Value Drivers of the Automotive Industry

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Abstract

To perform an evaluation of companies in the Automotive Industry it is useful to have the aid of an instrument that shows the sector's value drivers and their connections between each other. Such an instrument can simplify the understanding of the sector's trends and developments. There are various definitions of the sector worldwide limiting the accuracy of an analysis. To analyze a country's Automotive Industry a global perspective needs to be taken. A universal definition for the sector would therefore be helpful.

The thesis is based on information gathered from reports, former researches and analysis. The purpose of the study is to help analyze the Automotive Industry for a sector analysis, using a united definition of the sector and an elaborated model of how value drivers of the sector are connected.

The research has lead to an overall definition making it easier to grasp the contents of the Automotive Industry and its segments. This together with the cumulated value drivers in the model helps to understand factors affecting the industry and what may occur to its prerequisites. A SWOT analysis of the value drivers on the Swedish market level is made to complement with a competitive perspective of advantages and drawbacks. These instruments have their strength in their compounding overview of a sector that needs to encompass a global focus to be able to make more accurate analysis and forecasts.

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1. Introduction

An introduction of the subject is given in this chapter. First a short background to the study is presented in 1.1. The background serves as a short presentation that will serve as a basis for the main question in chapter 1.2. In the succeeding chapter the purpose will be stated with a following chapter explaining delimitations for the study.

1.1 Background

The authors of this study were commissioned by Bank A to perform a sector analysis of the Automotive Industry. During the procedure of the analysis we found that the task was difficult due to lack of compounding information of the sector and to various definitions of it. The research question for this study is therefore based on these difficulties and formed to explore if the process of an analysis could be simplified.

Credit institutes play an important role in industries. The sector involving the automotive industry is quite extensive containing high productive factories. The automotive industry includes a vast number of manufacturers, suppliers and retailers. In order to be competitive during these times of globalization, companies within this sector are quite capital-intensive due to large amounts spent on R&D (research and development), tangible assets and other capital-consuming parts that are needed in the manufacturing process. This will crave reliable financiers that are able to assist with large capital. (Bissinger, & Castellano, 2007)

The financier, which in this case is Bank A, searches continuously for new customers in need of debt financing. The environment for targets of the Automotive Industry is constantly changing because of new trends and factors shaping the prerequisites for business. These changes are important for financiers to be aware of to match a product for the market. Even more preferably would be being able to predict and realize the impact of changes in the making of a risk evaluation. So before entering a new market, an extensive sector analysis is often used to gather important information, such as the latest trends, factors and value drivers that characterize the industry.

The Automotive Industry continuously changes to new directions. Today there is a vast change of the Automotive Industry's prerequisites for profitability. Profitability levels are

shrinking for the European automakers and are now at levels of 1-3%. This is a result of a decrease in demand for new cars and production overcapacities. The type of demand has also changed to be opting for environmentally friendly and cost-conscious small cars, which have lower prices and slimmer margins for the automakers. This trend leads to consumers, in the segment of consumer passenger cars, purchasing smaller and more environmentally friendly cars, which results in smaller margins and less profits for contestants in the Automotive Industry. Politics plays a great role with the introduction of new legislations, pressuring manufacturers to spend more money on R & D and operational improvements. (Bissinger & Castellano, 2007)

The segment of trucks is also in a process of becoming more cost efficient. Because of this segment being tied to the economic cycle, its producer's aspiration is to undermine its correlation with profitability. Geographical diversification helps smooth out cash flows during economic cycles but isn't really an important factor in terms of cost efficiency. Companies within this segment struggle to broaden the use of universal platforms to minimize costs and at the same time being flexible enough with their production to meet differences in demand quickly. (Bissinger, Ballantine & Sprinzen, 2005)

These events need to be more thoroughly examined to identify reasons for the changing prerequisites of the Automotive Industry. The Automotive Industry is one of Sweden's largest and has positively affected the labour market and is still a major contributor of employment in Sweden. There are over 140,000 employees in Sweden who depend on the Automotive Industry (McKinsey Global Institute, 2006). The industry is also rated as one of the most successful sectors in the country and represents 15% of the Swedish export with revenues estimated to be around 450 billion SEK per year (McKinsey Global Institute, 2006).

1.2 Research question

Banks active with debt financing and intending on gaining better knowledge of the Swedish Automotive sector can perform or purchase a sector analysis. A couple of elements are typically included in a sector analysis. Main objectives are to: identify the elements of the sector, explain former occurrences (briefly) and future coming trends in the industry, identify drivers that are of most importance for changes in the industry, make a financial analysis explaining key ratios to companies of most interest and finally to suggest a business strategy.

Our research will focus on how to aid an analysis of the Swedish Automotive Industry with a value driver model.

To do so, the three initial objectives of a sector analysis will compose the area of study. The most important one, the identification of value drivers, will demand a comprehensive amount of data gathering to collect important factors that drive the industry in a certain direction. In order to achieve this task we need to make an up-to-date definition of the automotive industry that comprises all necessary parts and defines its value chain. There are various definitions of the automotive industry used in the industry and in previous researches and analysis, both domestically and internationally, but none that identifies and categorizes these parts in a comprehensive yet perspicuous way.

Value drivers and a definition of the automotive industry are hard to find in former researches. However, we find it interesting and relevant to take notice of former researches. Even those of other industries with value drivers not directly connected to the automotive industry, but might have similar correlations between the value drivers and their industries. Value drivers found in previous researches of the automotive industry and other industries will be compared and analyzed with those found in this research.

The main goal of this study is to analyze the automotive industry, i.e. to define trends and affecting factors, in order to identify important value drivers and their connections. A model of value drivers and their connections will be compiled, if possible, out of the findings of the research. To achieve this task, the question that needs to be answered is:

What are the most important value drivers and their connections that influence companies within the Swedish, European and global Automotive Industry?

1.3 Purpose

The main purpose of this study is to compile a value driver model by researching value drivers affecting the Automotive Industry mostly from a macro perspective, meaning to analyze how the value drivers correlate with each other. In so doing, it could be easier to analyze the industry by examining their status and how they might affect each other. Thereby it will be easier to predict changes of the industry's prerequisites that influence its future. We

will also examine previous studies within the subject to see their results and what relations they have with our findings. To make this possible there is a preceding purpose to survey the automotive industry in a comprehensive yet perspicuous way as well as to identify prevailing trends. It is our hope to contribute with new scientific results that we haven't found in former disquisitions. The findings are supposed to make it easier to analyze companies within the automotive industry.

1.4 Delimitations

In order to perform this research within a reasonable timeframe we find it necessary to limit the research area of the Automotive Industry. Figure 1 in chapter 3.1 shows the segmentation of the Automotive Industry used in this research. To find more qualitative information of segments in the sector we choose to only comprise segments where information is easy to find and with contesting Swedish manufacturers. The segments are Consumer Passenger Cars, Heavy vehicles and Automotive Suppliers. Some information will include the other sub-segments of Commercial Vehicles because they often are described together, but nevertheless it can still be of value for the research.

We would very much like to contain ourselves by only examining the Swedish sector but that would be a wrong move to make, due to that the Automotive Industry is highly globalized. Automotive companies all around the world are intertwined internationally and happenings in one part of the world can easily have an effect in another part of the world. The perspective will therefore still need to be global.

1.5 Disposition

Method: The chapter presents our method of choice. We discuss what type of problems this thesis is aimed at and how we intend to solve it.

Background information: The background information defines the Automotive Industry and its value chain. It describes including parts of the sector and the value chain. A definition of emission standards is also presented.

Literature: Chapter 4 presents former scientific research serving as a foundation for our study. We focus on researches that enable deeper understanding of industry analysis and value increasing/decreasing factors. The results of the theoretical framework are then summarized.

Empirical findings: Our empirical study concludes our findings found throughout the different segments of the Automotive Industry. The value drivers found in each segment are summarized in the end of the sub chapters: 6.1.4, 6.2.5, 6.3.5 and 6.4.3.

Analysis: The empirical findings are analyzed in chapter 7. The value drivers are categorized and grouped, then they are analyzed to finally form a model of value drivers. The results from the theoretical framework are also analyzed and put together complementing our schematic model of value drivers. To be able to see the possibilities of, and external effects on the Swedish Automotive industry, a SWOT analysis is performed on value drivers from the empirical findings.

