a result, seven categories emerged as the most descriptive and crucial among the literature.

The first, is the technological category which has to do with the lack of equipment, IT systems and generally latest technologies. The second group is governmental barriers that include the laws and legislations that support reverse activities. Next, is the infrastructural category which refers to the absence of infrastructure within and outside organizations that

facilitate reverse logistics activities. Fourth, is the collaboration and support group of barriers. This category implies the barriers that relate to the unwillingness of supply chain players to collaborate with each other.

Then, follows the financial category which involves economic barriers such as the lack of funding. Sixth, is the organizational category which received the least attention in the literature review. However, this category includes a great number of reverse logistics barriers. In this study, the organizational category refers to barriers such as the lack of organizational structure, low involvement from top management and resistance to change. Lastly, is the societal category which illustrates the lack of awareness over reverse practices by the society. The above categories are depicted Table 2 and will be utilized as a tool in the primary data analysis.

Category	Barriers
Technological	• Lack of most recent technologies • Lack of technological equipment • Lack of IT systems
Governmental	• Lack of laws, legislation, and directives for EoL products • Lack of governmental supportive policies
Infrastructural	• Lack of infrastructure and facilities • Lack of public infrastructure
Collaboration and support	• Lack of collaboration/coordination with partners • Lack of collaboration/coordination with 3PL • Lack of collaboration with customers
Financial	• High initial and operation cost • Expenditure to collect and store used products

Organizational	• Lack of proper organizational structure • Lack of education/training about reverse logistics practices • Low involvement from top management • Resistance to change
Societal	• Lack of societal consciousness/awareness • Lack of education over reverse logistics benefits

Table 2: Reverse logistics barriers categories

In addition to the previous process a similar effort was made to narrow down the reverse logistics benefits to address the scope of this paper. After examining the literature, we identified various benefits that can potentially drive reverse logistics implementation. However, this paper adopts the perspective of García-Rodríguez et al. (2013) who consider only environmental and financial as the most dominant and exclusive drivers towards reverse logistics implementation. Therefore, financial and environmental benefits are the only drivers that are going to be used in the analytical process.

In respect to reverse logistics implementation solutions, the literature enabled the research to steer the development of the framework into the right direction. In particular, acknowledging the solutions proposed by the literature, we were able to identify the gaps and the issues needed to be addressed after concluding the analysis. In addition, it provided a solid basis to spark our own reflection in the way that the reverse logistics implementation process should be treated.

4. Methodology

4.1 Literature Search

To provide a brief literature review about reverse logistics processes, barriers, solutions and connect the existing literature with the purpose of our research, we conducted a critical literature review. Critically reviewing the literature enables authors to organize effectively their studies and assess the utility of specific theories and concepts (Saunders et al., 2015). In addition, critical reviews reveal the expertise of authors on particular topics. Moreover, they entail the limitations of a subject, the most dominant theories and approaches that historically have been used by other authors (Saunders et al., 2015). Lastly, critical reviews allow authors to familiarize themselves with issues that relate to their research and explore new trends (Saunders et al. 2015).

As mentioned earlier, critical reviews could be used for several purposes and thus, they have several types. Saunders et al. (2015) suggest that the types of critical literature review are five, namely "*integrative, theoretical, historical, methodological and systematic"* (p. 74). The most prevalent among authors is the systematic review, which examines the existing literature and comes up with results concerning what we already know (Saunders et al., 2015). However, in our study we conducted an integrative review as this type enabled us to organize and criticize the literature to develop new propositions, fulfilling the objective of our research question.

Apart from the previous classification, Elgaard et al. (2015) suggest the exploratory literature review as a different approach. The goal of this approach is to analyze and shed light on certain issues, exploring definite parts of the literature that relate to the research question. Nonetheless, that requires that the authors are continuously focused solely on findings that potentially respond to the research question, avoiding analyzing irrelevant data (Saunders et al., 2015). Considering that our literature review is following this pattern, we could also characterize it as exploratory.

To remain critical throughout our literature review we adopted two approaches, the *"critique of rhetoric"* and the *"critique of objectivity"* (Saunders et al., 2015, pp. 77-78).

The first approach facilitated us to develop critical thinking, concerning the beliefs and the perceptions of the authors, and reflect them with reasonable arguments. The second approach allowed us to observe and identify insights that are objectively dominant and valuable according to several authors in problem solving. Also, it is vital to mention that we clarify in the literature review when we express our opinion and when we refer to actual facts.

As Saunders et al. (2015) state the most frequent structures of literature reviews are three: *" a single chapter, a series of chapters, literature review throughout the project"*. (pp. 79-80) Taking into consideration that in our study we adopted an inductive approach, we deem that the third structure is the most suitable for our study. Despite the fact that we introduce four thematic sections of literature review before analyzing our data, we continue to explore and analyze the bibliography throughout the study to answer our research question.

In this study, the literature review was organized in four stages. Initially the first stage sets the parameters of our research. We defined English as the preferred language for publications, so that our bibliographic sources are accessible from everyone. Furthermore, we limited the literature search in articles published in the last twenty years, but we have not limited the geographical origin. The more recent the articles that authors use in their research, the more updated they are regarding the issue they study (Saunders et al., 2015). We decided not to set geographical parameters because as noticed in previous studies, solutions applied in a specific context can potentially be applied to other areas.

The last parameter that we set was the type of literature that we would examine. We decided to focus on peer reviewed articles and a limited number of books. This decision derives from the fact that peer reviewed articles are considered to be the most valuable source of literature as they are both written and assessed by specialized authors (Saunders et al., 2015). Books provide readers the capability to acquire broad knowledge on specific subjects and that's why we agreed to establish our methodology based on them (Saunders et al., 2015).

The second step was to define the search terms that we would investigate. Considering our research question, we determined Reverse Logistics Barriers, Reverse Logistics and Reverse Logistics Implementation as the most decent keywords to identify suitable articles. Afterwards, the next action was to determine our bibliographic sources. The main

sources that we used were full-text online databases, namely Business Source Complete (EBSCOHOST), Browzine, ScienceDirect and the Library Search (LIBSEARCH) of Copenhagen Business School.

Apart from the online databases, we used Google Scholar, which is a specialized search engine, commonly accepted by the research community. By researching the literature on such platforms, we ensured that we had all the necessary data needed to integrate necessary bibliographic references in our study. For this procedure we used Mendeley, which is a citation software, that assisted us to insert all the references based on the formal requirements of Copenhagen Business School.

The last step of the literature search design was to set the criteria for the selection of the appropriate articles. Evaluating the relevance and the quality of other studies in comparison with our research question, was a difficult process. However, as Saunders et al. (2015) state, this process allows authors to exclude studies and theories that have ambiguous findings. That way authors are enabled to integrate in their literature reviews only essential parts that correlate with their research question. At a first glance, we observed that many studies were based on several hypotheses, including multiple limitations and high complexity. Therefore, we decided to keep the studies that have a clear methodological background, excluding the rest.

To ensure that the articles are familiar with our research question, we previewed their context reading the abstract. In some cases where the relevance of the content was questionable, we also read the section of the findings. Specifically, *"previewing"* is a critical process by which authors filter the importance of specific bibliographic references (Saunders et al., 2015, p. 75). Utilizing this methodology, we managed to distinguish fifty-five valuable articles for our study, from a total of eighty-nine articles. However, in this aggregate are not included the articles that we mention in other sections of this study and the books we studied to do the methodological section.

4.2 Philosophical Worldview and Theory Development

To establish the methodological background of this study we adopted the "*research onion*" diagram that Saunders et al. (2015) proposed (pp. 122-124). Following the structure of this research approach, the center of the onion involves the data collected to conduct our study. However, the selection of the appropriate techniques to analyze those data is dependent on the external layers of the onion. Therefore, we initially present the philosophy that we follow in this research and then we describe how we approached the theory development.

Saunders et al. (2015) state that "*research philosophy*" characterizes the perceptions, the ideas and the opinions of the authors regarding the evolution of knowledge on a specific subject (p. 124). Authors throughout their research make "*epistemological, ontological and axiological*" assumptions (Saunders et al., 2015, pp. 124-125). Specifically, epistemological assumptions are those that consider what knowledge is legitimate whereas ontological assumptions refer to how authors define reality (Saunders et al., 2015). Lastly, axiology encloses the value of ethics during a research.

Those assumptions can be further classified as subjective or objective. A subjective researcher deems that the social reality is formed depending on the social interactions of individuals (Saunders et al., 2015). In contrast, an objective researcher acts like an external observer of the social reality and investigates the prevailing social view. Saunders et al. (2015) state that in-depth investigation of those assumptions enables authors to introduce a creditable philosophy in their studies.

Defining our assumptions for this research, we concluded that our main goal is to focus on our research question and provide practical solutions in the context of Reverse Logistics. We defined as legitimate (epistemological assumptions) the Reverse Logistics practices, processes and solutions leading to the successful implementation of Reverse Logistics. Also, we deem realistic (ontological assumptions) anything that is clearly practical in the context of Reverse Logistics. Finally, we consider as ethical (axiological assumptions) the studies of the researchers that had the ambition to add value in the context of Reverse Logistics, utilizing solid theories to develop new frameworks and propositions.

In addition, the major research philosophies are "*positivism, critical realism, pragmatism, interpretivism and postmodernism*" (Saunders et al., 2015, p. 135). Each philosophy stands for a distinct approach to theory development. For instance, interpretivism represents the researchers that seek to discover new theories and social realities from scratch, without accepting that there are social rules applying to all social actors (Saunders et al., 2015). Taking into consideration our assumptions, we investigated the ideal philosophy that stands for our study. As a result, we ended up that the philosophy that represents this study is pragmatism.

The philosophy of pragmatism considers how a research can provide practical outcomes concerning a problem that takes place in a particular context. Moreover, this approach does not limit how authors can develop their methodology (Saunders et al., 2015). Pragmatism also compromises the gap between subjectivism and objectivism (Elgaard et al., 2015). In this case, pragmatism allowed us to concentrate on our study, collecting data and using the methodological tools that were necessary to propose a solution, without worrying about the foundations that our philosophy represents.

Having determined our research philosophy, we established the method that would enable us to develop the theory. There are three approaches to develop a theory, namely "*abduction, deduction and induction*" (Saunders et al., 2015, pp. 144-145). However, deduction and induction seem to be the most common approaches in the literature. Deduction is used when researchers examine the literature to test if a particular theory or framework applies to a case or a problem. On the contrary, the induction approach applies when authors examine a case analyzing aggregate data in order to develop new theories and frameworks. Finally, when authors attempt to reshape current theories and test any possible modifications, the ideal approach is abduction (Saunders et al., 2015).

As it is previously mentioned, our ambition was to explore the Reverse Logistics barriers and contribute to the literature providing practical solutions. Therefore, we decided to select the inductive approach as it enables us to discover barriers through data analysis and suggest beneficial propositions to organizations. Applying this approach, we had the capability to analyze both quantitative and qualitative data. In addition, an inductive approach is justified when the number of topics researched by authors is relatively limited (Saunders et al., 2015). Moreover, the abductive approach would be also interesting

because the findings of our study could be assessed. Nevertheless, the limited time frame to complete our study did not allow us to choose this approach.

4.3 Research Design

In the previous section we identified our philosophy and our approach to theory development which are the outer layers of the research onion. In this section we analyze our research design that enabled us to answer the research question of the study. Specifically, we clarify our methodological choices, the purpose and the strategy for our research design.

Initially, it is vital to mention the difference between quantitative and qualitative researches. Quantitative research entails both "*numeric*" and "*non-numeric*" data (Saunders et al., 2015, p. 165). Non-numeric data derive from surveys, questionnaires and graphs and are usually converted to numeric data during the process of data analysis. On the other hand, qualitative studies are conducted with data that derive from interviews (Saunders et al., 2015). As expected, authors are allowed to combine those research methods in order to answer their research question.

Our ambition was to adopt a mixed method research to collect both qualitative and quantitative data. We deem that this method would allow us to provide a deeper solution to the research question of the study. For that reason, we explored companies that have already implemented reverse logistics practices and that could potentially share with us quantitative and qualitative data. We sent emails to more than twenty companies asking to cooperate with them and gain access to valuable data. Beyond some companies that rejected our proposal, others that were interested in our research, informed us that they were unable to provide quantitative data.

Consequently, recognizing that we would be able to collect exclusively qualitative data, we decided to conduct a mono method qualitative research. By no means did we underestimate the importance of mono method studies. However, we deem that quantitative data would enable us to analyze how effective are companies' solutions to reverse logistics barriers. Saunders et al. (2015) state that qualitative studies are often used

by authors that adopt the "*realism and pragmatism*" philosophy (p. 168). Further, qualitative research design entails several practices by which authors can collect and analyze data (Saunders et al., 2015). Nonetheless, we mention the exact practices that we selected for data analysis in the following sections.

Having clarified our methodological choice, we need to interpret the purpose of our research design. The research design is defined by four separate categories that could also be combined in a single study. Those categories are "*exploratory, explanatory, evaluative and descriptive*" studies (Saunders et al., 2015, p. 174). Specifically, exploratory studies focus on investigating an issue in a specific context, whereas explanatory studies tend to investigate the correlation between certain variables. Evaluative research design is used by authors that attempt to assess how effectively strategies and processes are implemented. At last, descriptive studies aim to examine the sequence of events that relate to a case (Saunders et al., 2015).

Based on the research question, we conclude that the purpose of this research is purely exploratory. As we already mentioned, our ambition was to explore the barriers of reverse logistics in a specific context and examine the solutions that organizations implement, so that we could contribute to the literature proposing practical solutions. This kind of approach was ideal considering that it provides authors the capability to be flexible, in case the results of their study show that they need to explore new parts of the literature (Saunders et al., 2015). However, the study could also have an evaluative nature if we had the opportunity to analyze quantitative data, which would reveal how effective businesses solutions are against the reverse logistics barriers.

To conduct our research, it was also vital to determine our research strategy. As Saunders et al. (2015) mention the research strategy is the design of procedures that allow authors to answer research questions and create linkages between their philosophy and data analysis. Elgaard et al. (2015) state that usually there are barriers between philosophical backgrounds and their strategies. Therefore, we understand that choosing a strategy presupposes its harmonization with the philosophy we have chosen. The most common strategies found in the literature are: "*Experiment, Surveys, Archival and Documentary Research, Case Study, Ethnography, Action Research, Grounded Theory and Narrative Inquiry*" (Saunders et al., 2015, p. 178).

Experiments and surveys are applicable in studies that adopt a quantitative research design and thus we cannot consider them as appropriate strategies in our research (Saunders et al., 2015). Action Research could be an interesting approach, but it requires a continuous testing of findings and planning of actions, which was not feasible at this time. Similarly, Grounded Theory could be suitable because this strategy entails the inductive approach to theory development. However, as this research strategy is linked with the philosophy of interpretivism and since another philosophical approach was chosen, we could not embrace it.

Seeking to identify the most suitable strategy for this research, we concluded that Case Study is the most appropriate to answer our research question. Case studies enable authors to investigate comprehensively a topic in a "*real-life setting*" and acquire valuable knowledge in a particular context (Saunders et al., 2015, p. 184). According to Elgaard et al. (2015), case studies analyze multiple places and events that can range from businesses and individuals to societies and countries. Furthermore, Saunders et al. (2015) state that authors need to determine their case strategy, namely how many case studies will be analyzed. In our study, we investigate the context of reverse logistics in Greece obtaining data from three different companies.

Even though we could consider the research in a specific country as a single case, the fact that data were collected from three companies, led us to characterize our research as a multiple case study. Elgaard et. al (2015) claim that decisions of authors to select a single or multiple case study, stems from several factors. Depending on these factors, Elgaard et. al (2015) categorize case studies into four types: "*illustrative, typical, pragmatic, purposive*" (p. 169). Our case study is purposive as we selected three distinct companies in the same geographical context to investigate patterns on reverse logistics barriers and solutions. As a result, the unit of analysis in this study will be done at a company level. The small number of cases enabled us to emphatically manage the data we collected and assess the generalizability of our findings.

4.4 The Time Horizon, the Ethics and the Quality of the Research Design

Having laid the foundations of our research design, it is important to mention the time horizon that this research was conducted. Saunders et al. (2015) emphasize that there are two different cases, "*cross-sectional*" and "*longitudinal*" studies (p. 200). Cross-sectional studies investigate an issue at a specific time margin, while longitudinal studies explore a topic for a long period of time. This means that cross-sectional studies have specific time constraints to draw significant conclusions, whereas longitudinal studies give authors the opportunity to alter their studies based on findings that emerge during their research (Saunders et al., 2015).

Taking into consideration the time constraints, we realized that analyzing the collected data in a longitudinal manner was not feasible. Consequently, we decided to conduct a cross-sectional study. As Saunders et al. (2015) state, this type of study is the most common approach among students and experts that attempt to analyze a phenomenon in a certain period. Also, Saunders et al. (2015) state that the most practical research strategies in cross-sectional studies are surveys and interviews because data can be collected quickly. Having already determined interviews as our data collection method, we concluded that this type of study facilitates our research.

In parallel, it is significant to mention the ethics that characterize our study. As Saunders et al. (2015) mention, research ethics indicate the principles that describe authors' behavior throughout the research. In our research, we safeguarded the voluntary participation of the interviewees in the data collection process. In essence, we did not put pressure on individuals to participate in the research that could potentially compromise the integrity of the data. Furthermore, we informed the participants that we could ensure the anonymity of their personal data in case they do not want to be disclosed.

Probably the most important moral principle we set was that the data received, would be analyzed responsibly and accurately, without intervening in them. Throughout our research, participants were treated with respect and honesty, and were assured that we would analyze the data they gave us as objectively as possible. In general, we embraced

the deontological view which means that our research would be conducted based on the principles and the rules we had already set.

That means that we needed to ensure the quality of our study more widely. Saunders et al. (2015) declare that ensuring the quality of a research, eliminates the probability to reach wrong conclusions. Initially, we had to assure the external validity of our study. Specifically, external validity refers to the capability of authors to generalize the outcomes of their studies to another related context. For this reason, after the section that the theoretical framework is proposed, we check the external validity of our study. More information on how the external validity was assured is given in the section of conclusions.

Authors conducting qualitative researches usually struggle to prove that their research leads to qualitative conclusions, as they mostly collect data from a single interviewee (Saunders et al., 2015). Realizing that we need to collect data from multiple sources, we decided to collect data from as many companies as possible. The fact that we managed to collect data from three interviews reinforces both the internal reliability and the external validity of our study, as those data enriched our insights and enhanced our capability to generalize our findings.

The data collection process presupposed some particular steps. We originally sent emails to let the potential participants know the purpose of our research and how they could contribute to it. Then, we had telephone conversations with those who showed interest in participating, and we informed them in detail what data we would like to provide us. The latter process enhances the credibility of the research (Saunders et al., 2015). Being external researchers, the process of persuading the interviewees to participate in our research, was difficult and time consuming as we expected. However, being external researchers helped us to ensure the quality of the study, enabling us to be more objective than we would have been if we were working in one of these companies.

Interviewing individuals from diverse cultures can reduce the reliability of study (Saunders et al., 2015). Nonetheless, in this case the above statement does not apply as the aggregate of interviewees and interviewers originate from Greece. Therefore, such problems that could potentially affect the reliability of the research, cannot arise. To ensure the collection of a rich dataset before conducting the interviews, we studied in-depth the literature that relates to reverse logistics. That provides us the capability to develop questions that will

draw important data. Specifically, open questions were used, motivating interviewees to analyze their thinking and give useful information. Additionally, closed questions were used when investigation of a particular topic was taking place.

At this point it is important to mention that interviews were conducted in Greek language. Although interviews were audio-recorded, we had to translate them in English language to facilitate our research. Specifically, we transcribed the interviews in Greek language and then we translated them in English language.

We understand that this process is daunting since wrong translation could bring misleading data which in their turn can affect the quality of the research. Due to the different ways of writing a sentence (syntax) between Greek and English, doing a word-to-word translation was not possible. However, we can assure the readers of the research that the English translation fully conveys the meaning of the Greek sentences.

