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Green supply chain for spare parts distribution

Identified challenges of being “green” in aftermarket industry for Volvo Parts

Master’s Thesis in Management and Economics of Innovation

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Abstract

The main purpose of the research is to perform analyses of the challenges and arising opportunities of being "green" in the aftermarket industry for Volvo Parts. The thesis was performed in Gothenburg, at Volvo Technology Corporation, the Business Unit and the center for research and development of technology and business concepts within the Volvo Group. The work has been done in close collaboration with Volvo Parts.

This research is done by careful investigation of three main areas: (1) Aftermarket industry and aftermarket supply chain characteristics, (2) Environmental considerations and (3) Customers' impact and means of communication.

The research is following qualitative approach, and therefore, does not include heavy numeric or statistical data.

Thesis is performed by (1) acquiring an understanding of the main concepts in the field of aftermarket supply chain with the help of study of relevant theory, and by (2) empirical study including interviews with key individuals within the Volvo Group and careful study of internal environmental policies.

The analysis concludes that there are certain areas to focus on within the supply chain itself, which provide possibilities for improvements towards more environmental friendly solutions. One of the identified areas is the outbound logistics services, which Volvo Parts outsourcers from 3PL. The solutions here would be to put higher requirements on the supplier companies in terms of the CO2 emissions from the transportation. Reversed logistics was pointed out as a sub area to be revised in terms of stricter return policies and creating common data base.

Warehousing is a separate supply chain participant, which is addressed as a broad area for "going green". Rethinking of heating and lighting of the facilities is recommended, as well as the location of the regional warehouses and the number of them is a pointed out as a matter of consideration.

Dealer to dealer relationships would ease the spare parts flow "on demand" in emergency cases. Implementing the common database for regional dealerships would decrease the amount of emergency flights and taxis, as they are producing most CO2 emissions.

Communication problem is addressed from both perspectives: internal and external. Establishing special units within the company for dealing with and resolving both issues is recommended.

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Abbreviations

3PL	Third Party Logistics Provider
Arendal Support Warehouse	Arendal Support Warehouse
B2B	Business-to-Business
B2C	Business-to-Customer
CDC	Central Distribution Center
CPR	Collaborative Practice Research
DDP	Delivery Duty Paid
EPD	Environmental Product Declaration; software for calculating the environmental impact from cradle to grave
EUD	European Union Dealerships
EVM	Eco-efficiency Value Model
gC/Km	Gram Carbon per Kilometer
GDS	Global Distribution System
GrSC	Green Supply Chain
GrSCM	Green Supply Chain Management
KPI	Key Performance Indicators
LCA	Life Cycle Assessment
LPA	Logistics Partner Agreement; to develop, implement and maintain an inventory management system at the dealer, in order to optimize parts availability
NAP	Non-Automotive Purchasing
Support Warehouse	Support Warehouse
Violin	Volvo Intranet
VOR	Vehicle Off the Road (The most urgent order-class that Volvo Parts has)

Customers – there are several levels of customers identified in this particular research:

1. Volvo Business Areas
2. Dealers
3. Dealers' customers
4. End customers (consumers, users)

Therefore, each time the term is mentioned, the exact meaning of it will be provided then and there.

Acknowledgements

We consider this thesis as a great learning and experience. A number of persons within the Volvo Group as well as outside of it have contributed in one way or another.

First, we would like to thank Maria Walenius Henriksson, our supervisor at Volvo Technology Corporation, for her valuable contribution throughout the entire project.

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We also want to direct our thanks to various people at Business Areas and Units of the Volvo Group for their collaboration.

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Last but not least, we would like to express our warm gratefulness to our family and friends, who were a great support and faith throughout this thesis.

1 Introduction

1.1 Background

Environmental concerns have increased sharply in recent years. The main threat has been global warming which causes melting icebergs at the Poles and changing ecosystems. These concerns have forced governments to establish regulations and limitations for companies to limit their emissions and other environmental impacts. Although for years there was a thought that profitability and being environmentally friendly were contradictory to each other, gradually companies and businesses found solutions to align them hand in hand.

“Going green” is a popular term used to describe the process of changing one's life and business styles for the sake of safety and benefit of the environment. People who "go green" make decisions about their daily activities while considering what impact the outcome of those decisions and actions may have on global warming, pollution, loss of animal habitats, and other environmental concerns. (Osborn, 2010)

Currently, many companies benefit from their “green” images and their environmentally friendly products and services all around the world. There are huge potentials to turn environmental concerns and threats to opportunities by which one can make totally new competitive advantages and seize large market shares.

This is true because environmental awareness in society and among end-users has been boosted in recent years thanks to all modern communication technologies, particularly Internet. Now the public can easily reach the most recent information about almost everything through internet and check to what extent the products and services they use are compatible with environment. Normally, they can choose between many different options for diverse products and services and by choosing “green” solutions they can express an acceptable social image as well. In such business atmosphere new terms and buzzwords like *carbon footprint*, *carbon neutral*, *green efficiency, green supply chain* etc. emerge to attract customers more and to provide them with some tangible measures for comparison. Consequently, customers’ pressure on companies has become another driving force as well as governmental regulations.

Social environmental awareness brings a special opportunity for companies to market their products and services with “green” brands and labels. They can benefit a lot by differentiation and customization of their products and services in a way that appeals enough to customers so that they will pay more. Even though customers in many cases are willing to pay for the “green” products, it is not that easy to convince them to also pay for “green” services, mainly for aftermarket.

There are many debates about the reasons for such customers’ behaviors in business. According to some of them in this chapter, the main reason could be related to the characteristics of aftermarket industry in which *uptime* and *availability* are two critical factors. This comes from the fact that parts defects and failures happen randomly and there is always a lack of exact estimation for technical problems that might occur.

On the other hand, circumstances for companies in aftermarket industry are in a manner that they can be “green” and benefit both from the social image point of view and from reducing costs in different parts of their supply chains e.g. fuel costs. This is due to the fact that in aftermarket industry transportation, which is accounted as one of the main sources of pollution, plays a significant role in inbound, outbound and also reverse logistics.

Supply chain management is a set of approaches to integrate all the supply chain participants to reach and satisfy the end customer. Aftermarket supply chain, or spare parts market, provides after sales services of the product. Thus, it differs from regular market. It has certain differences in terms of the requirements of the customers, and brings out the “uptime” to be the main criteria of customer’s satisfaction. For commercial truck and bus owners breakdowns are critical, and the most important thing is to get the vehicle back in operation as soon as possible. Thus, the availability of a spare part and the ability of delivering it in the right place at the right time are crucial in the aftermarket industry.

During recent years, aftermarket industry and particularly the need for spare parts management and aftermarket supply chain development have started getting a lot of more attention in comparison to its initial years. The maintenance, regular service of a vehicle along with the quick problem-solving response brings additional value to the product, hence, enhanced trust and reliability towards the product and service provider.

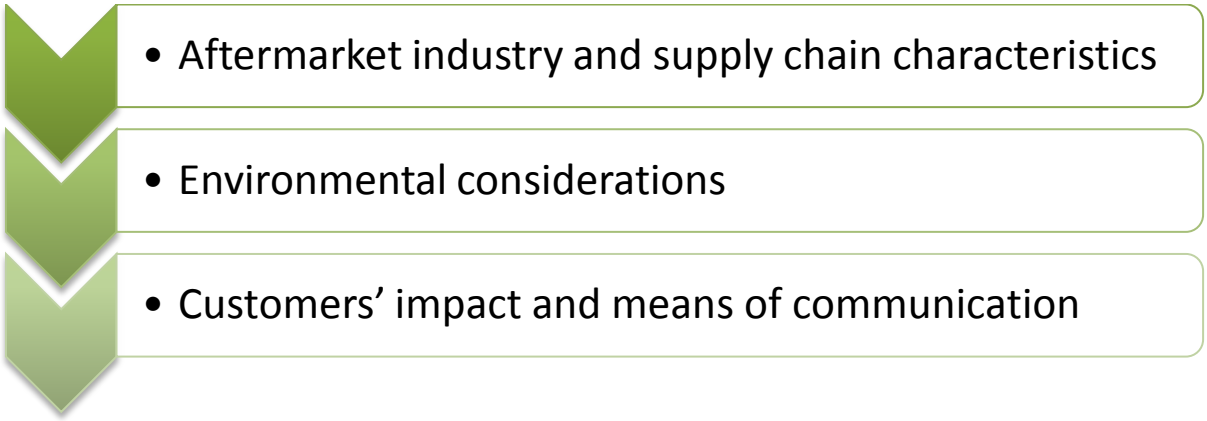
Sometimes companies outsource their whole transportations by recruiting a 3rd party logistics company. In such situations, other parts of their supply chains have to be evaluated to find potentials in the favor of environment. Warehouses, Material planning and the products themselves could be considered as the areas with “green” potentials. Besides, companies can put demands on their transportation suppliers like standards and criteria by which force them to be “green” as much as needed with regard to next level customers and companies’ core values.

The Volvo Group is one of the leading suppliers of commercial transport solutions. Volvo Parts, a Business Unit (BU) within the Volvo Group, is responsible for providing aftermarket solutions for all the Business Areas of the Group. As a way to create additional value to customers, all the BUs and Business Areas (BAs) within the Volvo Group were challenged to put the same focus on the three core values of the Group and not to turn a blind eye to Environmental Care as an ineffectual act.

1.2 Purpose

The main purpose of the research is to perform the analysis of the challenges and arising opportunities of being "green" in the aftermarket industry for Volvo Parts. The main objective of the thesis is to find ways to achieve "green" supply chain for spare parts distribution at Volvo Parts, and at the same time meet the requirements from the customers.

In order to fulfill the purpose of the research, more specifically this thesis deals with the analysis of the three areas:



1.3 Research question

According to the above objectives and areas of analysis in this thesis we can define one main research question:

- "What are the main opportunities and challenges of establishing "green" aftermarket supply chain to provide Volvo Parts customers with more environmental friendly solutions and meet their requirements at the same time?"

1.4 Limitations

1. Distribution of spare parts is considered from Volvo Parts to Volvo Trucks' Dealerships
2. Dealerships in Europe with a focus on Nordic countries

2 Frame of Reference

This chapter will contain the studied theory in order to give a deeper understanding of different concepts which are used further in analysis and discussion chapters. The areas were chosen due to the relevance of the topic investigated.

The main covered areas are the following:

- Supply Chain Management
- Aftermarket Supply Chain
- Environmental considerations
- Innovation and Business-to-Business Green Marketing
- Customers' role
- Transparency

The consistency of the theoretical background is presented in a way to make it visible for the reader what is the connection and its differences between the Supply Chain in general and Aftermarket Supply Chain. The existing research findings regarding Environmental Considerations are linked together with Supply Chain activities, and create the concept called Green Supply Chain. Further on, we will provide the theory for Innovation notion and the role of customers' in affecting companies' activities.

2.1 Supply Chain Management

According to Lumsden (1998), as referred by Schlyter et al. (2008), the traditional definition is that a supply chain encompasses the chain from the first supplier to the final customer.

Definition of Supply Chain Management (SCM), according to Global Supply Chain Forum is - "Supply chain management is the integration of key processes from end users through original suppliers that provide products, services and information that add value for customers and other stakeholders."

Supply chain optimization is one of the main goals for different companies worldwide nowadays (Simchi-Levi, 2000) as referred by Ahsen (2006).

When it comes to logistics and automotive industry, Lewis and Nalm (1995) claim that supply chain management has been introduced to provide a coordinated perspective of the logistical process of linking suppliers with customers in order to ensure that such qualities as reliability, service and price are delivered with the right product, to the right customer at the right time.

The traditional supply chain structure, described by Houlihan (1985), can be seen in Figure 1. It highlights the scope of Supply Chain Management with the links between functional areas such as manufacturing, purchasing, distribution and sales revealing the integrated approach. Supply chain management aims to control the flows of materials and information between each echelon in order to maximize the efficiency of operations with the aim to satisfy the customer needs.

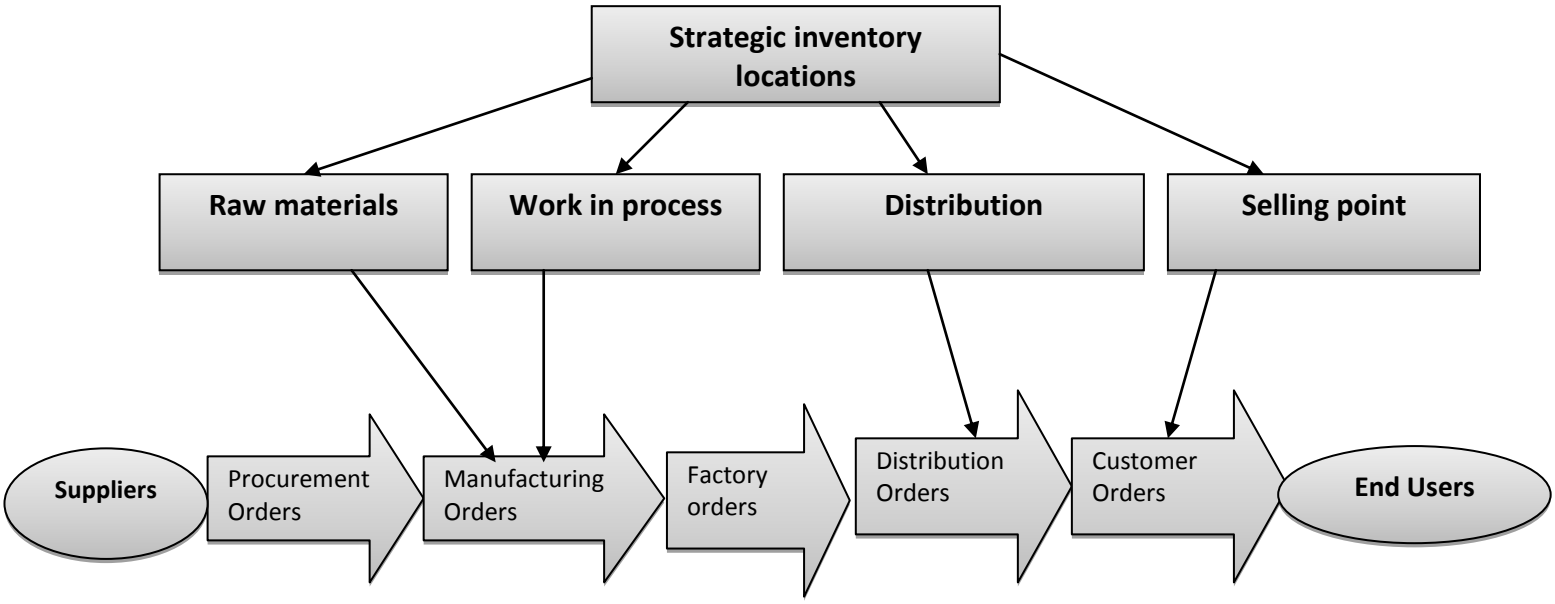


Figure 1: The scope of supply chain management (Houlihan, 1985)

Simchi et al. (2000), as referred by Schlyter et al. (2008), listed some strategic issued to be addressed when building the Supply Chain:

- Warehouses – appropriate number, location, size, design
- Trade-off between being close to customer and decrease lead-time
- Space allocation inside of warehouses
- Determine which products are delivered from which warehouse
- Proper controlling system

2.2 Aftermarket Supply Chain

As White (2010) claims, the core purpose of business in the automotive aftermarket is to provide parts, products and services to keep vehicles operating properly, efficiently, safely and cleanly. The aftermarket contributes to better gas mileage, less energy consumption and cleaner air. The aftermarket industry practices sustainability is meeting the needs of the present without compromising the future.

Overall, the supply chain in the aftermarket is more complex than manufacturing supply chains.

R. White (2010) points out the main activities of the aftermarket:

- Recycling of: Used oil, batteries, tires, transmission fluid, scrap metal, plastics, cardboard, brake fluid, filters, washer fluid, glass, parts cleaning solvents.

- Energy savings in: packaging, transportation, facilities design and management, internal company measures and initiatives, rebuilt-remanufactured engines and parts, paperless invoicing, cool roof technology.

- Promotes environmental awareness to consumers through preventive maintenance including: tune-ups, replacing filters, properly inflated tires, discouraging "topping off" at the tank, correct disposal of fluids, oil change.

Dennis (2003) showed the mix of the flows of materials, information and service labor. They are presented in Figure 2.

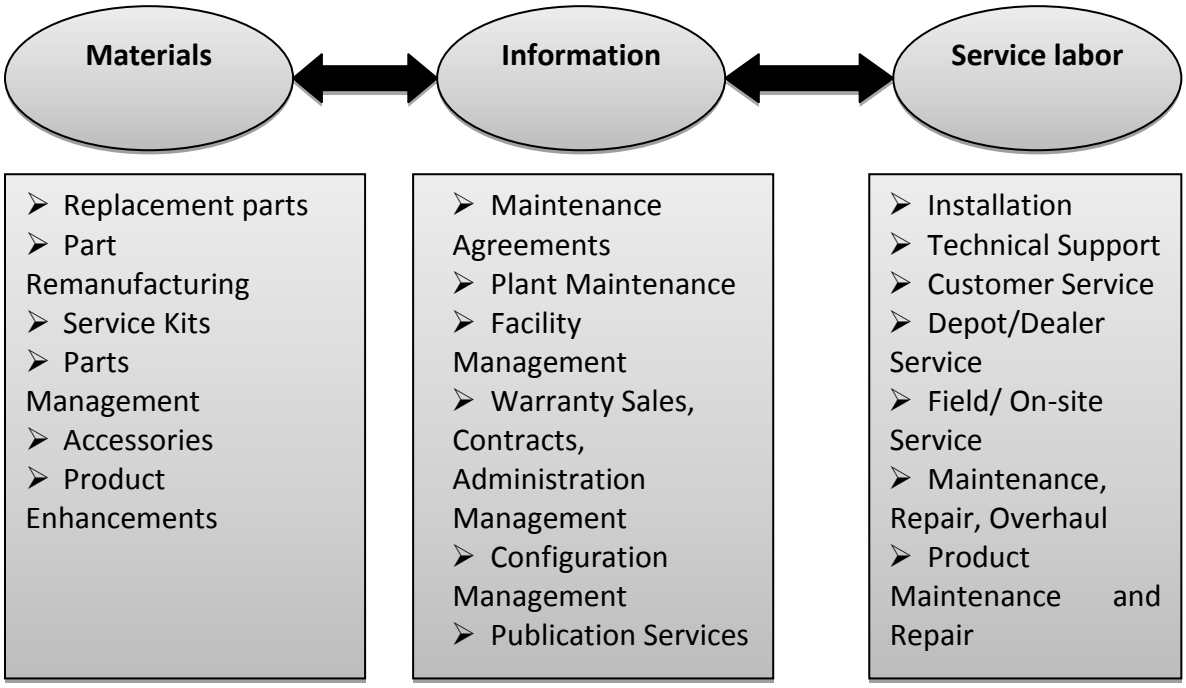


Figure 2: The mix of Materials, Information and Service labor that creates aftermarket supply chain (Dennis, 2003)

We can see from Figure 2 that the activities in aftermarket supply chain differ from those in regular manufacturing supply chain. Especially it can be seen in the information flow, which is providing customers with different types of information and services.