Conclusion and discussion: These chapters conclude our research and discuss its outcome.

2. Method

This chapter presents the approach and procedures for this Master of Science Thesis.

2.1 Perspective

Investigations are important. Companies do them frequently in order to benchmark and evaluate changes and developments in markets. Results from these investigations either confirm or discard earlier knowledge and apprehensions, but it also contributes to new knowledge being presented. The new generated material can then contribute in making better decisions. In order to be using existing resources more effectively it is significant being able to carry out properly done investigations and evaluate the quality of the investigation. (Eriksson & Wiedersheim-Paul, 1997)

While we choose our approach, it is likely to be connected with our view of the science. Our perspective is generally influenced from the environment we have been living in and of what we've learned through both our own experiences and our education. This forms a platform from which we study phenomena. The platform constitutes mostly of our mutual education, which lays the fundamentals for our views of the science. In our case the influencing education has been the program of Mechanical engineering with a major in Industrial economics. We have also both work experiences from the studied industry. Hopefully with this field of education and with our prior work experiences we will have a unique insight in the investigation of the sector automotives.

2.2 Set-up of the investigation

The steps that have been taken in order to reach the results in this master thesis started out with forming a formulation of a problem that would contribute to previous research and benefit Bank A at the same time. This was found to be rather time consuming but eventually a formulation was resolved. Also during this early phase of the study, fundamental information of the automotive industry was obtained in order to define what segments that are included.

The next step to proceed was to lay an outline and plan the procedures of the oncoming work. Focus was laid on gaining more immerse knowledge about the automotive industry. This

preparative phase contained both primary and secondary sources of information in order to have enough knowledge for the oncoming research to be conducted and also being relevant.

Later on, the process of recognizing the trends and drivers of value within the industry was initiated. This stage involves the combining of all gained knowledge in order to complete the empirical study before it is time for conclusions of the subject.

2.2 Scientific point of view and approach

In the science of methodology there are two ways of relating theory and reality. One of these is the inductive approach. This approach advocates for generating theory from results after observing reality (Bryman & Bell, 2005). The first step of the empirical study is approached inductively to come up with empiricism that will help generate methods of approaching the next step in the study.

In this phase another approach, such as the deductive way of relating theory and reality, will be suitable to obtain even more, but highly necessary, empiricism. It is meant by the deductive approach to try out what the researchers already have learnt, and theoretical considerations, on observations to obtain results (Bryman & Bell, 2005). These two approaches are used, but not at the same phases of the investigation.

When we carry out these phases, we might have to collect more information to come up with a theoretical reflection in order to be able to establish stipulations of which theories that can stand for themselves. This strategy is often related as an iterative one (Bryman & Bell, 2005). Such a strategy is used in the phases of gaining empirical data.

The scientific point of view this master thesis draws on, is a positivistic one. According to "Positivism" there are two sources to gain knowledge. They are what we can register with our five senses and what we can by human logic reason ourselves to (Eriksson & Wiedersheim-Paul, 1997).

2.3 Method of research

Both a qualitative and quantitative method will be used in this report. A qualitative method is a research strategy that emphasis an analysis that consists of words rather than numbers (Bryman & Bell, 2005). The qualitative method will be used fairly much throughout this report to gather information for the descriptive part of this study (Ståhl, 2007). All background surveys will be acquired from a qualitative type of research using the cross-sectional design as a strategy, where qualitative interpretations and estimations will be practised.

A quantitative research quantifies the results of the research in a way that makes it easier, in some cases, to maintain the overall picture. A typical example is when statistically collected data is rated or compared to each other. This strategy is not all about gathering numerical data, it also embodies a special knowledge theoretical and ontological position (Bryman & Bell, 2005). This form of method is also used within this study, yet to less extent than its qualitative counterpart, when a categorization of the value drivers occurs. The value drivers are then informally ranked in what order they affect the industry.

2.4 The character of the problem

The type of problem in this report is case-related. Bryman and Bell (2005) describes a case study as a research design that focuses on a detailed and thorough analyze of a single case or of few compared cases. While using case design a qualitative method of research is usually used, but it is often also approached with both a qualitative and a quantitative method. So for the character of the problem a cross-sectional design is preferred. This design includes many models of research such as surveys, structured interviews, content analysis, structured observations, analysis of public statistics and diaries. It is meant that with a cross-sectional design, data from more than one case will be collected for the purpose of obtaining a set of both quantitative and qualitative data that has connections with many variables. This will be reviewed in order to discover patterns of different relations (Bryman & Bell, 2005).

The cross-sectional design is suited for this study because of the variation obtained. The cross-sectional design is referred as nomothetic because it aims to come up with conclusions which aren't dependent of time and space (Bryman & Bell, 2005).

2.5 Data gathering

Gathering data is a process that can be done in two different ways. One way is gathering primary data, which means collecting data yourself for a certain goal. The other way is by gathering secondary data, which means collecting data that has already been collected by someone else for a different goal. As Eriksson and Wiedersheim-Paul (1997) state: it is both easier and cheaper to use already existing information, you should use secondary data first. Especially now that Internet plays a larger role as an enormous source of information.

Methods of gathering secondary data will consist of finding articles and journals through the Internet but mainly through use of financially related databases accessed by special subscription. Statistical information and public sources will also be collected from the Internet or from dedicated industry organisations. Some parts of the data will be gathered from literature written within the subject of interest. News articles will also serve as a source from which actualized data will be gathered. We will also use our own judgement through experiences we've had from the industry and from coaching given from our contacts within Bank A.

2.6 Source criticism

The use of secondary type of data or secondary sources can create advantages and disadvantages and can therefore obviously be questioned by those who would not agree on our choice of sources. The way to gather data from a secondary source can seem rather time consuming compared to gathering data from a couple of interviews of one or two hours. The choice can also be questioned not to be sufficiently accurate or focused for the study in mind. Some would say that this type of investigation would not reveal the most interesting solution to our question of research.

We are aware of the certain risk that this type of investigation may generate and that it would have been a lot easier for us to investigate using a common way, holding interviews to gain data. Nevertheless have we discussed what type of sources that would serve best for this study and we selected these sources because of several reasons. The secondary data that was gathered by us, to use for the investigation, was rigorously and professionally written by authors with long experience and great understanding of the subject in mind. Reading and

gathering all this data gave us a vast but also deep understanding of where the automotive sector is heading and what forces that may drive this industry in any direction. Taking part of these studies and analysis, primary data felt rather narrow and "coloured" by one person's point of view compared to the secondary data with a much larger group of specialists sharing their thoughts. We don't think only primary data would give us as much as all of the analysis and surveys done by consulting agencies and the European Union among others. It is however necessary to say that it may have been even more contributing and satisfying to complement our study and sources with a couple of interviews but time was also a factor of consideration and we continued therefore our study with our first choice of sources.

2.6 Selection of method

While defining segments of the Automotive Industry, a value chain was necessary. The authors constructed a value chain to fit this study of value drivers of the Automotive Industry by modifying general value chains and using data gathered and knowledge from the concerned industry. Letting this master thesis mostly build on the qualitative study using the cross-sectional design strategy helps us to analyze more thoroughly in order to identify the value drivers of the automotive industry. Applying them later in a SWOT model will help to clarify the value drivers' contemporary effect on the Automotive Industry. A quantitative part of the study will also let us try certain theories and investigate value drivers to see what they are correlated with. While analyzing correlating value drivers, the authors discussed which of them should be included for the construction of a model showing the value drivers correlations. A white-board was then used to bundle them up and simplify the model. Using a quantitative method will also enable testing of correlations between value drivers and characters of behaviour in the industry to help verify the relevance of them.

2.7 Reliability and validity

Scientific investigations are made through direct or indirect observations. In these cases it is important to try making them as valid as possible. Because it is obvious that people have diverse knowledge, the outcome of their research can differ quite a lot. There are two ways of observing. One way is by measuring and the other by interpreting. This is where the judgement of reliability will be useful (Eriksson & Wiedersheim-Paul, 1997). In the qualitative part of the research there is the matter of reliability that will be hard to measure. Its

relevance with results from the analysis will be tested with historical data. But not every result can be verified with historical data and will therefore have to be relied on the basis of experts' opinions and conclusions from the authors of this essay.