4.5 Data Collection

As previously stated, the method selected for primary data collection is the interview. The interview is a process where the interviewer is required to establish a harmonious environment and ask explicit and comprehensive questions that the interviewee is requested to reply to. Moreover, the interviewer is required to listen carefully to the answers in order to understand them and manage meticulous analysis (Saunders et al., 2015). The approach of the interview allows the collection of decent and accurate data that are also applicable to research objectives.

There are three categories of interview. On the one hand, interviews can be standardized and formed around structured questions. On the other hand, they can have an informal character moving around unstructured conversation. Apart from the two categories mentioned above, there is a third category where the degree of formality can vary. Each type of interview is designed to collect data for analysis and support a research topic (Saunders et al., 2015).

In the first category which is called structured or standardized interview, the questions are fixed and remain the same for every interviewee. This process involves the reading of questions and the recording of every answer in a standardized way. This method is mostly used in deductive studies because the collected data can easily be quantified. In addition, structured interviews can also fit in explanatory and evaluative studies.

The second category involves the semi-structured interviews where the interviewers act according to a theme, formulating basic and crucial questions that should be addressed. However, the order of the questions is not strict and is determined by the flow of the conversation. Moreover, some questions may be bypassed and replaced by others, giving the interview a more natural flow, and allowing the interviewer to tailor the interview to each interviewee. The data that are collected from this type of interview are suitable for qualitative analysis. Therefore, this type is suitable for explanatory and evaluative studies and less frequently for exploratory studies.

The third type is the most informal type and is called unstructured or non-standardized interview. In this situation there are no questions on the agenda but there is a distinct topic. Additionally, there is no guidance and the conversation are allowed to freely develop. This is the most frequently used type for exploratory studies but works for evaluative studies as well.

The type of interview selected for this research is the semi-structured interview. This decision is based on the purpose of the research, the nature of the data collection and the time required to complete the process. Specifically, structuring and standardizing the interview will limit the depth of the answers. Taking this into account and with an eye to explore areas that we didn’t consider before, we decided to use the semi-structure approach.

Furthermore, the selection of semi structured interviews was enhanced by the fact that the majority of our questions were open ended and required further investigation. In addition, the order and the set of questions were needed to be slightly modified based on the interviewee to ensure better results. On the other hand, considering the limited time of our interviewees, lengthy interviews would not be feasible thus, the unstructured method was avoided.

The last thing that needs to be mentioned before moving to how the interviews were prepared and how data were analyzed, is the instruments used to conduct the interviews. Telephone and internet applications were utilized due to travelling difficulties and geographical distance. In particular, the interviews were conducted from Denmark, Copenhagen while the interviewees were located in Greece. Furthermore, disadvantages such as the lack of opportunities to observe facial expressions, body language and the difficulty of establishing rapport with participants were considered (Saunders et al., 2015). Nevertheless, this type of communication allowed interviewees to select a convenient time of the day, providing them the opportunity to take the interview in a comfortable environment.

4.6 Thematic Analysis

For the data analysis, the Thematic analysis approach was selected. This is a common method mostly utilized in qualitative studies. It is characterized as systematic because it occurs in a methodical and logical course. Moreover, this method applies to either large or small qualitative dataset. On the other hand, it is defined as flexible because it is not bound to a specific philosophical view. In particular, Thematic analysis is an independent analytical technique and not a branch of specific methodological approach. In addition to this, thematic analysis can be applied to both inductive and deductive theory development approaches (Saunders et al. 2015).

Specifically, in the deductive approach the themes derive from theory and are used to examine the collected data. On the contrary, in the inductive approach the themes are formulated by primary data and examine the existing theory (Saunders et al., 2015). The main goal of Thematic analysis is to identify patterns and ideas that appear over the data collected (Saunders et al., 2015). In particular, Thematic analysis includes data coding that assists researchers to outline any potential patterns that exist among the dataset.

This method is adopted for this pragmatic and inductive research to facilitate a rigorous qualitative analysis. Moreover, it is deemed suitable to our research question, as pattern identification and common theme recognition was required. Last but not least, thematic

analysis matched our philosophical position, approach and research strategy. The procedure of Thematic analysis was conducted in four stages (Saunders et al., 2015). Those stages did not develop in a linear progression. In reality, they were taking place in a simultaneous and circular way, since more data were collected as analysis was advancing.

The first step is to familiarize with the collected data. This stage involves the transcription and the continuous examination of the dataset. This process allows meanings and patterns to become distinct and common themes to emerge. Furthermore, transcription summaries and self-memos were used to save time and assist the investigation. Specifically, the transcription summaries enabled the quick review of specific items and were utilized for quick reviewing. Self-memos enabled us to record our thoughts and ideas while we were reading and analyzing the dataset. As a result, the possibility of losing track and forgetting thoughts on collected and analyzed data was minimized. Furthermore, utilizing those aids offered a unique way to become familiar and comprehend the data.

The second stage involves the coding of the data. Regularly, qualitative data are large and complex. Furthermore, our dataset includes behaviors, beliefs, ideas, actions, conditions, interactions, strategies, outcomes and many more. The method of labelling each item within the dataset with codes, enabled us to capture and describe meanings, simplifying the procedure of analysis. As a result, each interesting unit of data is now available and processable. A code can be a word, a small phrase, a number or an abbreviation tied to a unit of data, such as sentences, paragraphs, or even images.

In addition, codes can derive from labels developed by the researcher or from literature terminology. The length of the coded unit is irrelevant as long as the meaning is entirely captured. Furthermore, if two or more data pieces have the same or similar meaning, they should be assigned to the same code. One more thing that is worth mentioning is the extent of the dataset that needs to be coded. In an inductive approach, it is typical to code the entire dataset because the nature of the theory development dictates a meticulous investigation to form solid patterns (Saunders et al., 2015).

However, the research question allowed us to distinguish which data to code. It might be the case that every unit of data can potentially be useful, but the research question will help to focus only on the critical parts of the dataset. The goal of the coding process is to depict the frequency of a theme or a pattern within the dataset thus, some codes may appear more

than others. In addition, as the investigation proceeds, it is likely that more codes will be developed to capture differences among the dataset. During the process of coding, to track the origin and the meaning of each code, an index list with every code and its source was kept. Summarizing, coding is a valuable tool when undertaking qualitative research. It links complex and vast chunks of data with short codes. In addition, it allows the classification of data into categories, to study the repetition of themes and patterns. However, coding can be proved as a time-consuming process thus, researchers must assure that they have enough time to handle it.

The third step of Thematic analysis is to seek for themes and recognize relationships. This stage starts as long as every piece of data is collected and coded. Despite the fact that this step normally succeeds coding, it can also occur during any other step of the process. Moreover, self-memos come in handy once again, assisting the recording of any identified relationships or common themes. At this stage of thematic analysis, the researcher is looking for patterns that emerge through the list of codes and identifies themes that are related with the research question.

The last step involves the refining of themes and proposition testing. The most important part of this procedure is to refine the themes that emerged and strengthen the relationships between them. During the process of refining, new patterns may emerge, clarifying coded data even more. Specifically, codes and themes will furtherly be assessed according to the dataset and their relevance. As a result, the researcher may decide to merge some of the themes into new ones or split a theme into two others capturing the dynamics of the dataset.

Another important thing at this step, is to test and confirm a proposition or a hypothesis according to the findings. Clearly, as the study is under development, researchers construct hypotheses that need to be tested. It is crucial to test those propositions by investigating "alternative explanations" and "*negative examples*" that do not attune with the themes and patterns derived from data (Saunders et al., 2015, p. 594). Only by investigating alternative explanations and crossing out different scenarios, a solid and valuable conclusion can emerge. Furthermore, the propositions developed should stand against negative cases. Specifically, negative cases are those that do not conform with the rest of the data.

On the contrary, this study is not proceeding into hypothesis testing. Having reached specific outcomes, a step of further validation was taken in order to enhance their credibility. Specifically, the data analysis was conducted in two rounds and the results were combined providing the main outcome of the paper. This outcome was furtherly assessed by conducting a third analysis of our primary data to enhance and solidify the contribution of this study.

5. Analysis

After the collection of data, we proceeded to the analysis using the four steps of thematic analysis method. First, the data were transcribed and summarized, to familiarize ourselves with the dataset. Next, the dataset was coded with labels. All the necessary data items were given a code to make them more processable and allow the progression into the third step. This step involves the pattern identification of the data, the relationship that might emerge between data items, and the themes that are eventually formed. In the following section there is a brief summary of the interviews that were conducted with three Greek companies.

5.1 Outlining Primary Data

5.1.1 Interview One

The first organization we interviewed was Thessbags and the process was conducted via telephone. The interviewee started by describing the two different products that the company produces. Moreover, he analyzed the attributes of both products such as the production processes, their product life cycle and the target groups. After that, he analyzed the benefits and the barriers of reverse logistics practices and shared his opinion about the Greek financial environment and society.

First the interviewee talked about the first product which is called “Cliché” and he described it as a big stamp. Furthermore, he said that this product is meant for flexography and it is the stamp that is used to print on flexible food packaging, such as a Tetra Pak or

a potato chips bag. The production process consists of four steps. The first step is the procurement of photopolymer plates which are made from a light sensitive rubber-like material. Then, the plates are exposed to light to be engraved with the desired print. Finally, the plates are submerged in an acidic solvent called “Unisol” which corrodes the surfaces that were not previously exposed to light, creating the final stamp.

After explaining the manufacturing process of the flexography plates, he analyzed what happens when the product’s life cycle comes to end. He said that they retrieve the stamps and check their reusability. However, he admitted that most of the time the returned plates are unusable due to the nature of the photopolymer material or due to the bad conditions and the low attention that their customers pay at the plates.

Moving on, the interviewee was asked about any reverse logistics practices that take place within the company. He said that the company invested in a distillation machine which is used to recycle the used solvent. In addition, he mentioned that this process covers almost the entire production needs. Specifically, this machine can turn 90% of the waste into new solvent. On the other hand, the interviewee said that the only thing that can raise the number of the reusable plates which are retrieved, is the investment into digital laser technology.

This technology allows plate engraving without light exposure or acid submersion, saving energy, time, resources raising the quality of the final product. As a result, the photopolymer material is not exposed to light and its reusability becomes more possible. Furthermore, he added that such an investment cannot be done without governmental support. Given that the investment is feasible, the interviewee admitted that it will offer various benefits and most importantly it will reduce the production cost to a great extent.

Later, the conversation shifted to the second product of the company which is paper bags. These are common paper bags targeting the whole market and especially retail stores. They are made from recyclable materials except from one material, the glue. Even though the company pays special attention to its suppliers and aims to procure recyclable or recycled paper, they find difficulties to track down the used paper bags and establish a reverse flow.

Moreover, they think that even If they can track down the paper bags, not only do they need to invest in a third-party partner to collect them, but also to acquire the necessary

machinery for paper processing and recycling. Furthermore, the activities mentioned above raise the complexity within the organization since they require a reasonable amount of time to be implemented. Theoretically, creating a reverse flow and being able to recycle paper, the company will reduce its production cost significantly.

Finally, the interviewee shared his opinion about reverse logistics practices in Greece. He believes that there is opportunity for further development, stating that reverse logistics can boost Greek companies in multiple dimensions. However, he mentioned that education is needed over this topic as well as the development of reverse logistics infrastructures. Finally, he concluded that the benefits that derive from reverse logistics are of financial and environmental nature, but they are invisible to most of the companies.

5.1.2 Interview Two

The second interview was also conducted through telephone with Dimitra from Kourikos S.A. Dimitra is the quality specialist and a member of the innovation team. The company specializes in herbs and spices. They are producing spices, aromatic herbs, tea and as the interviewee said they are currently developing a distribution system which delivers products without packaging. The interview started with a short description of the company profile. After that, the conversation approached every product separately targeting reverse logistics applications.

The first products that she analyzed were the spices. The interviewee explained that the manufacturing process is simple. Half of the spices are imported while the rest are collected from the Greek territory. Afterwards, the spices are grinded, combined according to recipes and packaged for delivery. Unfortunately, the new delivery system cannot be applied to this product due to quality issues. The interviewee commented that delivering spices without packaging will compromise the flavor. Additionally, she informed us that efforts of applying innovative practices on these products were in vain.

The second product mentioned was the tea. Tea herbs are collected from the Greek mountains and the countryside. Similarly, tea herbs are grinded, combined according to recipes and packaged to be sent straight to the retailers. The package-free distribution system cannot be applied to this product for the same reason as spices. Furthermore, she

added that the quality of flavors is one of the company's competitive advantages. Therefore, compromising product quality may cause many losses. In addition, the flavor of spices and tea products is preserved by the utilization of packaging, thus as company members claim, the benefits of packaging cannot be substituted.

On the contrary the characteristics of aromatic herbs allow them to apply the package-free delivery system. The production process is similar with the rest of their products. First, herbs are collected exclusively from Greek mountains and flatlands. Then, they are grinded and packaged to be delivered. The characteristic that enables this product to be distributed without packaging is its utilization. Specifically, packaging does not matter since aromatic herbs are more resistant and can sustain a rougher procedure. As a result, the company decided to design the package-free delivery system that was mentioned before for this product category.

The philosophy behind the new system is to reduce the unnecessary packaging. The first version of the system was designed to retrieve the empty packages from customers but that was not feasible. Consequently, they investigated an alternative solution. The plan is to deliver herbs in large quantities inside big boxes, designed to reserve the quality of the products as much as possible. Then, customers can obtain the products in retail stores, filling their own containers with the desired portion. In the meantime, the company must be in touch with the retailers to exchange information about the daily demand and the remaining amounts of aromatic herbs inside the boxes. When the stock reaches a predefined level, the company arrives, collects the boxes, refills and delivers them back to retailers.

After the description of this package-free distribution model, the interviewee elaborated on the problems that they are facing or may face in the future while they will try to implement it. Furthermore, she claimed that it is hard to identify all the potential problems since the implementation is at an early stage of development. Nevertheless, the dominant problem that they are trying to solve right now is the tracking of product quantities inside the boxes.

Moreover, while negotiating with retailers they found that there was a reluctance in collaboration, especially from the small ones. Last but not least, the company needs to redesign the entire process of packaging before proceeding to the final implementation,

since they are trying to follow some quality and hygienic principles. Consequently, it is a very demanding task that requires a lot of effort and resources.

On the other hand, the interviewee admitted that besides those barriers, there are some obvious benefits for the company. Specifically, she identifies both financial and environmental benefits. However, the financial benefits dominated environmental benefits as the entire project is based on them.

5.1.3 Interview Three

The third interview was the shortest in length and was conducted through telephone as well. We interviewed one of the two owners of a coffee importing company in Greece. Furthermore, the company's main activity is to import coffee beans and distribute them over coffee shops, bars and canteens. In addition, the company leases the appropriate equipment for coffee grinding and brewing. Meraki G.P. is a small company that enlists three employees and two owners.

As previously mentioned, the company imports coffee beans and distributes them among shops that sell coffee. Consequently, they need to design a good distribution system. Pavlos admitted that the distribution is the main difficulty that company faces right now. Specifically, they occupy one truck to deliver the products to customers. However, it is difficult to cover large areas with a single truck, when the orders arrive randomly and require immediate fulfilment.

He informed us that generally the coffee demand in Greece is volatile and notably during the tourist seasons. Consequently, the company struggles to make accurate forecasts concerning their customers' demand and as a result the planning of distribution becomes challenging. Furthermore, the interviewee said that normally their clients keep a safety stock and they place their orders two to three day in advance. In addition, he stated that due to the reasons listed above, the demand can follow erratic patterns and spike unexpectedly.

A radical solution to this problem proposed by one of the two owners. He proposed a makeover to their business model. Specifically, he suggested the opening of two smaller warehouses closer to the location of their customers. Those warehouses will operate as

retail stores where customers can arrive and buy the amount of coffee beans they need. As a result, this model will allow the company to reduce its prices. Particularly, they will be able to import coffee in bigger batches and in larger packaging achieving better deals.

In addition, they will reduce the extra packaging material needed to fulfill the orders. Furthermore, the transportation cost will considerably be reduced. However, Pavlos commented that the delivery process will not be stopped but it will be reduced as much as possible. Consequently, the lower price will motivate our customers to participate in this change, abolishing the old ordering system.

The benefits that are identified in this new model are mostly financial. Specifically, the interviewee lists some of them, namely lower transportation cost and better deals with suppliers. In addition, the low prices will attract more customers. On the other hand, they also identify environmental benefits but not to the same extent as the financial. They believe that eliminating the amount of packaging and the emissions from the delivery vehicle, will benefit the environment but not significantly.

Despite the fact that Pavlos recognizes the benefits listed above, he is reluctant and does not agree with the shift of the business model. Furthermore, he believes that an attempt like this requires a big investment and that the Greek economic environment is not ideal. Additionally, the interviewee states that despite the reduced price, convincing customers to spend time and resources to supply coffee instead of ordering, is a difficult task. Lastly, the interviewee underlines that unknown problems might emerge in the future.

After a continuous analysis, it seems that some patterns can be identified. One common idea that is shared in two of the three interviews, is the lack of a fertile economic environment as well as the lack of governmental support. In addition, there seems to be a lack of willingness from the supply chain actors to cooperate in reverse logistics practices. Moreover, it is fairly recognizable that there is a lack of technological know-how and established infrastructure. Before proceeding into further analysis and detecting every pattern, theme and relationship within the dataset, the coding process is critical. The next section describes the coding process explaining the labels that were used and assigned to data items.

5.2 Coding Qualitative Data

Proceeding with the coding process each interview was analyzed separately. Furthermore, the interview was read extensively while text parts were isolated and labelled according to their meaning. The isolated parts appear in *italics* and in quotation marks. In addition, the isolated parts were assigned a code. During this process special attention was given to capture all the patterns, isolating only the parts that have distinct and pure meanings.

Lastly, the form of the code followed the same pattern across all the interviews. Specifically, the capital letters declare the nature of the code, the lower-case letters declare the general category, the first number denotes the number of the interview and the second number stands for the serial number of the code. The code parts are connected with particular meanings and they are presented in Table 3 below.

CODE part	**Meaning**
A	Activity
TECH	Technological
GOV	Governmental
INFR	Infrastructural
COL	Collaboration and support
FIN	Financial
SOC	Societal
ORG	Organizational
ENV	Environmental
bar	Barrier
ben	Benefit

Table 3: Codes and meanings

As for example the code TECHbar3.2 refers to the second technological barrier found in the third interview.

5.2.1 Interview one

Activities

The first set of codes involves the current reverse logistics activities that the company has adopted or is willing to adopt in the future. First, there are retrieving activities "*The first thing is to take back the broken stamp from the customer and check if it can be reused.*" (Andreas) **A1.1**.

The next code is referring to the recycling activities that take place within the company. Special emphasis was given to the recycling machine that helps them recycle one of the materials that is used in the manufacturing process "*In addition to this, we invested in a machine which is used to recycle the solvent (Unisol) used in the manufacturing process. This machine provides us with 90% reusable resources (solvent) and the rest is a residue which is almost useless*." (Andreas) **A1.2**. Similarly, "*There is a liquid waste which as I said is being recycled and becomes 90% new solvent and 10% gel which is completely useless for us.*" (Andreas) **A1.3**.

In addition to this, there is a recycling process that happens outside of the company and is referring to gel that previously mentioned "*I stock it in barrels, and I call the recycling company to come and collect it.*" (Andreas) **A1.4**. Finally, the company follows green practices for the paper products "*It is produced under all environmental principles and green methods and of course I know my supplier's*." (Andreas) **A1.5**.

Barriers

The second set of codes is referring to the problems and the barriers that the company faces with their current procedures or may face during the implementation of new reverse logistics activities. The largest group of barriers that was extracted by the interview was of technological nature. First, the lack of equipment *"We don't have the necessary machinery and processes to recycle paper ourselves."* (Andreas) **TECHbar1.1**.

Second, the manufacturing process itself raises a barrier against the reusability of their products "*Last, the manufacturing process itself (light exposure, acid submerging)*

sometimes is enough to ruin the reusability of the final product." (Andreas) **TECHbar1.2**. Moreover, the nature of the material requires special handling processes "*A material like this needs to be kept in a dark place as it is a photopolymer. The light is stabilizing the surface and sets the material difficult to process.*" (Andreas) **TECHbar1.3**.