Cohen et al. (2006) claim that the aftermarket supply chain is vastly different from the finished goods supply chain, and includes extended global service supply networks with reverse logistics flows which add complexity and cost. Inventory must be pre-positioned to satisfy customer requirements. Demand is intermittent and difficult to forecast. Table 1 presents the main differences between the Manufacturing and Aftermarket Supply Chains.

Table 1: Manufacturing and after-sales services supply chains compared (Cohen, 2006)

Parameter	Manufacturing supply chain	Aftermarket supply chain
Nature of demand	Predictable	Unpredictable
Required response	Scheduled	ASAP
Stock Units	Limited	Up to 20 times more
Product portfolio	Homogeneous	Heterogeneous
Delivery network	Depend on nature of product, multiple networks necessary	Single network, capable of delivering different service products
Reverse logistics	Doesn't handle	Handles returns, repair, disposal, failed components
Performance metric	Fill rate	Uptime (availability)
Inventory management aim	Maximize velocity of resources	Pre-position resources
Inventory turns	6 to 50 a year	1 to 4 a year

As businesses began offering solutions along with products, Cohen et al. (2006) mention, it became evident that selling spare parts and after-sales services, could be a bountiful source of revenues and profits as well. It isn't surprising, though, Cohen et al. (2006) continue, that companies find it tough to compete in the aftermarket. Delivering after-sales services is more complex than manufacturing products. When delivering service products, executives have to deploy parts, people, and equipment at more locations than they do to make products. This is due to an after-sales network which has to support all the goods a company has sold in the past as well as those it currently makes.

Figure 3, by Ishikawa (1963), also known as a "fishbone" or "cause and effect" diagram, highlights some aftermarket logistics measures of performance which contribute to the efficiency of each interface.

2.2.1 Uptime

Automation is increasing in today's business world, and the dependence on human labor is decreasing. Technology grows and expands into new areas and enables companies to do more with less so that safety and profits increase. At the same time, there is a growing requirement for the physical assets; to have them up and running (Campbell & Reyes Picknell, 2006). Every business in any industry needs equipment to deliver its outputs. Uptime of equipment is of great importance for the financial success of businesses.
According to Alvergren et al (2008), there are two main ingredients of uptime:

- Availability, which is a measurement for determining how often a product is available for use when it is needed. Another important ingredient is
- Reliability, which is the ability to perform a required function under given condition for a certain time interval. This implies that uptime, more generally speaking, can be defined as a period of time when something (i.e. a machine or factory) is functioning and available for use

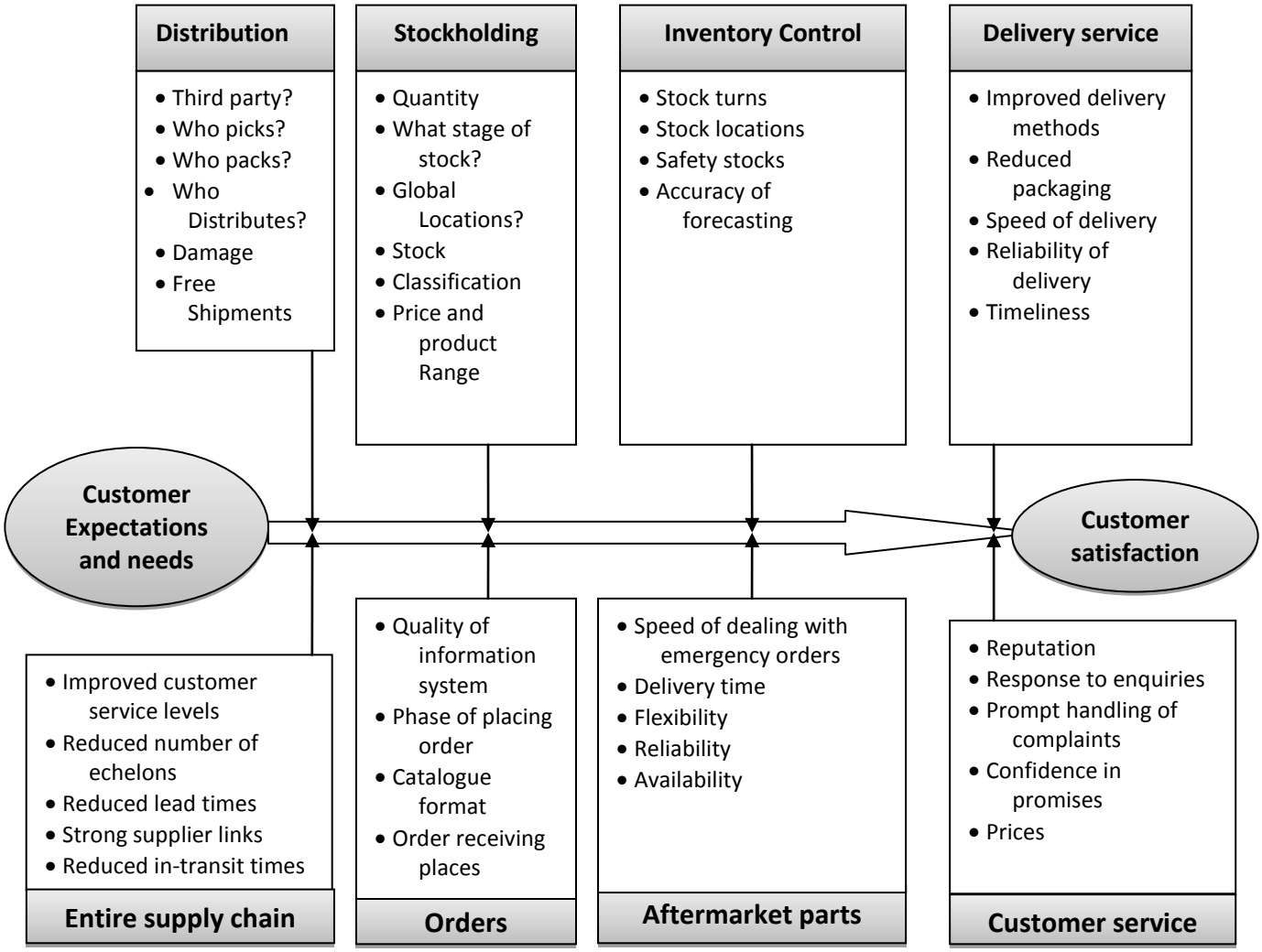


Figure 3: An Ishikawa diagram highlighting aftermarket logistics measures of performance (1963)

2.2.2 Reverse logistics

According to Kokkinaki et al. (2001) reverse logistics stand for all operations related to the reuse of products and materials. Bichler et al. (2002) state that the reverse logistics processes includes "…the management and the sale of surplus and returned equipment and machines from the hardware leasing business".

According to this definition, reverse logistics activities include:

- Processing returned merchandise for reasons such as damage, seasonal, restock, salvage, recall or excess inventory
- Recycling packaging materials and reusing containers reconditioning, remanufacturing and refurbishing products
- Obsolete equipment disposition
- Hazardous material programs
- Asset recovery

According to Seydl et al. (2002), the problems of logistics are the events which bring the product towards the customer. In the case of reverse logistics, the resource goes one step

back – from customer to the distributor or further to the manufacturer, as can be seen in Figure 4.

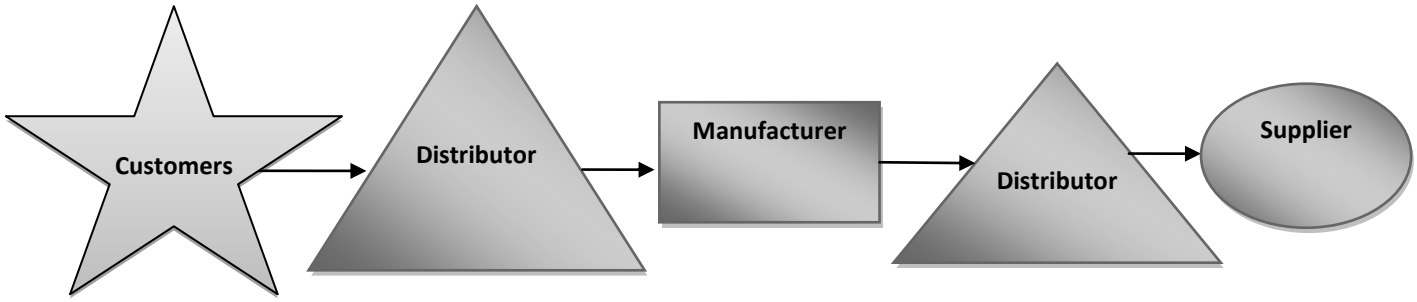


Figure 4: Simplified reverse supply chain (Rengel & Seydl, 2002)

A reverse supply chain is a series of activities required to retrieve a used or unused product from a customer and either dispose of it, reuse it, or resell it (Guide & Van Wassenhove, 2002). More commonly this is referred to as reverse logistics.

During the last years the importance of reverse logistics has increased. The companies are becoming aware of their benefits. The rate of reverse logistic streams can be dangerously high for some companies but having a good management of these streams can lead to a significant increase at the bottom line. Reverse logistics are environmentally friendly because of the reuse, refurbish and recycle, leaving the landfills is the last resort. (Rengel & Seydl, 2002)

Reverse logistics encompasses planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods, and related information from point of consumption to the point of origin for the purpose of recapturing value or for proper disposal (Rogers & Tibben-Lembke, 1999). The complexity of reverse logistics programs means that information support is absolutely critical. However, traditional information systems are designed around forward logistics. (Trebilcock, 2001)

Reverse logistics is fast becoming a competitive necessity due to customer demands for more liberal returns policies or the option to buy on consignment (i.e., if It doesn't sell, the original seller gets the product back) (Daugherty, Autry, & Ellinger, 2001). Shorter product lifecycles also translate to increased returns. Retailers and other customers don't want to hold old models and outdated stock on hand. Other reasons for returns include receipt of damaged merchandise and incorrect shipments, product recalls, and regulatory requirements related to recycling. (Ritchie, Burnes, Whittle, & Hey, 2000)

Across all industries, reverse logistics ranges from about 3% to as high as 50% of total shipments (Rogers & Tibben-Lembke, 1999). Returns may be influenced more by the difficulty in projecting accurate sales forecasts or the whims of consumers. Consumers may change their minds and return products even if they are in perfect condition. Certain industries routinely handle large volumes of returns (Rogers & Tibben-Lembke, 1999).

Reverse logistics is further complicated when operating in an international setting, but often is a necessity. If asset value above the cost of transportation can be recovered, it should be considered. Other factors affecting the decision to handle returns internationally include customer goodwill, the desire to keep name-brand products out of secondary channels, and environmental concerns (Gooley, 1999). Reverse logistics is also used to "clean out" the channel by removing obsolete or slow-moving items and make room for newer products ((Andel (1997) as referred by Tan, & Arun, (2003)). Because of the potential volumes involved, some 3PLs have developed international returns handling capabilities.

Virtually all types of companies must deal with the problem of retrieving products and determining the proper disposition that will allow them to reclaim value that would have otherwise been lost. Proper handling of returns also has important customer service implications. Prompt, efficient reverse logistics can help to keep customers happy. A good returns handling system may even be able to function as a profit center. Some types of products can be remanufactured and resold. (Stock, Speh, & Shear, 2002)

As MEMA MIS Council (October, 2009) reported, while the automotive aftermarket industry faces many challenges related to reverse logistics, there are even more opportunities to implement new processes all the way to the shop that can help streamline operations, cut costs and improve profitability and at the same time apply green sustainability practices. With new environmental regulations and sustainability pressures, more companies are focusing on reverse logistics. And those that implement sooner rather than later will have a competitive advantage.

That's why there is an increasing importance of return management, which covers three main areas (Rengel & Seydl, 2002) minimizing or eliminating returns if possible; handling return procedures, redistribution of goods. Returns management will become increasingly more important for many companies. Returns management will become increasingly more important for many companies, especially for the B2C mail-order business, because the volume of returns increases continuously. However, technical problems (e.g. broken goods, wrong order) are more typical for B2B. Therefore, the main purpose of return management is to create efficiency in terms of returns of goods.

2.3 Environmental considerations

As it was mentioned before, concerns regarding our environment are growing rapidly. Greenhouse effect and global warming have brought our planet many disturbing impacts such as climate change, droughts, floods etc. In addition, our health is facing serious dangers and risks due to different kinds of pollutions. "In order to halt the buildup of greenhouse gases in the earth's atmosphere, global emissions would have to stop growing at all in this decade and be reduced by an astonishing 60% from today's levels by 2050." (Lash & Willington, 2007) (p.3)

This is why researchers, scientists and many other people involved in industry have begun to include environmental considerations in their studies and in experience in diverse aspects. Many companies have realized the importance of environmental issues to the extent that they define their core values based on them. However, "…Adopting the environment as a

core value, for an individual or an institution means more than just declaring it as a value, it means changing behavior." (Grant A.J., 2006)

Some companies have succeeded in finding environmental solutions and remaining profitable as well. They strengthen their management systems by implementing solutions for reducing costs and strong considerations of environmental impact of their activities. This is going to be the dominant business strategy as Wal-Mart CEO Lee Scott addresses: "It will save money for our customers, make us more efficient business, and help position us to compete effectively in a carbon-constrained world." (Lash & Willington, 2007)

2.3.1 Motivations and Pressures

As Vaccaro (2009) addressed, the main motivations for creating and marketing greener products are:

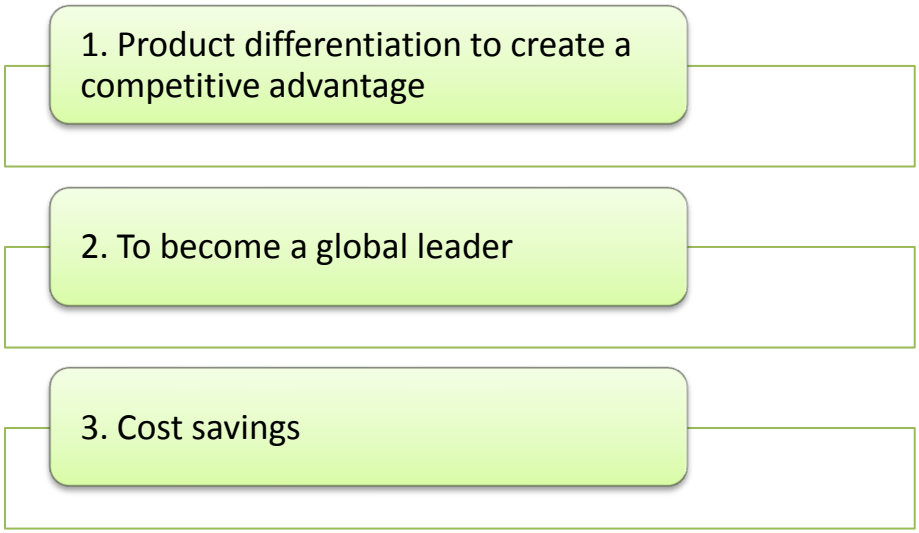


Figure 5: Main motivations for be more "green" (Greenerdesign.com, 2009)

"Going green is no longer just about protecting the environment or even providing a healthier and more productive workplace for employees," says Miscovich (2007). He continues: "Green is also about improving the bottom line. Thus, corporations will drive sustainable practices into the mainstream, yielding tremendous environmental and social benefits while generating increased corporate profits and shareholder value." (Miscovich, 2007)

As it is mentioned by O'Reilly (2006) times are changing, however, so are perceptions of how green awareness and supply chain management can be co-stars.

2.3.2 Carbon footprint and Carbon Neutrality

"Carbon emissions have always existed, but until recently, businesses have not had the means or the inclination to factor them in." (O'Reilly, 2006)

In this way and to determine how and to what extent activities and mechanism, within a supply chain, can or have to be aligned with environmental solutions, some measures and touchstones have been defined. *Carbon footprint* and *Carbon Neutrality* are two of them

which are used in many markets and industries currently and they are spreading in many other areas at fast rate.

According to Carbon Trust (2010) - "A carbon footprint measures the total greenhouse gas emissions caused directly and indirectly by a person, organization, event or product." Carbon footprint is usually calculated for the time period of one year (Carbon Trust, 2010).

The footprint includes Carbon dioxide (CO2), Nitrous oxide (N2O), Methane (CH4), Hydro-fluorocarbons (HFCs), Per-fluorocarbons (PFCs) and Sulfur-hexafluoride (SF6) which are the Kyoto Protocol greenhouse gases. Tones of carbon dioxide equivalent (tCO2e) are used for measuring footprint. (Carbon Trust, 2010)

There are many different definitions for carbon neutrality from different aspects as personal, products, activities, etc. There are a widespread number of companies and websites whose main business is to offset clients' emissions by selling carbon offsets and to make you carbon neutral.

"The term carbon neutral is being defined by common usage. There are no standard ways of measuring your carbon emissions and so no standards for becoming carbon neutral." (Murray & Dey, 2007)(p.7) However, according to National Carbon offset Standard for Australian Government (come into effect from 1st July 2010) *Carbon neutrality* Commonly refers to a "Situation where the net emissions associated with a product or an organization's activities are equal to zero through the acquisition and retirement of carbon offsets that meet additionally criteria." (NCOSA, 2010)

As a prediction, Makower (2007) believes that "At best, carbon neutral will be seen as a de facto requirement, no longer be newsworthy outside the company itself."