Conclusions that are made can either be useful in a certain situation or universally in different situations over time. That is why it is important to evaluate if the conclusions are useful, if they have relevance (Eriksson & Wiedersheim-Paul, 1997). Answering this will set the validity of them. So testing of the results from the analysis will give substantial relevance to it. The validity of other results will be harder to measure because of its possibility to be pure interpretations of upcoming events in the industry and also that results might be related to interpretations that come from conclusions from the analysis.

3. Background information: Definitions and the value chain

3.1 Definition of the Automotive Industry

Due to various amounts of definitions concerning the automotive industry, this report will bring up definitions that best satisfy the automotive industry as it is explained in this report. The automotive industry involves advanced products that need R & D, manufacturing, assembling, distribution and sales. The industry also involves after-market services such as maintenance & repair. The definition of the end products states as follows: "*Land-based automotive vehicles used for the transportation of people and/or goods*". Companies that are active in the automotive industry are Original Equipment Manufacturers (OEM), suppliers of parts, components and raw material, general agents, resellers and repair garages. These participants are described in the following text:

- An Original Equipment Supplier is a company that manufactures and/or assembles the final product. A vehicle made under a brand name by a given company may contain various components, such as tires, brakes or entertainment features manufactured by different suppliers, the firm responsible for the final assembly/manufacturing is the OEM (European Commission, 2004).

- There are different kinds of suppliers to the OEMs. They are normally classified as different levels of suppliers. These are (European Commission, 2004):

    - A tier 1 supplier is a component supplier delivering directly to final vehicle assemblers. They work hand-in-hand with automotive manufacturers to design, manufacture and deliver complex automotive systems and modules, such as significant interior, exterior or drive train units. Tier 1 suppliers in turn purchase from tier 2 and tier 3 suppliers.

    - A tier 2 supplier is a company that produces value-adding parts in the minor sub-assembly phase. Tier 2 suppliers buy from tier 3.

    - A tier 3 supplier supplies engineered materials and special services, such as rolls of sheet steel, bars and heat and surface treatments. The tier 3 suppliers

rank below tier 2 and tier 1 suppliers in terms of the complexity of the products that they provide.

- General agents are firms who are authorized to transact business for the principal of sales and marketing of automotive vehicles. Sales is directed towards resellers and marketing on a national level (Elsässer, 1995).

- The resellers are freestanding firms and are the ones who have direct contact with the end customer, which means; they handle sales and distribution to the end customers. Marketing is also performed by the resellers but is more locally directed. Resellers represent normally authorized service- and repair shops (Elsässer, 1995).

- Repair garages also perform service and repair work. They are normally authorized for certain brands and have exclusive deals with the manufacturer for spare parts (Elsässer, 1995).

A definition of the segments in the Automotive Industry varies depending on in which country you are in and who you ask. To best be able to encompass both international and Swedish definitions we have put together the following definition seen in figure 1. It shows four different segments that comprise the automotive industry: Non Commercial Vehicles, Commercial Vehicles, Automotive Suppliers and Automotive Services. These segments vary in different ways, i.e. in different value chains, global or domestic activity, volume of sales etcetera, but they are all contributing to the final product, the automotive vehicle, and are thereby driven by similar main drivers. They will shortly be described in the following sub chapters.

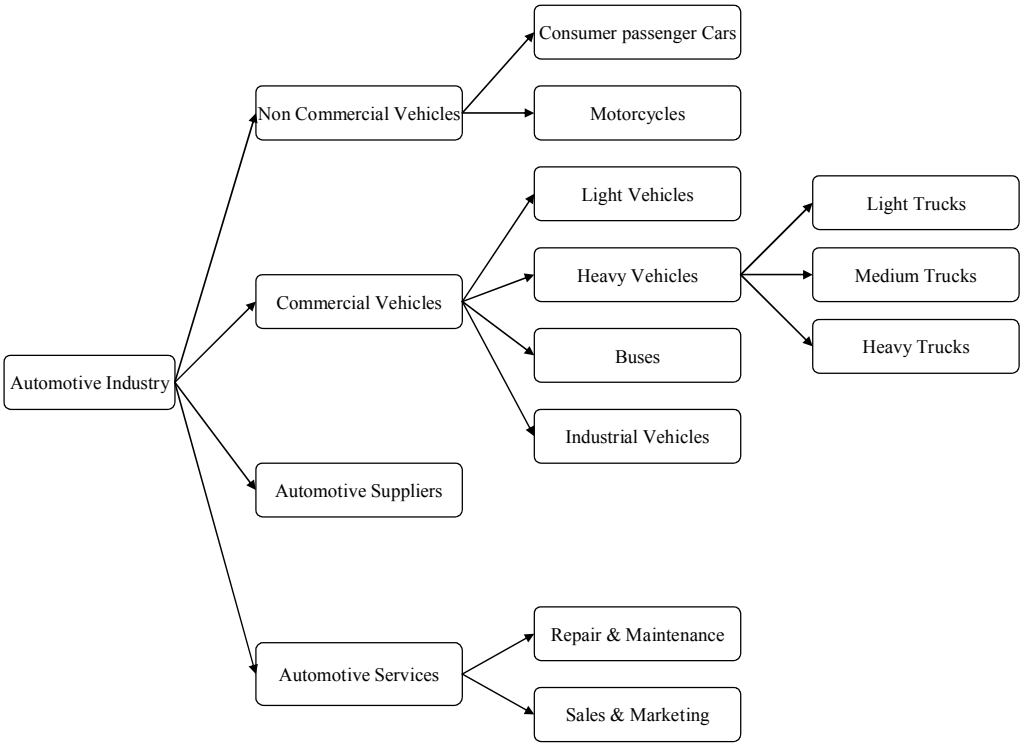

Figure 1. *Definition of the automotive industry.*

3.1.1 Non Commercial vehicles

The Non Commercial segment in the Automotive Industry constitutes of land-based products running on wheels, manufactured for non-commercial use, i.e. products for private use and not for the use in a business. There are two sub-segments belonging to the segment of Non Commercial Vehicles. These are Consumer Passenger Cars and Motorcycles.

Consumer Passenger Cars

Consumer passenger cars or motorcars are wheeled passenger vehicles that carry their own motor. They are primarily designed to run on roads, to have seating for up to eight people and typically have four wheels. They are also principally constructed for the transport of people rather than goods.

Motorcycles

This segment includes motorcycles with two, three and four wheels as well as mopeds. It is a rather narrow segment due to its' limited fields of use with a small turnover compared with other segments in the Automotive Industry. In Sweden, 22480 motorcycle vehicles where sold in 2006 (SCB, 2007). This segment will not be covered in the report.

3.1.2 Commercial Vehicles

The segment of Commercial Vehicles refers to vehicles manufactured for being used for the purpose of earning money. The segment can be divided into sub-segments.

Light Vehicles

The segment of Light Vehicles[1] corresponds to road vehicles that weigh less than 3.5 tons and for the commercial use (Bilsweden, 2008).

Heavy Vehicles

Heavy Vehicles refer to road vehicles weighing more than 3.5 tons and are usually entitled as trucks and buses in everyday language. Trucks can also be divided into three sub ranges; light, medium and heavy trucks. Table 1 shows the main characteristics of the heavy vehicles sub ranches.

	Light trucks	Medium trucks	Heavy trucks
Gross vehicle weight (tons)	3,5 up to 7	7 up to 16	16 and up

Table 1. *Characteristics of the heavy vehicles sub ranges. (Bilsweden, 2008)*

In the Swedish Automotive Industry sub ranges may appear differently than in table 1. It is common with other definitions of the ranges of vehicles in Swedish statistics. These are encompassed in table 2. An even older definition can be seen in appendix 1. But the definitions used throughout this study are the ones from table 1.

[1] The corresponding word in Swedish for light vehicles is "lätta lastbilar" or "lätta transportfordon". This is not to be mixed up with the segment of light trucks.

	Light transportation vehicles[2]	Transportation vehicles[3]	Heavy transportation vehicles[4]
Gross vehicle weight (tons)	Up to 3,5	3,5 up to 10	10 and up

Table 2. *Categories normally used in Swedish statistics. (Bilsweden, 2008)*

Industrial Vehicles

Global spec (2007) defines the industrial vehicles:

"The industrial vehicles are driver controlled, self propelled vehicles designed for a variety of applications. These include personnel transportation, load carrying as well as other specialty applications."