There is an absence of systems that can provide information about product location "*First, it is difficult to track them"* (Andreas) **TECHbar1.4**. Moreover, the lack of tracking systems over end of life products "*No, it is extremely difficult to have this information. Hopefully, they end up in a recycling center."* (Andreas) **TECHbar1.5**.

Finally, there are two barriers referring to the nature of the material which renders the returnable product useless "*Most of the times it is useless but there are some cases that the plate can be scraped, re-engraved and remanufactured into a new one.*" (Andreas) **TECHbar1.6**. Even if the material does not fail it will regain a severely reduced life span and reduced quality "*The new stamp might have a reduced life span because it now has half the size."* **TECHbar1.7**. Lastly, the utilization of the products is also a barrier "*Moreover, this plate as I said is used for printing and therefore operates under extreme pressure. As a result, the material brakes and the integrity of the stamp fails.*" (Andreas) **TECHbar1.8**.

The next group of barriers that impede reverse logistics implementation involves the governmental and legislation barriers. There is obviously a lack of governmental support "*However, an investment like this is not feasible without the support of the country and the industry."* (Andreas) **GOVbar1.1**. Additionally, there is lack of a fertile economic environment "*Exactly, in my opinion ideas like reverse logistics are difficult to materialize in an environment like Greece due to lack of legislation and financial support"* (Andreas) **GOVbar1.2**. The previous barrier is illustrated once again "*Honestly, Greece is like a big impressible baby which is in need of innovative ideas, strong minds and investments to get things going"* (Andreas) **GOVbar1.3**.

After, there are identified two infrastructural barriers. The first barrier refers to the lack of infrastructure that facilitates reverse flows of goods *"This can only be created by the scrap paper that comes as a waste from bag production which is not compared to the volume of production. I think that it is impossible to redirect used bags back to my facilities due to several reasons"* (Andreas) **INFRbar1.1**.

More intensively, Andreas mentions the following *"Finally, I don't see any possible way to create this reverse flow as paper bags can easily be damaged and disposed of. Nobody has in mind to keep it and send it back as it is a cheap and low value good."* (Andreas) **INFRbar1.2**. The last barrier can be categorized as a market or customer barrier. However, for simplicity it is categorized as infrastructural as it is very close to this category as well.

The fourth category is referring to barriers that are related with the lack of collaboration and support by the other actors of the supply chain. Specifically, there is a lack of a rewarding system for recycling waste "*Nothing. They just give me a certificate that I am not polluting the environment and I am treating my waste in the right way*" (Andreas) **COLbar1.1**. Moreover, there is lack of cooperation from customers who do not pay the appropriate attention and do not follow the instructions given "*There can be many reasons. The most frequent is that the customers did not maintain it correctly*" (Andreas) **COLbar1.2**.

Surprisingly, financial barriers appeared only once *"we have to invest in a third party to collect those bags for us"* (Andreas) **FINbar1.1** but they are closely related with the governmental barriers. Last but not least, it is mentioned that societies lack education over reverse logistics *"We must have more information and more education on this topic as a society"* (Andreas) **SOCbar1.1**.

The interviewee states difficulties in adopting new practices due to the time and resources requirements *"even if we had the resources to invest, it would add new processes that would take us time to get used to"* (Andreas) **ORGbar1.1**. Last, there is one more organizational barrier identified which refers to the difficulty of understanding the benefits of reverse logistics "*I also see difficulties in implementation because of facilities, education. The most important obstacle is that the benefits and the profits of those practices and models are almost invisible."* (Andreas) **ORGbar1.2**

Benefits

The last group of codes involves the benefits of the reverse logistics practices that are perceived by the company as drivers. The benefits mentioned are mostly financial. First, reverse logistics activities are considered as cost reduction processes *"It will significantly*

reduce my production cost" (Andreas) **FINben1.1**. Moreover, Andreas mentioned that reverse logistics can reduce the resources required for manufacturing *" In other words, it will save energy, time, and resources"* (Andreas) **FINben1.2**.

In addition, some obscure benefits are extracted. The first one is of financial nature and refers to the extended lifespan of a company's product in case they adopt a new technology in their manufacturing process "*Implementing a technology like this will raise the number of the reusable stamps and extend their lifespan for one more use. As far as I know there is nothing you can do to keep a photopolymer forever."* (Andreas) **FINben1.3**. Nevertheless, there are also environmental benefits perceived *"I can see environmental and financial benefits"* (Andreas) **ENVben1.1**.

5.2.2 Interview two

The coding for the second interview follows the same pattern as the first. Three categories of codes are going to be introduced. First, the "activities" category, then the "barriers" and finally the "benefits".

Activities

The first category entails only one code as there are no current reverse logistics activities except from a team that works towards an innovative distribution design *"Moreover, I am a member of the innovation team which is working on a new distribution system without packaging."* (Dimitra) **A2.1.** However, it should be considered they have a reverse logistics activity under development.

According to primary data, the company invests in this new idea, so it is registered as an activity during the coding process *"The philosophy behind it is to reduce unnecessary paper which is bought for packaging. At first, we were thinking of a chain that will allow us to retrieve and refill the packages but that is out of the table due to many reasons. So, we started thinking of a system where we deliver oregano for example into a large box and*

place it in a supermarket. Then, customers arrive and fill their own containers and that is it. After the large box runs out, we collect it, refill it, and put it back.” (Dimitra) ***A2.2***.

Barriers

The section that follows illustrates the coding of reverse logistics barriers. The second interview demonstrates that organizational barriers are the most frequent. However, the order of presenting the coding process will remain the same starting with the technological category. First, there is a lack of know-how on the preservation of spices and their flavor *“No, the system is for the aromatic herbs. Unfortunately, packaging is very important for spices because it is crucial for maintaining the intensity of aromas.”* (Dimitra) **TECHbar2.1**.

Despite the fact that the company is working on several technological solutions, they have no results yet *“No nothing that we are aware of. Everything we tried had an impact on the quality of the final product”* (Dimitra) **TECHbar2.2**. Finally, they confront the same barriers with another product *“I won’t say much about the tea products because they cannot go without packaging for the same reason”* (Dimitra) **TECHbar2.3**.

The second category is the organizational barriers. In this category, three barriers are identified. The first one refers to the lack of awareness of potential problems that might emerge during the implementation of the new activity *“It’s hard to say that we found all the potential problems since we are still developing it”* (Dimitra) **ORGbar2.1**. However, they have identified the most critical obstacle “I think that the hardest one is to measure the rate that every container needs to be refilled and to design a proper recover activity.” (Dimitra) **ORGbar2.2**.

Another important barrier are the resources required for the maintenance of the quality principles while they implement the new distribution design *“One more thing that stops us, is that we need to redesign the entire process of packaging. Since we are trying to follow the HACCP principles this will be a difficult task to do. We need to invest in personnel’s training at all levels. This is a very stressful procedure to undertake and requires a lot of money to be invested.”* (Dimitra) **ORGbar2.3**. Finally, the last barrier of the organizational category relates to the lack of knowledge and the reluctance of changing

their activities "As I said before, this cannot be done. Even if you consider it as a theory, I still believe that the advantages of packaging cannot be substituted" (Dimitra) **ORGbar2.4**.

The next category involves the lack of collaboration and support from the retail stores, namely their customers and supply chain partners *"We thought of doing it like this, but from a couple of conversations with some retailers, we didn't find the willingness of collaboration especially from the small ones"* (Dimitra) **COLbar2.1**. In addition, there is one more piece of data that reveals this barrier *"The problem isn't that they won't inform us when the box is empty, but that we need a report of the everyday consumption, so we can manage our delivery performance to all of them"* (Dimitra) **COLbar2.2**.

Benefits

The last category of codes refers to the benefits that the company realizes after the successful implementation of the new distribution model. First, there are financial benefits *"We cannot say for sure. There might be some financial benefits, but it is not easy to say before I see the new practice in action"* (Dimitra) **FINben2.1**. However, when the interviewee was asked about environmental benefits the reply was positive but still focused on financial benefits *"When we started thinking and designing this new process that was our initial goal, but as the financial part came into play, we focused on it entirely."* (Dimitra) **ENVben2.1**.

5.2.3 Interview Three

Similar with the previous coding analysis, the same pattern will be followed in the third interview as well. However, the main difference is that there are no current reverse logistics activities taking place at the company, so the benefits and the barriers are referring mostly to the future activities that the company desires to adopt.

Activities

The first set of codes involves the shift of the business model. Specifically, the change from a distribution warehouse to a retail shop *"My brother Kostas thinks that we need to shift our business model and open one or two smaller warehouses and place them in critical spots according to our customers' location. Those warehouses will operate as retail stores and instead of delivering coffee, our customers will be able to arrive and buy the necessary amount themselves"* (Pavlos) ***A3.1***.

On the other hand, delivery activities will not be eliminated but will be kept at a minimum level *"Apart from establishing those smaller warehouses we won't stop delivering, but deliveries will be minimized as much as possible. So, everyone will be happy according to my brother."* (Pavlos) **A3.2**.

Barriers

The second set of codes refers to the three barriers identified in the third interview. The first one, is the lack of knowledge and the inability to predict the problems that will emerge during the implementation of the new practice *"Third, despite the fact that it might solve some of our problems, it will create more which we are not aware of now."* (Pavlos) **ORGbar3.1**.

Nevertheless, the barriers that are visible at the moment are of financial nature "*First, to shift our business to that direction requires a big investment and I think that the Greek economic environment is not ideal at the moment for such a move."* (Pavlos) **FINbar3.1** The final barrier identified in this interview referred to the lack of support from their customers *"Second, it will take us time to inform and convince our customers to follow our model and might lead to customer loss."* (Pavlos) **COLbar3.2**.

Benefits

The last group of codes includes the benefits that are recognized by the owners of the company in case the new business model is successfully implemented. Similar to the previous cases, there are identified financial and environmental benefits. However, the

financial benefits outweigh the environmental and that is illustrated in the following statement of the interviewee: *"Summarizing I want to say that the environmental benefits exist, but they are not enough for me to agree on that move"*.

Particularly, the interviewee believes that financial benefits will be achieved by striking better deals with suppliers *"Kostas thinks that if we run our business utilizing the small warehouses model, we can import coffee in bigger batches"* (Pavlos) **FINben3.1**. Furthermore, the interviewee states that the new model will result in reduced transportation cost *"Moreover, we will reduce the transportation costs. Given all that, we might be able to sell at lower prices"* (Pavlos) **FINben3.2**. Finally, the company will be able to offer better prices to customers *"Specifically, we will be able to offer lower prices due to the reasons mentioned before, such as larger orders, less packaging, lower transportation costs, etc."* (Pavlos) **FINben3.3**.

On the other hand, there are environmental benefits. The first benefit extracted from the interview has to do with the reduction of excess packaging and therefore reduction in waste *"In addition, we can order coffee from our suppliers in different packages so we can be relieved from the excess packaging that we need to make our deliveries."* (Pavlos) **ENVben3.1**. Moreover, the second environmental benefit identified, is the reduction in gas emissions from the delivery truck *"In addition, we can also say that there are environmental benefits from the reduction of packaging and emissions produced by our vehicles"* (Pavlos) **ENVben3.2**.

However, the interviewee is not a strong believer of the last environmental benefit. Specifically, Pavlos states the following: *"However, for the second one I have some reservations because we will reduce our emission, but we must consider the emission that will be added by the vehicles arriving to get their order".*

5.3 Pattern Identification Within the Dataset

In the third step of the analytical process, we identified the themes and the relationships within the dataset. Therefore, we examined each interview separately focusing on the frequency of the codes to identify the themes and the meanings of each interview. The

measurement of the frequency was made in a four-levelled scale from high to low. Specifically, the most frequent items were assigned the value "High" which is followed by the value "Moderate", "Limited" and "Low". Additionally, the frequency of codes for each interview was measured individually.

In other words, the most dominant codes among each separate interview is labelled as "High" whereas the rest are labelled with the other values mentioned above. For instance, if an interview consists of ten barriers and five of them belong to one category, then this category is declared as "High". After that, the themes will be combined to form potential relationships illustrating a more complete picture of the dataset.

The most frequent barrier identified in the first dataset is the technological barrier. Specifically, different technological barriers that impede reverse logistics implementation are mentioned eight times. Furthermore, the next most frequent category of barriers is related with the government and legislation. Particularly, governmental and legislation barriers appear three times. Additionally, in the third place there are three categories, namely the infrastructural, the collaboration and support, and the organizational barriers. Those categories appear two times within the first dataset. Finally, the least frequent category refers to financial and societal barriers which appear only once.

Afterwards, the reverse logistics benefits were also identified. The most frequent benefits of the first dataset were financial which are mentioned three times among the dataset. On the contrary, the less frequent benefits were the environmental which mentioned only once. Summarizing the first dataset, it is worth mentioning that the first company considers five different reverse activities, illustrating the significant impact of reverse logistics to the organization. The dataset analysis is summarized in the Table 4.

1st Dataset-Interview one	
Barriers	**Frequency**
Technological	High
Governmental	Moderate
Infrastructural	Limited
Collaboration and support	Limited

Organizational	Limited
Financial	Low
Societal	Low
Benefits	**Frequency**
Financial	Hight
Environmental	Low
Activities	5

Table 4: First dataset results

Moving on with the second dataset, the pattern of the barriers changed. The category of barriers that was the most frequent among the dataset is the organizational. Particularly, organizational barriers were mentioned four times during the interview. The technological barriers were mentioned three times across the interview. Therefore, the frequency of this category is considered moderate.

Moreover, the least mentioned category of reverse logistics barriers is the collaboration and support category, which refers to the willingness of the other supply chain partners to cooperate. This category was mentioned two times through the second dataset. Surprisingly, four categories of barriers were not found in the dataset of the second interview. Specifically, governmental, infrastructural, financial, and societal barriers did not receive any entry when the second dataset was coded and analyzed.

As far as the reverse logistics benefits were investigated, the financial and the environmental categories were equally frequent. Particularly, both categories depicted the same frequency of codes getting one entry each. Finally, the reverse logistics activities that the interviewee mentioned were two. Consequently, that number demonstrates that reverse logistics activities have low impact on this organization. The analysis of the second dataset is illustrated to the Table 5.

2nd Dataset-Interview two	
Barriers	**Frequency**
Technological	Moderate
Governmental	Zero

Infrastructural	Zero
Collaboration and support	Limited
Organizational	High
Financial	Zero
Societal	Zero
Benefits	**Frequency**
Financial	Moderate
Environmental	Moderate
Activities	2

Table 5: Second dataset results

Finally, in the last set of data the codes seem to follow approximately the same patterns as those of the second data set. The barriers that were identified belong to the organizational, the financial and the collaboration and support category. Specifically, each category was mentioned only once. On the contrary, the rest of the categories did not appear during the coding process. Notably, barriers from the technological, governmental, infrastructural, and the societal category do not seem to worry the third company.

From the perspective of the reverse logistics benefits, the third company mentioned the same categories as the previous companies did. However, the frequency of those benefits was greater. Particularly, financial benefits appear three times in the dataset. Therefore, financial benefits were more frequent than the environmental benefits which were mentioned twice. Summarizing the third dataset, the organization aims to adopt two reverse logistics activities. As a result, it is observed that two potential reverse logistics activities can imply multiple benefits for the organization. The analysis of the third dataset is represented in the Table 6.

3rd Dataset-Interview three	
Barriers	**Frequency**
Technological	Zero
Governmental	Zero

Infrastructural	Zero
Collaboration and support	Moderate
Organizational	Moderate
Financial	Moderate
Societal	Zero
Benefits	**Frequency**
Financial	Hight
Environmental	Moderate
Activities	2

Table 6: Third dataset result

5.4 First Analysis Outcome

The next step of thematic analysis involves the identification of relationships and common patterns between the datasets. First, the analysis combined the findings of the previous step to identify patterns and then proceeded in relationship identification within the dataset. The most dominant reverse logistics barriers that are frequently mentioned among the interviews belong to the technological category. This result illustrates that there is lack of equipment and the lack of knowledge in material handling. In addition, the manufacturing process itself can sometimes be a barrier when organizations adopt new practices. Moreover, the absence of measuring and forecasting systems is a big obstacle among Greek companies.

The second category of barriers according to the data collected are the organizational barriers. Specifically, organizational barriers appear seven times across the interviews. As a result, Greek companies suffer from the lack of proper organizational structures, the lack of training and education and the lack of flexibility to adapt in potential problems that might emerge. The third most frequent category of barriers is the collaboration and support category. This category is referring to the other supply chain partners and their willingness to cooperate during the implementation of new practices. Namely, there is lack of support and reluctance of collaboration from supply chain participants.

The next more frequently mentioned category in the dataset is the governmental barriers. Particularly, the unstable economic environment and the absence of supportive legislation regarding reverse logistics implementation, do not appear to be a great concern for the interviewed Greek companies. Afterwards, there are two categories of barriers which have the same number of appearances through the dataset.

Explicitly, financial and infrastructural reverse logistics barriers were mentioned only two times. This thing reveals that financial constraints and the scale of investments that needs to be done, are not so important compared with the barriers mentioned above. The last category of barriers that is mentioned only once is the societal category. This depicts the fact that society is ready to be involved in a reverse logistics environment and act as a responsible player in reverse supply chains.

The next thing that needs to be considered is the perception of the Greek companies about reverse logistics benefits. There are identified both of the categories that can drive reverse logistics implementation. Specifically, financial and environmental benefits were found across each interview. Looking at the previous tables, one can say that the financial benefits dominated the environmental ones. In other words, financial benefits were mentioned seven times while environmental only four times across the data. Consequently, Greek managers believe that reverse logistics drivers are mainly of economic instead of environmental nature.

Moreover, they consider that reverse logistics can generate additional revenue, reduce the manufacturing and transportation cost contributing to organizations' profitability and competitiveness. On the other hand, managers acknowledge the environmental benefits such as the reduction of waste generation and the resources that can be saved. However, they do not consider those benefits of primary importance. Finally, summing up the reverse logistics activities that companies employ or attempt to encompass, we will not reach any useful pattern or relationship. Therefore, the analysis did not proceed into further activity investigation.

Summarizing the results of the fourth step of the analysis, the most important barriers across Greek companies derive from the technological, the organizational and the collaboration and support category. Meanwhile, the barriers causing the least concern are of societal and infrastructural nature. Additionally, governmental and financial barriers

were found to be of mediocre importance. Lastly, the financial benefits are those that primarily drive reverse logistics implementation in Greece. Nonetheless, environmental drivers can also trigger the application of reverse logistics.

5.5 Second Approach

Instead of the vertical analysis of data, it is worth to also proceed into a horizontal analysis. Specifically, the above analysis took into account only the frequency of mentions of each barrier and benefit of reverse logistics implementation. Consequently, it is critical to look for common ground between the interviews without considering the number of mentions. In other words, the previous analysis might be misleading because a specific barrier can be identified as the most important on account of being mentioned a lot of times in one of the interviews, and not because many companies share the same concern.

Therefore, the dataset was analyzed again in an effort to identify the mutual barriers that are shared across the companies and rank them according to commonalities. However, the benefits were not analyzed furtherly, since their importance was measured successfully from the previous analytical approach. Specifically, both categories received mentions and the dynamics between them were clearly presented. An illustration of the horizontal representation of the dataset is given in the Table 7.

Barriers	**1st Dataset- Interview one**	**2nd Dataset- Interview two**	**3rd Dataset- Interview three**
Technological	Identified	Identified	No mentions
Governmental	Identified	No mentions	No mentions
Infrastructural	Identified	No mentions	No mentions
Collaboration and support	Identified	Identified	Identified
Organizational	Identified	Identified	Identified
Financial	Identified	No mentions	Identified
Societal	Identified	No mentions	No mentions

Table 7: Horizontal demonstration of data

Analyzing the dataset again, it is obvious that each barrier is not mentioned in every interview. Despite the fact that the first interview entails mention for the aggregate of barriers, the rest do not share the same perspective. For instance, in the second interview there are identified only technological, collaboration and support, and organizational barriers whereas the third interview implies collaboration and support, financial and organizational barriers.