However, there are some drawbacks of carbon neutrality. Some researchers believe that it could be seen as a cover-up which prevents companies to go for real actions to reduce their emissions and environmental impacts. For example, it may decrease companies' tendency to move toward higher efficiencies and reducing their energy consumption or utilizing as much as possible of clean and renewable energy resources. Carbon offsets are quantified and sold in metric tons of carbon dioxide equivalent (CO2e). Buying one ton of carbon offsets means there will be one less ton of carbon dioxide in the atmosphere than there would otherwise have been. (CarbonNeutral.com, 2010)[1]

Speaking of offsetting and carbon neutrality it is worth mentioning Renewable energy certificates (RECs) which are also known as "Green Tags"[2]. According to Schendler (2007), producers of that megawatt hour of clean electricity are allowed to print and sell RECs. They represent the quantity of clean electricity. Companies and organizations can buy that REC and claim that their purchase neutralizes some of the carbon emissions created by their electricity use. Schendler (2007, p.38) argues that such RECs in many cases are printed up to

[1] http://www.carbonneutral.com/knowledge-centre/offsetting-explained/
[2] Obtained from US federal Trade Commission http://www.ftc.gov/os/comments/carbonworkshop/533254-00038.pdf

bring in additional revenue and most of them do not actually offset the buyer's carbon emissions or reduce the amount of carbon.

Makower (2007) compared buying offsets for an energy-wasteful activity and naming it environmentally responsible to drinking Diet coke and eating double bacon cheeseburger and naming it weight-loss program!

Carbon emissions initiatives will take supply chain management to the next level by casting "decision making" as socially responsible and fueling innovative research and collaboration to find more energy-efficient ways of doing business." (O'Reilly, 2006)

2.3.3 Drivers and Obstacles toward Environmental thinking

M. Franchetti et al. (2009) mention several drivers to thinking environmentally:

- Environmental problems occur because people want and need products
- Consumer numbers will not reduce, and their habits will not change
- In modern society, mass production is the norm
- All products are designed
- All designs are manufactured
- There is an environmental impact for all product designs
- There is an environmental impact for all manufacturing processes
- It is important to get the design right at the beginning
- The designer must think about potential environmental impacts at all design stages

At the same time, Murphy et al. (1996) claimed, that there is a number of reasons for establishing environmental policies:

- Compliance with government regulations
- Control environmental-related costs
- Minimize liability from potential lawsuits
- Keep up with competitors
- Societal expectations
- Profit opportunities

Companies worldwide are continuously trying to develop new and innovative ways to enhance their global competitiveness. An amount of companies have enhanced their competitiveness through improvements in their environmental performance to comply with mounting environmental regulations, to address the environmental concerns of their customers, and to mitigate the environmental impact of their production and service activities (Lin, Ho, & Chiang, 2009).

While dealing with outbound logistics, organizations are faced with difficult decisions regarding the trade-offs involving inventory policies and environmentally responsible logistics programs. The contemporary emphasis on cycle time compression, for example, may result in a multitude of smaller shipments moving by fast, fuel-inefficient forms of transportation. Environmentally responsible logistics programs, by contrast, are more comfortable with fewer, larger shipments moving by slow, fuel-efficient forms of transportation (Murphy & Poist, 2000).

However, Murphy et al. (1996) states that there are certain obstacles on the way to establishing environmental policies. Figure 6 shows them:

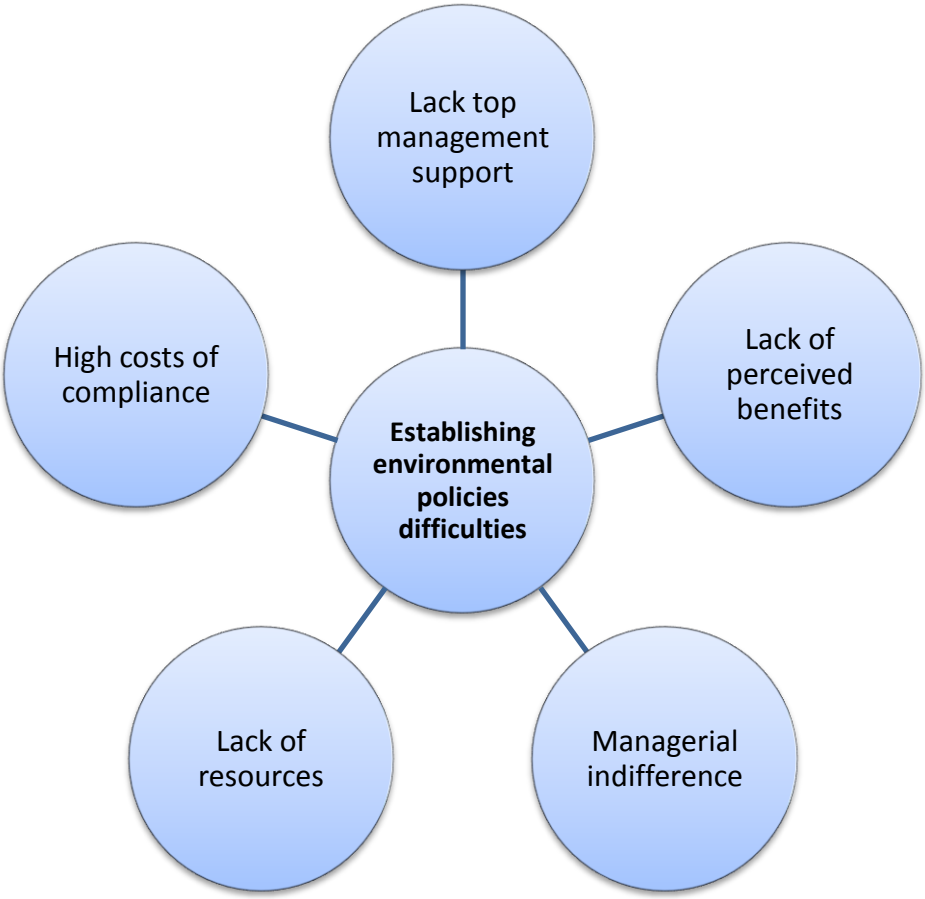


Figure 6: Certain obstacles for establishing environmental policies (Murphy, et al, 1996)

According to Ahsen (2006) the growing worldwide concern about the environment has led to increased customer requirements such as cutting fuel consumption and reducing emissions to the air. Legislations and environmental agreements on governmental level add the pressure on car manufacturers and their environmental management function.

As McKinnon and Piecyk (2009) addressed, transportation accounts for 14% of total greenhouse gas emissions globally and 75% of these emissions comes from road transport.

Logically, car manufacturers can reach these requirements with close cooperation with their suppliers. As a consequence, their suppliers are called on to accept additional responsibility not only for the quality of the product or service but also for the environment, as Ahsen (2006) argues.

2.3.4 Green supply chain

According to Gilbert (2001), as referred by Ramos et al. (2004), greening the supply chain is the process of incorporating environmental criteria or concerns into organizational purchasing decisions and long-term relationships with suppliers. There are three approaches involved to GrSC: Environment, Strategy and Logistics. The mix of them is seen in Figure 7.

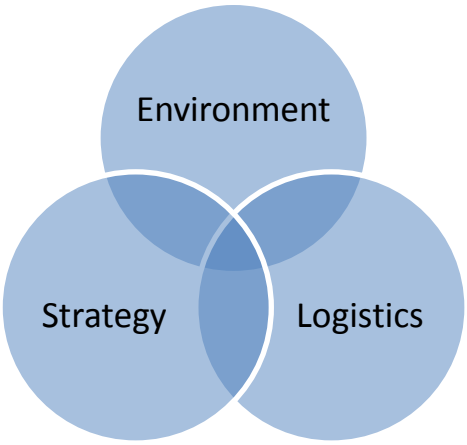


Figure 7: Approaches of Green Supply Chain by Gilbert (2001)

Working with GrSC means to work in the interface of those areas. GrSC is linked to environmental protection, which is the main objective of it. It is a well strongly linked to strategy because it formulates long-term decisions. Logistics is another part of the correlation, because it approaches procurement, material handling, distribution, storage, material recovery and disposition.

As Hall (2006) explained, that “large customer firms invest in environmental supply chain innovation as a means of reducing their exposure to risks associated with their suppliers’ poor environmental performance.” He continued by emphasizing on the fact that "Dynamics of environmental supply chain innovation is dependent upon a dominant supply chain member that is under environmental pressure” (Hall, 2006). He proposed a model (Figure 8), which is useful first to identify and understand “types of pressures with which the firm is exposed” and then to evaluate “their exposure to their suppliers’ poor environmental policies.” (Hall, 2006)

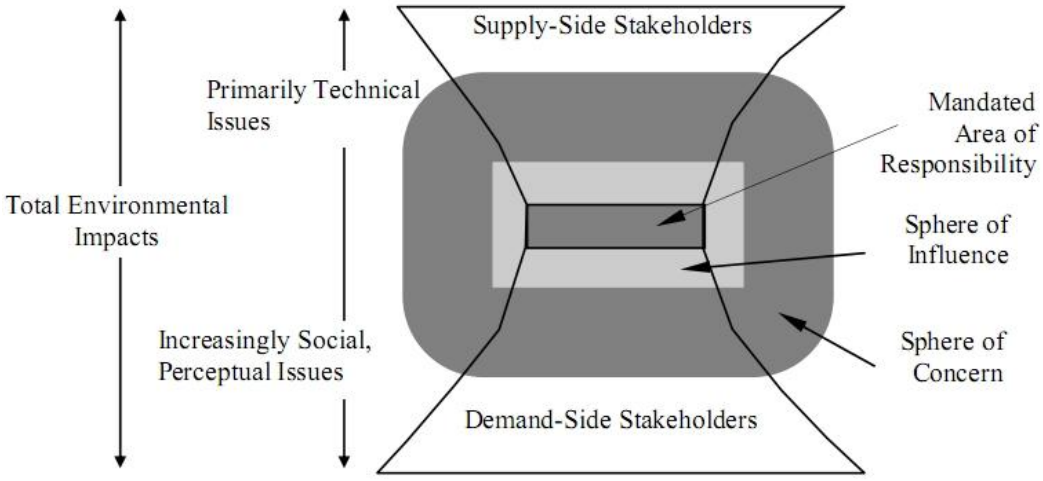


Figure 8: Sphere of influence model (Hall, 2006)

As customers and other stakeholders do not always distinguish between a company and its suppliers (Bacallan, 2000) more and more companies have started to undertake significant efforts towards establishing Green Supply Chain Management (GrSCM) initiatives (Srivastava (2007) as referred by Zh & Sarkis, (2008)).

Logistics operations play a significant role in GrSCM. With the rapid development of the GrSCM, the importance of environmental management for the logistics industry has increased dramatically. To deliver products and services to customers more environmentally friendly, logistics companies need to address more efforts on environmental issues (Murphy & Poist, 2003). Integrating environmental management and logistics services has become an important topic for the logistic industry.

The operation of logistics services often leads to several negative impacts on the natural environment, including air pollutants, hazardous waste disposal, solid waste disposal, fuel consumption, and others (Berry, 2000). This recommends the necessity of studying environmental issues in the logistics industry.

Not surprisingly, Murphy and Poist (2000) claimed, there are numerous environmental considerations with respect to both inbound and outbound logistics, with some differences. One such consideration, efficient warehouse design, can reduce the number of empty or partially empty forklift trips, which is environmentally beneficial due to improved vehicle utilization. Likewise, freight consolidation of inbound loads can reduce the number of partially loaded transport vehicles, thus improving fuel efficiency.

According to Ramos et al. (2004) there are four basic steps to implement a green supply chain. The following model is a decision-making framework suggested by EPA (2000) and it is based upon the best practices of several companies that have successfully initiated and implemented environmental accounting practices. Ideally, companies will customize this approach to best suit their own organizational needs and culture. The four steps are presented in Figure 9:

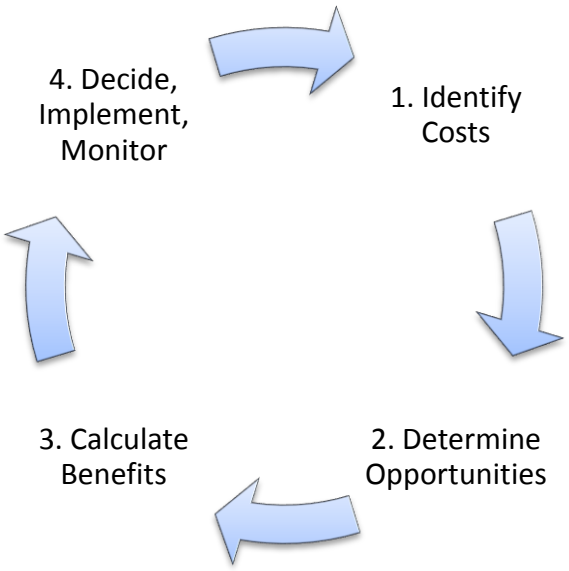


Figure 9: Four Basic Steps to implement a Green Supply Chain (Ramos et al., 2004)

Environmental Management Systems

In 1996, the International Organization of Standards adopted a new international standard for EMS–ISO 14001—with the intent not only of raising expectations for environmental practices worldwide but also to facilitate trade and reduce trade barriers. More specifically, ISO 14001 encompasses the following general areas: EMS, auditing, performance evaluation, labeling, life cycle assessment, and product standards. (Melnyk, Sroufe, & Calantone, 2003)

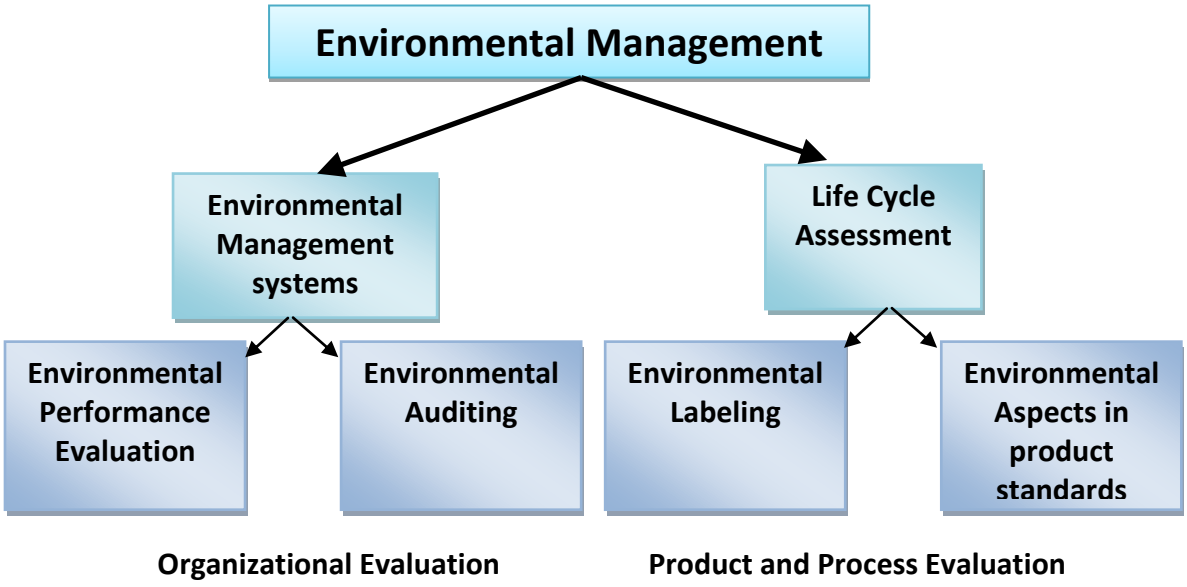


Figure 10: ISO 14001 and environmental management systems (Tibor & Feldman, 1996)

According to Mclntyre et al. (1998) there may be a basic dichotomy between measuring the performance of supply chains and the greening of supply chains. That is, supply chain performance measurement tends to focus on short-term metrics (e.g., profitability) as well as the interests of corporate shareholders. The evaluation of environmental issues, by contrast, tends to involve longer time horizons and should accommodate the concerns of a variety of stakeholders (e.g., suppliers, customers, and the local community).

Hall (2006), who argues that lack of information sharing within the supply chain is one of the obstacles for companies reaching a Green supply chain: "Only when organizations in the supply chain exchange information backward through their channels will supply chains discover more efficient, environmentally sound, and profitable disposition solutions."

2.3.5 Transportation and Environmental impact

McKinnon and Piecyk (2009) suggested an analytical framework which can map interdependence between freight transport, economic performance and a series of logistics parameters as Figure 11 depicts below:

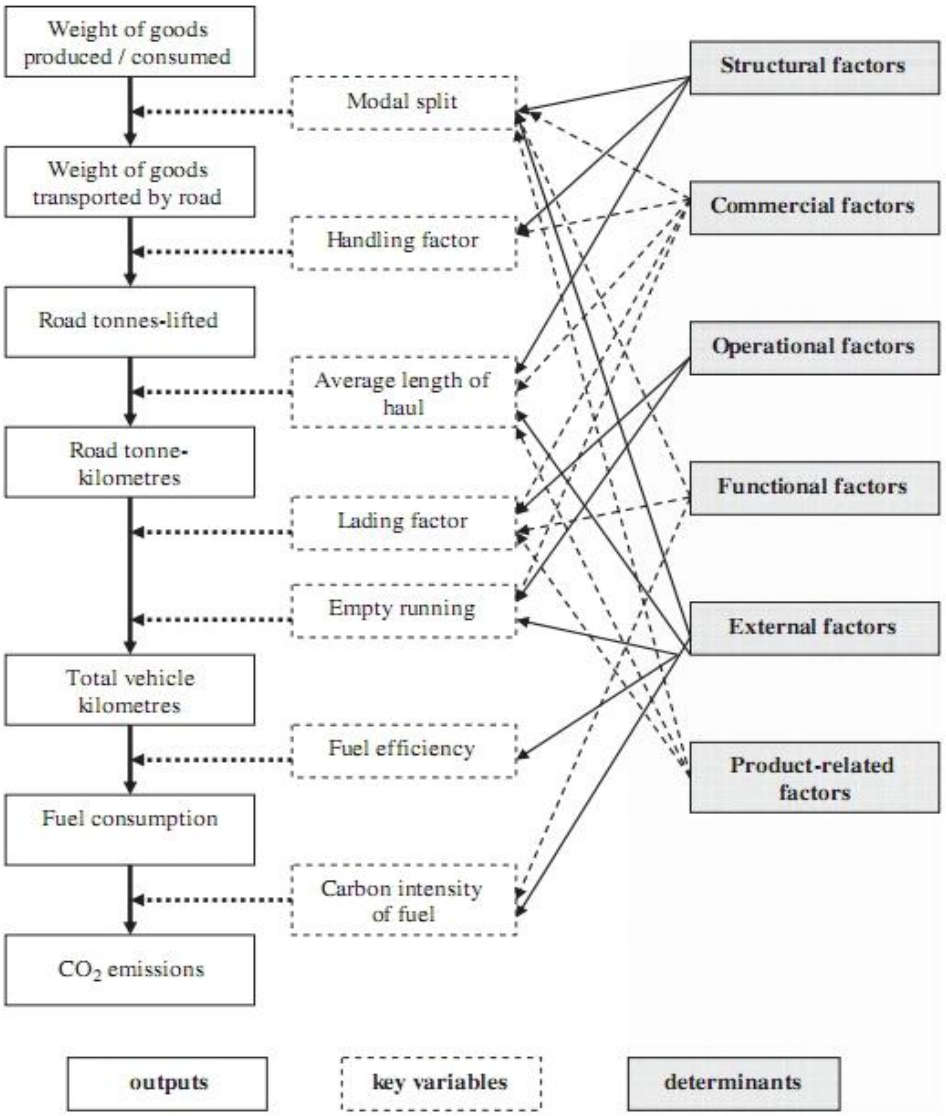


Figure 11: Relationship between logistical variables determinants and environmental impacts, (McKinnon & Piecyk, 2009)

According to this framework and McKinnon and Woodburn (1996) six levels of logistical decision-making inside a company can be distinguished:

1. *Structural factors* determining the number, location and capacity of factories, warehouses and other facilities in the logistics system.
2. *Commercial factors* related to companies' sourcing and distribution strategies and policies.
3. *Operational factors* affecting the scheduling of product flow.
4. *Functional factors* relating to the management of transport resources—usually regarding the choice of vehicle, planning of loads and routing of deliveries.
5. *Product-related factors* affecting the nature of the transport operation.
6. *External factors*—such as government regulations and tax policy, wider macro-economic trends, market dynamics and advances in technology.