The Industrial Vehicle segment in this study contains all vehicles used in production and construction industries. The vehicles vary from mining vehicles such as bulk miners, material loaders, excavators, articulated haulers for paving, forest and construction vehicles such as pavers, tractors and fork lifts (Sandvik, 2007; Volvo, 2007; CAT, 2007).

Buses

The segment of buses includes all kinds of buses. They can be divided into two different weight classes. The first class is coaches[5], a smaller type of bus weighing less than 10 tons, and the second is heavy buses[6], i.e. buses weighing over 10 tons (ACEA, 2007b).

3.1.3 Automotive Suppliers

This segment corresponds to actors contributing with raw material, parts, components, modules and systems, necessary to build the automotive vehicle. This is an important segment that often focuses on outsourced parts of the main manufacturing process. In the Swedish automotive industry the segment is not only an important contributor in the value chain but

[2] In Swedish: "Lätta transportfordon"
[3] In Swedish: "Transportfordon"
[4] In Swedish: "Tunga transportfordon"
[5] The Swedish translation is "lätta bussar".
[6] The Swedish translation is "tunga bussar".

also as an employer within society and to the industry's total turnover. Automotive suppliers are classified as the different levels mentioned earlier; tier 1, tier 2 and tier 3.

3.1.4 Automotive Services

The Automotive Services segment represents the sub-segments Repair & Maintenance and Sales & Marketing segments. These segments are important supplements to the main product. It will be included in the definition but main focus will be on the other segments.

3.2 The value chain of the automotive industry

A value chain is shown in figure 2. It is constructed by the authors to fit this study and the Automotive Industry. It could be made more detailed, but it is simplified for this research in able to place where the segments of the Automotive Industry are active within the value chain.

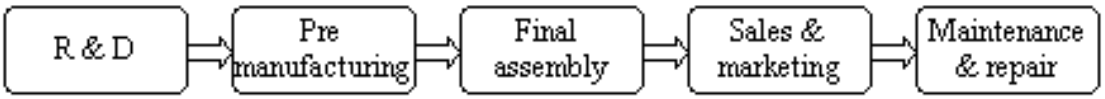

Figure 2. *Simplified value chain of the automotive industry.*

3.2.1 Research and development

First off in the value chain is the activity of R&D. According to the Organization of Economic Cooperation and Development (OECD) the term R&D is referred as "creative work undertaken on a systematic basis in order to increase stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new application". Investments in R&D reflect an organization's willingness to change products and processes in order to increase future performance or returns. Normally focus in this department have been laid on being innovative enough to be competitive and strengthen market share, but it has become more important over the last decades to develop more environmental friendly cars. Pressures for this direction have come from both politics and trends in consumer's consumption.

The process of developing a new vehicle starts at formulating a concept of the product. Having these concepts as a starting-point, more detailed goals of a vehicle's design can be set. These goals are to be translated into engineering blueprints and prototypes. The blueprints also lay the foundation of the description for the production process. Another important part in the development process is the composing of tools, supplying equipment and training of the operators and assembly workers. (Elsässer, 1995)

Development costs are high in the segments of the automotive industry. Developing a new car model is a multi billion SEK project. For the contestants in the Swedish automotive industry, who haven't got the same economies of scale's advantage as a large volume manufacturer, these costs are relatively high compared to these manufacturers worldwide. Almost 60% of these costs are put on the development of the car platform. There is a tendency to standardize and decrease the number of platforms in order to reduce development costs. (Elsässer, 1995)

There are certain strategies in being able to affect development costs. One way of reducing them is by keeping a low number of models in the product program. Another is by extending the life cycle of a produced model or to keep producing old components and use them in new models. It is more commonly nowadays that OEM's and other companies tend to concentrate on their core competence and therefore choose to outsource certain parts of the production and also by cooperating with suppliers and competitors. This is another way of reducing development costs. The automotive industry in Sweden has used all of these strategies. (Elsässer, 1995)

Like the passenger cars, trucks and buses are also complicated products with a wide variety of different features. But there are differences in their relationships with their customers. Truck and bus brands are like cars associated with brand image but haven't got the same importance when it comes to factors like design, driving characteristics and status. Their customers, who normally are haulage contractors and municipal traffic firms, posses great competence of evaluating the characteristics between truck and bus models and comparing price alternatives. The importance for these companies while choosing between models is to have operating costs, reliability and the availability of a service net in mind. (Elsässer, 1995)

Developing a new truck isn't as costly as the development of a new passenger car, because the lack of car body, but they are catching up due to more and more luxurious truck cabins.

Development costs for other parts, such as engines, transmissions, gearboxes etc, are just as high as for the corresponding parts for passenger cars, but trucks are produced in a smaller volume, which makes development cost per vehicle a lot higher than for passenger cars. (Elsässer, 1995)

The body of a bus is an important part of the buses design but development of this is normally done by separate companies who often customize the design after specific customer specifications. The development of the remaining parts is made together with that of the truck side. Companies operating in this segment of the Swedish automotive industry are much larger than those within the passenger car segment compared to their competitors. But either way, it has been essential even for them to reduce development costs. This was done by the strategy of having a narrow product program. Scania was early in its campaign of standardizing components to reduce development costs, which has been a success story ever since. (Elsässer, 1995)

3.2.2 Pre manufacturing

Pre manufacturing is an early stage in the production process. Raw material, which in this study isn't counted for being part of the automotive industry, is being processed into parts and some are even assembled into a system, module or a system module. A "system" in this case is defined as an integrated, functional unit that need not however be a fully assembled package. A "module" refers to a pre-assembled physical unit that doesn't need to cover a complete functional area. If a functional system is simultaneously designed as a fully assembled module it is termed as a "system module". This is interesting in the manner of how integrated collaboration needs to be between OEM's and their suppliers. Examples of products from this stage in the value chain are gearboxes, transmissions, motors, hydraulics, cabins, panels and seats. (Elsässer, 1995)

3.2.3 Final assembly

After pre manufacturing there is the final assembly stage where parts are being assembled together into an end product. A number of OEMs, Scania among others, have adopted an advanced Japanese production philosophy, called the Toyota production system, which is also later known as Lean Production among Americans. Lean operations and JIT (Just In Time) is

implicated in production for the achievement of meeting demands instantaneously with perfect quality and without wastes. That is when the philosophy for production is redirected from mass thinking (traditional mass production) to lean thinking. (Packendorff, 2006)

In terms of production, the expression lean can be traced back to the year 1990, which was introduced by Jim Womack, Dan Jones and Daniel Ross. Their book is based on a study performed by MIT (Massachusetts Institute of Technology) and describes how the concept "lean" started in Japan, mainly by the company Toyota and their Toyota production system. (Lean Forum, Scania & Nordea, in PENGAR24, 2007)

Lean production is about maximizing value and minimizing waste through the optimization of throughput time and also with focus on the customer. This develops an operation that is faster, more dependable and produces higher quality products and services to a lower cost. But these are not the only important factors in today's manufacturing process. Due to competitive pressures it has become vital for manufacturers to provide product diversity, which now is the norm, and to head towards being more batch oriented. Thus achieving more flexibility in production introduction and scheduling. This has been a must because of the customers demand for a wider choice when buying vehicles which results in manufacturers being able to offer a range of vehicles with a variety of models for each segment in the range. Manufacturing equipment needs to be easily adaptable for later upgrades of vehicle models that seem to be necessary more intensely. Even the product life cycle has been shortened to satisfy today's market trends. (Packendorff, 2006)

3.2.4 Sales and marketing

The passenger car and light vehicle manufacturer, who often are the same manufacturer, have mainly two levels of middlemen before the product reaches the end customer. These middlemen are responsible for the Sales/Marketing stage in the value chain. The first level constitutes of general agents who specify on particular automobile makes. The general agents are individual firms that in Sweden are owned by the automakers. There are 26 general agents in Sweden (KTHNOC, 2008), distributing passenger cars to the next level of middlemen. Sales and distribution towards the end customer in the passenger car segment are run by 110 resellers. The traditional reseller has very low margins on their sales of new passenger cars. On average, the margin is only 1,5% of the profit before tax for passenger car resellers in

Sweden. They are even lower for resellers in the rest of Europe and lies under 1,5%. (Bissinger & Castellano, 2007)