Considering the table above, three categories identified only once and do not find common ground among the interviews. Those are the governmental, infrastructural, and societal barriers. Moreover, the financial and technological barriers were mentioned in two of the interviews. Therefore, according to the vertical analysis perspective those two categories are more important than the previous barriers. Finally, the most crucial categories of reverse logistics barriers that were identified in the aggregate of interviews, are the collaboration and support, and the organizational barriers.

According to the horizontal analysis, the Greek companies are not concerned about barriers that are raised by the society. Furthermore, supportive laws for reverse logistics implementation and governmental assistance accumulate low importance. This implies that either government supports reverse logistics practices or there are more important obstacles that the Greek companies must deal with. Additionally, infrastructural barriers are mentioned only once and are categorized as of low importance.

On the other hand, financial and technological barriers are considered as two of the most essential barriers for the Greek companies. In comparison with the vertical analysis, this approach illustrates better that the high investment cost, low ROI, and other economic issues can disable reverse logistics implementation. In addition, technological barriers which are by far the most significant barrier according to the first approach, are mitigated but they are still important.

Surprisingly, the most critical barriers that hinder reverse logistics implementation derive from the organizational and the collaboration and support categories. Particularly, the Greek companies are suffering from the unwillingness of their supply chain partners to support new activities and bad organizational structures. This conclusion has been reached since collaboration and organizational barriers are the common ground between the interviews.

5.6 Combining the Approaches

The interpretation of the result might be that Greek companies and especially the top management of the organizations demonstrate resistance to change. In other words, if the lack of collaboration is generalized it can be perceived as reluctance to change the established practices in favor of something new or to adapt according to the environment. This perspective can be enhanced taking into account the organizational barrier. Moreover, the bad organizational structures reveal that organizations do not welcome changes, even if they refer to small structural adjustments to thrive in their business environment.

Therefore, the belief that resistance to change is the main root of reverse logistics barriers across the Greek organizations was developed. Particularly, to validate our belief, a second scan of the entire dataset was conducted, in an effort to identify data items that reveal proof of organizational resistance. However, since the collaboration and support, and the organizational barriers were ranked high in both analytical approaches, it is clear that the dataset entails items that will confirm and validate the above belief. Therefore, the analysis did not proceed into a thorough and detailed coding investigation but to a quotation of the parts that demonstrate proof of resistance to change.

However, this time the attention shifted to the interviewees and their attitude towards reverse logistics instead of their supply chain partners' behavior. Specifically, the previous analytical processes took into account the mentions of the interviewees about the problems their partners cause to their company. On the contrary, the analysis that follows aims to identify organizational resistance within the three interviewed companies. In that way, not only the belief about resistance to change will be validated but also a more solid solution towards reverse logistics implementation can be established. Finally, the following part examines the interviews separately for proof that illustrate the organizational resistance to a possible change.

In the first interview, there is an obvious sign of resistance when the interviewee described the implementation of new processes as time consuming and stressful procedures. Moreover, the training that is required is perceived as a process that will delay the normal flow of the everyday activities. This statement is illustrated in the part of the interview that

follows: *"first, it is difficult to track them but even if we could, we have to invest in a third party to collect those bags for us. Second, we do not have the necessary machinery and processes to recycle paper ourselves and even if we had the resources to invest, it would add new processes that would take us time to get used to. Finally, I do not see any possible way to create this reverse flow, as paper bags can easily be damaged and disposed of. Nobody has in mind to keep it and send it back as it is a cheap and low value good."* (Andreas).

Furthermore, the second interview demonstrates the same point of view. In other words, the process of training for new activities was described as stressful. Withal, the issue of the resources required for educating the personnel was highlighted. Specifically, the interviewee said: *" one more thing that stops us, is that we need to redesign the entire process of packaging. Since we are trying to follow the HACCP principles, this will be difficult to do. We need to invest in personnel's training at all levels. This is a very stressful procedure to undertake and requires a lot of money to be invested."* (Dimitra).

Finally, the third interview entailed the majority of data items that illustrate organizational resistance to change. First, there is a reluctance in adopting new practices by the top management: "*I am thinking of just continuing as we are and when we will be able to hire more personnel and trucks, problems like this will not occur anymore. For example, we can have more vehicles delivering around the city and more people preparing the orders at the warehouse."* (Pavlos).

Second, the hesitation is enhanced by listing a few concerns about the possible shift of their business model. Particularly, the interviewee mentioned the time required to inform their partners about the change, that might cause a disruption in their supply chain. Additionally, the interviewee mentioned the fear of unknown problems that might emerge during the implementation of the new practices. Finally, there is a reference to the economic environment which is perceived as a barrier and thus, the change is not welcome: *"First, to shift our business to that direction requires a big investment and I think that Greek economic environment is not ideal at the moment for such a move. Second, it will take us time to inform and convince our customers to follow our model and might lead to customer loss. Third, despite the fact that it might solve some of our problems, it will create more which we are not aware of now."* (Pavlos).

As a result, resistance to change can be identified to every Greek company that was analyzed in our dataset. This conclusion is reached from two different perspectives. Firstly, resistance to change is demonstrated by the supply chain partners of the interviewees. Specifically, lack of willingness to collaborate is reported throughout the dataset. Secondly, the same result was found when the analysis shifted towards the interviewees, and their willingness to adopt new practices. Despite the fact that they desire to be involved in reverse supply chains, their reluctance to embrace change is clear.

On the one hand, the resistance demonstrated by the unwillingness of the supply chain actors to support the reverse logistics activities of the interviewed organizations. On the other hand, the interviewees were found reluctant to change for a different reason. Specifically, they were unwilling to provide the necessary education to their personnel and to invest in new technological equipment. Additionally, another critical dimension that reveals resistance to change is the bad organizational structure. In other words, a stagnant company structure exposes the unwillingness of top management to proceed into changes.

6. Results

The analytical process was conducted in three steps. The first step involved a thematic analysis of the three-interview dataset. Furthermore, the thematic analysis identified and measured the frequency of mentions of each reverse logistics barrier and benefit in Greece. According to the first analytical approach, the most frequent was the technological category followed by the organizational, and the collaboration and support barriers.

Moreover, governmental and financial barriers were mentioned a limited amount of times, whereas infrastructural and societal barriers received the least of attention. On the other hand, the benefits identified were of financial and environmental nature, demonstrating approximately the same frequency. Specifically, financial benefits were slightly more frequent than environmental. A representation of the results is given in the Table 8 below.

Interview Dataset	
Barriers	**Frequency**
Technological	High
Organizational	High
Collaboration and support	Moderate
Governmental	Limited
Financial	Limited
Infrastructure	Low
Societal	Low
Benefits	**Frequency**
Financial	Hight
Environmental	Moderate

Table 8: First approach results

The second step of the analytical process followed a different approach and analyzed the dataset from a different point of view. This time the dataset was analyzed based on the barriers that are commonly shared across the companies. Furthermore, the second step did not consider the frequency of barrier appearances but examined the common ground between the interviews.

Specifically, every barrier was registered once, and its importance was measured according to the number of interviews that each barrier was found in. Surprisingly, the results were similar to those of the first approach, but they did not perfectly match. The categories that were mentioned in every interview, were the organizational and the collaboration and support barriers and thus, declared as the most critical.

Financial and technological barriers are considered of mediocre importance, since they were registered twice. Finally, the barriers that appear exclusively in one interview and are characterized of low importance, belong to the governmental, infrastructural, and societal category. Additionally, this approach was taken in order to minimize the error that might have occurred in the first step. This error refers to the phenomenon of a barrier being mentioned frequently only in one interview and thus, be declared as the most important.

However, the second step did not proceed into reverse logistics benefits, as both categories identified in every interview. Furthermore, reverse logistics benefits demonstrated nearly the same frequency of appearance. The results of the second step of the analytical process are depicted in the Table 9.

Interview-Dataset	
Barriers	**Importance**
Technological	Medium
Governmental	Low
Infrastructural	Low
Collaboration and support	High
Organizational	High
Financial	Medium
Societal	Low

Table 9: Second approach results

The last step considers the common ground between the two previous analytical approaches. Therefore, the reverse logistics barriers that were isolated for further analysis, derive from the organizational, and the collaboration and support categories. In addition, a belief was developed, and a third scan of the dataset was performed to assess its validity.

Specifically, the analysis proceeded to identify the common root of those two categories. According to literature, the linkage between organizational barriers and collaboration barriers, is the resistance demonstrated by organizations in front of an imminent change. Consequently, the third scan aimed to identify data pieces that reveal resistance to change. The results validated our belief, giving away references in every interview that reveal organizational resistance to change.

To summarize, the three-step analytical process was conducted to identify the drivers that stimulate reverse logistics application, and the barriers that hinder reverse logistics implementation. The study was conducted in a thorough and meticulous way, referring

exclusively to the Greek business environment since our data was collected from that country. In conclusion, the benefits that drive reverse logistics implementation in Greek organizations are usually financial whereas the barrier that hinders their implementation is the organizational resistance to change.

7. The Conceptual Framework

7.1 Motivation and Objectives

In this section we develop a conceptual framework which is a suggestion on how organizations could deal with reverse logistics barriers in Greece. Having defined our research question, we conducted this research to explore the reverse logistics barriers in a particular context and the best solutions to resolve them. To achieve this, we harmonized our philosophy and our research method with our goals. Specifically, we have found that the best philosophy that serves the purpose of research is pragmatism. In addition, we concluded that an inductive approach would allow us to contribute to the literature, since the proposed solution would be based on the analysis of the data we collected.

It was necessary to examine the current trends concerning the reverse logistics implementation. As Waqas et al. (2018) state, firms believe that reverse logistics is the most complicated part of supply chains and consider that their practices are not examined at a satisfactory level. Even though developed countries deem reverse logistics as the most important element of supply chains, they encounter various barriers during their application (Waqas et al., 2018). Taking into consideration the reverse logistics literature review, we totally agree with the authors' arguments. Regardless of where reverse logistics are applied, companies face a number of problems that are difficult to address, considering the slow evolution of reverse logistics practices.

Furthermore, we observed that many studies in the literature focus on how policy makers legislate regulations to tackle reverse logistics barriers, without providing practical solutions that organizations could take advantage of. Consequently, our objective is to

provide applicable tools, ideas and suggestions that would be really useful for the organizations. Peña Montoya et al. (2015) mention that researchers should investigate the regional characteristics of a domain rather than leaning on previous studies, when they try to identify reverse logistics barriers. This view motivated us to collect primary data for the Greek context, rather than using secondary data from other research and studies that may be inaccurate.

Having collected and analyzed data from three companies, we concluded that the most critical reverse logistics barriers in the Greek business environment are the lack of collaboration among supply chain partners and the lack of effective organizational structures. Specifically, it was identified that both barriers stem from organizational resistance to change. Organizations usually take into consideration only the evolution of the forward supply chain to boost their profits and ignore the capabilities that the reverse supply chain offers (Govindan et al., 2012). As a result, we need to investigate how Greek companies that attempt to implement reverse logistics practices, could confront problems that arise. Therefore, this paper proceeds into a conceptual framework development that addresses the issue of organizational resistance to change.

Considering that we desire to suggest our own proposition, we needed to be aware of the advantages and the disadvantages that such an approach has. Firstly, we acknowledge that the most significant advantage of our approach is the contribution to the literature, providing an alternative solution that mitigates reverse logistics barriers. Finding a solution for reverse logistics problems through innovative ideas, contrary to approaches that have already been used, can provide new competences and advantages to firms (Govindan and Bouzon, 2018).

We are already aware that the greater part of case studies focuses on a specific industry. The most frequent industries analyzed are the automobile, the computer and the electronic industry (Govindan et al., 2015). At the same time, Govindan et al. (2015) state that literature emphasizes specific sectors when studying reverse logistics, namely countries and industries. Consequently, we deem that our approach is a great opportunity to address issues, concentrating at a single geographical area and without focusing on a specific industry. Theoretically, this means that the results of this study could potentially be utilized by various industries within Greece. However, a potential drawback of this approach is

that organizational resistance has attracted the attention of many authors, yet no effective way to confront it has been found.

Reviewing the literature, we could not find studies that address the barrier of organizational resistance in the reverse logistics context. Despite the fact that several authors identify organizational resistance as a reverse logistics barrier, they do not propose solutions on how companies can overcome it. The only study related to this issue explained how accounting management can resolve organizational resistance, and among the other organizational functions how it can improve reverse logistics activities. However, reading this study, we concluded that it is not relevant to our purpose since it does not refer to how companies surpass reverse logistics barriers.

Ali (2017) states that the examination of reverse logistics requires a holistic approach, where the barriers will be encountered as an aggregated unit and will be analyzed separately. Since this approach is currently missing from the literature, we attempted to provide a holistic solution for the Greek companies that desire to get involved in reverse supply chains. Declaring this ambition, we are aware that our solution may not be effective for every company. On the contrary, we believe that it will have valuable effects to organizations that face similar obstacles in reverse logistics application.

To develop the conceptual framework, we start by presenting the literature over this particular reverse logistics barrier. Specifically, the cited bibliography presents the thoughts and concerns of the authors about resistance to change in organizations. Then, we examine the literature of organizational resistance in general, identifying its origins, the parameters we need to consider and how we can deal with it. Later, we isolate and analyze the parts of the literature that enable us to create a new framework . At the end, we present the conceptual framework that we propose to organizations, explaining in detail how it can be used in practice.

The creation of the new conceptual framework is done in order to meet our expectations that emerged after studying the literature. Literature mostly focuses on reverse logistics rather on closed-loop supply chains because reverse logistics operations require more technical knowledge (Govindan et al., 2015). Particularly, the majority of the studies concern processes such as remanufacturing, recycling and waste management practices (Govindan et al., 2015). Despite the fact that the objective of many studies is the evaluation

and the simulation of specific issues and problems, only a few propose new models, methodologies and frameworks (Govindan et al., 2015).

Given the above, we expect to create a framework that counters the organizational resistance and that could potentially mitigate other reverse logistics barriers. On the other hand, societies raised their expectations, demanding from firms to develop enhanced business practices and safer working conditions, stressing the importance of corporate social responsibility (Yusuf et al., 2017). Therefore, we develop a framework that effectively addresses critical reverse logistics barriers and increases the value of reverse logistics functions.

7.2 Organizational Resistance in Reverse Logistics Context

In this section we present all the dimensions that are addressed in the literature of reverse logistics about organizational resistance. Bouzon et al. (2016) analyzing the barriers of reverse logistics, concluded that organizational resistance is a major barrier when organizations attempt to improve the process of recovering end-of-life products. In another study, Chileshe et al. (2015) investigating the barriers of construction industry in Australia and China, identified among others that resistance to change is a critical organizational barrier.

Resistance to change can also be detected on the perceptions that organizations express, concerning reverse logistics implementation. In particular, Mahadevan (2019) points out that organizations consider reverse logistics practices as "*evil*" rather than a chance to enhance their performance (p. 438). Lamba et al. (2019) claim that reverse logistics barriers are resisting forces that derive from the organizational dimension (the vision, the mission, the values that characterize the organization) and from the employees that constitute the organization. Lamba et al. (2019) categorized those resisting forces as "*inter-firm rivalry*" and "*managerial complexity*" (p. 3).

Inter-firm rivalry describes the bias of supply chain partners to keep a detached position opposite to others instead of being eager to collaborate with them (Lamba et al., 2019). The deficiency of collaboration in supply chains, limits the capabilities of partners to

accomplish high return on investments with minimized cost (Lamba et al., 2019). Moreover, managerial complexity describes problems such as "*trust, decision making, profit sharing, equity*" that are identified due to limited contribution between supply chain members (Lamba et al., 2019, p. 3).

In addition, it is interesting to observe how authors deem that organizational resistance is related to reverse logistics and how it can be treated. Pumpinyo and Nitivattananon (2014) state that successful reverse logistics implementation is possible when firms demonstrate great adaptability to changes. This can be augmented if organizations exhibit flexibility in their business plan and gain customers' trust. In this effort, as reported by Waqas et al. (2018), the participation of heterogeneous stakeholders would be beneficial as it can eliminate the overall uncertainty of reverse logistics functions.

In fact, authors claim that the basic premise for successful reverse logistics implementation is the absence of organizational resistance. Lee and Lam (2012) state that solutions for reverse logistics should be applied gradually in three stages: vital solutions should be implemented in the short-term, mid-term solutions should be applied within one year, whereas the application of long-term solutions can last longer. In the following sections the time horizon that solutions should be implemented for the particular issue of organizational resistance will be analyzed.

In our case, the most important part of the reverse logistics literature is to examine the reasons that organizations do not apply reverse logistics activities. Organizations are not willing to enforce reverse logistics because the economic advantages are still not justified in comparison with the economic advantages that derive from forwarding logistics (Ali et al., 2018). Similarly, Lee and Lam (2012) claim that top management deals with the dilemma of reproving reverse logistics, because the evaluation of the total cost and benefits is usually problematic. As we have already seen in the literature, the role and the perceptions of the top management regarding reverse logistics, are very important.

Moreover, Yusuf et al. (2017) highlight that "*organizational inertia*", "*resistance to change*" and the lack of knowledge, are significant factors that prevent the acquisition of benefits that stem from the favorable implementation of reverse logistics (p. 631). In certain cases, firms figure out that implementing reverse logistics practices can perform effectively in the long-term causing deficits in the short-term.

Consequently, they decide to remain dormant rather than attempting to evolve (Lee and Lam, 2012). As we can see, most authors attribute the non-application of reverse logistics to the fact that organizations do not realize their benefits. They also believe that it is due to the hierarchy within organizations while little attention is paid to organizational resistance.

Aitken and Harrison (2013) state that changes in the top management of the organizations can benefit the implementation of reverse logistics. Specifically, Aitken and Harrison (2013) mention that factors which drive those changes, are the acquisition of advanced knowledge and the codification of new information. The value of knowledge in the implementation of reverse logistics practices is recognized by several authors. Furthermore, Hazen et al. (2015) mention that knowledge can build organizational capabilities, utilizing stable organizational patterns. Knowledge according to Hazen et al. (2015) characterizes the ability of firms to communicate and spread valuable information that is vital for decision making.

Essentially, authors suggest the acquisition of knowledge as a method to improve employee's skills and reduce resistance. As indicated in the study of Raci and Shankar (2005), resistance to change in the context of reverse logistics is a fundamental obstacle that originates from human nature. To tackle this issue, Aitken and Harrison (2013) suggest that organizations should occupy employees with various competences to handle the complexity of reverse logistics practices. However, Aitken and Harrison (2013) disclose that new competencies cannot exclusively be developed enhancing the knowledge of employees, but also enhancing their expertise.

Taking into consideration the literature of reverse logistics we need to highlight some critical points. The first is that authors do not consider organizational resistance as the main reason that hinders reverse logistics implementation. Secondly, authors believe that the top management of organizations significantly affects the application of reverse logistics. Finally, authors deem that the acquisition of knowledge, or in a broader sense the education of the personnel, can enable organizations to successfully apply reverse logistics practices.

7.3 Organizational Resistance

In the previous section we analyzed how authors perceive the issue of organizational resistance in the context of reverse logistics. Specifically, we examined the areas of interest and what facilitates organizations to implement reverse logistics activities. However, we were not able to identify any applicable solutions to mitigate this specific barrier. Therefore, in this section we present the literature that exclusively focuses on organizational resistance, without considering the context of reverse logistics.

This literature review aims to broaden our knowledge over organizational resistance. As Buchanan and Badham (1999) state, conflicts and resistance are common characteristics of organizations. We mainly focus on the organizational resistance but still we examine the conflicts that derive from the attempt of organizations to change and overcome that resistance.

As it is mentioned below, organizational change is vital when organizations try to mitigate resistance. Consequently, it is worth mentioning how the management of this change is defined. By (2005) defines change management as the processes that repeatedly reestablish the organizational competences and structures, to meet the needs of internal and external stakeholders. An important privilege of organizations is to recognize what changes will be imposed by their environment, in order to plan their reaction (By, 2005). Furthermore, By (2005) states that favorable change management is critical for organizations that operate in challenging environments where many competitors are actively involved.