In the survey conducted by McKinnon and Piecyk (2009) to determine baseline trends in logistics and supply chain management and associated environmental effects of road freight transport up to 2020, it was revealed that "increases in the volumes of goods and services traded online and in the amount of product being returned for recycling or reused were two of the main commercial factors impacting on freight transport demand in 2020." The extractions of the survey are presented in Table 2.

Table 2: Commercial factors affecting road freights demand (McKinnon & Piecyk, 2009)

How are the following commercial practices likely to change by 2020? (where -2=much less important than now and 2=much more important than now)	**Mean (round 1)**	**Mean (round 2)**	**Reduction of standard deviation (%)**
Online retailing	1.6	1.7	−11
Return of products for reuse/recycling	1.6	1.6	−8
Global sourcing of supplies	0.9	0.9	−15
Localised sourcing of supplies	0.4	0.3	−7
Expansion of the market areas of UK businesses	0.8	0.8	−5
Retailer control of the supply chain	0.8	0.9	−18
Subcontracting of non-core processes	1.0	1.1	−6

According to another result of this survey, by strengthening retailers' control over supply chains even further, the responsibility for improving the environmental performance across the chains could be increase in near future. This is due to the general expectation that more "green" demands will be good incentives for retailers to be more involved in supply chain and increase efficiency for overall environmental and economic benefits (McKinnon, 2009, p.7).

Despite a higher-level decision-making system at the strategic, commercial and operational levels, managers' scope to "green" the transport operation at a functional level is considerable. Another prediction from McKinnon's survey was that by 2020 managers' contribution will be facilitated by wide application of telematics and computerized vehicle routing and scheduling systems (CVRS). The extractions of the survey are presented in Table 3.

Table 3: Functional factors affecting road freights demand, (McKinnon & Piecyk, Forecasting the

What will be the uptake of the following management practices by 2020 relative to today? (where −2=much less and 2=much more)	**Mean (round 1)**	**Mean (round 2)**	**Reduction of standard deviation (%)**
Use of telematics	1.4	1.4	−10
Use of vehicle routing and scheduling systems	1.3	1.4	0
Logistical collaboration between companies	1.3	1.4	−4
Integration of production and distribution	0.8	0.8	0
Matching of vehicle fleet to transport demands	1.0	1.1	−16
Investment in double-deck/high-cube vehicles	1.2	1.3	−8
Use of vans for deliveries	0.7	0.7	−1
Backloading of vehicles	1.2	1.3	1
Focus on service quality rather than costs	0.5	0.5	−13

As it can be seen in Table 3, next significant functional factors which could affect road freight demand in an environmentally friendly way are "logistical collaboration between companies" and "Back-loading of vehicles".

2.4 Innovation and Business-to-Business Green Marketing

According to Christensen (1995), an innovation is a new idea, practice, or object, which a person or a group acknowledges and decides either to adopt or to reject.

Center for Research on Innovation and Competition (CRIC) defined innovation as the successful exploitation of new ideas and continued that it is possible to apply this definition to all firms in the economy including service sector.

However, it is not that easy to fit some firms or sectors in routine classifications. Table 4 shows a classification for three service sectors, retailing, transport and financial services regarding their different kinds of innovation for different patterns (DTI, 2007).

Therefore, it is possible to look at "Green Aftermarket" as a new logistic concept. Outsourcing transportation and offering clients new methods and techniques are related respectively to Client-led Innovation and Innovation through Services. (Table 4)

Table 4: Characteristics of innovation in Retailing, Transport and Logistic Services and Financial Support (Broersma, 2007)

	Supplier dominated	Innovation in services	Client-led innovation	Innovation through services	Paradigmatic innovation
Retailing	Scanning registers/stock replenishment systems	New shop formulae/new franchise schemes	Green or "organic" product/home delivery	Retail consultants introducing new formulae or marketing strategies	E-commerce
Transport and logistic services	On board computers	New logistic concepts mostly streamlining value chains and adding information to it	Outsourcing of transport and "light" production/ assembly	Shippers offering clients tracking and tracing facilities and so contribute to reductions in stocks	Containarisation, e-commerce
Financial services	New distribution channels based on technical platforms (SMS alerts, new mobile devices), back office automation	New (customised) financial service concepts, multi channel management	Green banking, products covering various stages in life e.g. starters mortgage or estate planning	Financial constructions e.g. sale and lease back	Multi-functional smart cards (including non-financial functions)

According to Vaccaro (2009) it is possible to apply innovation diffusion theory to green marketing since it contains innovations regarding products, services and processes. One of the applications of this theory is to reveal how the rate of adoption of green products, services and processes could grow and accelerate creating a competitive advantage for companies in a B2B market.

Vaccaro (2009) cited from Peattie and Crane (2005) who addressed some problems in the way of green marketing in their paper. They emphasized on two main problems as:

- "Green spinning" (manipulation of green image via publicity and lobbying from "Dirty" industries such as oil, chemicals, pharmaceuticals, and automotive)

- "Green selling" where firms do a post-hoc identification of environmental features in existing products, and then opportunistically promote them sometimes with misleading or unproven green claims (Vaccaro, 2009).

He explained how diffusion theory is related to B2B organizations and mentioned to main elements that play a significant role in this regard as: (Vaccaro, 2009)

- The adoption process (stages an organization's buying center goes through to decide whether to adopt or reject an innovation)
- Adopter characteristics (e.g. organizational size, structure, professionalism, R&D capability, corporate culture, etc.)
- Information about the innovation (i.e. marketing communications);
- The external environment (e.g. competition);and
- Diffusion of innovation characteristics

Table 5 presents the relationship diffusion of innovation and characteristics to potential benefits of competitive advantage that come from various proactive B2B strategies: (Vaccaro, 2009)

Table 5: Diffusion characteristics and B2B green marketing competitive advantage, (Vaccaro, 2009)

Diffusion Characteristics	Potential Competitive Advantage
• **Observability** • **Compatibility** • **Complexity** • **Trialability** • **Relative Advantage**	1. Enhanced Corporate reputation 2. More satisfied stakeholders (suppliers, retailers, customers, general public, stockholders, the media, government, etc.) 3. Greater brand differentiation and brand loyalty 4. Higher business performance 5. Increased revenues & higher profits; long term profits 6. First-Mover advantage 7. Higher Market share and ROI 8. Cost Saving and market gains due to differential advantage 9. Increased R&D support 10. Fulfill mission of organization 11. Greater ecological sustainability for the common good

2.5 Customer in focus

Consumers are increasingly seeking businesses that provide environmentally friendly products and practice environmentally friendly services, including automotive. (White, 2010)

Finisterra et al. (2008), states that the modern world has led consumers to become increasingly concerned about the environment. Such concerns have begun to be displayed in their purchasing patterns, with consumers increasingly preferring to buy so-called 'environmentally friendly products'.

The main impetus for greening the supply chain stems from consumers who continue to push for more environmentally friendly products and services, and retailers who continue to demand better recycling solutions, as Doug Tozer CEO of the Wheels Group, a leading third-party logistics provider headquartered in Mississauga, Ont., emphasized in as referred by Kohane (2009).

Hong et al. (2007) say that since the customer is the ultimate judge of supply chain performance, effective and timely responses to ever- changing customer tastes and preferences have become essential components for successful business performance. Hong et al. (2007) refer to the head of McKinsey & Co. in Detroit who said, "Customers have changed their minds about what defines quality – a shift that is making the uphill climb for US automakers even steeper". Hence, companies become more and more customer-oriented throughout their supply chains.

Hong et al. (2007) define customer orientation in supply chain as the degree to which a supply chain focuses on customers and recognize their desires, placing first priority on meeting their needs with superior products or services through collaboration with other supply chain partners. Being in aftermarket, it is crucial to listen to customers, because they are the ones who originally create demand and require availability of spare parts and the uptime is their business success.

2.6 Transparency and Supply Chain

In the new world if the company makes any scandal it is too difficult to hide it and it will spread so fast. Additionally, incredible speed of data transferring and communication methods has opened new ways of cooperation and collaboration for all players in business area to benefit more. Therefore, there are increasing demands on enterprises and companies on transparency. That is driven by different stakeholders from social media, customers, and investors to suppliers.

Increasing transparency of a company's routines and also new innovative solutions and ideas which the company is interested in can save cost in different ways. The most important one is that it builds royalty for the customers and improves brand's image.

Having transparency, one company makes many opportunities not only for others to cooperate in a constructive way but also for itself to do its business in a more efficient way where problems can be seen and solved much faster. Transparency is a solution for companies to involve their customers more and more in their business. It facilitates cooperation and contribution of customers in different levels from retailers to end-users.

Transparency can be beneficial for a better communication within supply chains as well. Wiemer (2007) in his paper of "Transparency in the Supply Chain" cited from Maren Böhm[3] that "systematic and trustful communication between the two parties is an essential key to a successful cooperation". Transparency and openness from suppliers' side can encourage buyers as well to establish a more open and frequent communication which is again beneficial for both suppliers and them (Wiemer, 2007) (P.1). As a result, a transparent supply chain gives this chance to everybody to find the best chains for win-win collaborations.

According to Douglas Macbeth, addressed by Paton and McLaughlin (2008), although in many cases companies know the ways of being more open and transparent about their supply chains, very few of them have succeeded to deliver such solutions practically.

Macbeth believed that this is because when managers faced with challenges of implementing a transparent system while they have to manage also present operational situations, they return to old styles of doing thing and familiar manners (Paton & McLaughlin, 2008). Besides, transparency could not be on all aspects of a company. There are secrets for every company and distinguishing real secrets needs precise decisions and approaches.

2.7 Theoretical framework in summary

So, we can see from the extensive frame of references, that the arising awareness regarding environmental issues is finding their place throughout firms' supply chains, including aftermarket activities. Customers have more and more impact on firms and force them to adjust their existing requirements. However, aftermarket supply chain, which, as had been identified with the theoretical basis, differs from regular supply chain. It does not deal with direct products, but services in most cases. In the case of this specific research, it is distribution services and delivery activities of spare parts for Volvo Trucks and buses. Therefore, customers perceive it differently, since availability and uptime is crucial. Thus, voice of customer and its satisfaction is most valuable.

After having defined the important and most relevant concepts with the help of theory, we will now introduce in details the research procedure, which guided our empirical investigation in finding out what are the real obstacles for Volvo Parts to make their aftermarket supply chain "green", how relevant it is and how to communicate this to customers.

[3] CSR Representative for Asia, Otto Group

3 Methodology

This chapter discusses the methodology used in this master thesis. The overall research design will first be discussed before going into details of the different research methods used. Issues of reliability and validity will also be addressed here.

3.1 Research approach

In the beginning of this thesis, there was little known regarding the background of the project. Therefore, explorative and discovery-oriented approach was chosen as a basis for the research.

Research can be either quantitative or qualitative. According to Blaxter et al. (2006) quantitative research is empirical research where the data are in the form of numbers; qualitative research is empirical research where the data is not in the form of numbers.

Qualitative research is concerned with collecting and analyzing information in as many forms, chiefly non-numeric, as possible. It tends to focus on exploring and aims to achieve 'depth' rather than 'breadth' (Blaxter, Hughes, & Tight, 2006). Qualitative research studies involve a limited participant pool in comparison to quantitative statistical research. (Dawson, 2007)

The main characteristics and thus differences between quantitative and qualitative research strategies can be seen in Table 6.

Table 6: From (Blaxter, Hughes, & Tight, 2006)

Qualitative approach	Quantitative approach
Concerned with understanding behavior from actors' own reference frame	Seeks facts and causes
Naturalistic and uncontrolled observation	Controlled measurement
Subjective	Objective
"Insider" perspective	Outsider perspective
Discovery oriented	Verification-oriented
Exploratory, Descriptive	Reductionistic
Inductive	Deductive
Process-oriented	Outcome-oriented
Valid	Reliable
Holistic	Particularistic
Considers dynamic reality	Considers stable reality

Due to the nature of the questions asked/the problem behind this thesis, a qualitative research approach was applied. Such an approach was best suited, since the primary information needed to understand the problem was non-numerical, and quantitative data, such as statistics, have not been considered to be applicable to this research. The data collection was focused on so-called "soft" data, such as qualitative interviews and literature studies, which have been further analyzed in the thesis.

3.2 Collaborative Practice Research

This research could also be characterized as being collaborative. The choice of this research technique was based on the initial prerequisites and project proposal, which required in-depth participation in daily work routines and interviews on work places.

Collaborative Practice Research (CPR) is a research technique in which the researcher is immerged in the work environment of the practitioners, and where a close collaboration develops between industrial work and academic research. Thus, organizational and academic knowledge are blended. (Rosenhead & Mingers, 2001)

CPR produces valuable and unique insights, along with great work and knowledge gathering experience, which are not possible to acquire only through survey studies or scientific publications., even those strongly industry- driven.

Working inside the organization and being able to observe and participate in every-day routine activities helped to get deeper understanding of how the organization functions in reality. There was the opportunity to observe how formal meetings take place, as well as informal coffee-breaks.

3.3 Data collection

All research involves collection of data whether through reading, observation, measurement, asking questions, or a combination of these or other strategies. This study was explorative, with the purpose of collecting as much information as possible in order to fulfill the purpose of the research and provide a comprehensive view and analysis of results.

3.3.1 Primary data

An interview is a primary data technique used to collect information based on questions. When conducting an interview, the way of how questions are asked is also one major issue, which might lead to different answers and affect the final results.

This research was performed by conducting face-to-face semi-structured interviews. Having face-to-face interviews enabled to follow the path of the conversation, react on changes of the subject and be able to come up with follow-up questions, which were initially not included in the preliminary scope of framework of themes to be explored.

All the interviews were carried out at interviewees working environment and had strictly professional mode. Most of the times there were two interviewers. Interviews lasted from one to one and a half hours. Recording equipment was used, and the notes were taken as well. This was made in order to maximize the likelihood of remembering all the necessary information and having the possibility of listening to the interviews again. A summary of the interview was produced and typed in a file directly after the interview.

Interviewees were selected on the basis of their key roles. The round of the interviews began with a list of interviewees provided by the tutor at Volvo Parts. The list then extended by asking interviewees who would they suggest to interview in the relevant areas that were covered, and by searching internally on the Volvo Intranet within relevant divisions and departments. There were fourteen managers interviewed during the period of three

months. The persons to be interviewed were chosen carefully, considering having most knowledge in the field being asked about.

3.3.2 Secondary data

According to Pervez and Grönhauge (2002) secondary data is type of data presented by other researchers or organizations. Secondary data was gathered in two different ways: documents and observations.

Documents: Documents are one major source of data for all researches and this thesis particularly. As it was already mentioned, the literature review consisted of a lot of external documents, such as books, annual reports, research articles, scientific papers, and credible Web resources. As for the empirical study, Volvo's Intranet portal was of a great use, valuable documents spread internally within the organization helped to get an understanding what policies the company has and how are they being communicated. Internal Power Point presentations were provided.

Observations: People's behavior and ways of interaction were observed and analyzed. This is how the observation method came in and helped to discover more of the real-world situations. It is a method that is analogous to interviews, but more discreet and is a part of Collaborative Practice Research.

3.4 Literature review

In order to get guidance towards the initial background of the subject, preliminary study in a way of literature review was conducted. It is one of the essential preliminary tasks in every research to go through existing literature and findings, in order to have an idea of what has already been done and investigated, It makes it easier, first of all, to avoid repetitions, thus, will save time. Second, it creates the ground for own ideation management, so-called, something to "build on". Plus, one of the main things in any research is to compare your own findings with the established ones.

Literature review, according to Kumar (2005) has a number of important functions:

- It forms theoretical background for the study
- It helps to establish the links between what have been studies before and what you proposing.
- It shows how your own findings contribute to the existing body of knowledge within the profession it helps to contextualize your findings.

Thus, to enable a better understanding of the subject, literature studies were carried out during the first phases of the thesis as a foundation for the whole thesis. The information was taken from books, articles, international journals, and the Internet. PhD dissertations and previous theses, as well as trade journals and academic publications were also used. One of the benefits of using such documentation in a literature study is that information can be gathered rather quickly in a short time, thanks to the technology development and ability to find a lot of sources online.

3.5 Data Analysis

The majority of the data is qualitative, and has been obtained through interviews and discussions at the case company. This section explains in more detail how the analysis of data was conducted.

After having conducted interviews, and transcribed them, the interview data was analyzed. The transcriptions of the interviews conducted at the company were aggregated to see what the overall picture from the interviews looked like.

The interpretation of the information and putting it in line with the answers of other interviewees eventually drew the visible logical coherency.

The data was interpreted and analyzed with the help of theoretical background, which was gathered as a preliminary study. Empirical understudying of the business processes, which was obtained during Master Program, played a great role in drawing major conclusions.

The process was ongoing throughout all the research and the final major suggestions for improvements and considerations were chosen and elaborated upon.

Being an inside researcher with the Collaborative Practice Approach, which means being involved in the everyday work routine, and at the same time having External view on processes and operations, is a great experience. Some part of the analysis of the data was conducted in collaboration with supervisors and tutors, who have deep industrial knowledge.