These firms normally make their profits from other activities than the selling. This is the next step of the value chain and is called Maintenance & Repair. Resellers often have their own repair shops where customers come for service or repair of their vehicles. The resellers also sell spare parts. Almost 90% of the resellers' profit margins come from activities other than passenger car sales. (Otterbeck, 2006)

The Sales/Marketing/Distribution stage of the value chain for heavy vehicles is almost similar, but the OEM Scania is an exception. For them, this stage of the value chain is since the end of the 60's handled by themselves. AB Volvo uses in general the same reseller network as for the passenger car segment, and the same goes for other brands. (Elsässer, 1995)

Resellers needn't necessarily operate the last stage in the value chain. About 25 % of all performed repairs of passenger cars are made by independent repair shops, meaning not owned by any reseller. They have agreements with the automakers, which make them authorized repair garages for passenger cars, but aren't doing any business selling them. There are about 2000 passenger car-repair garages in Sweden (Motorbranschens riksförbund, 2007). This amount of garages tends to subside as a consequence of cars becoming more and more technical advanced. (Otterbeck, 2006)

3.3 Emission regulations

Emission requirements started out for passenger cars and light vehicles in the early 1970s in the EU. For heavy vehicles it wasn't due until the end of the 1980s. The EU was late to introduce requirements to enforce the use of catalytic converters in petrol vehicles, compared with the US and the European countries Sweden, Norway and Austria. (The Swedish NGO Secretariat on Acid Rain, 2004)

There are four types of compounds that are regulated by the exhaust emission requirements. These are nitrogen oxides (NO_x), hydrocarbons (HC), carbon monoxide (CO) and particulate matter (PM). For cars and light vehicles the emission standards vary depending on the engine

type. The engine types are those running on petrol, diesel and alternative fuel. Emissions of carbon dioxide (CO_2, equivalent with the greenhouse gas) from any vehicle type are yet to be regulated with a forthcoming EU restriction, which was proposed in February 2007. The terms used for these standards are designated "Euro" and followed by either Arabic numbers (Euro 1, 2, 3 and so on) for cars and light vehicles, or by Roman numerals (Euro I, II, III and so on) for heavy vehicles. (The Swedish NGO Secretariat on Acid Rain, 2004)

Emissions from passenger cars and light vehicles are measured in g/km and during a test cycle with the entire vehicle. The measurement for heavy vehicles is performed by bench-testing their engines and is expressed in relation to the engine power (g/kWh). It is sufficient for a vehicle or engine to be tested and approved in one EU country to be sold and used throughout the whole union. (The Swedish NGO Secretariat on Acid Rain, 2004)

Two different test cycles have been used in the EU for heavy vehicles. These are ETC (European Transient Cycle) and ESC (European Stationary Cycle). (The Swedish NGO Secretariat on Acid Rain, 2004)

Test cycles are used differently outside the EU, so emission standards between countries aren't directly comparable, but the EU, US, Japan and China agreed in December 2003 to draw a common scientific platform for measuring and benchmarking air pollution. (The Swedish NGO Secretariat on Acid Rain, 2004)

The different EU emission standards for passenger cars and heavy vehicles are seen in tables 3 and 4 where PI stands for positive ignition (meaning engines run on petrol, natural gas or liquefied petroleum gas) and CI stands for compressed ignition (diesel engines). (The Swedish NGO Secretariat on Acid Rain, 2004; Europa, 2007)

Passenger Cars	PM (mg/km)		NOx (mg/km)		HC (mg/km)		HC+NOx (mg/km)	
	PI[7]	CI	PI	CI	PI	CI	PI	CI
Euro 1 (1992-93)	–	140	–	–	–	–	0.97	0.97
Euro 2 (1996)	–	80/100[8]	–	–	–	–	0.5	0.7/0.9[9]
Euro 3 (2000)	–	50	51	500	–	200	–	560
Euro 4 (2005)	–	25	80	250	–	100	–	300
Euro 5 (2009)	5	5	60	180	100	--	--	230
Euro 6 (2014)	5	5	60	80	100	--	--	170

Table 3. *Emission standards for passenger cars. (The Swedish NGO Secretariat on Acid Rain, 2004; Directive 1999/96/EC of the European Parliament and of the Council of 13 December 1999, 2000)*

Heavy Vehicles	NOx (mg/kWh)	HC (mg/kWh)	PM (mg/kWh)
	CI	CI	CI
Euro I (1992)	9000	1230	400
Euro II (1995-96)	7000	1100	150
Euro III (2000)	5000[10]	660[11]	100/160[12]
Euro IV (2005)	3500[13]	460[14]	20/30[15]
Euro V (2008)	2000[16]	460[17]	20/30[18]

Table 4. *Emission standards for heavy vehicles. (The Swedish NGO Secretariat on Acid Rain, 2004; Directive 1999/96/EC of the European Parliament and of the Council of 13 December 1999, 2000)*

The Euro V emission standard for heavy vehicles is next in line to take force. The US has a different legislation. The corresponding U.S. standard, EPA10, will be even more demanding than the European one and will be set in 2010. The Euro VI standard will replace Euro V and is more equivalent to the U.S. standard. It will be set in 2012. (Bissinger & Schultz, 2007)

[7] Positive ignition particulate mass standards apply only to vehicles with direct injection engines.
[8] Indirect Injection (IDI) and Direct Injection (DI) engines respectively.
[9] Indirect Injection (IDI) and Direct Injection (DI) engines respectively.
[10] Both ESC and ETC test cycle.
[11] ESC test cycle only.
[12] ESC and ETC test cycle respectively.
[13] Both ESC and ETC test cycle.
[14] ESC test cycle only.
[15] ESC and ETC test cycle respectively.
[16] Both ESC and ETC test cycle.
[17] ESC test cycle only.
[18] ESC and ETC test cycle respectively.

The forthcoming legislation for a mandatory limit of CO_2 emissions, which was proposed in February 2007, is meant to limit average CO_2 emissions to 120 g/km for new passenger cars to be reached in 2012. (Bissinger & Castellano, 2007)

Emission standards for motorcycles, mopeds and engines for non-road machinery are also regulated but are not covered in this report.

4. Literature

In this chapter we will present a scientific framework that introduces relevant research within the scope of this study. We will start with an introduction of former analysis made on companies involved in industrial activity. This research is more generally focused on analysis applied on industries, see chapter 4.1. We hope this shall enrich our study with examples on factors influencing an industry from different perspectives and during different circumstances. After giving this broad industry analysis introduction we will focus more on the main objective of our study, namely the value drivers, which are exposed in chapter 4.2. First out will be a definition of value drivers followed by a presentation of value drivers identified in various industries. This will finally lead to the value drivers found in former research of the automotive industry laying the foundation for our research.

4.1 Former research in strategic analysis of industries

To analyze the automotive industry and its' value drivers we will now present former research that defines an industry, explains vital factors for competitive industries and thereby also presents vital factors for an industry analysis.

Grant (1999) defines an industry as "a group of companies that delivers to a market". This includes all companies that in any way contribute with services or products to the industry. A market consists of similar products or related products. It is usual that several products are included within the industry's line of products, which differ in achievement, size and function (Porter, 1985). The automotive industry is no exception.

During the 1970:s and major part of the 1980:s the focus, in strategic research, was aimed on a macro perspective where the effect of the business environment was measured among companies. A competitive analysis was of great importance if, e.g., a comparison between two companies was on the agenda. A well-known person within this field was Michael E. Porter who has been studying industry structures and competitive advantage. Throughout the 1990:s this industry analysis was supplemented by a more resource focused strategy theory, which dealt with the company's resources and its ability to create value (Grant, 1999).

4.1.1 Industry analysis from a national environment's point of view

To understand an industry that is global, analogous to the automotive industry, great care should be taken to factors that bring success not only domestically, but also internationally in a particular industry. These factors shape the business environment for local companies and give advantages or disadvantages to other companies abroad. Porter (1990) presents these factors as (also seen in figure 3):

- *Factor conditions*. The nation's advantageous or disadvantageous factors of production, such as skilled labour or infrastructure necessary to compete in an industry.

- *Demand conditions*. The domestic demand for the industry's product.

- *Related or supporting industries*. Includes the presence or absence of supplier industries and related industries in the nation that are internationally competitive.