Realizing the importance of change management, we need to investigate the reasons that organizational changes are usually met with failure. Dent and Goldberg (2016) claim that change programs fail because they rely on theories that cannot give organizations a satisfactory background to deal with resistance. In addition, Buchanan and Badham (1999) state that change projects fail because organizations do not focus on the human factor.

Withal, authors complement that organizations emphasize on their business culture neglecting the effects of changes. Furthermore, Buchanan and Badham (1999) state that organizations do not support effectively the individuals that drive change. In parallel, the effort of companies to confront political issues is usually met with failure.

Kotter and Schlesinger (2008) state that few changes have a good success rate but there are also a few that fail completely. The vast majority of the changes last longer than it was expected and are more expensive than it was predicted (Kotter and Schlesinger, 2008). During the periods of change, the morale of the employees is affected because they are considered as eras of instability (Kotter and Schlesinger, 2008). As a result, the change itself is affected.

Organizations that do not realize the value of certain changes, affect the consciousness of the top management concerning their utility (Ramsay and Croom, 2008). Therefore, managers underestimate their significance. Kotter and Schlesinger (2008) state that even reasonable and positive changes, contain uncertainty and pose risks which prevent organizations from adopting them. In fact, we observe that many authors believe the main obstacles towards change derive from the organization itself.

However, there are many writers who believe that change fails due to the bias that exists in the literature. The majority of theories that address the issue of change, do not offer applicable solutions and their practices are usually based on assumptions (By, 2005). By (2005) states that seventy percent of organizations fail to implement a change, because they do not have a functional framework that guides the handling of the upcoming changes. Buchanan and Badham (1999) agree with the previous statement. They claim that even though the literature on organizational change is extensive, it does not provide theoretical frameworks and methods that can be used by practitioners. Later we will present in detail how all these affect the organizations and what problems they cause.

It is worth analyzing how the authors categorize the changes. Buchanan and Badham (1999) state that changes could be classified in three levels. Changes that organizations implement to enhance the efficiency of their departments, belong to the first level (Buchanan and Badham, 1999). The second level entails changes that concern various subsystems of organizations, whereas the third level implies changes that relate with the values, the ethics, the working methods which are applied throughout the organization (Buchanan and Badham, 1999).

As Buchanan and Badham (1999) claim, changes that occur in the first two levels necessitate political awareness, while changes in the third level involve "*political intervention*" (p. 612). This practically means that the greater the organizational change,

the greater the political intervention enforced by those who promote change. However, we will mention later how politics is linked to the organizational resistance. As By (2005) claims, changes vary based on the scale of their application and he classifies them into four categories: "*fine-tuning, incremental adjustment, modular transformation, corporate transformation*" (p. 377).

Fine-tuning refers to strategic organizational changes that aim to implement changes to a specific department (By, 2005). In contrast, organizations that utilize incremental adjustments, differentiate their strategies to implement successfully new changes. Modular transformations are usually applied when organizations need to implement changes quickly in multiple departments (By, 2005). Lastly, corporate transformations are enforced by organizations that attempt to change urgently their business strategies (By, 2005). Perhaps the most important conclusion we can draw from these categorizations is that every change requires different handling.

Having already mentioned that each change requires different handling, we examine how various factors affect the resistance of organizations. The first factor we consider is collaboration, as it is a dominant barrier in the Greek context, as evidenced by the analysis of our primary data. Fawcett et al. (2015) define supply chain collaboration as the capability of firms to cooperate with other supply chain actors across the organizational bounds to develop exclusive value-added procedures. Furst and Cable (2008) characterize organizations as collaborative systems whose development is based on the willingness of employees. The collaboration of employees is especially vital when organizations attempt to change their functions (Furst and Cable, 2008).

Organizations have the ability to generate value that otherwise could not be created individually, when they collaborate with partners and realize "*relational rents*" (Fawcett et al., 2015, p. 648). This presupposes that the cost of a partnership is less than the benefits that stem from it (Fawcett et al., 2015). However, in the literature we found many cases where collaboration between organizations fails, thus it is necessary to identify the reasons that lead to this result.

As Fawcett et al. (2015) claim, collaboration is influenced by organizational resistors that affect the capability of organizations to establish relational rent. Therefore, authors proposed a framework that determines organizational resistors. What is more important to

be emphasized, is that sources of relational resistance could be various procedures, tactics, practices and individuals (Fawcett et al., 2015).

Another factor that we consider is the activities of the organizations. As already mentioned, the activities of organizations affect their resistance to change. Ramsay and Croom (2008) state that an important mistake that organizations make is to overlook the fact that they have to adjust their activities according to the circumstances. In addition, Ramsay and Croom (2008) state that organizations that desire to fully or partially implement a new business function, need to perfectly control the rest of their activities in order to succeed. Supply chain functions are categorized in "*strategic*" functions that are correlated with high interorganizational prestige, and "*non-strategic*" functions that are considered as operations with low prestige (Ramsay and Croom, 2008, p. 193).

Classifying the supply chain functions and utilizing metaphorical nouns to describe their evolution, organizations show that specific activities are not yet developed and reveal their necessity (Ramsay and Croom, 2008). To enhance the status of particular activities, managers must highlight their importance and the benefits that they provide to the organization (Ramsay and Croom, 2008). In other words, we conclude that two things are happening: a) When organizations do not have full control over their activities, they influence the implementation of new functions which can be characterized as indirect resistance. b) When the top management does not emphasize the importance of new activities, it triggers organizational resistance since their value is not recognized.

As well as the activities of the organizations cause resistance to change, so are their structures (Fawcett et al., 2015). When a change presupposes significant adjustments in the organizational structure and high investments on the development of new skills, the organization puts up great resistance (Fawcett et al., 2015). Although structures seem to be an important factor that influences the resistance of organizations, only a few authors associate the issue of resistance with them.

As the literature depicts, the speed of change undoubtedly affects the resistance of organizations. Nowadays, many organizations act and implement new changes every few years or even annually (Kotter and Schlesinger, 2008). By (2005) investigated the most popular types of change in the literature in terms of speed. The results showed that the most common type of change among the authors was "*discontinuous*" change (p. 371).

Additionally, quite popular were the types of "*smooth incremental*" and the "*continuous*" change (By, 2005, p. 371). The author proposed that continuous change seems to be the most convenient type of change in an environment that is constantly evolving. Particularly, it predisposes employees to control and respond to changes, making steady and slow steps.

At this point it is important to mention the reasons why people resist change. In order to achieve this, we analyze below a study that adequately covers these reasons. Individuals and groups of people face changes in a different way. Sometimes they face the changes passively while others actively, thus it is very important that managers predict the type of resistance that they will encounter (Kotter and Schlesinger, 2008). To predict the type of resistance, managers must be aware of the reasons that humans resist changes (Kotter and Schlesinger, 2008).

One of those reasons is "*parochial self-interest*" which represents people's belief of suffering a loss from the implementation of a new change (Kotter and Schlesinger, 2008, p. 3). Authors say that when this happens, people are overwhelmed by their personal interests trying to preserve them. As a result, resistance is created and is transmitted to the organization by "*political behavior*" (Kotter and Schlesinger, 2008, p. 3). Authors mention that even though political behavior is expressed as contradicting views between two sides, the dialogue taking place by the parties is not public.

Another reason that people resist changes is "*misunderstanding and the lack of trust*" (Kotter and Schlesinger, 2008, p. 4). Organizations face this type of resistance when people are not aware of the results that changes bring, and also when they feel that changes entail disadvantages instead of beneficial outcomes for them (Kotter and Schlesinger, 2008). Furthermore, authors declare that this type of resistance shows up when employees do not trust those who perform the changes. On the other hand, "*different assessments*" is another reason that triggers resistance (Kotter and Schlesinger, 2008, p. 4). When employees perceive a change differently than their managers and consider it as unprofitable for the organization and themselves, the resistance increases sharply (Kotter and Schlesinger, 2008).

As Kotter and Schlesinger (2008) stated, the last reason for people's resistance is "*low tolerance for change*"(p. 4). Authors say that when organizational changes require speed, people are afraid that they will not be capable of enhancing their competences so fast and

oppose change. Authors also assert that low tolerance to changes prevents employees from aligning with them, even if they realize they are positive.

However, when organizations make major changes, employees resist without necessarily realizing it (Kotter and Schlesinger, 2008). Dent and Goldberg (2016) investigated the most common causes of resistance. Among the most popular causes of resistance are "*emotional side effects, lack of trust, misunderstanding, personality conflicts, work group breakup, threat to job status and security*" (Dent and Goldberg, 2016, p. 28).

Having analyzed the reasons that people react negatively to changes, we need to analyze the relationship between politics and resistance, which has already been mentioned twice in previous paragraphs. Buchanan and Badham (1999) claim that the bibliography of organizational change is "*fragmented*" and presents various aspects of political behavior (p. 612). Political behavior entails tactics that are not appropriate in the workplace serving specific interests. In addition, political behavior implies contradictory practices opposing organizational interests, in an environment dominated by conflicts and uncertainties (Buchanan and Badham, 1999). Organizations consider political behavior and activities as "*dirty tricks*" and not as a form of organizational attitude (Buchanan and Badham, 1999, p. 610).

Politics indicate the behavior of a group that is spontaneous, narrow-minded and disruptive, while at the same time it has no authorization, specialization nor does it decide with a common ideology (Buchanan and Badham, 1999). Moreover, Buchanan and Badham (1999) claim that political behavior is primarily triggered by change and uncertainty, but also increases when individuals are exposed to innovative ideas, different values and opinions, new visions and goals. In addition, they claim that political behavior is expressed when one group uses its power to impose its will over another group.

Some authors claim that political behavior is vital without considering the results of its application. On the contrary, others believe that political behavior turns people to exert their power negatively, trying to influence others for their own interests (Buchanan and Badham, 1999). Given what the authors say, it is worth noting is that changes cause political behaviors within organizations. In essence, these political behaviors increase or decrease the resistance of organizations to change, depending on the power of the resistors and those that apply the changes.

In the previous paragraphs we analyzed how political behavior affects the resistance of organizations. It is therefore interesting to thoroughly study how people working in organizations create resistance and their core reasons. As Buchanan and Badham (1999) state, critical changes generate conflicts and resistance which usually derive from the individual interests of employees. When people are afraid of change, they are overwhelmed by stress and their ability to understand and interpret information decreases (Fawcett et al., 2015). The fact that organizational changes are treated with fear is reported by other authors as well.

Kotter and Schlesinger (2008) claim that restructuring an organization is perceived with fear by individuals because they are afraid it will affect their routines and their status. In the literature it was claimed that employees are favored by the existence of routines and can enhance their performance (By, 2005). Nevertheless, in the modern literature authors report that people need to be more flexible in order to be able to adapt to continuous changes (By, 2005). Fawcett et al. (2015) state that what is happening in organizations derives from the goals that top management attempts to accomplish.

As expected, the authors refer not only to employees but also to top management that also affects the organizational resistance. Buchanan and Badham (1999) state that managers who promote a change usually provoke a parallel reaction to those who do not support it. Dent and Goldberg (2016) claim that employees resist the managers' ideas when those seem unattainable or when they know they will encounter many obstacles. In addition, employees demonstrate resistance when they are forced to make changes that they do not know their results (Dent and Goldberg, 2016).

Despite the fact managers know that organizational resistance is affected by "*human resistance*", they rarely investigate the reasons and the individuals that resist (Kotter and Schlesinger, 2008, p. 3). Dent and Goldberg (2016) state that individuals and groups that are actively involved in the planning and the deployment of a change, are less resistant than others who do not participate in these processes. Furst and Cable (2008) agree and complement that employees harmonize with the requirements of the organization when they are well-behaved by managers and emphasizes the importance of the relationships between them.

We conclude that the employees of an organization, regardless of their position in the hierarchy, are a determining factor in how an organization reacts to change. Another important aspect of our research is the fact that organizations do not explore the origin of resistance. However, we will refer to this when we create our conceptual framework. In previous paragraphs we have reported in detail all the factors that affect the resistance of organizations to change. Therefore, we must look at the approaches suggested in the literature, by which organizations can manage or mitigate the resistance.

In recent decades, the way authors have studied resistance to change has altered (Dent and Goldberg, 2016). Dent and Goldberg (2016) suggest that the most favorable way to approach the problem of organizational resistance, is not to believe that individuals are resisting change. On the contrary, the authors state that we need to realize that individuals are afraid of losing their jobs, their prestige and their comfort, which are not directly related to resistance.

Additionally, Dent and Goldberg (2016) claim that the majority of the frameworks that propose resistance confrontation, refer to those who implement the changes, without making suggestions to those who resist. It is important to note that we fully agree with the authors since we did not find such suggestions in our research. The existing frameworks according to Dent and Goldberg (2016), cannot appropriate solutions that resolve the problem of resistance, because those who implement the changes cannot intervene at every organizational level themselves.

It is interesting to find out historically the most popular approaches to organizational resistance. One of the well-known methods for managing change is the "*Planned approach*" (By, 2005, p. 373). The supporters of this approach argue that in order for a change to take place, the organization should initially eliminate its old processes, actions and designs (By, 2005). This can be achieved if the organization unfreezes its current state, upgrades its standards and finally re-freezes the new state (By, 2005).

The planned approach has been recognized by various authors as it has been shown to have satisfactory results in organizations (By, 2005). However, as the author states this approach has also been challenged by many. As it has been reported, it only applies to small changes and assumes that the organization functions are in a steady state. According to the opponents of this approach, this assumption is not realistic, as organizations operate in

fast-paced environments which require immediate solutions and changes (By, 2005). As we have seen above, the speed of change is a determining factor and thus we understand why this approach is not considered ideal.

Another method that attracted the interest of the literature was the "*Emergent approach*" (By, 2005, p. 376). This approach suggests that changes should not be seen as a straight line of actions but as an open and ongoing process by which organizations are trying to cope with the circumstances (By, 2005). While some authors claim that this approach could be applied on every occasion, others disagree and believe that an effective approach must consider factors concerning a particular situation (By, 2005). Although we agree that change must be a continuous process, we believe that situational factors are an integral part when an organization wishes to implement a new change.

Kotter (2014) believes that organizations need to solve two continuously developing issues that are not directly related to resistance, the "*nature of management*" and the "*nature of enterprises*" (p. 33). He explains this using the example of start-up companies. As Kotter (2014) mentions, those companies consisting of a few people can easily align the company's vision with its functions. He believes that this is due to the strong leadership those companies have, which allows them to have good communication and change structures and processes quickly.

On the contrary, companies that have been operating for years have more traditional channels of communication between management and employees, that do not allow organizational flexibility and quick response to changes (Kotter, 2014). When the start-up companies begin to grow, even though their activities and responsibilities increase, they maintain the same flexibility in communication and continue to adapt to changes without problems (Kotter, 2014). He states that this phenomenon stops when these companies mature and necessarily acquire more traditional communication channels, since direct communication between management and employees is no longer possible.

Having said that, Kotter (2014) does not want to discourage changes in mature businesses. In contrast, he states that businesses must become more agile and reliable, integrating more people into the changes and strengthening the organization's leadership. Furthermore, he suggests that employees should feel constantly free to take initiatives, changing procedures. His last suggestion is that those who implement the changes should consider

the feelings of the employees. In fact, employees are more willing to contribute to a change when they are emotionally connected to other people (Kotter, 2014).

At this point, given the fact that we have referred to modern and older methods of approaching organizational resistance, it is vital to mention the strategies that organizations use to confront it. We begin with an extensive analysis of the following study because it collectively mentions various strategies applied by organizations. Then, we report the conclusions over those strategies.

According to Furst and Cable (2008) managers can utilize "*soft*" and "*hard*" strategies to deal with the resistance demonstrated by employees (p. 454). The authors investigated those strategies that respond better to resistance. Soft strategies are those that can potentially help employees to implement a change, whereas hard strategies are those that discipline the employees who do not comply with changes (Furst and Cable, 2008).

In the category of soft strategies Furst and Cable (2008) introduce "*consultation*" and "*ingratiation*"(p. 454). They claim consultation is the tactic by which managers assist employees to overcome resistance and engage them in the procedure of change. Thus, employees have the capability to shape the change and safeguard their interests (Furst and Cable, 2008). This tactic is effective and usually offers mutual benefits for managers and employees.

However, the strategy fails in cases where employees have opportunistic behavior or when they believe their managers are not trustworthy (Furst and Cable, 2008). Exploring the literature for organizational resistance, we came across the proposition that employees must participate in organizational changes once again.

Ingratiation refers to the strategy where managers congratulate the employees for their achievements and effort, while at the same time they respect their personality and opinions (Furst and Cable, 2008). This strategy has beneficial outcomes, but it is not justified when employees do not have good relations with the management. In this case, employees feel that someone is gaining their favor in order to achieve personal goals (Furst and Cable, 2008). As we have already seen in the literature above, good relationships between employees and management are critical for several reasons.

The hard tactics that Furst and Cable (2008) mention in their study are "*sanctions*" and "*legitimization*" (p. 454). Sanctions apply when managers, relying on their authority, attempt to force employees to comply with specific changes (Furst and Cable, 2008). Authors state that usually this strategy has negative consequences because employees feel that their superiors do not trust them. Furthermore, they complement that employees feel that they are not treated properly, resulting in increased resistance. The issue of trust and the behavioral aspect of managers have also been covered in our literature review.

Legitimization is the effort of managers to justify their demands from employees, invoking organizational legal frameworks (Furst and Cable, 2008). Authors declare that this tactic rarely has positive results. This strategy does not act as a lever of pressure on personnel, because they consider that managers relinquish their responsibilities. According to Furst and Cable (2008), the most popular and effective tactic between them is consulting, as it presents the least degree of resistance from employees. On the contrary, the tactic that managers use less is sanctions, since it creates several problems.

The reason for examining the suggestions and the issues that appear in our bibliography, was to check if the strategies implemented by the organizations are in line with the prerequisites pointed out by the authors. However, it is useful to know which strategies are considered optimal. Dent and Goldberg (2016) that investigated several studies of other authors concluded that the most effective strategies are "*education, facilitation, participation, negotiation, manipulation and coercion*" (p. 28). As Dent and Goldberg (2016) state, strategies that encounter resistance can solve problems that arise from necessary "*administrative, technological and structural*" changes (p. 29).

Nevertheless, Kotter (2014) without being pessimistic claims that modern methods and techniques that come up against resistance are becoming less and less effective. Dent and Goldberg (2016) state that authors suggest solutions that confront the anticipated resistance that stems from organizational changes. However, those solutions are preventive and do not cover cases where resistance emerges during the change. The last argument is a reality that we cannot ignore. For this reason, in the proposed conceptual framework, we take this fact into account and use part of the following strategy to overcome this gap.

This strategy was proposed by Fawcett et al. (2015), who mentioned that building relational capabilities is vital for all the organizations. In particular, relational rents enable

organizations to seize opportunities and face risks from their environment, incorporating changes. In the next section we describe the parts we adopted from the literature, to develop a new conceptual framework that addresses the issue of organizational resistance in the context of reverse logistics.

7.4 Developing the Framework

In the previous section we presented various issues related to organizational resistance. Before analyzing our own conceptual framework and the parts of the literature that we embrace, we must state the philosophy of our choices. To achieve this, we need to summarize the important findings detected in the previous section. Initially, we identified the reasons why changes fail and observed that resistance is affected by a variety of factors. We also realized the role of employees, how they influence organizational resistance and how changes lead them to political behavior. Although these parts of the literature have illustrated the background of organizational resistance, we aim to develop a framework that addresses issues that are not adequately covered.

Therefore, to build our conceptual framework, we take into account the gaps that emerge from the literature presented. One conclusion we have drawn is that every organizational change needs to be treated separately. However, organizations do not seem to pay attention to situational factors that are critical. Those factors are the speed and the resistors of each change. Another conclusion we exacted is that organizations do not realize that their structures affect their collaborations and their resistance to chance.

Finally, we observed that there is a deficiency of frameworks and propositions that deal with resistance when it arises, since the majority of authors propose solutions assuming that organizational resistance already exists. Having identified those gaps, we want to create a framework that covers these aspects. Nevertheless, it should be restated that the framework is developed as a solution towards reverse logistics barriers.