Based on the literature review, the analytical framework and model for analysis (Figure 12) were developed and the focus areas were chosen. All relevant areas for the thesis were covered, including Supply Chain Management, Aftermarket characteristics, uptime/downtime definitions, reversed logistics issues, Environmental considerations and existing industrial implications in greening supply chains from different industries, particularly automotive and the role of customers in creating demand issues.

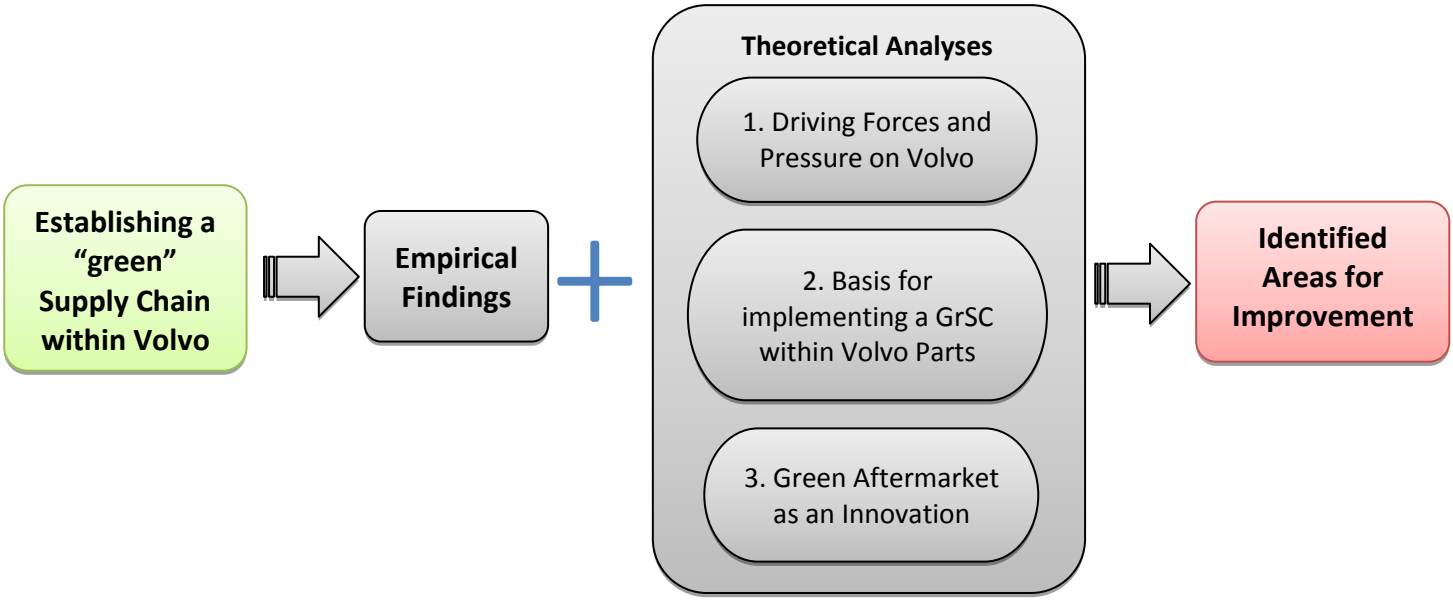


Figure 12: Analytical Model Used for Analysis

3.6 Research Procedure

Summarizing the methodology (Figure 13), we came up with the model which briefly represents the steps of our research procedure as our thesis proceeded.

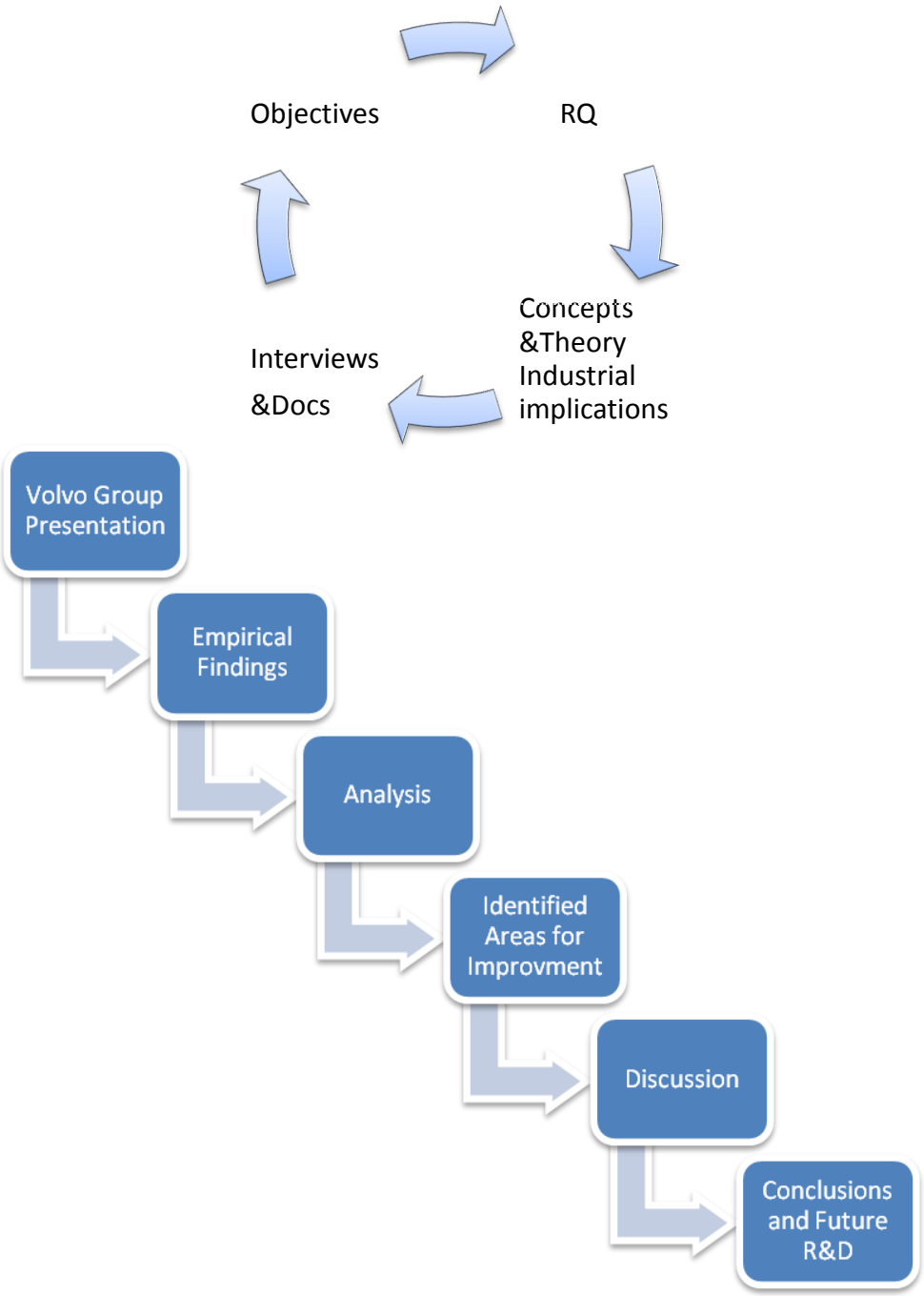


Figure 13: Research Procedure

Having described the necessary concepts in the identified areas with the help of frame of reference, which are most relevant to be covered in our research case, we made a list of people who might be most informative.

While conducting interviews, the number of people who are being recommended as being most relevant to talk to was “snowballing”.

At the same time reading publications in the industrial magazines regarding existing implication of going "green" was an ongoing process. This helped to get ideas for further questions to the future interviewees and follow-up questions to people who we already talked to.

The answers of interviews' respondents were recorded, thus, it made it possible to listen to them later on to find out what exactly was meant in that or that context.

Needless to mention, during literature review, and conducting the interviews, the main objectives of the research as well as research question were modified several times, due to constant information flow and additional inputs which influenced the path of the research direction.

As one of the final steps of the research, an interview was conducted at the "Truck Center", Dealer Center of Volvo Trucks. The interviewee confirmed the major conclusions regarding one of the main objectives of the research, - "green" concepts communication to the customers. The interview and obtained results played significant role on the research validity, since they aligned with other findings that we had from former interviews. At the same time, it confirmed the need of the proposal for the future research.

Summary is presented in the conclusions, referring to the main initial objectives of the research in order to see if the research question was answered and the requirements of the project fulfilled.

Future research and development is always needed, and this thesis is not an exception. The recommendations of further investigation and calculations are provided in the last chapter.

3.7 Validity and Reliability

When conducting the research and collecting the data, a researcher should make sure that the sources, primary and secondary, are both valid and reliable. This section discusses the accuracy of this master thesis in terms of reliability and validity.

Reliability in this qualitative research is important to be considered high. According to Yin (1994) external reliability (replicability) is concerned with the degree to which same methods used and same data gathered would show same results if conducted by other researches. Internal reliability has a parallel in qualitative research called inter-observer consistency. It is about the fact that whether the same things have been observed by researchers (Smallbone & Quinton, 2004). In this regard and as one of the purposes of the research, one of the final steps was the visit to the dealer center, where the Sales Chief was interviewed. Dealers are presumed to be the closest gate to the end customers and actual product users. Therefore, Dealer manager's opinion was highly valuable. The outcome of the meeting confirmed our findings and research conclusions. It considerably increased the internal reliability of the study.

Internal validity is high as a fact of qualitative researches (Bryman and Bell, 2003). As discussed by Payne et al. (2004) well foundation of the understating and interpretation of

the studied concepts improve validity. To gain higher validity, the theories used as a foundation for interpreting concepts, were gathered from credible sources. The majority of the data for pre-study as a secondary data was gathered from Chalmers University of Technology electronic databases for e-journals and e-books and previous research published as Doctoral and Master Theses in the same field. As for the primary data, interviews, it was collected from credible individuals having years of experience in the respective field within Volvo organization and academic world.

However, external validity could be a problem as it is not that easy to generalize our findings for all the companies. As Smallbone et al. referred to Schofied (1990) there is a belief that external validity should not be considered as an objective for qualitative researches. However, we believe it is possible to generalize the results for other BAs and BUs within Volvo Group AB.

Ecological validity is defined by Reis & Judd (2000) as "whether an effect has been demonstrated to occur under conditions that are typical for the population at large." It basically means that all factors of a research have to be in the real-life situations during investigations. (Brewer, 2000) This is true about this project. All the interviews were conducted with a single interviewee in a relax atmosphere without any pressure from interviewers or any stress from interviewees side.

However, human factor should not be taken apart, since during the interviews, people might say different things, not because they were lying before, but they could've extended their knowledge by the next time being asked same question. As we already mentioned, the people to be interviewed were chosen carefully, from top management positions, considering having most knowledge in the field being asked about. The corporate personnel are most knowledgeable about environmental issues and are likely to be in positions of middle and upper management, this study focused on those people.

4 The Volvo Group

In this chapter we will present Volvo Group and its different business areas and business units those were engaged in our project. This information is mainly gathered via Volvo intranet during our research from January to May 2010.

4.1 The Volvo Group

The Volvo Group is one of the leading suppliers of commercial transport solutions providing products such as trucks, buses, construction equipment, driving systems for marine and industrial applications as well as aircraft engine components. The Volvo Group also offers its customers financial services.

The Volvo Group has production facilities in 19 countries and sales activities in some 180 countries. The Volvo Group is organized in nine product-related business areas and supporting BUs.

The corporate values – quality, safety and environmental care – are a commitment to meet the expectations of customers, business partners and society. The corporate values also constitute the common ground for the Volvo Group's different brands.

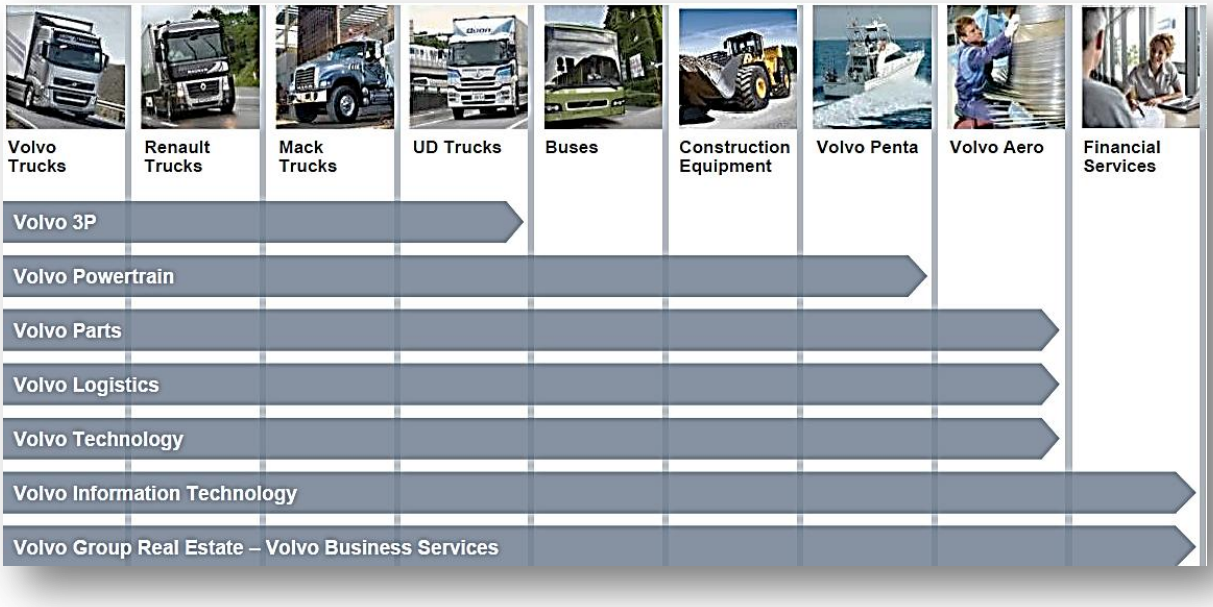


Figure 14: Volvo Group description Source: Volvo Intranet (2010)

4.2 Volvo Technology Corporation

The challenge of conducting this Master thesis was taken by Volvo Technology Corporation (VTEC), in Gothenburg. Volvo Technology is an innovation company and the center for research and development of technology and business concepts. Volvo Technology provided physical work place and all kinds of supervising and supporting activities for the authors of this thesis.

4.3 Volvo Parts

Volvo Parts (Volvo Parts) plays a role of the requesting party and the initiator and the driver of the project. Volvo Parts is a Business Unit within the Volvo Group, which provides spare

parts, logistic services, including purchasing, and aftermarket services to Volvo Group partners and customers. Volvo Parts has around 4000 employees globally that most of them are in the field of logistics. The company delivers spare parts to customers in 120 countries, has 44 distribution centers worldwide, and more than 600 000 stocked part numbers in total. In order to clarify possible misunderstandings, it is worth mentioning that Volvo Parts is not producing spare parts, their main responsibility is distribution parts.

Volvo Parts' Mission is to maximize customer satisfaction and profitability by providing leading-edge aftermarket services to the Volvo Group and other selected customers.
Vision - number one in aftermarket services and perceived as easy to do business with.

Supply chain Management at Volvo Parts:

- *Warehousing*

The Central warehouse*:*

The central warehouse, in Gent, Belgium, was opened in 1973. It has good excellent location, with an easy reach of importers in Europe. In 1994 the central warehouse in Gent became ISO certified. In 1997 it received environmental certification.

Volvo Parts in Gent offer worldwide distribution services for truck and bus parts, and supply of Volvo Penta and Volvo Construction Equipment heavy range excavator spares. In addition Volvo Parts also takes care of urgent spare parts delivery for Renault. In order to ensure quick and efficient parts availability at the customer's sites, the organization can rely on an extensive network of both regional and Support Warehouses.

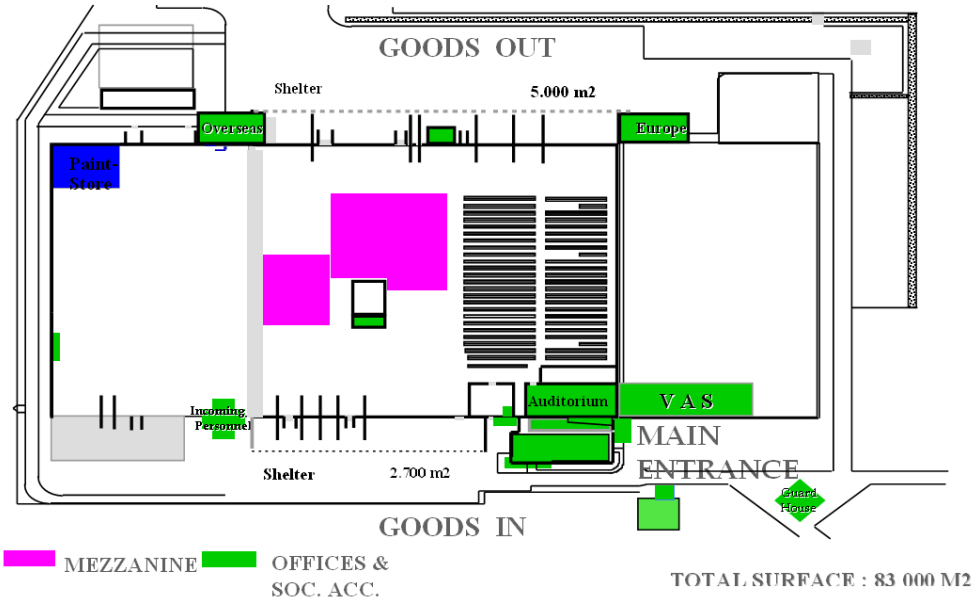


Figure 15: Layout of Central warehouse in Gent. Source: Volvo Intranet

Support Warehouses:

In 1993 the Support Warehouse in Rugby S1 was opened on January 1 to serve Great Britain and Ireland.

In 1993 the Nordic warehouse was opened S3 in the Arendal section of Göteborg. The warehouse serves Sweden, Norway, and Denmark.

In 1993, on October 1, the Support Warehouse in Lyon S2 was opened to serve France and Switzerland.

In 1995 the Support Warehouse S6 was opened in Bologna to serve Italy.

In 1996 the Support Warehouses S2 and S4, in Lyon and Helsinki, became ISO certified.

In 1997 the Support Warehouses S2 in Lyon and S3 in Arendal, Göteborg became ISO certified, as did Volvo Parts in Eskilstuna, Sweden.

Figure 16: Warehouses Locations in Europe.