- *Firm strategy, structure and rivalry*. The fourth factor shows the conditions in how the nation governs how firms should be organized, formed and managed. It also shows the nature of domestic rivalry.

Porter (1990) states that it is possible to have a competitive advantage based on just two of these factors in a natural resource-dependant industry or in an industry where there is little sophisticated technology or skills. This kind of advantage is not sustainable though, due to fast shifts when competitors circumvent this advantage. But it is not a prerequisite to have advantages in all determinants for a competitive advantage in the industry because interplay between advantages can yield self-reinforcing benefits that are hard for foreign competitors to replicate.

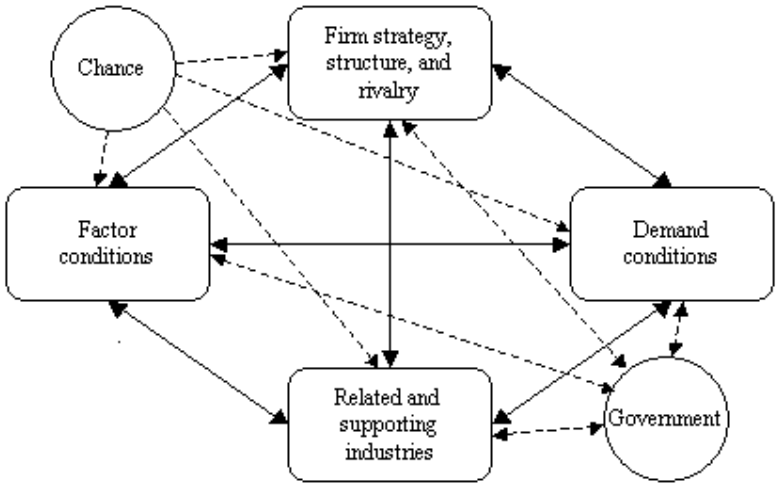

Figure 3. *Determinants of the national competitive advantage. (Porter, 1990))*

Figure 3 shows the entire picture where two new factors are presented. These are chance and the government. Chance refers to factors that are out of control for companies (and often the nation's government), like technological breakthroughs, wars, inventions, external political developments, and major shifts in foreign market demand. The second and final factor is government. This factor can detract or improve from all the national advantages through subsidies, standards and laws that affect the demand of buyers (Porter 1990). These factors are of great importance to firms acting on a global level, and possibly to the industry of automotives. The ability to understand and try to forecast government legislation is very likely important for an automotive company to be competitive and yield growth in the future.

4.1.2 SWOT analysis

To achieve an effective strategy, it's of great importance to understand the interaction between the company and its' environment. Dynamic adoption and development of resources, competence and company targets is a key step for following shifting market prerequisites. A common used model for measuring the company, sector or business environment is the SWOT analysis. Value drivers will be analysed by using the SWOT model.

The SWOT model is used for understanding strengths and weaknesses within the company/sector together with opportunities and threats within the business environment of the company/sector (Skärvad & Olsson, 2005). See figure 4.

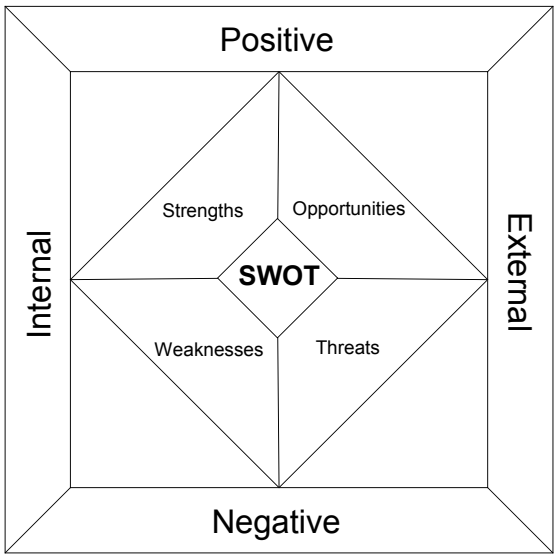

Figure 4. *SWOT analysis positioning.*

The strengths within the sector represent the factors that are seen as the sector's main advantages. A typical strength may be a special knowledge that has been achieved through several years of experience. This can later on be compared with other sectors to see who possess the competitive advantage. Likewise, the weaknesses are represented by typical factors that can be seen as disadvantages within the sector. Thereafter are the opportunities measured and are corresponding to the possibilities that are prominent to the sector. A new kind of opportunity can arise when a technological sensation is discovered and thereby gives new possible solutions to the sector. But with opportunities comes threats and therefore do all possible threats that can danger the future opportunities of the sector, need to be identified.

The SWOT analysis can be a valuable strategic conclusion applied on a company or sector. However, if the SWOT analysis shall be satisfying it's essential to identify relevant factors. This is done through a foregoing sector, competitive and environmental analysis.

This analysis will later serve as a complementary analysis model following our own model of value drivers. In chapter 8.4 the SWOT analysis will identify strengths and weaknesses, opportunities and threats among the value drivers in the Swedish Automotive Industry.

4.1.3 Changing strategic landscape for industrial companies

All factors affecting a company on a national level (external) or company level (internal) are also affecting the automotive industry as a whole. The competition becomes more and more intense among companies involved in manufacturing processes and will therefore create different forms of competition that is driven by certain factors. One type of competition is the "hyper competition" affecting the industry's business position as well as its' value drivers and thereby also laying more pressure on the strategic decisions.

Hitt, Keats and DeMarie (1998) refer to "hyper competition" when the competitive landscape is changing towards a more intense competition. This competitive landscape is driven by technological revolution and significant globalization, which escalates competition and strategic manoeuvring between companies and industries. This results in extreme emphasis on price, quality and satisfaction of customer needs and a new greater focus on innovation. Utterback (1996), states that technological innovation is great if you need alteration in your production system to meet new demand from customers. But it is also very expensive and therefore results in tough decisions for the management team. Furthermore, the timeframe for strategic actions is reduced which puts companies active in this competitive landscape in highly turbulent and chaotic environments (Hitt, Keats & DeMarie, 1998).

Two major factors (A, B) affecting the industry's strategic landscape are presented below.

A. The technological revolution

Hitt, Keats & DeMarie (1998) states the Internet as an example of an engine that drives the technological revolution. The most significant trends and characteristics within technology are according to the researchers:

- The increasing rate of technological change and diffusion
- The information age
- Increasing knowledge intensity i.e. increasing importance of, and emphasis on, knowledge for competitive advantage

- The emergence of positive feedback industries

All these changes have shortened life cycles, made patents less effective and reduced the R&D time to bring new products to the market (compare the production time of a car of today with the ones for twenty years ago). What's more is that this technology has made it easier to customize products more quickly and economically (Bettis & Hitt, 1995).

B. Increasing globalization

The existence of multinational firms is transcended by globalization and development of cross-border relationships. This also affects local businesses in domestic markets. For example: Web pages for marketing and teleconferences have contributed for the globalization of small firms. (Hitt, Keats & DeMarie, 1998)

Globalization has been largely due to worldwide economic improvement and the opening of domestic markets to foreign companies. Hitt, Keats and DeMarie (1998) also states that economic change often affect political change. To encourage further growth and economic development, politicians are forced to agree on new rules that will improve needs and demands. As an example of these new rules there are free-trade agreements like GATT and NAFTA. Europe, several Asian countries and North America have targeted China for new investments that has affected China's gross domestic product to surpass Germany and Japan in a way that leads some to predict that it will become a global economic superpower (Weidenbaum, 1995). The politicians are often forced to make agreements with industries, such as the automotive industry, especially in countries were the automotive industry represents a large part of national GDP and politicians are agreeable to change laws to make sustaining growth possible. The China region is, as an example, an extremely interesting market for industries, not only the automotive industry, but for all industries wanting to grow globally.

Moving into new markets makes many opportunities possible, but also multiple challenges. For example, moving to a global market increases incentives for innovation and improved opportunities to generate returns because of the expanded marketplace. Challenges lie hereby in a more complicated operating environment. Operations become more complicated to coordinate across borders, which also craves for complex structural arrangements. Evaluating

the performance of a trans-national organization's various units is no longer a simple task. So globalization reshapes the competitive landscape and will continue to do so (Hitt, Hoskisson & Ireland, 1994).