We begin developing our conceptual framework considering the situational factors, that according to the literature, are not given the necessary attention by the organizations. Moreover, the situational factors affect the decisions of organizations regarding the

strategies against resistance. Kotter and Schlesinger (2008) indicate several critical factors that affect those decisions, such as the kind and the scale of resistance but also the power level of resistors. Furthermore, Kotter and Schlesinger (2008) mention that managers should be aware of the individuals and stakeholders that occupy neuralgic positions that critically affect changes.

Nonetheless, at this point we exclusively focus on the two situational factors mentioned above, namely the speed and the resistors of the changes. By (2005) states that even though it is difficult to find a fully functional framework, managers agree on two aspects. The first aspect is that the speed of change is a critical factor, while the second is that change can take many forms and dimensions, depending on the environment that causes it (By, 2005). Although managers consider the speed of a change as a determining factor, they do not take it into account when choosing strategies to deal with resistance. This motivated us to develop a framework in which speed would be inextricably linked to the final decision of strategy selection.

As Fawcett et al. (2015) mention that managers need to build momentum to overcome the wall of organizational resistance. This statement confirms our belief that the duration and the speed of change are significant and must be considered perpetually. However, Fawcett et al. (2015) claim that this procedure is not painless, as the real role of the resistors is to spoil the momentum that managers are trying to achieve.

In fact, the authors not only emphasize the influence of resistors on the speed of change, but also our perspective that locating resistors in every change is necessary. For the framework we develop in the next section, we embrace the study of Fawcett et al. (2015) in terms of determining the resistors, since it is detailed and mentions various aspects of them. We also select it because it states that this categorization of resistors, can help organizations locate those resisting collaboration.

Fawcett et al. (2015) classified the resistors based on two criteria: a) The "*origin*" of the resistor and b) The "*timing*" of the resistor (p. 653). Authors state that the origin distinguishes if the resistance arises from the organization as a whole or if it exists on an individual level. In parallel, they declare that timing refers to whether the organizational resistance is timeless or whether it has recently emerged. From this classification, four

categories were created. In particular they are "*structural resistors, sociological resistors, individual skills and organizational routines*" (Fawcett et al., 2015, p. 653).

Each of those categories encloses different problems. In the category of structural resistors Fawcett et al. (2015) include multiple sources of resistance such as "*territoriality, strategic misalignment and poor systems connectivity*" (p. 654). They consider territoriality as the most critical resistor among all the categories because it refers to conflicts that affect organizations. This resistance occurs when individuals attempt to implement a change, without considering whether that change is in the best interests of the organization.

Additionally, they claim that strategic misalignment usually occurs when organizations focus on the short-term costs instead of considering the long-term benefits. Lastly, poor systems connectivity refers to the deficiency of investments in IT systems that enable the departments of an organization to share valuable information between them and with other supply chain partners (Fawcett et al., 2015).

The category of sociological resistors entails resistance that stems from "*low trust, information hoarding and opposition to change*" (Fawcett et al., 2015, p. 655). Low trust describes the low level of cooperation in the relationships of managers and employees. On the other hand, information hoarding refers to the obtaining of information, which is sometimes easier at the supplier level than within the organization (Fawcett et al., 2015). Finally, they disclose that opposition to change is the situation in which managers lack significant qualifications and not only resisting but opposing change.

Afterwards, the third category of resistance results from organizational routines. This category encompasses the following issues: "*relationship intensity, process integration, complexity management*" (Fawcett et al., 2015, p. 656). Authors describe relationship intensity as a situation in which there is a lack of equality between the relationships within an organization. Process integration refers to the absence of integration of actions to create new value.

As Fawcett et al. (2015) state the latter presupposes the assumption that employees are responsible for distinct roles they have taken within the organization. Yet, complexity management stems from the lack of visibility in the supply chain processes and negatively affects how employees perceive its functions (Fawcett et al., 2015).

The last category involves the individual skills and implies two problems that create resistance: "*leadership deficit and collaborative skill gap*" (Fawcett et al., 2015, p. 657). Leadership deficit as Fawcett et al. (2015) mentioned is one of the most critical issues operating as a resistor. Authors highlight that this form of resistance refers to managers who lack significant competencies and are not willing to participate in decision-making processes that involve risks and uncertainty. Lastly, the collaborative skill gap indicates the situation where staff lacks critical thinking, and top management is looking for new talented employees to bridge the gap (Fawcett et al., 2015).

Having thoroughly analyzed how authors categorize resistors, we must point out that this classification helps us to encounter another issue that we have identified in the literature. This issue was the deficiency of frameworks that consider resistance that is generated during a change. Specifically, the majority of frameworks take into account the pre-existing resistance without recognizing that new can appear. However, by adopting this classification, we have the ability to create a new framework that identifies both the old and the new resistors that emerge. Having completed our report on the situational factors, we must mention the strategies examined to propose in our framework, which confront the organizational resistance.

Initially, we must state that we have identified many different strategies in the previous section. However, we adopt the strategies of Kotter and Schlesinger (2008) for various reasons. One reason is that the strategies proposed below are among the most popular and effective within the literature, as we have previously seen. Another reason is the thorough analysis of advantages and disadvantages of each distinct strategy cited by the authors.

At this point, it is worth clarifying that adopting those strategies does not mean that we include all of them in our own framework. On the contrary, we consider those strategies as practical and effective and thus, the appropriate for facing organizational resistance in the context of reverse logistics are selected.

Kotter and Schlesinger (2008) state that "*education and communication*" is a strategy utilized by managers that attempt to educate the personnel before a change takes place (p. 5). This strategy is aiming to enable employees to realize the necessity and the benefits of a change. Authors claim that this strategy could ideally be applied when employees resist due to being poorly informed about an issue, but their role is critical in the implementation

of change. The basic prerequisite for its application is good relations between employees and managers, since education is a time-consuming process (Kotter and Schlesinger, 2008).

In addition, Kotter and Schlesinger (2008) introduce the strategy of "*participation and involvement*", that is a procedure in which managers engage resistors in the phase of planning and implementing a change to overcome their resistance (p. 5). In this strategy, managers obtain valuable information and advice from employees that they were previously missing (Kotter and Schlesinger, 2008). Authors declare that even though it is considered as a successful strategy, in some cases can bring poor results due to the plurality of participants.

Another strategy that Kotter and Schlesinger (2008) proposed is "*facilitation and support*" (p. 6). This strategy is implemented when managers perceive that the development of personnel's' skills is necessary (Kotter and Schlesinger, 2008). Consequently, managers train and support their colleagues when they understand that they are afraid and anxious about a change (Kotter and Schlesinger, 2008). The disadvantage of this strategy is that despite the fact huge amounts of resources may be spent on training, the implementation of the change is not secured.

"*Negotiation and agreement*" is another strategy to overcome resistance (Kotter and Schlesinger, 2008, p. 6). As the authors claim, when managers realize the significance of particular resistors, they negotiate offering them higher salary and various benefits. The drawback of this approach is that organizations waste a lot of resources, while managers are likely to blackmail employees in case they do not compromise (Kotter and Schlesinger, 2008).

The fifth strategy that Kotter and Schlesinger (2008) present is "*manipulation and co-optation*" (p. 6). Authors mention that managers who utilize this approach usually give particular roles to key employees, motivating them to participate in the change process. As Kotter and Schlesinger (2008) complement, this cannot be considered as a strategy of participation because employees are not asked to reflect their ideas and beliefs concerning the change.

Although co-optation is not an expensive strategy, it involves the risk of staff reaction if they feel that someone manipulates them (Kotter and Schlesinger, 2008). In this case, employees act in the opposite direction, harming the interests of the organization. In fact, co-optation is enforced when managers have implemented other strategies and have failed. However, as the authors report, this strategy relegates the skills of managers since it causes panic among employees.

Finally, Kotter and Schlesinger (2008) introduced the "*explicit and implicit coercion*" strategy (pp. 7-8). In this strategy, managers fire or move employees to another department in their attempt to impose a change (Kotter and Schlesinger, 2008). Authors state that managers prefer this particular strategy when they desire to overcome resistance fast and when they have supreme authority. As it is expected, the selection of this strategy has a negative impact on how employees perceive their relationships with managers. Having analyzed all the strategies and having determined all the parameters we take into account, we have laid the foundations for the theoretical framework that is developed in the next section.

7.5 A Framework for Organizational Resistance

The framework we propose here is inextricably linked with the purpose of our study which is to identify the reverse logistics barriers and provide practical solutions to overcome them. Analyzing the data that we collected from three companies that operate in Greece, we found that the most dominant reverse logistics barrier in the Greek context is organizational resistance. In essence, organizational resistance refers to the reluctance of companies to implement reverse logistics practices. Therefore, the conceptual framework that we suggest aims to support these businesses to cope with organizational resistance to change.

The theoretical framework we propose entails four phases that organizations should follow to mitigate resistance. However, before describing how it can be implemented, we need to analyze why we include each phase separately. The first phase proposed in the framework is that organizations must define the speed of change. The speed of change is one of the

two situational factors that we consider in this framework. Precisely, we do not underestimate the significance of other factors. On the contrary, organizations should acknowledge all the situational factors that affect a change.

According to the literature, the two situational factors considered for the framework, can influence and have the most significant impact on the changes. The speed of change actually refers to the time horizon that organizations must determine in advance, to implement successfully new reverse logistics processes. The reason that speed of change is considered as the first phase is because, as literature dictates, organizations understand the importance of this aspect but do not consider that it is directly related to the strategy they should choose. This essentially means that every strategy is not ideal for every time span that organizations arrange to implement reverse logistics practices.

Kotter and Schlesinger (2008) state that a change strategy should be aligned with a "*strategic continuum*" (p. 8). That practically means that an organization should select strategies that encounter resistance based on the desired speed of change (Kotter and Schlesinger, 2008). When the conditions require a fast change in an organization, then coercive strategies are more appropriate because they involve fewer people in the change and provide a clear plan (Kotter and Schlesinger, 2008).

On the contrary, Kotter and Schlesinger (2008) state that when a change does not need to be made immediately, managers could select slower strategies that enable the participation of several individuals. The authors' arguments above show the direct link between speed and strategy of a change. The optimal speed of change along with the suggested strategies will further be discussed in the third phase of the framework.

The second phase proposed in this theoretical framework, is that organizations must identify which people are reluctant to change or alternatively which are the resistors. We need to mention here that resistors are the second situational factor to which we referred earlier. In other words, what we are proposing in the second phase is to identify the people who are resisting the new reverse logistics procedures and practices that an enterprise wants to apply.

The reasons that this phase is recommended are two. Specifically, the first reason is that resistors affect the speed of a change. In fact, resistors apart from their influence on the

changes, are connected to the first phase of the conceptual framework, thus we cannot ignore them. The second reason is that resistors affect the effectiveness of the strategies proposed in the third phase so that organizations can mitigate resistance. As it is illustrated in the previous section, Fawcett et al. (2015) proposed the classification of resistors in four categories, namely structural resistors, sociological resistors, individual skills and organizational routines.

The classification that authors proposed (Fig.1), was based on two criteria: the origin and the timing of the resistors. Specifically, the first criterion reveals if the resistance derives from the whole organization or from individuals. The second criterion unveils if the sources of organizational resistance exist for a long period or if they emerged recently. In agreement with this categorization, we suggest that organizations must identify and categorize their resistors considering this approach before choosing their strategy. This proposal enhances the organizational capabilities to identify the new resistors resulting from a new change. It cannot be furtherly stressed that emerging resistors are not encountered by any framework in the literature.

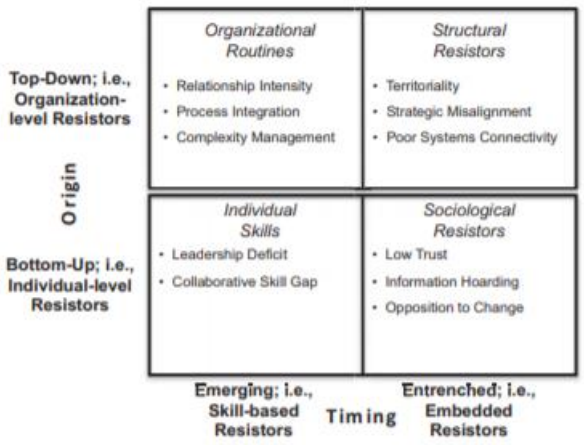

Figure 1: The classification of resistors by Fawcett et al. (2015)

Undeniably, all four categories of resistors are very important and affect the application of reverse logistics practices. As Fawcett et al. (2015) mention, those categories interact with each other and create a "*wall of resistance*" (p. 652). Furthermore, Fawcett et al. (2015)

liken structural resistors to "*bricks*" that construct the wall and sociological resistors to mud that keeps those bricks together (p. 659). In addition, Fawcett et al. (2015) compare individual skills and organizational routines to materials with which the bricks are made and are eventually added to the wall of resistance.

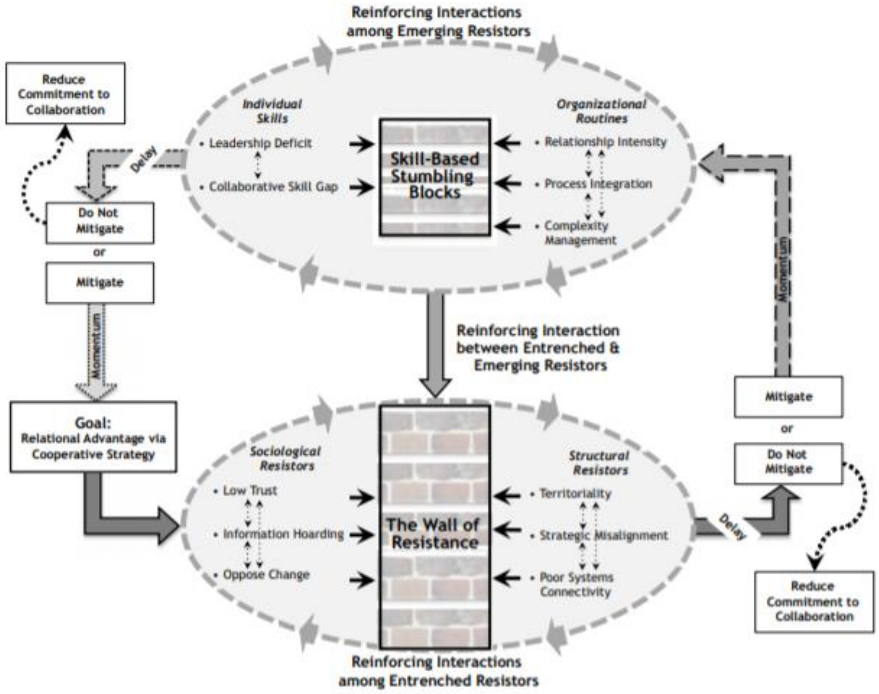

Figure 2: "Wall of resistance" Fawcett et al. (2015)

In essence, organizations need to overcome the wall of resistance in order to successfully implement the activities of the reverse logistics. In this endeavor we first urge organizations to locate all the resistors and then emphasize the treatment of two of them. The first category that we suggest organizations should focus on, is individual skills. The reason behind our suggestion is that individual skills interact with another category which is the sociological resistors.

For instance, when there is lack of leadership, problems such as the lack of trust occur, which in the end create the mud that holds the bricks on the wall of resistance. We believe that in order to dismantle this wall we must remove the mud that holds it together or alternatively reduce the sociological resistors. Therefore, in order to achieve this, we need to focus on the source that this category stems from, which is the individual skills.

The second category of resistors that organizations should eliminate is structural resistors. Our motivation to propose this suggestion is the interaction of this category with the category of organizational routines. Recalling the example given by the authors, the structural resistors are the bricks in the wall of resistance whereas organizational routines are the materials that create new bricks.

Structural resistors such as strategic misalignment and poor systems connectivity affect negatively the organizational routines of businesses. Those routines in turn, create new bricks that heighten the wall. Therefore, to control and reduce the size of organizational resistance, there must be no new bricks, namely futile organizational routines that increase it. As a result, structural resistors should be confronted.

To strengthen our proposal furtherly, it is important to observe the beliefs of the authors who propose this classification. Fawcett et al. (2015) highlight the importance of organizational structures and claim that they usually do not enable employees to mitigate external risks, turning them against possible changes. This emerges from the fact that the personnel are specialized and have certain roles, routines and regulations to perform particular tasks (Fawcett et al., 2015). Having mentioned the view of the authors, we believe that organizations mainly addressing these two categories, will be able to effectively reduce the organizational resistance.

The third phase of the conceptual framework is that organizations must select the right change strategies to deal with organizational resistance. In essence, the third phase refers to the choice of suitable strategies to implement reverse logistics activities, overcoming the barrier of organizational resistance. As mentioned in the previous section, we consider that the study of Kotter and Schlesinger (2008) covers the most widespread and effective change strategies, thus we embrace some of them in our conceptual framework. The reason for not adopting the entire set of strategies is because we believe that some of them will not bring the desired results.

Stating the above argument does not mean that we do not acknowledge the potential outcome of the strategies. However, having studied the literature, we consider that some of them are not justified in the context of reverse logistics. We must state that the choice of strategies was based on three criteria. The first criterion was the speed of change, which

we have already seen that affects the effectiveness of strategies. The second criterion was the literature of reverse logistics, while the third was the tactics and results of each strategy.

In the previous section we saw that if a change is urgent, coercive strategies are more effective. In addition, we know from the literature review of reverse logistics that their implementation entails several changes in the operations and processes of businesses. This means that the application of reverse logistics concerns the majority of the departments of an organization, hence their successful implementation depends on many participants.

However, this is contrary to coercive strategies which in order to be implemented quickly and effectively, demand exclusively the participation of few individuals. Consequently, coercive strategies are believed to be inappropriate for changes related to reverse logistics activities. Beyond our point of view, Kotter and Schlesinger (2008) also declare that the best option is the selection of strategies that are applied slowly for socio-economic reasons, since fast changes entail severe problems.

As a result, in this phase of our conceptual framework, we suggest organizations to choose strategies that allow the gradual implementation of the reverse logistics while overcoming the barrier of organizational resistance. The change strategies proposed to achieve this result are: 1) Education and communication 2) Participation and involvement 3) Facilitation and support 4) Negotiation and agreement. Those strategies enable organizations to implement changes effectively in a wider time horizon. They also allow them to adapt smoothly to new processes and activities as they enable the involvement of many individuals.

On the contrary, we did not include the following strategies: 1. Manipulation and co-optation 2. Explicit and implicit coercion. Both strategies are not realistically consistent with the time required for the reverse logistics implementation. In addition, they create a climate of terror among employees. As a consequence, those strategies do not support the organizational change in the reverse logistics context, where the success depends decisively on the participation of employees. Even if organizations implement changes utilizing those strategies in the short term, the arising problems will affect them in the long term.

At this point we need to clarify whether organizations need to choose one or more strategies to implement the reverse logistics practices. Kotter and Schlesinger (2008) claim that managers can adopt more than one strategy to overcome resistance. However, this presupposes that managers have a deep understanding of the capabilities and the limitations of each strategy, and a pragmatic approach to a change (Kotter and Schlesinger, 2008).

As Kotter and Schlesinger (2008) state, the most popular misconception is that managers adopt strategies that encounter resistance practically. Taking into consideration the above statement, we propose to organizations to select the strategy or the strategies which are more appropriate to deal with the resistors, that have already been recognized in the second phase. In this way, the process of selecting strategies may be facilitated, if organizations pick those that address the most critical sources of resistance.

Having analyzed the third phase of the framework we present the last phase. In the fourth phase we propose to the organizations to monitor the change strategy they have chosen in the previous phases of the theoretical framework. As Kotter and Schlesinger (2008) state, when an organization is planning a change, several parameters can be differentiated regardless of how carefully it was designed.

Kotter and Schlesinger (2008) also claim that if the organizations do not control the implementation of their change strategies, they cannot react effectively if something goes wrong. Consequently, this reason enlightened the idea of proposing this step. We consider this phase as necessary, to avoid the misconception that choosing the right strategy ensures success on its own. The fourth step enables organizations to reassess their choices, get feedback on any problems that arise and reconsider their strategies.