- *Customers*

Primarily the eight Business Areas of the Volvo Group:

- Volvo Trucks
- Renault Trucks
- Mack Trucks
- UD Trucks (former Nissan Diesel)
- Volvo Buses
- Volvo Construction Equipment
- Volvo Penta
- Volvo Aero

As it has already been mentioned due to the delimitations of the research project, only European branches of Volvo Trucks Corporation and Volvo Buses Corporation, as the key biggest customers, and their requirements were considered.

For this thesis, the focus has been on the flow concerning components and parts from the suppliers of Volvo Parts in central Europe to the truck Dealer Center in Gothenburg.

4.4 Key customers' description

4.4.1 Business Areas

Volvo Truck Corporation
Volvo Trucks is one of the world's leading manufacturers of heavy trucks, creating transport solutions for its clients all over the world. Volvo Trucks is represented in more than 130 countries over the world through 2330 retail and service networks worldwide.

Volvo Buses Corporation
Volvo Buses is the world's second largest bus manufacturer, with a complete range of heavy buses to meet customers' requirements for passenger transport solutions. The product range includes complete buses and coaches as well as chassis combined with a range of services. Volvo Buses also offers complete system solutions. The company has a global presence, with production in Europe, Asia, North and South America.

4.4.2 Dealers

Dealers are the BA/BU's closest interfaces with customers and that is why they have a great role in profitability of the company. There are many dealers all around the world. A big portion of them are private dealers and some of them are owned.

Bäckebol Truck Center
Volvo Truck Center is a wholly owned subsidiary of Volvo Truck Corporation. Volvo Truck Center has a leading position in the service of trucks and buses as well as sales of new Volvo trucks, Nissan vans, used trucks and buses and additional services, such as the hiring of transport and trucks and the sale of used parts. One of the largest Volvo Truck Centers can be found in Bäckebol, Göteborg.

In addition to above main SC participants, below participants are also involved:

- Transports
- Procurement
- Purchasing
- Order
- Reversed Logistics
- Dealer Inventory Management
- Logistic Development

4.5 Other parties involved and contributed to the research

Volvo Information Technology
Volvo IT provides solutions for all areas of the industrial process, and offers unique skills and expertise in Product Lifecycle Management, SAP solutions, and IT operations. Volvo Information Technology AB is a wholly-owned subsidiary of AB Volvo. Clients include the Volvo Group, Ford-owned Volvo Car Corporation, and other major industrial companies. We have been provided with the information that inside Volvo IT there was a concept developed called "Open CO2". Some research in order to get deeper understating about it was executed.

Volvo 3P

Volvo 3P is a Business Unit within the Volvo Group. It combines the resources of the four truck companies in the areas of Product Development, Product Planning, Purchasing and Product Range Management. Volvo 3P works in partnership with the four truck companies (Mack Trucks, Renault Trucks, and Volvo Trucks & Nissan Diesel) to ensure a powerful and strong competitive offer for each brand .Volvo 3P is responsible for purchasing activities for Volvo Trucks that is why it was considered to be worth interviewing in order to find out the relationships with suppliers.

Volvo Logistics Corporation

Volvo Logistics is a part of the Volvo Group and the group's lead logistics provider with about 1 000 staff around the world. As part of the Volvo Group, Volvo Logistics share the core values of the Volvo Group - quality, safety and environmental care. Volvo Logistics skills: Inbound (material supply), Outbound (distribution), packaging materials.

Volvo Logistics is responsible for all the inbound transportation within Volvo Parts. Hence it will be referred to several times when talking about supply chain of Volvo Parts.

5 Empirical observations

In this chapter our findings from internal organizational sources such as conducted interviews, Volvo Intranet and other accessible documents will be presented. Current view of aftermarket services at Volvo Parts comes first and then details of the involved units such as warehouses, reverse logistics, communication structures etc. will be presented. The main aim of this chapter is to give the reader an explicit picture of how Volvo Parts organization performs.

5.1 Current Aftermarket Supply Chain set up at Volvo Parts

5.1.1 Transportation

Inbound - Flows from Volvo Parts material suppliers to Volvo Parts warehouses in Europe where Volvo Parts, according to Terms of Delivery, is responsible for the transport set up. Volvo Parts purchases this contracting service from Volvo Logistics with the same demands/targets as for Volvo Parts environmental transport policy.

Outbound - Flows between Volvo Parts warehouses and flows from Volvo Parts warehouses to Volvo Parts customers, according to Terms of Delivery, where Volvo Parts is responsible for the transport contracting. Carriers/Forwarders are controlled and followed up at Volvo Parts transport department. Figure 17, shows the simplified version of the logistics set up at Volvo Parts.

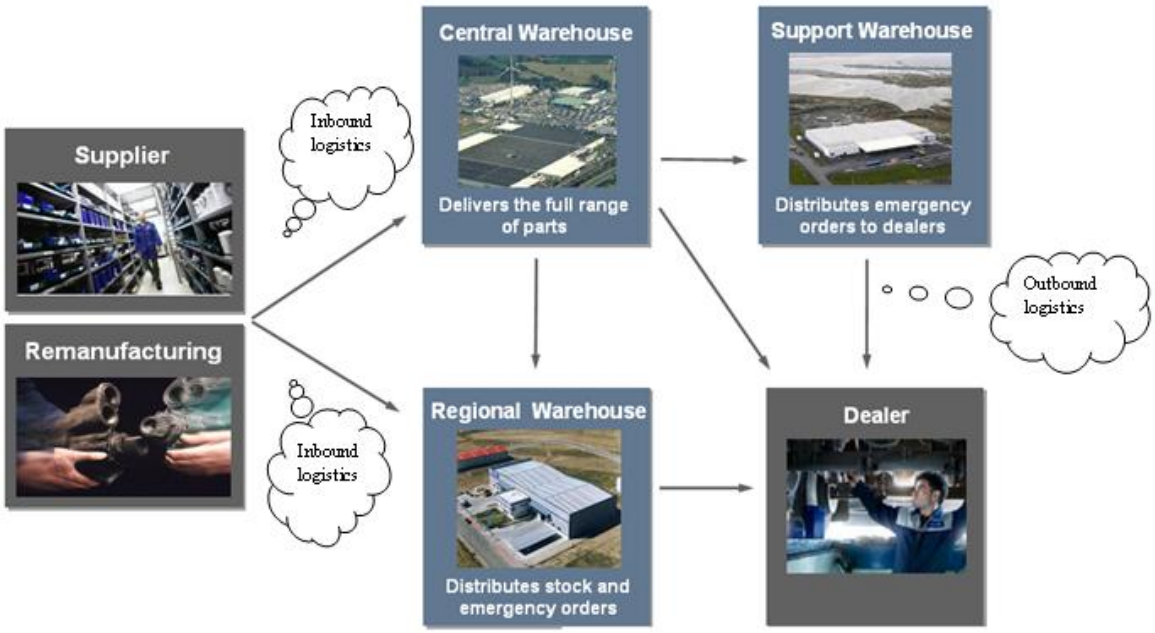


Figure 17: Supply Chain Management at Volvo Parts. Adapted from Volvo intranet 2010.

Figure 18 below shows a broader picture of the supply chain, covering not only aftermarket and outbound services, but the whole supply chain involving both finished products along with the spare parts distribution. Transport modes are as well shown in this figure.

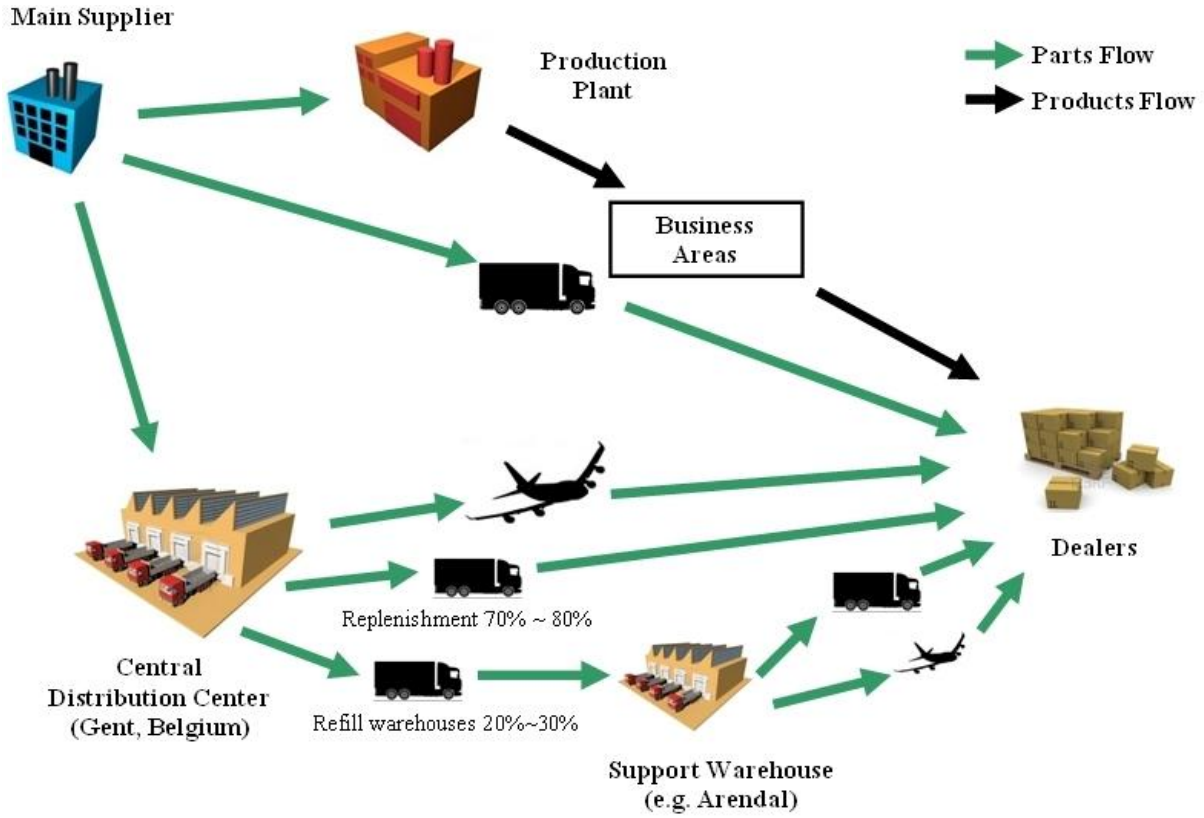


Figure 18: Supply Chain with transport modes; From Suppliers to Dealers (Source: Authors)

Figure 19 below illustrates a rough estimation of order lines for Norway, Sweden and Denmark on daily bases from Arendal Support Warehouse. As shown, Sweden with almost 900 order lines by trucks and 100 order lines by air per day is at top and there is no air transportation for Denmark. Number of air shipped order lines for Norway is twice as Sweden and according to one of interviewees this is due to the fact that Norway is a country in which road transportation is very difficult. Figure 19 illustrates transportations cost for trucks and buses spare parts paid by Volvo Parts for same countries during 2009.

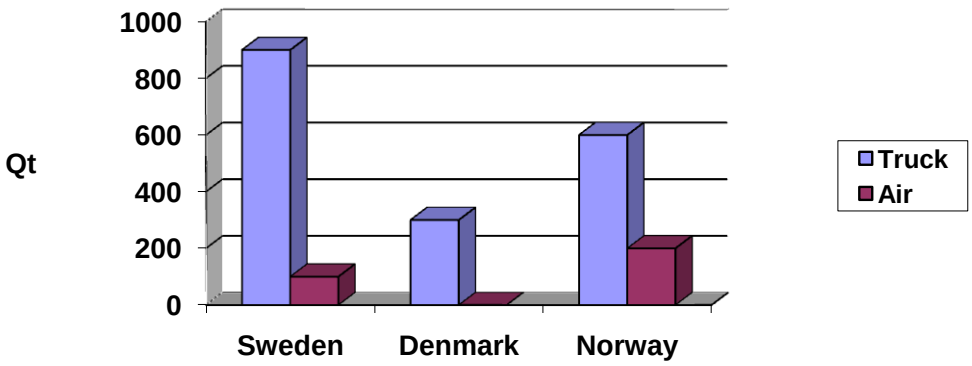


Figure 19: Estimated number of order lines from Arendal Support Warehouse to three Nordic countries daily. Source: Interviewees, Volvo Parts March 2010

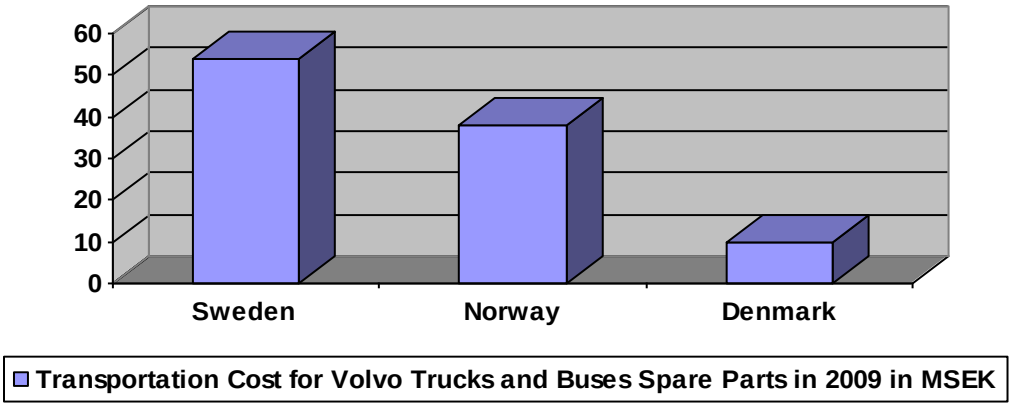


Figure 20: Source - Global Transport Division at Volvo Parts. April 2010.

5.1.2 Emergency Transportation

Emergency transportation procedure is carried in three different forms and all are done via phones.

Dealers call and order a part but they come and collect the parts themselves using their own cars, trucks, etc. It is more frequent for the dealers which are located near Arendal Support Warehouse.

Dealers make a call and order a part as an emergency and request Volvo Parts to ship that. Then the order must to be checked versus the specific criteria called "VOR[4]". If the order meets the VOR then Volvo Parts will arrange for Pick and Pack and Taxi etc. and that accounts for extra transport. Otherwise, it depends on the contracts between BAs and Volvo parts. However the cost of transportation in such cases is usually paid by the customers.

Dealers call and put an order which does not meet VOR but they pay for all transportations.

5.1.3 Reverse Logistics

Different forms of reverse parts flow in Volvo Parts for reverse logistics are:

Buy-backs

As a part of agreements with dealers for aftermarket services, Volvo Parts takes care of the planning of the parts which dealers should have in their stocks and also what parts are allowed to be returned back to the company or sent to other dealers.

Buy-backs are the responsibility of Volvo Parts to tell dealers what parts are not selling. The transportation used for this flow is the same transportation which is used for forward logistics out to the dealers and about the same costs. For Europe and for Volvo Trucks and Volvo Buses the transportation cost is included in the cost which these Business Areas have already paid via the agreement to Volvo Parts. Buyback happens normally one to two times a year depending on the contracts with dealers and it can be efficiently planned.

[4] Vehicle Off the Road

There is an offer called “Open Buy” for dealers to keep parts for a specific while e.g. one month in their stocks, and returning those in case of not selling during that period of time and get the full credit back for those parts. It is perceived as an incentive for dealers to buy confidently. Volvo Parts returns such parts as well and sends them to other dealers or to some warehouses. As all transportation and logistics costs are paid by Volvo Parts, they are currently looking for some solutions to cover at least small portions of these costs. For instance, paying 90% of parts price if a dealer wants to buy it open is an option. However, it must be considered precisely whether such solutions are worth it all or will only have destructive effects on relationships with dealers.

Discrepancies

Discrepancies happen when dealers receive either wrong type, or wrong amount of parts, or damaged parts. All kinds of quality problems go under this title as well. Dealers send such parts to the nearest hub (Support Warehouse) at their own expense. From there, the parts are returned to a central warehouse by Volvo Parts. Discrepancies are normally transported by ground transport. There is no exact estimation of number and time for the frequency of discrepancies.

There is no program or project running to reduce the number of discrepancies currently at Volvo Parts. One of the goals for the new established reverse logistics unit is to set KPIs for reverse logistics in the nearest future.

Recalls

It happens when a BA requests Volvo Parts to collect a special problematic part. This is not a common flow of parts. The costs for recalls depend on terms and conditions of contracts and agreements with BAs. Nowadays, there is no method the calculation of transportation costs for recalls and no clear solution for how the costs can be split between BAs.

Figure 21 below shows the proportion between number of order lines and number of Buyback lines and discrepancy lines. This investigation is carried out on data for the time period Jan to Aug 2009.

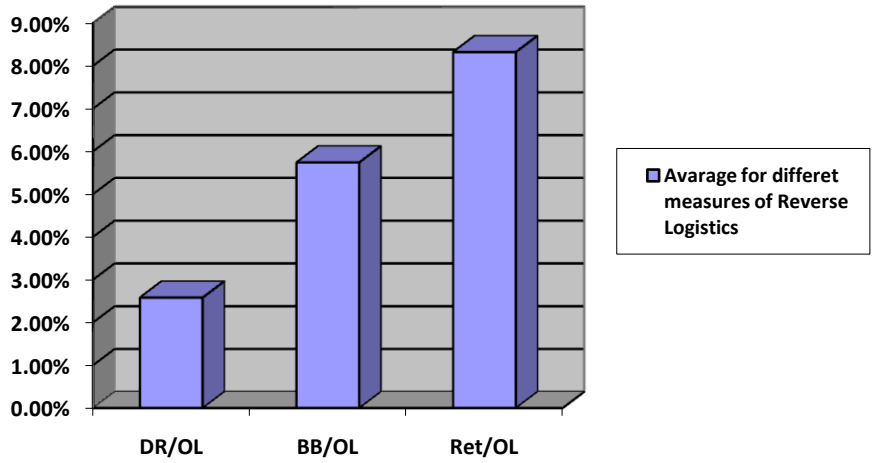


Figure 21: Obtained from Reverse Logistics department at Volvo Parts. March 2010.

- (DR/OL) shows the relation between numbers of discrepancies/number of order lines
- (BB/OL) shows the relation between number of Buy back (lines) /number of order lines
- (Ret/OL) shows the relation between total number of returns (both buybacks and discrepancies) and number of order lines.

No data could be found to show relation between the number of return lines and order lines when it comes to value. (E.g. return value/order value)

Database for reverse logistics

There is no way of getting statistics for reverse logistics in a fast way. Although reports for reveres logistics do exist, it is not possible for one to access the number of discrepancies for a specific period of time easily. Such statistics have to be extracted by somebody from many different reports so this turns out to be a complex process.