4.2 Former research of Value Drivers

After this broad introduction of former research in industry analysis, we will continue with research focused directly on value drivers affecting industries. First, several definitions of value drivers are exposed, followed by value drivers identified in mixed industries and in the automotive industry.

Madanoglu (2005) explains that thorough understanding of value drivers are of great importance for managers that want to be able to select the most appropriate competitive methods that will create competitive advantage to the firm. Variables that have impact on results of the business e.g. occupancy and customer satisfaction, are called value drivers. If these drivers are defined in a proper way they may help managers to:

- Understand how value is maximized and created in the business
- Prioritize drivers and decide whether some resources should be allocated or removed.
- Make value drivers align managers and employees to common goals (Copeland, Koller & Murrin, 2000)

There are several types and categories among value drivers used throughout the literature. A short compilation will therefore here be presented. Copeland, Koller and Murrin (2000) defines value drivers as variables that more or less affect the company's value in different ways. The management team can easily understand how the company should create more value by identifying its value drivers. Koller, Goedhart and Wessels (2005) define value drivers as actions affecting business performance in the short or long term and therefore create value. Zhao and Olsen define value drivers as internal and external drivers referred to the company and also as tangible and intangible value drivers. As examples of tangible drivers that include several econometric variables are labour supply of a nation or region,

gross domestic product and consumer spending etcetera (Zhao & Olsen, 2003, in Madanoglu, 2005).

4.2.1 Value drivers from mixed industries

Baruch Lev has identified and managed tangible assets. The author has examined assets such as human capital, customer lists, patents and brand equity being value drivers when helping companies gaining and sustaining competitive advantage over its competitors Lev, 2001, in Madanoglu, 2005). Zhao and Olsen regard this type of value drivers as being less tangible and therefore more challenging to analyze from a cause and effects point of view (Zhao & Olsen, 2003, in Madanoglu, 2005).

Madanoglu (2005) defines internal value drivers within the restaurant business. These are revenue per customer, seat turnover, and more general internal drivers as return on investment and return on sales. These drivers originate within the company and are directly controlled by management. Return on invested capital and return on sales are common value drivers explained within the financial literature.

External value drivers are according to Madanoglu (2005) more common to cause volatility in the company's cash flows because management does not directly control them, as with internal drivers and may lead to vagueness in the business environment due to internal drivers affected by external. Examples of external drivers are technology, safety government regulations.

Zhao and Olsen shows further how the remote environment can be tracked more or less from their start up to accomplish the firm's objectives as described in figure 5 (Zhao & Olsen, 2003, in Madanoglu, 2005).

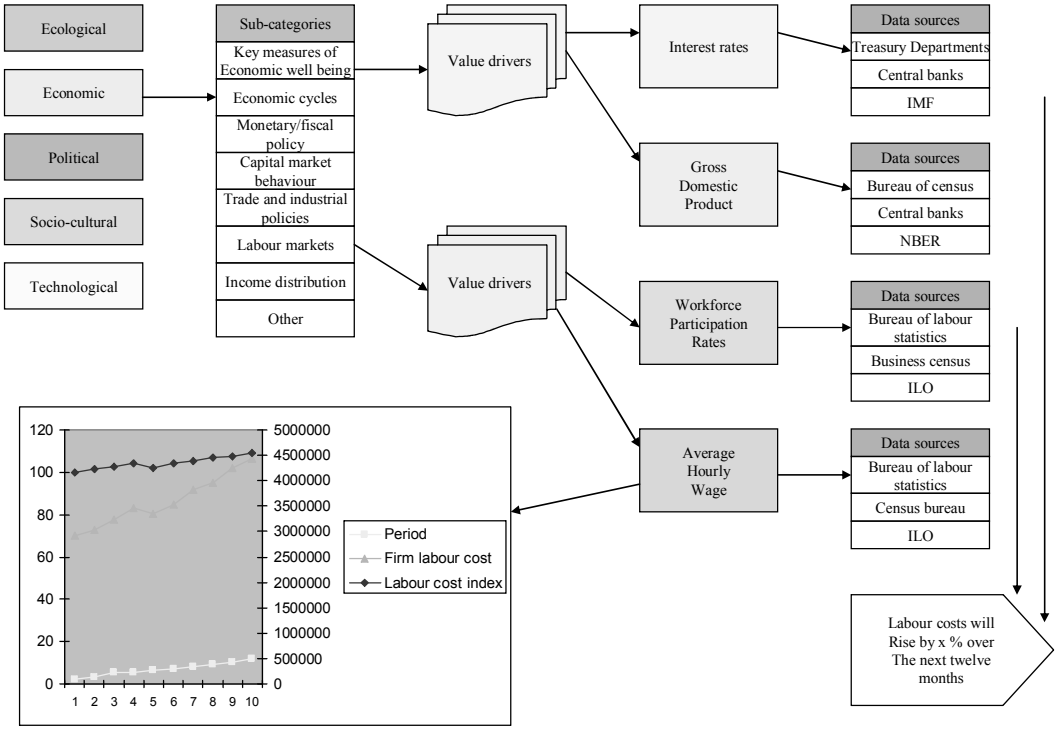

Figure 5. *Cause and effect relationships of value drivers (Zhao & Olsen, 2003, in Madanoglu, 2005).*

The figure explains the importance of understanding the key value drivers related to each category of environment, establishing a base of valid and reliable information and at last to provide a short outlook of those value drivers' future. By size and quality of this outlook management should be able to make better and quicker estimations by more effective estimation processes concerning cash flows of value driving competitive methods.

Kumar, Strandholm and Subramanian (2001) state that it is a new way of strategy research to identify key value drivers. Another researcher, Sweet (2001) states that value drivers are the link between microeconomic paradigms and macroeconomic paradigms. Zhao and Olsen think of value drivers as forces that drive change within industries or companies (Zhao & Olsen, 2003, in Madanoglu, 2005). Another group of researchers are presenting their thoughts concerning tangible value drivers. McBride (2000) states financial drivers as innovation, quality, customer care and management skill. The author refers to tangible drivers as market capitalization and share price. Kalafut and Low (2001) presented an index measuring

intangible value drivers and also uses variables like innovation, customer relations, management capabilities, alliances, quality, technology, brand value employee relations and environmental and community issues. The authors pronounced the employee category as the single greatest value driver, which had an impact on the company's market value and presented the employee factor as a positive correlation with the company value. Kalafut and Low (2001) examined the airline industry where quality and talent of the workforce, quality of labour management relations and diversity are very important factors within the industry's value creation.

In an exploratory study made by Bose and Oh (2003) three industries where examined, namely biotechnology, information technology and energy and environment. Seven drivers where identified: uniqueness of innovation, growth prospects, reputation of research team and firm, economic factors, risk and last but not least profitability. Later on in 2004 the authors ranked all the drivers where profitability followed by uniqueness of an innovation were ranked first and second respectively.

Ruhl and Cowen (1990) presented operating profit margin, growth rate, working capital investment, cost of capital and fixed capital investment as five of the most important internal value drivers creating shareholder value.

4.2.2 Value drivers from the Swedish automotive industry

It is remarkable how the Swedish automotive industry's development has befallen. There is a general idea that big countries, with a large home market, have the best prerequisites to produce vehicles. The Swedish market is relatively small compared to the larger ones, e.g. USA, Japan and Western Europe, which presumably should be a handicap. However, the Swedish automotive industry has shown an immense expansion over the second half of the 20th century. Elsässer (1994) studied this case and focused on identifying the value drivers behind this development during the post-war era between 1946 and 1994.

Elsässer starts out explaining that the development of the Swedish automotive industry is associated with the structural transformation, which has occurred within the Swedish industry and the rest of the business world. The outcome is a result of how well companies have managed to compete with foreign automotive manufacturers and how well they managed in

the struggle of domestic resources with other domestic companies of different sectors. When an analysis of the transformation is needed, a dynamic analysis model should be used. Elsässer uses theories from a research alignment known as “Industrial Dynamics” that meets the dynamic requirement.

Swedish automotive manufacturers can through strategic decisions influence a transformation that can affect their competitiveness. They are often taken to adapt to changes of the automotive industry’s paradigm but can also be taken to fulfil an underlying vision and of being innovative. These decisions normally concern product development, marketing, manufacturing, purchasing or financing. The organization of a company’s activities is also vital for its competitiveness. Elsässer summons these as five aspects:

- Product development
- Supply of components
- Manufacturing process
- Marketing and internationalization
- Organizational structure

He examines what strategic decisions have been of most importance for them during the post-war era.