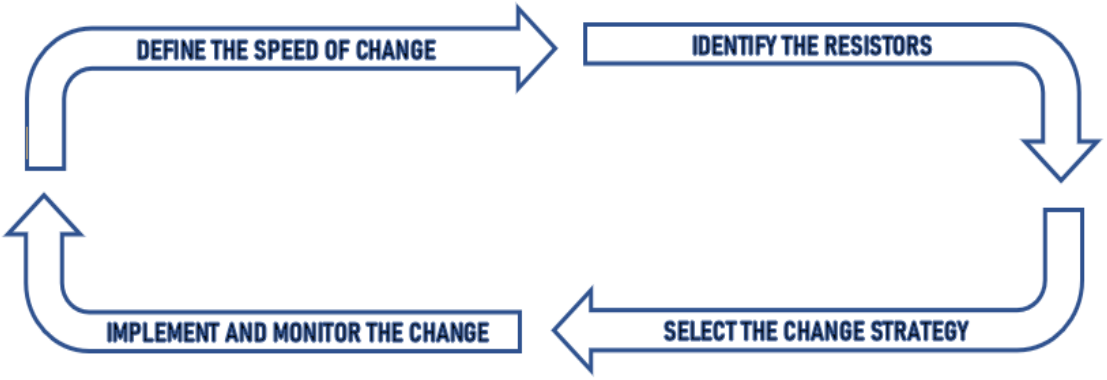

Figure 3: Conceptual framework for organizational resistance

In the above paragraphs we have mentioned in detail why we chose to propose each phase separately. In Figure 3 we illustrate all the phases of the framework collectively. Summarizing, organizations must first determine the speed of change that is suitable for them. Then, they must classify their organizational resistors and especially emphasize on the selection of a strategy that will face two categories, namely structural resistors and individual skills. The next step for organizations is to choose one or more of the four proposed strategies which correspond to the initial selection of the speed of change but also to the resistors they located. The last step that organizations must take, is to monitor the implementation of their change strategies, so that they can identify potential problems and be able to change their strategies accordingly.

We believe that this theoretical framework can become a useful tool for organizations in Greece, to overcome the barrier of organizational resistance and eventually apply the practices of reverse logistics. Although it is designed to address this particular barrier, we believe that it can indirectly address other reverse logistics barriers such as the lack of education, the lack of management support, the lack of awareness about reverse logistics activities and many others. This belief is based on the fact that the strategies we propose, concern and relate to other reverse logistics barriers which were not only identified in the literature but also in the Greek context. However, this remains to be proven in practice.

8. Conclusion

This study explores the barriers that impede reverse logistics implementation and the benefits that are perceived by managers in Greece. A literature review was conducted to investigate the context of reverse logistics, namely the barriers, the benefits and implementation solutions. The results demonstrate that multiple distinct barriers hinder the application of reverse logistics. However, for the purpose of our research we classified the barriers in seven categories to facilitate the analysis. On the other hand, the benefits were divided into two categories. Furthermore, a primary dataset was collected through interviews and analyzed in detail from several different perspectives.

The literature findings combined with the analytical process, accommodated the identification of the benefits that drive reverse logistics implementation in Greece. Additionally, the identified barriers were narrowed down to reveal the root cause that delays or disrupts reverse logistics from being applied in Greek organizations. Afterwards, the development of a conceptual framework was followed, as a suggestion to organizations to overcome the critical barrier that emerged.

Nonetheless, some limitations were recognized. Initially, the interviews were conducted through the telephone, thus there was a difficulty in developing rapport which is a significant factor for successful data collection. Specifically, the lack of visual cues and non-verbal behavior may disempower the meanings and the nuances of the interviews. In addition, the generalizability of the results is diminished by the short and restricted dataset. In particular, the dataset collected is relatively limited according to the analysis and the outcomes that this paper attempts to explore. Therefore, the generalizability of the results may not be possible.

Moreover, this paper focuses on a specific country and according to Waqas et al. (2018), generalizing the results of a research that has been done in a specific economic region or country is not acceptable and reasonable. This results from the fact that different policies, operating systems and maturity level of reverse logistics activities apply in each case. In this way, we cannot state that the barriers and the solutions found in our study can take place in different contexts. Finally, the suggested conceptual framework has not been put to the test. Consequently, the actual results of using the framework to overcome reverse logistics barriers, may differ from those that are described by the paper.

Apart from the limitations, the analysis yielded numerous important results regarding barriers and benefits of reverse logistics implementation. The key implications of the research are discussed below. Considering our expectations, this paper contributes to academia and especially to managers interested in implementing reverse logistics.

8.1 Academic and Practical Implications

The study brings several significant academic and practical conclusions. One crucial point that derives from the analysis is that despite the fact that the Greek economic environment is not stable, organizations recognize the benefits of investing in modern practices. As mentioned in the literature, there are numerous barriers but the importance and the intensity of each one varies, depending on the country and the industry.

Specifically, the categories formulated for the analytical process are seven for reverse logistics barriers and two for reverse logistics benefits. Namely, the categories are the technological, governmental, infrastructural, collaboration and support, financial, organizational and societal barriers. Moreover, the categories for benefits are the financial and environmental.

In the first round of the analytical section, we processed the primary data collected utilizing the literature, to extract and classify the barriers and the benefits of the Greek business environment. However, the results generated by this step were based on the frequency of appearance of each barrier and benefit across the dataset and thus, were considered unstable. For this reason, the analysis proceeded into a second round which did not take into account the number of mentions.

On the contrary, barriers were declared as important according to commonalities among the datasets. In other words, the second round of analysis registered the barriers only once per interview and measured the reappearance of each category among the dataset, looking for common ground. A thing that should be mentioned is that a reverse logistics benefit analysis was not involved in the second round of analysis because a solid outcome was extracted by the first round.

Furthermore, to build a stronger and more precise conclusion, the outcomes of the first and the second analytical rounds were combined to produce the final result, which was put to the test through the dataset. Specifically, the final result which is produced by merging the outcomes of the two different analytical approaches, confirmed by running a third round looking for specific evidence.

The conclusions of the entire analytical process showed that Greek companies are mostly driven by financial benefits but occasionally, environmental benefits can be the starting point. On the other hand, the problem that hinders reverse logistics implementation was proved to be the organizational resistance to change. Additionally, the paper proceeds in the development of a conceptual framework to assist organizations located in Greece to overcome this particular barrier.

The first step before the formulation of the framework was to conduct a brief literature review about the perception of organizational resistance as a barrier in the context of reverse logistics. Afterwards, we proceeded in an in-depth literature search that moved around organizational resistance and change management issues. Specifically, the second literature review was conducted in order to identify various gaps and acknowledge the critical spots that should be focused by the conceptual framework. Therefore, specific theories were isolated to critically address the identified gaps. Lastly, a four-step framework was formulated to support reverse logistics implementation through organizational resistance mitigation.

The results of this paper as well as the proposed framework can provide useful insights for both academics and practitioners. From an academic point of view, the field of reverse logistics in Greece was investigated with respect to barriers and benefits. Specifically, this paper contributes to literature adding information on the status of reverse logistics in Greek organizations.

According to the literature, there were no results indicating that a previous study was carried out focusing on the Greek business environment. The majority of studied papers displayed that equivalent studies on reverse logistics have taken place regarding other countries or industries, but the Greek environment was still uncharted. Therefore, this paper is perceived as a unique contribution to the literature.

From a practical perspective, this paper strives to deliver a path that will help companies and especially those that are located in Greece to overcome organizational resistance towards the adoption of new reverse logistics practices. Particularly, the framework can act as a managerial tool to support decisions related to reverse logistics implementation.

Moreover, the framework addresses issues such as organizational resistors and the speed of change, which are critical factors to the main barrier identified. As a result, the conceptual framework offers an integrated approach to suppress resistance and successfully implement reverse logistics. The paper closes with a discussion over the thoughts for future research.

8.2 Recommendations for Future Research

Besides the contribution of the study, there are numerous capabilities to extend this research. Essentially, it is vital to investigate the reverse logistics context in Greece furtherly and contribute to literature analyzing the Greek business environment. It is recommended that future researchers should also validate that organizational resistance is the dominant barrier in the Greek context, collecting a larger dataset.

Moreover, the conceptual framework that is developed in this paper has not been tested in practice. One additional route of future research is to test the suggested framework in order to check its validity and reveal any possible weaknesses. Therefore, it is recommended to test the framework in different industries as the results may vary in different business environments. It is worth mentioning that the testing should not only be in organizations that vary in kind but also in size.

Particularly, testing in different industries may yield results that will support the evolution of the framework, making it more robust and generalizable. Finally, it should be clearly stated that the outcome of this paper is based on a limited dataset due to limited time frame. Consequently, it is strongly recommended to enhance the dataset and repeat the analytical processes. This process will either reveal the instability or reinforce the outcomes of this study.

9. Refences

Abdulrahman, M.D., Gunasekaran, A. and Subramanian, N. (2014), "Critical barriers in implementing reverse logistics in the Chinese manufacturing sectors", *International Journal of Production Economics*, Elsevier, Vol. 147 No. PART B, pp. 460–471.

Aitken, J. and Harrison, A. (2013), "Supply governance structures for reverse logistics systems", *International Journal of Operations and Production Management*, Vol. 33 No. 6, pp. 745–764.

Ali, C.M.S.E. (2017), "Analyzing Pharmaceutical Reverse Logistics Barriers: An Interpretive Structural Modeling Approach", *International Journal of Applied Logistics*, Vol. 7 No. 1, pp. 16–48.

Ali, S.M., Arafin, A., Moktadir, M.A., Rahman, T. and Zahan, N. (2018), "Barriers to Reverse Logistics in the Computer Supply Chain Using Interpretive Structural Model", *Global Journal of Flexible Systems Management*, Springer India, Vol. 19, pp. 53–68.

Badenhorst, A. (2016), "Prioritising the implementation of practices to overcome operational barriers in reverse logistics", *Journal of Transport and Supply Chain Management*, Vol. 10 No. 1, pp. 1–12.

Bai, C. and Sarkis, J. (2013), "Flexibility in reverse logistics: A framework and evaluation approach", *Journal of Cleaner Production*, Elsevier Ltd, Vol. 47, pp. 306–318.

Bernon, M., Tjahjono, B. and Ripanti, E.F. (2018), "Aligning retail reverse logistics practice with circular economy values: an exploratory framework", *Production Planning and Control*, Taylor & Francis, Vol. 29 No. 6, pp. 483–497.

Bogataj, M. and Grubbström, R.W. (2013), "Transportation delays in reverse logistics", *International Journal of Production Economics*, Vol. 143 No. 2, pp. 395–402.

Bouzon, M., Govindan, K. and Rodriguez, C.M.T. (2018), "Evaluating barriers for reverse logistics implementation under a multiple stakeholders' perspective analysis using grey decision making approach", *Resources, Conservation and Recycling*, Elsevier B.V., Vol. 128, pp. 315–335.

Bouzon, M., Govindan, K., Rodriguez, C.M.T. and Campos, L.M.S. (2016), "Identification and analysis of reverse logistics barriers using fuzzy Delphi method and AHP", *Resources, Conservation and Recycling*, Elsevier B.V., Vol. 108, pp. 182–197.

Buchanan, D. and Badham, R. (1999), "Politics and Organizational Change: The Lived Experience", *Human Relations*, Vol. 52 No. 5, pp. 609–629.

By, R.T. (2005), "Organisational change management: A critical review", *Journal of Change Management*, Vol. 5 No. 4, pp. 369–380.

Cannella, S., Bruccoleri, M. and Framinan, J.M. (2016), "Closed-loop supply chains: What reverse logistics factors influence performance?", *International Journal of*

Production Economics, Vol. 175, pp. 35–49.

Chan, F.T.S., Chan, H.K. and Jain, V. (2012), "A framework of reverse logistics for the automobile industry", *International Journal of Production Research*, Vol. 50 No. 5, pp. 1318–1331.

Chan, H.K., Yin, S. and Chan, F.T.S. (2010), "Implementing just-in-time philosophy to reverse logistics systems: A review", *International Journal of Production Research*, Vol. 48 No. 21, pp. 6293–6313.

Chileshe, N., Rameezdeen, R. and Hosseini, M.R. (2015), "Barriers to implementing reverse logistics in South Australian construction organisations", *Supply Chain Management*, Vol. 20 No. 2, pp. 179–204.

Dent, E.B. and Goldberg, S.G. (2016), "Challenging ' Resistance to Change ' Challenging ' Resistance to Change '", Vol. 35 No. March 1999, pp. 25–41.

Dixit, S. and Vaish, A. (2015), "Perceived barriers, collection models, incentives and consumer preferences: An exploratory study for effective implementation of reverse logistics", *International Journal of Logistics Systems and Management*, Vol. 21 No. 3, pp. 304–318.

Dowlatshahi, S. (2012), "A framework for the role of warehousing in Reverse Logistics", *International Journal of Production Research*, Vol. 50 No. 5, pp. 1265–1277.

Elgaard, Camilla Bounvig (2015): Research methods for international hospitality management students. Essex, England: Pearson.

Fawcett, S.E., McCarter, M.W., Fawcett, A.M., Webb, G.S. and Magnan, G.M. (2015), "Why supply chain collaboration fails: the socio-structural view of resistance to relational strategies", *Supply Chain Management*, Vol. 20 No. 6, pp. 648–663.

Furst, S.A. and Cable, D.M. (2008), "Employee Resistance to Organizational Change: Managerial Influence Tactics and Leader-Member Exchange", *Journal of Applied Psychology*, Vol. 93 No. 2, pp. 453–462.

García-Rodríguez, F.J., Castilla-Gutiérrez, C. and Bustos-Flores, C. (2013), "Implementation of reverse logistics as a sustainable tool for raw material purchasing in developing countries: The case of Venezuela", *International Journal of Production Economics*, Vol. 141 No. 2, pp. 582–592.

González-Torre, P., Álvarez, M., Sarkis, J. and Adenso-Díaz, B. (2010), "Barriers to the implementation of environmentally oriented reverse logistics: evidence from the automotive industry sector", *British Journal of Management*, Vol. 21 No. 4, pp. 889–904.

Govindan, K. and Bouzon, M. (2018), "From a literature review to a multi-perspective framework for reverse logistics barriers and drivers", *Journal of Cleaner Production*, Elsevier Ltd, Vol. 187, pp. 318–337.

Govindan, K., Palaniappan, M., Zhu, Q. and Kannan, D. (2012), "Analysis of third party reverse logistics provider using interpretive structural modeling", *International Journal of Production Economics*, Elsevier, Vol. 140 No. 1, pp. 204–211.

Govindan, K. and Soleimani, H. (2017), "A review of reverse logistics and closed-loop supply chains: a Journal of Cleaner Production focus", *Journal of Cleaner Production*, Elsevier Ltd, Vol. 142, pp. 371–384.

Govindan, K., Soleimani, H. and Kannan, D. (2015), "Reverse logistics and closed-loop supply chain: A comprehensive review to explore the future", *European Journal of Operational Research*, Elsevier B.V., Vol. 240 No. 3, pp. 603–626.

Guarnieri, P., e Silva, L.C. and Levino, N.A. (2016), "Analysis of electronic waste reverse logistics decisions using Strategic Options Development Analysis methodology: A Brazilian case", *Journal of Cleaner Production*, Elsevier Ltd, Vol. 133, pp. 1105–1117.

Halldórsson, Á., Kotzab, H. and Skjøtt-Larsen, T. (2009), "Supply chain management on the crossroad to sustainability: a blessing or a curse?", *Logistics Research*, Vol. 1 No. 2, pp. 83–94.

Hazen, B.T., Overstreet, R.E., Hall, D.J., Huscroft, J.R. and Hanna, J.B. (2015), "Antecedents to and outcomes of reverse logistics metrics", *Industrial Marketing Management*, Elsevier B.V., Vol. 46, pp. 160–170.

Ho, G.T.S., Choy, K.L., Lam, C.H.Y. and Wong, D.W.C. (2012), "Factors influencing implementation of reverse logistics: A survey among Hong Kong businesses", *Measuring Business Excellence*, Vol. 16 No. 3, pp. 29–46.

Hsu, C.C., Tan, K.C. and Mohamad Zailani, S.H. (2016), "Strategic orientations, sustainable supply chain initiatives, and reverse logistics: Empirical evidence from an emerging market", *International Journal of Operations and Production Management*, Vol. 36 No. 1, pp. 86–110.

Khor, K.S., Udin, Z.M., Ramayah, T. and Hazen, B.T. (2016), "Reverse logistics in Malaysia: The Contingent role of institutional pressure", *International Journal of Production Economics*, Vol. 175, pp. 96–108.

El Korchi, A. and Millet, D. (2011), "Designing a sustainable reverse logistics channel: The 18 generic structures framework", *Journal of Cleaner Production*, Elsevier Ltd, Vol. 19 No. 6–7, pp. 588–597.

Kotter, J.P. (2014), "Capturing the Opportunities and Avoiding the Threats of Rapid Change", *Leader to Leader*, Vol. 2014 No. 74, pp. 32–37.

Kotter, J.P. and Schlesinger, L.A. (2008), "Choosing Strategies for Change", *Harvard Business Review*, Vol. 86 No. 7–8.

Lai, K.H., Wu, S.J. and Wong, C.W.Y. (2013), "Did reverse logistics practices hit the triple bottom line of Chinese manufacturers?", *International Journal of Production Economics*, Elsevier, Vol. 146 No. 1, pp. 106–117.

Lamba, D., Yadav, D.K., Barve, A. and Panda, G. (2019), "Prioritizing barriers in reverse logistics of E-commerce supply chain using fuzzy-analytic hierarchy process", *Electronic Commerce Research*, Springer US, No. 0123456789, available at:https://doi.org/10.1007/s10660-019-09333-y.

Lee, C.K.M. and Lam, J.S.L. (2012), "Managing reverse logistics to enhance

sustainability of industrial marketing", *Industrial Marketing Management*, Elsevier Inc., Vol. 41 No. 4, pp. 589–598.

Mafakheri, F. and Nasiri, F. (2013), "Revenue sharing coordination in reverse logistics", *Journal of Cleaner Production*, Elsevier Ltd, Vol. 59, pp. 185–196.

Mahadevan, K. (2019), "Collaboration in reverse: a conceptual framework for reverse logistics operations", *International Journal of Productivity and Performance Management*, Vol. 68 No. 2, pp. 482–504.

Meng, K., Lou, P., Peng, X. and Prybutok, V. (2017), "Quality-driven recovery decisions for used components in reverse logistics", *International Journal of Production Research*, Vol. 55 No. 16, pp. 4712–4728.

Meyer, A., Niemann, W., Mackenzie, J. and Lombaard, J. (2017), "Drivers and barriers of reverse logistics practices: A study of large grocery retailers in South Africa", *Journal of Transport and Supply Chain Management*, Vol. 11, pp. 1–16.

Moktadir, M.A., Rahman, T., Ali, S.M., Nahar, N. and Paul, S.K. (2019), *Examining Barriers to Reverse Logistics Practices in the Leather Footwear Industry*, *Annals of Operations Research*, Springer US, available at:https://doi.org/10.1007/s10479-019-03449-y.

Nativi, J.J. and Lee, S. (2012), "Impact of RFID information-sharing strategies on a decentralized supply chain with reverse logistics operations", *International Journal of Production Economics*, Elsevier, Vol. 136 No. 2, pp. 366–377.

Pacheco, E.D., Kubota, F.I., Yamakawa, E.K., Paladini, E.P., Campos, L.M.S. and Cauchick-Miguel, P.A. (2018), "Reverse logistics: Improvements and benefits when shifting parts exchanging process in a household appliance organization", *Benchmarking*, Vol. 25 No. 5, pp. 1447–1460.

Peña Montoya, C.C., Osorio Gomez, J.C., Vidal Holguin, C.J., Torres Lozada, P. and Marmolejo Rebellon, L.F. (2015), "Reverse logistics in the plastics subsector: Main facilitators and barriers", *Ingenieria e Investigacion*, Vol. 35 No. 3, pp. 27–33.

Prajapati, H., Kant, R. and Shankar, R. (2019), "Prioritizing the solutions of reverse logistics implementation to mitigate its barriers: A hybrid modified SWARA and WASPAS approach", *Journal of Cleaner Production*, Elsevier Ltd, Vol. 240, p. 118219.