One can check central warehouse in Europe for discrepancies but when it comes to other regional warehouses. For instance, in the USA the systems are different and it is not possible to check them online. As a result, it is not possible to get a holistic global view for reverse logistics and reversed parts.

5.1.4 Warehouses

The procedure of orders of spare parts is carried in the following way: a dealer makes an order today and requested parts. If they are available in the Support Warehouse, they will be sent out in the evenings using overnight trucks and dealers will have the parts tomorrow morning. The lead-time is quite short for such orders. These shipments are done by trucks. These orders are made completely online by dealers via software and tools e.g. Parts Online etc.

It is also possible for dealers to order needed parts directly from the central warehouse in Gent and normally dealer will have the parts the next day morning. This is usually done by airfreights to keep the lead-time as short as possible. However, this is a costly service which also has damaging impacts on environment to a great extent. It is possible to send such orders by truck or trailers but it depends on required order time from dealerships.

Therefore, having Support Warehouses helps Volvo Parts to avoid extra costs and to gain shorter lead-time for orders. Arendal Support Warehouse in Gothenburg is the only Support Warehouse for the Nordic countries which covers Norway, Sweden and Denmark. There is an ongoing research and studies in Volvo Parts to check if they should only stick to Arendal Support Warehouse for Nordic or to develop its Support Warehouse to reduce more costs and gain much better lead-time. However, there are many factors to consider reaching a feasible result.

In the evening, around 10 pm order lines are shipped to dealers and Support Warehouses need to be refilled from the central warehouse in Gent (Belgium). Every morning two trailers come from Gent. This replenishment always comes from the central warehouse in Gent and never from suppliers.

For outbound transportation from Support Warehouse to dealers in Norway and Denmark there are always two trucks leaving Support Warehouse in the evenings. They deliver the parts in different directions from each other e.g. one covers southern and the other one covers northern parts of Denmark. This system is the same for Norway with a small difference. As in Norway road transport is a problematic issue, one of the trucks goes to an airport near Oslo, Gardermoen, and delivers almost half of the parts to TNT Logistics Company. Shipping for the rest of the way to the northern part of Norway is by airfreight. For Sweden, five different trucks leave Support Warehouse every evening in different directions and some orders are shipped by air as well to the northern locations in Sweden every day.

5.1.5 Packaging

The parts are packed in accordance with Volvo's unique rules governing Genuine Volvo Parts. Special features should be on the packages, specific font, size, readability, special color, so it's not just you print the Volvo box and that's it. Every created box is given a number, just like a normal spare part, in the system.

The Packaging group's main objective is to outsource pre-packing to the product supplier. The purpose by doing so is to reduce cost by minimizing the handling, reducing the lead-time and the safety stock (Volvo Intranet, 2010). Another objective is to create solutions that will minimize pallet quantities, reduce the amount of heavy lifts, increase quality and make the best logistic solution for all.

Main Area of Responsibilities

The aim is to optimize the supply chain from supplier to dealer concerning pre-packed parts. Predominantly by:

- Outsourcing packaging to product suppliers.
- Creating sales packaging which complies with Volvo's corporate identity policy and the business requirements of BAs.
- Deciding, at an early stage, how the spare parts should be packed and if this shall be done by the supplier or the central warehouse.
- Rationalizing the packaging range.

Concerning environmental issues, the packaging group is striving to reduce all hazardous materials in boxes, plastic bags etc.

Main Environmental Objectives (Volvo Intranet, 2010):

- To use returnable packaging (pallets and frames)
- To use recyclable materials
- To use less material in packaging
- To use only water-based paint on cartons (which was not always the case before)
- To avoid products described in "Volvo Black and Grey lists".

The issue is how to use less material in packaging. Being strictly green, nothing has to be packed at all, just putting it on a pallet and sending it. But that's not possible. That's the

reason why Volvo Parts are not packing 40% of parts. Renault, however, has another policy. Their BA's demand is that 100% should be packed.
The returns are handled by Volvo Parts internally, from the packaging point of view. If the box is not damaged, it is reused.

Waste
The packaging boxes are designed and produced in such a way that they are environmentally friendly and recyclable. The boxes have the recycling mark.
The staplers are not allowed to be used on plastic boxes. It should be taped.
And the stickers (part number labels) on the boxes have to all be plastic. Then, they will float up and can be collected during the washing stage for the reusability step.

You can put plastic labels on carton boxes, and you can use paper labels on carton boxes, but you cannot use paper labels on plastic boxes. Instead of having two different types of labels, the decision has been taken to use only plastic.

5.2 Environmental considerations within Volvo Parts

Volvo Parts is following the general rules set by the Volvo Group regarding the environmental considerations as one of the core values, which is "Environmental Care" Volvo Parts adheres to the Volvo Group Environmental policy. There have been efforts within the Volvo Group to build a "green" picture in society and in the eyes of public and to be perceived as an environmental supporter in almost every market that it enters.

Volvo Parts operates according to special policy regarding energy consumption. This policy is called "Guidelines for choice of energy at Volvo Group operations", and refers to all the Business Areas and Units under the "umbrella" of the Volvo Group. The aim is to use energy sources that are sustainable in the long term, that offer high energy efficiency and that have a low environmental impact. In summary, these guidelines apply to all Volvo Group operations, such as production sites, design centers, test centers, service workshops, distribution centers, warehouses and offices.

Another important document that states the requirements is called "Environmental requirements for production sites and other operating units within the Volvo Group". In summary, this document sets the environmental requirements, minimum as well as wanted positions, for Volvo Group Production and other Operating sites in the following areas:

- Use of chemicals and storage
- Use of energy and emissions of CO2
- Emissions to air
- Water usage and emissions to water
- Material efficiency and waste management
- Soil and groundwater contamination
- Noise (separate "Volvo Group noise strategy" policy exists)
- Technical requirements for specific processes

By looking at different supply chain participants at Volvo Parts we have found that most of the relationships are considered and thought through from the environmental perspective.

5.2.1 Dealers

Certain guidelines control the relationships with the Dealers – "Environmental Requirements for Volvo Group Dealers". In summary, the document provides the following information: all dealers and workshops should correspond to the Volvo Group environmental policy, they should have proper knowledge and high competence level, they should be able to identify specific area for possible improvements and they all have to be able to report the environmental performance of the units.

5.2.2 Suppliers

Volvo Parts, on behalf of the whole Volvo Group, has certain general environmental requirements for its suppliers. In summary, it states, that Volvo Group expect its suppliers to show commitment to environmental issues. In a way of:

- They have to comply with existing legal environmental requirements; provide evidence of a documented Environmental Management System (e.g. ISO 14001);
- Be able to act along with the Volvo Group on their improvement processes concerning environmental issues, as well as being able to provide assistance and relevant data.
- Fulfill material packaging requirements, and use recyclable and reusable materials, which do not fall into Volvo's Black or Grey lists[5].

5.2.3 Environmental Demands on Carriers/Forwarders

Carriers/Forwarders to Volvo Parts must be certified according to an Environmental Management System:

- ISO 14001 certificate
- The Swedish Road Haulage Association Environmental Certificate
- Eco-Management and Audit Scheme
- FR 2000
- Other Environmental Management System equal or above Volvo Parts requirements and approved by auditor
- No use of EURO "0" engines

5.2.4 External communication of environmental aspects

Volvo Parts has no direct external communication to customers or other interested parties. When it is necessary Volvo Parts communicates its environmental aspects only through its primary customers, the Volvo Business Areas. This has been decided by Volvo Group and has been confirmed in Parts Executive Group.

5Volvo Black (STD 100-0002) and Grey List (STD 100-0003). GADSL (Global Automotive Declarable Substance List, http://www.gadsl.org/) will replace Volvo Black and Grey List for new designed product parts. Volvo Black and Grey lists will continue to be valid for all legacies and carry over parts as well as for all process chemicals used in internal facilities (Volvo Intranet, 2010).

Requests for communications to or from external parties are handled by Volvo Parts HR manager who co-ordinates with the Communications, the Quality & Environment manager as well as concerned local managers (Volvo Intranet, 2010).

However, it was decided within the Volvo Trucks that environmental policy should be in the introduction for all the new employees, it was also part of the introduction of the consultancy and everyone else who was recruited. Hopefully, it is still a part of the introduction process, which is available. There is also an interactive training tool available through Violin, and environmental policy is a part of that, so all the employees should be made aware of the environmental policy. Environmental care is the core value and it is described in the policy, so it forms the base. However, of course, it should be interpreted to get the basic training what it means to the company, which is done by different kinds of training.

5.3 External communication of environmental aspects

Dealers are the BA/BU's closest interfaces with customers. Some customers would buy trucks based on the personal attitude or geographical principal of the dealers' locations. When a truck is sold once, it takes a long time when the customer comes back to buy a new truck, but during that time they return to the dealers for services, repairing, etc. which is extremely important in terms of the company relationships with the customers.
The role of dealers meanwhile is very important in convincing final customers to wait for their spare parts or pay more to have it in different loading and transportations modes.

Priorities from dealers
The cost has been always an issue of course. Prices for the parts are normally set by BAs like Volvo Trucks when they make contracts with dealers and they agree on a price for aftermarket and support as well. The lower cost that Volvo Parts has the higher margin for BAs to benefit while they are making contracts. Therefore Volvo Parts' prices influence possibilities for BAs to gain more market.

Service level and the stability of service levels are crucial factors for dealers as well. Stability can be defined in this way that changes in amount of sales and volumes of spare parts do not affect availability and accessibility of them. Volvo has experienced such conditions almost two years ago when there was an increase in volumes and then as a consequence Volvo Parts received feedbacks of poor availability. The dealers started to complain as they saw a huge business potential in the market but they lacked spare parts and that was a bad experience. Recently and during downturn and although there was recession in market, Volvo Parts had poor availability again. This time the conditions were worse as dealers were fighting for their survival and not for more profit.

5.3.1 Relationship with dealers and Marketing by BAs from warehousing point of view

While there is a good relationship between Volvo Parts and dealers, one of the respondents believes that it is not possible for Volvo Parts to influence on dealers or convince them to do the marketing for Volvo Parts Green supply chain. It has been emphasized by one of the interviewees that dealers are not concerned about such topics the much that they should

be. However it is more likely for Volvo Trucks to ask its own dealers to do so by putting more pressure and demands on them to at least start thinking about environmental issues. Offering green aftermarket and services to the customers can be done much easier by a company like Volvo Trucks as they have marketing units inside their organizations and are capable of influencing customers in a more convincing way.

Some of the dealers are owned by Volvo Trucks and others are private dealers. Volvo Parts has almost the same relationship with both kinds of dealers and there is no big difference in terms of process and regulations. Although there are always a few conflicts, particularly when parts are not available, the whole relationships with dealers can be summarized as acceptable and at a good level.

5.3.2 Dealer to dealer relationships

Today, when a dealer needs a part he can check Support Warehouses' stock whether the part is available or not. It is also possible for him to check some other few dealers' stocks in Sweden. If it is not possible to find the part, he calls Support Warehouses because they can check all the dealers stocks in Sweden, Denmark and Norway.

They also can check plants[6] in Sweden but this is a unique feature that only Arendal Support Warehouse (ASW) has due to its location in Sweden, tradition and so on. Then if the part is not available in Gent as well, Arendal Support Warehouse starts to check other dealers. If they find a dealer who has the part, e.g. a dealer in Denmark, they call him via phone and ask if he is willing to sell it to another dealer e.g. in Stockholm. Arendal Support Warehouse arranges transactions and transportation considering VOR and agreements with BAs. The price of the part is always fixed at the price that Volvo Parts has sold it for the first time to dealers and dealer put that part as a discrepancy in the return list.

When the dealers are belonging to an independent, they can check their own network and try to keep the business inside their company. Such dealers rarely contribute in above mentioned cooperation however it depends on many other factors that might motivate them to do so.

Figure 22: Routs for an order which is not available at Arendal Support Warehouse and shipped from Gent.

[6] Tuve and Borås, Sweden

5.3.3 Regulation hindering dealers to dealers cooperation (Figure 21)

If a dealer calls Arendal Support Warehouse and orders a part (1) that is not available in Arendal Support Warehouse but in Gent, according to their routine Arendal Support Warehouse is forced to order it from Gent as a special order (2) and then order will be air shipped to the dealer (3) via nearest airport. Such mechanism is valid for all other warehouses in EU as well. When dealer knows that another close dealer has the part but while the part does exist in Gent it is not allowed to make a dealer to dealer connection (4) due to the routines. This process imposes a lot of costs and meanwhile increases lead-times. Here is one of the obstacles that have the potential to be revised as it has a great impact from environmental perspective as well. It might have minor impacts for central Europe but it gets worst when orders come from dealers in northern part of Sweden or Norway where orders have to be air shipped more than 2000 kilometers in average.

6 Analysis

In this section we will analyze our findings and observation in relation to theoretical background. In doing so, we will use an analytical model to draw connections and interrelations between empirical and theoretical materials and thus, to identify the areas for improvements.

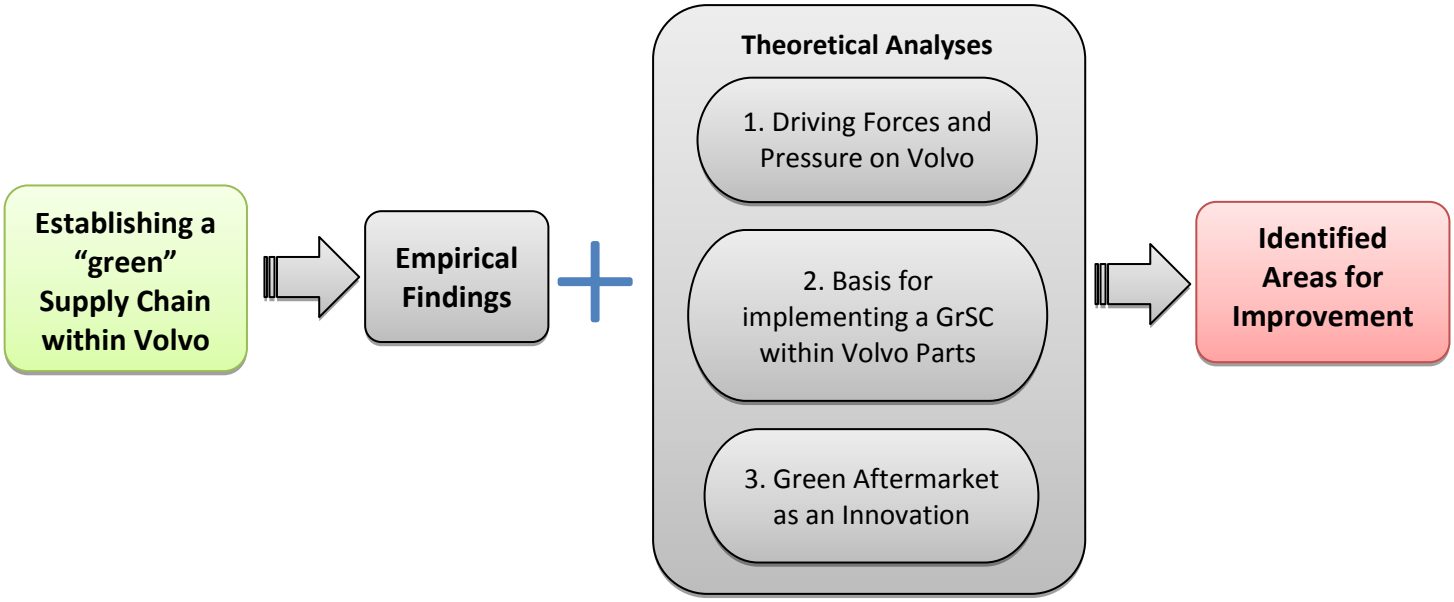


Figure 23: Analytical Model Used for Analysis

6.1 Driving forces for going "green"

According to Hall's sphere of influence model (Hall, 2006) different driving forces can be determined for Volvo parts in order to change to a "green" company. Some of them of course are located in mandated area of responsibility:

6.1.1 Environmental care as a core value

This is an internal demand by Volvo Group as one of its three core values is "Environmental Care" to remain in market competition and for not lagging behind other rivals. In current tough market situation, it is very vital and crucial to be at least one step ahead of other players to protect core values of your company.

6.1.2 Pressure from the customers

Volvo Parts as being the Business Unite within the Volvo Group does not have direct contact with the end customers; however, the communication is carried out on behalf of them by the Business Areas and the Dealer centers. All this puts a heavy pressure on the Volvo Parts in terms of handling all the switching and fast-developing demands.

6.1.3 Suppliers

As Hall (2006) mentioned, one of the most problematic issues which delimits environmental influence area of a company is its suppliers' performance. Considering the fact that Volvo Parts outsources all its transportation, it is very logical to address its suppliers as one of the main points to put more emphasize on and to start an action.

6.2 Basis for implementing Green Supply Chain

Although there is a very sound understanding of importance of being environmentally friendly within the company, still there is no exact and calculated data by which one can have a good estimation of all the benefits in terms of cost. To put it in other words, perception of being environmentally friendly is more a qualitative understanding which is not supported well by any quantitative information.

That is why when EPA (EPA, 2000) proposed a decision-making framework for implementing environmentally friendly SCs within companies (Figure 9) 'Identifying cost' has been mentioned as the first vital step. Without having such cost identification and without including environmental and externalities costs in that, it would be very difficult for a company and its managers to decide why and how the company has to move for a "green" change. Cost identification can easily reveal potential opportunities by calculating probable benefits. We could not find any explicit and accessible information regarding this issue during our interviews and by looking at other documents.

Such cost identification including externalities, could also facilitate evaluation of logistical variables determinant such as structural and functional factors and brings a more realistic estimation for the company. When McKinnon (2009) described structural factors in his analytical framework (Figure 11), he mentioned determining number, location and capacity of warehouses as an example. Making decision about such topics for establishing a GrSC requires a company to re-calculate the expenses for those plans.

McKinnon (2009) (Table 2) referred to reversed logistics as one of the commercials factors which have a great potential to play a significant role in future of establishing a GrSC. Reverse logistics and return management also need more quantitative investigation, e.g. LCA, to reveal further opportunities within the company toward a GrSC.

6.3 Green Aftermarket Service as an Innovation

Since "Green Aftermarket" can be identified as a Service Innovation (DTI, 2007) innovation theories are applicable. According to Vaccaro (2009) (p.28) first two elements to be clarified are adoption process and adopters characteristics for an innovation. The former deals with how an organization decides to utilize that innovation and the latter explain about conditions of the company. Adoption process in Volvo Parts is heavily depended on aforementioned driving forces and profound cost estimation.

Regarding the important step of Vaccaro (2009) framework (p.28), information about innovation is vital. This step deals with marketing communications and how to express and sell the innovation. There is no Marketing department within Volvo Parts and Volvo Parts' services are mainly marketed via BAs while they do the marketing for their own products e.g. Trucks. It means that there is almost no interface to transfer the message of "Being Green" to the final customers.

However, dealers can be considered as the only interfaces by which Volvo Parts is able to show its "green" services. According to aforementioned survey (McKinnon & Piecyk, 2009) retailers control on the supply chain will be increased as one of the effective commercial

factors of “green” road freights in next coming decade. Currently, and according to some interviewees, Volvo Parts has good relationships with almost all dealerships but it is beyond the bounds of possibility for Volvo Parts influencing them regarding Volvo parts marketing issues.

Due to the lack of some regulations and absence of a surrounding database, it is not possible for all the dealers to share their stocks information. This accordingly affects dealer to dealer communications and cooperation.

6.4 Identified areas for improvements

After having conducted the analysis of the empirical findings with the help of theoretical and existing industrial practices, some areas were identified which can contribute to the process of “greening” the aftermarket supply chain of Volvo Parts.

- Logistics
  - Outbound transportation
  - Reverse logistics
  - Warehousing
  - Packaging

- Communication
  - Internal - within the organization
  - External - with customers (BAs marketing departments)
  - Dealers communications
  - Transparency and External communication with different stakeholders

The possible solutions for identified areas, will be deeper addressed in the next chapter.

7 Discussion

This chapter will present our proposals for improvements to the earlier identified areas. Supply chain participants, which are carrying out supportive activities for spare parts management, are addressed. These are reversed logistics, warehousing, dealerships and communication means of spreading the concept idea among different levels of customers.

7.1 Outbound Transportation

Outbound transportation services are bought from external providers, however, as the Global Transport Manager at Volvo Parts says, the requirements for transportation providers are to a great extent as the same requirements as Volvo logistics has. There are a number of reasons for dealing with logistics providers directly, but not buying from Volvo logistics. First of all, there are established relationships with most of them today. Second of all, they are over-night transport solutions providers which differ from Volvo logistics services.

The suppliers of transportation are still chosen and evaluated from environmental perspective as one of the main requirements. EURO 3 and ISO 14001 are the obligatory standards to meet today, in order to be considered as a supplier for Volvo Parts distribution channel. However, there are no other specific environmental criteria for them to fulfill. Therefore, our main suggestion to the logistics department is to set higher requirements and environmental demands.

However, one of the interviewee claimed that whatever is possible to do in order to improve the logistics processes, Volvo Parts takes any chance to implement these possibilities.

7.1.1 Inside truck – IT solutions

Another issue to address in transportation is the importance of understanding vehicle's behavior by detecting important parameters and their deviation of optimized conditions such as amount of unwanted frictions in different places, amount of dust in fuels, engine temperature and their chain reactions etc. These kinds of information should in a perfect future be extracted from the vehicle remotely to make a more realistic prediction of when a vehicle is going to be stop working and why. This mechanism will be beneficial for Volvo Parts as they will facilitate parts planning and distribution systems.

Implications for truck drivers:

Kohane (2009) suggests some implications for truck drivers: Weekly monitoring of fuel mileage for all his tractors, setting idle time goals and rewarding drivers who meet them, recycling all used oils from truck engines, as well as extending oil change intervals from every month to 60 days, and even 180 days.

A battery-powered climate control system that provides engine-off heating and cooling, plus voltage power for drivers for up to 10 hours (about four hours more than many other engine-off heating solutions). The technology pares idling time and fuel wastage, and gives the driver a more comfortable environment.

These solutions can be included in new criteria for Volvo Parts transportation suppliers in the way of going "green" and achieving more sustainability.

7.1.2 Railway

During our research we found out that train is not considered as a transportation solution for Volvo Parts. We asked about it and according to respondents one of the problems is lead-time since loading and unloading parts at the stations are time consuming processes and beside transportation between warehouses and stations makes planning even more complex.

One interviewee mentioned that train could be practical if there is one big factory in a single point and company has huge numbers of local warehouses and it uses bulk freights like papers, woods etc. as more and less IKEA is doing that currently.

On the other hand and for the long distances, for northern Sweden for instance, it is possible to ignore small transportation between warehouses and stations and look at trains as an alternative by which Volvo Parts can reduce not only costs but also a great amount of emissions at the same time.

7.2 Reverse logistics and return management

Reverse logistics raising its importance dramatically. There is a big potential in reverse logistics to be improved in a more systematic and efficient way. However, there is currently no easy and standardized way of getting statistics for reverse logistics globally. Such statistics have to be extracted from many different reports which turn out to be a complex process.

How to deal with returns?

Our recommendation for the Volvo Parts reverse logistics and return management division to rethink return policies and balance value of such a policy as a marketing tool against the costs. According to Rivers (2002), reducing return rates even a single percentage point can result in a substantial improvement of the overall profitability. If Volvo Parts can reduce the costs by having a less liberal return policy, it will also be much easier to compete with price as a consequence.

Another possibility, according to Rengel et al. (2002) could be to let the customer decide, if they want to pay the higher price for the liberal return or not. In other words, the customer gets rewarded, if is willing to contribute to a lower risk of returns. This could be handled in a way that, in the order process there might be included the possibility to choose the option of having insurance for the return case, then the price will be recalculated.

Rengel et al. (2002) suggests a third option along with others to help tracking and hence reducing the returns, hence eliminating unnecessary transportation. Volvo Parts in this case, can build a database that contains return reasons. If there is a quality problem with a product, consolidation of returns will highlight those quality difficulties more quickly. It is possible to prevent greater expense for all of the members of the supply chain, when the firm can react earlier.

Another solution would be to consider one type of returns – discrepancies, to be collected together with other types of returns. Additionally, separating different kinds of discrepancies

at the dealerships and not to return all the discrepancies under one title could help a lot in terms of planning for further distributions.

7.3 Warehousing

Warehousing is a complex supply chain participant. There are different types of them and they are inter-dependent. The main issue here is how to optimize the distribution among dealers involving center warehouses and regional ones in a way that suits the timing demand from the customer.

Some difficulties come from the existing regulations. First of all, there is no common database for the dealers to see and search the stock of each other and Second if they could have checked other dealers stock to provide their customers with needed parts as soon as possible, they are not allowed to do that while the part exist in Gent. Therefore, as long as a requested spare part exists on the support or the central warehouse, is being transported from there. The routine that requires delivery from the center warehouse in Gent to the requesting dealer in the North of Europe cannot be seen as “green” at all, because the usual transport mode used in this case is air which is most expensive and polluting.

Naturally arising solution of building one more warehouse closer to dealers is not the best solution in practice, from the expenses point of view. Considering the situation in the North of Europe, the demand is not high enough there to cover the cost of maintaining another distribution center.

On the other hand, as we found out, one of the most problematic areas to cover is the north part of Norway and to some degree Sweden. Those are the areas that usually are covered by air transportations. Establishing a new Support Warehouse in northern part of Sweden or Norway will avoid many airfreights and not only save money for the company will have significant impacts in favor of environmental care.

Lockman (2009) suggests the following activities in order to reduce the carbon print of warehouses by rethinking certain aspects.

1. Using lighter-colored materials,—or something such as grass on the roof,—it's significantly reducing facility's heat island effect. If it's changed to more modern lighting technologies, it may have reduced its light-related electricity requirements by as much as 70 percent.

2. Use fewer artificial lights and reduce ongoing electricity consumption. Small window installations can result in huge lighting and morale improvements.

3. Forklifts. They do not log as many miles as trucks or trains. However, they still cover a big amount of ground each year, and some of that ground is probably highly unnecessary. Rethinking and shortening the journey between a facility's most popular products' storage slots and the loading dock via a product slotting optimization can significantly reduce a company's forklift energy requirements. Thus, its overall expense, as (Lockman, 2009) claims.

4. Doors. Install facility dock doors that open and close more quickly, or doors that have higher levels on insulation. They can dramatically reduce a temperature loss in a warehouse.

5. Better advanced scheduling software programs in order to reduce the amount of times trucks have to wait,—while idling engines, — for a dock door to open up.

One option is to have local distribution unit as Volvo Cars has. At the first glance shorter lead-times and in the same time increase in transportations, planning and costs seem to be logical outcome. However such decisions need intense investigations accompanying with profound strategies and holistic plans.

7.4 Packaging

Packaging is done in a well-established routine, and most of the packages are recyclable or reusable. The only issues to address here is to follow the new materials and chemicals to be used in packages, from the utility and recycle-ability point of view. As it was mentioned before, there has been a new database introduced instead of old Black and Grey lists of chemicals and materials to be used and not used. The new database is Global Automotive Declarable Substance List (http://www.gadsl.org/) and is more extensive and provides more detailed information.

The general need for packaging should be considered. As for today, Renault Trucks, for instance, have different requirements of their spare parts to be packaged – they require 100% to be packed, while Volvo Trucks only require 40%. Standardizing the orders for packaging and bringing in the commodity would lead to cost savings and will definitely contribute to the tendency of going green.

7.5 Dealers interrelations and decreasing emergency shipments

Dealer to dealer sales or exchanges can be utilized as a double-edge tool to reach dealers interests and Green goals. For instance possibility for dealers to look at their local areas to check and find needed parts in other dealers stocks or to check which dealer needs the parts that they want to get returned could be a feasible solution. There is a good opportunity to cut much transportation by utilizing IT infrastructures and smoothing regulations.

7.6 Expressing “green” image

7.6.1 Internal communication

Internal means of communication are a great channel to create awareness within an organization. Our main recommendation is to maintain the existing methods of information sharing. Volvo Intranet is considered to be the main information source among employees. Special magazines, catalogues and presentations should be more transparent and well-spread.

Different departments within the organization should have closer collaboration towards mutual goals. Therefore, they all have to aware of the new ideas and activities taking place and affecting others.

7.6.2 Communication to customers

There are certain so-called buzz-words that can be addressed. Since the human beings are mostly able to concentrate on one thing at a time, as one of the respondents pointed out, there should be some simple expression that would catch the interest of people and make them think. Without revolutionizing people's way of thinking throughout the society it is hard to set the industry standards. Therefore, it will take some time, until all people, from simple product consumers to commercial truck owners, will realize on the subconscious level to choose "greener" offer.

Slogans such as "Green" would be one of the suitable solutions here. It goes down to conscious and people imagine something close to nature. This would make people consider that the way a company is running business is not so harmful for nature, even if it is dealing with heavy regular basis transportation and pollution. Example here would be green-colored trucks of "Green cargo" Logistics Company.

"CO2-neutral" might be one of the suggested buzz-words. But in this case it requires understanding of the basic chemistry. Let's assume, not all the people have that to the needed extend. If we want to create all-around society awareness of environmental issues, we have to find out something simple and understandable for everyone, not depending on what background people have.

"Smart climate" – is something that was suggested by people outside the engineering industry, who were asked by us.

7.6.3 Transparency

The main idea of transparency is to explicitly show how the activities within the company they are carried out. Regarding environmental issues transparency can include energy consumption of different units as warehouses, production plants etc., CO2 emissions and other resource consumption like water etc. For instance and more specifically, it can include expressing the amount of CO2 emission for a supply chain for a particular part from raw materials to the shelves of a dealer.

This is a solution that a clothing and gear company called Patagonia benefits from currently. In their website (www.patagonia.com) and under the heading of "Footprint Chronicles" they offer an online service for both their customers and suppliers to track the route that a product comes from and see total energy consumption in kWh and Mega-joules, distance traveled in km and using a user friendly graphical interface, CO2 emissions in Kg, water consumption in liters and the waste generated in Grams. They also provide very tangible equivalents for all above mentioned measures by which an ordinary citizen can easily understand them.

As an example and for a jacket you can see that approximately 155 Mega-Joules (43kWh) of energy is consumed from the beginning of manufacturing to delivering the final product to Patagonia's Reno distribution center in California in US. And this is equal to burning an 18W compact fluorescent light bulb for 100 days (24 hours a day). (Figure 24)

The most important pre-requisites running such projects are:

- Profound and reliable calculations includes LCAs
- Determine between secrets and non-secrets

Figure 24: Screen shot from Footprint Chronicles inside the Patagonia website. This tool depicts routs for different products and show many measures about environmental impacts for each product. (Obtained on April 2010)

Another example of transparency would be the online book store – Bokia.se, where an optional "green" alternative for the delivery of the product is introduced which goes hand in hand with the cost savings and relative time of the delivery (http://www.bokia.se). The end customer then given an opportunity of choosing and therefore, contribute to the environmental considerations.

7.7 Keep on doing it, Volvo Group!

Here we would like to mention the current activities and situation within Volvo Parts and the Volvo Group in general, which is leading the organization towards working on environmental care as one of the core values.

Global SCM program, which is considered to be the biggest investment lately, will have great positive impact on the global supply chain of Volvo Parts, by implementing the solutions in cooperating and coordinating distribution channels and supply chains throughout main Business Areas of the Volvo Group. This program is striving to make the global supply chain lean. It can as well be translated as being "greener", since it will reduce some transportation modes and orders handling.

Volvo Technology as an innovation and R&D center within the Volvo Group are carrying out environmental training programs, which are announced via Volvo Intranet. The main

objective is to provide deep information regarding environmental activities throughout BUs and Areas which is very good and helpful in terms of getting deeper understanding and knowledge sharing.

Environmental audits are conducted on the regular basis, both eternally and internally, which are very valuable and help to keep up with the regulations and necessary certifications. Especially it is crucial in suppliers' evaluation.

It has been a while since the Volvo Group introduced the application "Commute greener" - challenge to reduce personal CO2 footprint which creates the global organization awareness and commitment to the Volvo Group's core values.

EPD – Environmental Impact Calculation by Volvo Trucks

Calculating the environmental impact - from cradle to grave - Environmental Product Declaration (EPD) for the Volvo Trucks' customers and other interested parties is available online to compute the carbon footprint throughout the truck's lifecycle available online of the external Volvo Trucks webpage (http://www.volvotrucks.com/trucks/global/en-gb/values/environment/Footprint_calculation/Pages/Calculator.aspx).

Volvo Trucks EPD Calculator is a Web application that includes information on materials, energy consumption, emissions, etc., which makes it possible to calculate the environmental impact of manufacture, use or disposal of a Volvo truck gives rise to - or taken together (i.e. lifetime).

8 Conclusions

This chapter summarizes the thesis objective and presents whether the research question has been answered.

The research question was formulated as:

- "What are the main opportunities and challenges of establishing "green" aftermarket supply chain to provide Volvo Parts customers with more environmental friendly solutions and meet their requirements at the same time?"

We looked at three areas, which helped us to answer the research question properly and in consistency throughout the whole research.

These areas are:

1. *Aftermarket supply chain and industry characteristics*

Availability of spare parts and uptime of the deliveries were identified as main characteristics of the aftermarket supply chain of the company. Opportunities here arise within the supply chain participants themselves. These are possible changes in warehouses, as physical buildings and location and amount of them. Certain opportunities were found among reverse logistics services and rethinking of return policy was suggested.

2. *Environmental considerations*

Environmental considerations in a way of CO2 emissions' reduction were identified as increasing throughout the industry as well as Volvo's tight devotion to them, as one of its core values.

3. *Customers' impact and means of communication*

Customers' attitude towards "going green" is positive in general. However, is contradicting with the fact of the real life requirement of having the product on the right time in the right place within the promised time scale.

Transparency, as a means of communicating the environmentalism to the customers, is suggested as one of the options. Along with establishing new Units within the organization responsible for coordinating and monitoring the marketing and external communication activates.

We can conclude that it is much easier to say than to actually be "green". And it is easier to be "green" in the industry where uptime and availability of the product is not as crucial as in the aftermarket industry.

Considering all above, mutual cooperation of all the supply chain participants at Volvo Parts is needed to be close and intense in order to achieve "green" image.

Main recommendations:

- Learn from others by benchmarking and cross-sectional research among the industry players
- Better cooperation with the BAs in terms of communicating “Green” issues and solutions.
- LCA needed - CO2 emissions calculations from outbound transportations)
- Cost estimation of the new facilities building including environmental considerations.

8.1 Future research and development

The field of environment presents many interesting area for future research and development. Since the technology is constantly developing, there is always a place for improvements. Different tools are available to contribute to more detailed calculations. For example, EVM (eco-efficiency value model) is developed to be available and usable by people with no special IT background and applicable to all the steps of the value chain of product and service providers.

Further research might be performed in a way of quantitative strategy, including more numbers and statistical data. It should include deeper insight of every supply chain participant. Calculations and estimations can be performed by using tools like LCA and joint eco- and emissions – calculators where all aspects of value chain are included and carefully considered.

Deeper investigation of the customers’ preferences is needed. Finding the possibilities for incentives for customers to switch towards choosing “greener” solutions for aftermarket services should is essential. Communication and marketing of “green” concepts is another field which is important to cover in further research, since delivering the message of providing “green” offers, helps to establish to what degree offers should be customized and differentiates.

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Appendix I

List of interviews conducted

Names	Units	Position	Date of Interview
Patrik Ström	Volvo Parts	Concept Development Manager	21st Jan, 26th Feb
Lennart Bohman	Volvo 3P	Purchasing Coordinator, Operational Development	18th Feb
Lars Mårtensson	Volvo Trucks	Environmental Director	19th Feb
Henrik Klemming	Volvo Parts	Director Quality & Environment at Business Office	24th Feb
Thomas Lundqvist	Volvo Buses	Marketing communication manager	3rd March
Klas Sandren	Volvo Parts	Senior Vice President Business Office. Customer Satisfaction	4th March
Andreas Johansson	Volvo IT	Business Innovation Manager. "Open CO2" concept developer	11th March
Marie Hansen	Volvo Parts	Global Process Manager Reverse Logistics	12th March
Ulf Höglund	Volvo Parts	Logistics Concept Development	12th March
Johan Mellström	Volvo Parts	General Manager, Arendal Support Warehouse	25th March
Johan Hjalmarsson	Volvo Parts	Manager, Inventory Management EUD	26th March
Jan Kinnander	Volvo Parts	Manager Packaging	7th April
Lars Gunnar Svärd	Volvo Parts	Global Transport Manager	16th April
Gerth Andersson	Volvo Truck Dealer Center (Bäckebol)	Sales Chief	23rd April