Prakash, C. and Barua, M.K. (2016), "A Multi-criteria Decision-making Approach for Prioritizing Reverse Logistics Adoption Barriers under Fuzzy Environment: Case of Indian Electronics Industry", *Global Business Review*, Vol. 17 No. 5, pp. 1107–1124.

Prakash, C., Barua, M.K. and Pandya, K. V. (2015), "Barriers Analysis for Reverse Logistics Implementation in Indian Electronics Industry using Fuzzy Analytic Hierarchy Process", *Procedia - Social and Behavioral Sciences*, Vol. 189, pp. 91–102.

Pumpinyo, S. and Nitivattananon, V. (2014), "Investigation of barriers and factors affecting the reverse logistics of waste management practice: A case study in

Thailand", *Sustainability (Switzerland)*, Vol. 6 No. 10, pp. 7048–7062.

Raci, V. and Shankar, R. (2005), "Analysis of interactions among the barriers of reverse logistics", *Technological Forecasting and Social Change*, Vol. 72 No. 8, pp. 1011–1029.

Ramsay, J. and Croom, S. (2008), "The impact of evolutionary and developmental metaphors on Purchasing and Supply Management: A critique", *Journal of Purchasing and Supply Management*, Vol. 14 No. 3, pp. 192–204.

Saunders, M. N. K.; Lewis, Philip; Thornhill, Adrian (2015): Research methods for business students. Seventh edition. New York: Pearson Education.

Silva, D.A.L., Renó, G.W.S., Sevegnani, G., Sevegnani, T.B. and Truzzi, O.M.S. (2013), "Comparison of disposable and returnable packaging: A case study of reverse logistics in Brazil", *Journal of Cleaner Production*, Elsevier Ltd, Vol. 47, pp. 377–387.

Sirisawat, P. and Kiatcharoenpol, T. (2018), "Fuzzy AHP-TOPSIS approaches to prioritizing solutions for reverse logistics barriers", *Computers and Industrial Engineering*, Elsevier, Vol. 117 No. September 2017, pp. 303–318.

Škapa, R. (2011), "Reverse logistics in the Czech Republic: Barriers to development", *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, Vol. 59 No. 4, pp. 363–370.

Waqas, M., Dong, Q.L., Ahmad, N., Zhu, Y. and Nadeem, M. (2018), "Critical barriers to implementation of reverse logistics in the manufacturing industry: A case study of a developing country", *Sustainability (Switzerland)*, Vol. 10 No. 11, pp. 1–25.

Ye, F., Zhao, X., Prahinski, C. and Li, Y. (2013), "The impact of institutional pressures, top managers' posture and reverse logistics on performance - Evidence from China", *International Journal of Production Economics*, Elsevier, Vol. 143 No. 1, pp. 132–143.

Yusuf, Y.Y., Olaberinjo, A.E., Papadopoulos, T., Gunasekaran, A., Subramanian, N. and Sharifi, H. (2017), "Returnable transport packaging in developing countries: drivers, barriers and business performance", *Production Planning and Control*, Taylor & Francis, Vol. 28 No. 6–8, pp. 629–658.

Zerhouni, H., Gayon, J.P. and Frein, Y. (2013), "Influence of dependency between demands and returns in a reverse logistics system", *International Journal of Production Economics*, Elsevier, Vol. 143 No. 1, pp. 62–71.

10. Appendix

Interview with ThessBags G.P

Interviewer: Hi we would like to discuss about the reverse logistics function that your company has.

Andreas: Yes, first RL functions happen only to one of our two manufacturing processes but of course faces many problems.

Interviewer: Can you please describe the two different products that you are producing?

Andreas: The first one is called cliché. You can imagine it as a big stamp. The material that it is made of is called photopolymer and it is like a solid rubber if you touch it. This stamp is used for flexography. In addition, this product is mainly sold at printing companies. It is used for printing on paper, plastic and on flexible food packaging like a tetra pack or a potato chips bag. The second manufacturing process refers to simple paper bags.

Interviewer: Okay, let's take every product separately, what's the life span of cliché?

Andreas: Depends on the usage. It can last forever if you use and maintain it properly.

Interviewer: Can you describe the manufacturing process of the stamp in simple words?

Andreas: Absolutely, this first step in the production line is to take a photopolymer plate and engrave it with the desired design by light exposure. Then, the plate is submerged into a solvent called unisol which will corrode up to a certain level the areas that are not exposed to light creating a stamp for flexography. Finally, we deliver it to our customers

Interviewer: What happens when the stamp breaks or comes to an end? How do you apply reverse logistics practices on this product?

Andreas: The first thing is to take back the broken stamp from the customer and check if it can be reused. Most of the times it is useless but there are some cases that the plate can be scraped, re-engraved and remanufactured into a new one. However, the new stamp might have a reduced life span because it now has half the size. In addition to this, we invested in a machine which is used to recycle the solvent (unisol) used in the manufacturing process. This machine provides us with 90% reusable resources (solvent) and the rest is a residue which is almost useless.

Interviewer: What's the reason that renders the returned plate unusable?

Andreas: There can be many reasons. The most frequent is that the customers didn't maintain it correctly. A material like this needs to be kept in a dark place as it is a photopolymer. The light is stabilizing the surface and sets the material difficult to process. Moreover, this plate as I said is used for printing and therefore operates under extreme pressure. As a result, the material brakes and the integrity of the stamp fails.

Last, the manufacturing process itself (light exposure, acid submerging) sometimes is enough to ruin the reusability of the final product.

Interviewer: Is there anything you can do to raise the number of reusable plates that you take back from customers?

Andreas: Yes, by investing in digital technology. An investment like this will give us the advantage of keeping the material in better condition and raise the quality of the final product. Specifically, it will take out the entire manufacturing process of light exposure and acid submersion. In other words, it will save energy, time, and resources. However, an investment like this is not feasible without the support of the country and the industry.

Interviewer: Do you think that there is lack of governmental support?

Andreas: Exactly, in my opinion ideas like reverse logistics are difficult to materialize in an environment like Greece due to lack of legislation and financial support.

Interviewer: Me: Totally agree, this is major pillar for achieving reverse logistics. What benefits do you recognize in implementing the technology that you mention before?

Andreas: It will significantly reduce my production cost. Implementing a technology like this will raise the number of the reusable stamps and extend their lifespan for one more use. As far as I know there is nothing you can do to keep a photopolymer forever.

Interviewer: What about the waste that remains after the production of a cliché?

Andreas: There is a liquid waste which as I said is being recycled and becomes 90% new solvent and 10% gel which is completely useless for us.

Interviewer: Can this gel be useful in another production?

Andreas: As far as I know it is one of the best substances that can raise the heat in blast furnaces. For example, during the production of ceramics an immediate raise of the temperature is needed. So, it is a very popular material in ceramic industry.

Interviewer: How do you treat this gel?

Andreas: I stock it in barrels, and I call the recycling company to come and collect it.

Interviewer: What do you get as an exchange?

Andreas: Nothing. They just give me a certificate that I am not polluting the environment and I am treating my waste in the right way.

Interviewer: Okay, let’s move to the second product, paper bags.

Andreas: Yes, we are talking about simple paper bags and they are referring to the whole market especially retail stores.

Interviewer: What kind of materials do you use for bag production? Is everything recyclable?

Andreas: Almost. I use recyclable paper but unfortunately the glue is not recyclable.

Interviewer: Do you know where your bags end up?

Andreas: No, it is extremely difficult to have this information. Hopefully they end up in a recycling centre.

Interviewer: Do you know where the paper come from?

Andrea: It is produced under all environmental principles and green methods and of course I know my suppliers.

Interviewer: What about creating a reverse flow of products providing you with resources for paper bag production.

Andreas: This can only be created by the scrap paper that comes as a waste from bag production which is not compared to the volume of production. I think that it is impossible to redirect used bags back to my facilities due to several reasons.

Interviewer: Pease elaborate.

Andreas: First, it is difficult to track them but even if we could, we have to invest in a third party to collect those bags for us. Second, we don't have the necessary machinery and processes to recycle paper ourselves and even if we had the resources to invest, it would add new processes that would take us time to get used to. Finally, I don't see any possible way to create this reverse flow, as paper bags can easily be damaged and disposed of. Nobody has in mind to keep it and send it back as it is a cheap and low value good.

Interviewer: If you had the chance to create this flow, what would be changed to your production cycle?

Andreas: The bag production will not be affected as a process compared to the cliché production, but a big portion of costs will be taken out. It will be very interesting to be able to create such a flow of recycled paper.

Interviewer: What do you think about reverse logistics in Greek companies?

Andreas: Honestly, Greece is like a big impressible baby which is in need of innovative ideas, strong minds and investments to get things going. We must have more information and more education on this topic as a society.

Interviewer: Last question, do you think that the ideas of reverse logistics and circular models can be feasible in the future and what benefits do you see in them?

Andreas: I can see environmental and financial benefits, but I also see difficulties in implementation because of facilities, education. The most important obstacle is that the benefits and the profits of those practices and models are almost invisible.

Interview with Kourikos S.A

Interviewer: Hi I would like to discuss reverse logistics with you. First, tell me a few things about the company and your role in it.

Dimitra: Kourikos S.A is a company specialized in herbs and spices. We collect herbs from all around Greece and we produce aromatics like dried oregano, thyme, basil etc as well as spice mixtures like curry and paprika and tea mixtures. I am a quality specialist currently in charge of maintaining HACCP principles. Moreover, I am a member of the innovation team which is working on a new distribution system without packaging.

Interviewer: Seems a pretty interesting innovation.

Dimitra: Yes, but we are currently facing some problems.

Interviewer: At this point I would like you to tell me a few words about your manufacturing processes.

Dimitra: Yes of course. We have 3 different manufacturing lines. Two of them are for herb manufacturing and the other for spices. Let's take them one by one. First, I am going to get through the spices process. Half of the spices are being imported and the rest are coming Greek areas. At this point I would like to underline that we pay special attention to our suppliers and the quality of their products. Many of the spices like turmeric need further processing like cleaning drying and grinding. After that we combine the spices according to recipes to create a spice mixture or we package them pure and deliver them to retailers.

Interviewer: It must be very interesting to work with spices and have all those tastes around you.

Dimitra: Yes, there are so many spices in the world, and we are currently trying new recipes so there are some benefits, I admit that.

Interviewer: (laugh), okay and you said that you are designing a delivery system without packaging, right?

Dimitra: No, the system is for the aromatic herbs. Unfortunately, packaging is very important for spices because it is crucial for maintaining the intensity of aromas.

Interviewer: Isn't there an alternative way to ensure this intensity in a different way?

Dimitra: No nothing that we are aware of. Everything we tried had an impact on the quality of the final product.

Interviewer: Okay, let's move on with the rest of your products.

Dimitra: I won't say much about the tea products because they cannot go without packaging for the same reason. Tea herbs are collected exclusively from Greek mountains and flatlands and they are grinded combined according to recipes, put in small

pyramid bags and then packaged and sent to retailers. As I said the package-free distribution system cannot apply here.

Interviewer: Are you delivering straight to retailer?

Dimitra: Yes, even though we have a relatively big production we try to supply retailers directly to ensure that our products won't be left at warehouse for a long time compromising the quality. You know that spices and herbs are a bit sensitive, their aromas tend to fade as the time goes by no matter what you do to preserve them.

Interviewer: Seems like that you invest a lot to preserve the quality of your products.

Dimitra: Yes, flavour is a very sensitive thing to preserve. We try to minimize as many losses as possible in terms of flavour and quality as this is the company's competitive advantage.

Interviewer: Do you think that developing a way to deliver those two products (spices and tea) without packaging will enhance your competitive advantage?

Dimitra: As I said before, this cannot be done. Even if you consider it as a theory, I still believe that the advantages of packaging cannot be substituted.

Interviewer: How did you manage to maintain the flavour of your third product then?

Dimitra: Herbs like oregano and thyme are different. Those herbs are so intense that can survive. In addition, they are made for cooking so they are going to be combined with other ingredients and will pass through a cooking process. Therefore, their aromas will be combined with the rest of the ingredients and the process will rejuvenate them.

Interviewer: But isn't this the case for spices and tea as well?

Dimitra: Reasonable question but no. Spices need to be preserved because they are in powder form and easily lose their aromas. For tea, even though that has the same form and characteristics as aromatic herbs, it is meant to be brewed alone and its flavour must be the dominant and distinct in order to be pleasant. On the other hand, aromatic herbs are strong and can afford a little bit of degrading and still deliver the same intensity. Imagine it yourself, having a low flavour tea will not satisfy you but oregano for example can work.

Interviewer: Yes, I understand, it sounds logical.

Dimitra: Similar with the team production line, herbs are collected from Greek mountains and land fields and then are dried, grinded and packaged for delivery. At this production process we don't mix them up, we prefer to keep them pure.

Interviewer: And you decided to design a distribution process without packaging, right?

Dimitra: Exactly. The philosophy behind it is to reduce unnecessary paper which is bought for packaging. At first, we were thinking of a chain that will allow us to retrieve and refill the packages but that's out of the table due to many reasons. So, we started thinking of a system where we deliver oregano for example into a large box and place it

in a supermarket. Then, customers arrive and fill their own containers and that's it. After the large box runs out, we collect it, refill it and put it back.

Interviewer: Sounds interesting but you said before that you are facing some problems implementing it, can you please elaborate more on those?

Dimitra: It's hard to say that we found all the potential problems since we are still developing it, but I think that the hardest one is to measure the rate that every container needs to be refilled and to design a proper recovery activity.

Interviewer: What about establishing a collaborative environment with the retailers, so they let you know the level of every box for example?

Dimitra: We thought of doing it like, this but from a couple of conversations with some retailers, we didn't find the willingness of collaboration especially from the small ones. The problem isn't that they won't inform us when the box is empty, but that we need a report of the everyday consumption, so we can manage our delivery performance to all of them.

Dimitra: One more thing that stops us, is that we need to redesign the entire process of packaging. Since we are trying to follow the HACCP principles, this will be a difficult to do. We need to invest in personnel's training at all levels. This is a very stressful procedure to undertake and requires a lot of money to be invested.

Interviewer: You are right, but don't you get benefits to outbalance these difficulties?

Dimitra: We can't say for sure. There might be some financial benefits, but it's not easy to say before I see the new practice in action.

Interviewer: What about some waste management goals and benefits. Do you take them into account?

Dimitra: When we started thinking and designing this new process that was our initial goal, but as the financial part came into play, we focused on it entirely.

Interviewer: Thank you very much Dimitra I hope you succeed on this project. Is there anything else that you want to add?

Dimitra: I think I covered most of the things I can share for the moment and I hope that I answer all of your question. Good luck with your project.

Interviewer: Have a nice day Dimitra.

Dimitra: Bye and have a nice day.

Interview with Meraki G.P

Interviewer: Hi Pavlos, we are doing a research on reverse logistics practices and we would like to discuss the case of your company. First, can you describe in simple words the operations that taking place within your company and your position in it?

Pavlos: We are a small coffee importing company and we provide bars, cafeterias, canteens and shops with coffee bean as well as with the appropriate equipment to grind and brew coffee. Me and my brother are the founders of the company so you can say I am half the head of the company but as I said we are a small company, so we don't have discrete titles and positions.

Interviewer: How many people do you employ?

Pavlos: Three plus me and my brother.

Interviewer: So, can you please elaborate a little bit more on the operations?

Pavlos: Our business is very simple. We import coffee beans and the equipment like coffee grinders and coffee machines. We have 3 different coffee qualities. Then we make deals with cafeterias, bars etc to lease them the equipment and provide them with the amount of coffee beans according to their needs.

Interviewer: Sounds pretty simple and as far as I know Greeks drink a lot of coffee so you must have a big demand.

Pavlos: Yes, no complaints about demand.

Interviewer: How do you handle the delivery of the coffee beans?

Pavlos: That's the tough part. Currently we are using one truck that we load with the daily orders. Then we plan the route and that's how we handle the delivery.

Interviewer: What exactly is the difficulty in this plan?

Pavlos: As you pointed out Greeks drink a lot of coffee and as a result the coffee places have a big demand, so orders arrive randomly during the day and our clients want their order to be fulfilled immediately. As a result, we cannot send only one truck once carrying all the orders. We must have vehicles moving back and forth all day long carrying small amounts.

Interviewer: How many sacks of coffee does your clients order? I am asking this to understand the daily consumption because they must keep a safety stock it can't be the case that they have daily needs and orders. Moreover, keeping a safety stock will allow them to place a new order 1-2 days before they run out so you can manage your truck better and more efficiently. Seems like a win- win situation to me.

Pavlos: You are absolutely right. Maybe I didn't describe it correctly. Of course, they keep safety stocks and they place their orders 2 maybe 3 days in advance but since coffee

is their main product, they sometimes run out due to unexpected demand or miscalculation I don't know. For example, during periods tourism peaks those problems are emerging. When something like that happens, we need to act immediately and provide them with a new batch otherwise they won't be able to operate.

Interviewer: How to you think of tackling this problem?

Pavlos: I am thinking of just continuing as we are and when we will be able to hire more personnel and trucks, problems like this will not occur anymore. For example, we can have more vehicles delivering around the city and more people preparing the orders at the warehouse. On the other hand, my brother has an interesting idea which I am afraid I don't believe that much but that's thing that you might be interested of.

Interviewer: Okay, let's talk about that.

Pavlos: My brother Kostas thinks that we need to shift our business model and open one or two smaller warehouses and place them in critical spots according to our customers' location. Those warehouses will operate as retail stores and instead of delivering coffee, our customers will be able to arrive and buy the necessary amount themselves.

Interviewer: Aren't your customers able to come and buy directly from your warehouse right now?

Pavlos: Yes, of course they can but the thing is that the warehouse is at the outskirts of the city and therefore away from the majority of our customers.

Interviewer: Please continue.

Pavlos: Apart from establishing those smaller warehouses we won't stop delivering, but deliveries will be minimized as much as possible. So, everyone will be happy according to my brother.

Interviewer: Yes, but what will be the motivation for your customers to come and buy instead of ordering coffee beans?

Pavlos: My brother thinks that we can achieve better prices with this new model.

Interviewer: Can you describe the changes that will allow this?

Pavlos: Kostas thinks that if we run our business utilizing the small warehouses model, we can import coffee in bigger batches and achieve better prices. In addition, we can order coffee from our suppliers in different packages so we can be relieved from the excess packaging that we need to make our deliveries. Moreover, we will reduce the transportation costs. Given all that, we might be able to sell at lower prices.

Interviewer: Okay sounds very promising but what's the benefits of this model?

Pavlos: You should have interviewed my brother and I am sorry he is unavailable, but I will try to give you the big picture. As I said before the big portion of the benefits of this model is financial. Specifically, we will be able to offer lower prices due to the reasons mentioned before, such as larger orders, less packaging, lower transportation costs, etc.

In addition, we can also say that there are environmental benefits from the reduction of packaging and emissions produced by our vehicles but the last will be levelled out by the emission of our customers vehicle. Eventually, someone has to make the transfer.

Interviewer: You said before that you don't believe in this idea. Why is that?

Pavlos: First, to shift our business to that direction requires a big investment and I think that the Greek economic environment is not ideal at the moment for such a move. Second, it will take us time to inform and convince our customers to follow our model and might lead to customer loss. Third, despite the fact that it might solve some of our problems, it will create more which we are not aware of now.

Interviewer: What do you think about the environmental benefits of that model? do you take them into account.

Pavlos: I don't say that I don't believe in the environmental benefits of this project. As I said before I can identify two of them. The first one is a reduction of packaging and therefore waste and the second one is the emissions. However, for the second one I have some reservations because we will reduce our emission, but we must consider the emission that will be added by the vehicles arriving to get their order. Summarizing I want to say that the environmental benefits exist, but they are not enough for me to agree on that move.

Interviewer: Thank you very much Pavlos your perspective is valuable for me. Is there anything that you want to add.

Pavlos: I am really sorry that you didn't have the chance to talk to Kostas maybe he would have been more enlightening on the topic.

Interviewer: Don't worry Pavlos your opinion matters as well. Have a nice day.

Pavlos: You too.