Elsässer also explains different factors determining the Swedish automotive industry's paradigm. These can be seen in figure 6.

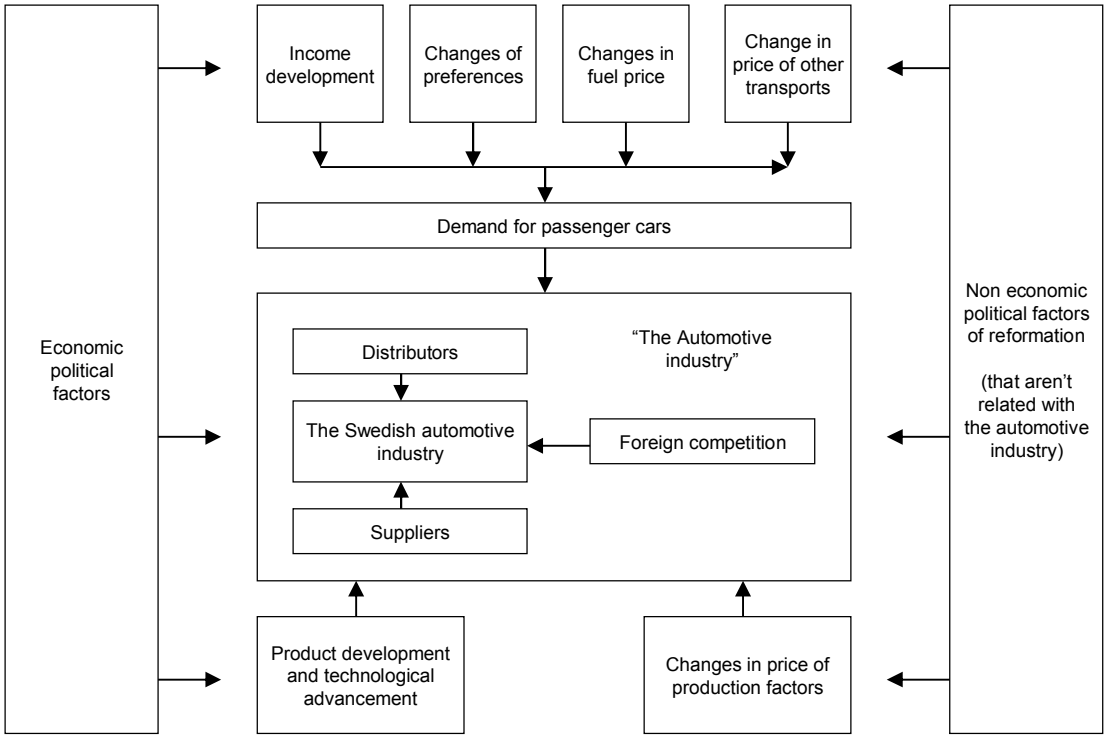

Figure 6. *Different factors that determines the pressure for transformation of the Swedish Automotive Industry and transformation possibilities. (Elsässer, 1995)*

The author states that strategic decisions are made because of changes of the business environment, caused by factors out of the automotive manufacturers control. The figure shows on the demand side that changes in demand depend on changes of customer preferences, income development or changes in price of substitute and complement products. Affecting factors also come from the supply side, like new technology and change in price of factors in being able to produce products. Factors of both these sides are largely formed from economic political factors.

One of the most important factors is the power of competitors, which itself is affected from the formation of economic political factors. Other important factors are the relationships to suppliers and distributors. Healthy relationships not only stretch in a vertical path, like in the value chain, but also horizontally between competing companies. Product development and production technological know-how is spread through competitors or suppliers.

Domestic factors are influenced by economic political factors in Sweden such as the legislation, tax system and some actions taken by certain organizations. Elsässer lays a lot of focus on these types of changes in the automotive industry's business environment.

How well a company manages doing business is determined by its evolvement power. It is a concept of a dynamic competitive power where capacity building, i.e. internal build-up of knowledge, and flexibility is most important. R & D is vital for a company to be able to gain competitive power through capacity building. It can also be built up through "learning by doing". Vital competence is that of product technical and production technical knowledge. Knowledge in administration, financing, purchasing, marketing and organization is not of the same importance for a company's evolvement power.

The concept of a company's flexibility is its possibility to adapt to the impulses of changes in the industry and depends upon "inner" and "outer" factors such as; how quickly the company can identify changes of its business environment, is the business management and the employees ready to undertake a transformation despite problems that come with the reconversion and to what extent does competition push for such a renewal.

Elsässer names the two outermost important factors that have contributed to the automotive manufacturers' evolvement power during the post-war era until 1994. One is the capacity of the business management and their ability to act for the company's best. The other is the prerequisite for industrial activity in Sweden during this time and especially the economy politics.

4.2.3 Framework summary

Beneath, in table 5, value drivers from mixed industries that were found in chapter 4.2.1 are summarized. In table 6 corresponding value drivers, from the Swedish automotive industry in chapter 4.2.2, are summarized.

Value drivers

Value driver / Industry	Internal	External	Miscellaneous
Restaurant	Revenue per customer Seat turnover Return on investment Return on sales		
Airline	Quality Talent of workforce Quality of labour-management relations Diversity		
Biotech, IT, Energy and Environment	Uniqueness of innovation Growth prospects	Reputation of research team and firm Risk	Economic factors Profitability
General technological industry	Growth	Risk	Profitability
Miscellaneous	Innovation Quality Customer care Management skill Share price Custom relations Management capabilities Employee relations Profit margin Growth rate Working capital investment Cost of capital Fixed capital investment Human capital Patent	Market capitalization Technology Safety Security Government regulations GDP Labour supply of nations Consumer spending Environmental issues Community issues Alliances	Brand value Brand equity

Table 5. *Value drivers from former studies of mixed industries.*

Strategic decisions	Relationships to suppliers and distributors
Product development	Relationships between competing companies
Marketing	Production technical know-how
Manufacturing	Economic political factors
Financing	Legislation
Organization	Tax system
Demand	Actions taken by certain organizations
Customer preferences	Capacity building
Income development	Build-up of knowledge
Changes in fuel price	Product technical competence
Substitute and complementary products	Production technical competence
Supply of new technology	Flexibility
Supply of components	R & D
Changes in price of production factors	Capacity of the business management
Power of competitors	

Table 6. *Value drivers from former study of the Automotive Industry.*

5. Empirical findings: Trends, developments and drivers

This chapter shows the empirical findings relevant to identify value drivers of the Automotive Industry and its segments. They are also divided in different market levels to make it easier to later analyze correlations between them. Every sub chapter ends with a table that gathers the value drivers that are found.

5.1 Automotive Industry

5.1.1 Global market level

The three largest automotive markets, US, Europe, and Japan will be under pressure because of the decline in demand for new vehicles during 2007. The demand in the emerging markets is still rigid but the profitability has become down to world average due to overcapacity, market fragmentation and fierce competition. The industry trend is negative as a result of high competitive pressure, largely unfavourable exchange rates for the export OEMs, and longer-term threat involving new emission standards. (Bissinger & Schultz, 2007)

To the automotive manufacturers great fortune, the liquidity has stayed rigid despite certain financial market turbulence. This is obviously important in an industry were huge working capital swings and high capital expenditures are inevitable. (Bissinger & Schultz, 2007)

The emerging markets of China and India have had an impressive growth of 60% to 70% in recent years. But the china market has faced weakening factors that have reduced profitability: Overcapacity, fragmentation, high material costs, higher than average production costs and lower availability of components. This trend is expected to last. The Indian market has only three dominating players were the market is experiencing high profitability of 12% EBITDA margin. (Bissinger & Schultz, 2007)

5.1.2 European market level

The automotive industry is one of the largest contributors to employment in Europe with 2.3 million people directly employed and another 10 million in associated industries. The sector is

also the largest R&D investor in Europe. The manufacturers and suppliers represent a combined turnover of € 700 billions. (ACEA, 2007b)

During the years 1999 to 2002 there was a slowdown in economic growth across Europe. This led to reduced consumer and business confidence. Industrial production decreased, including the production of durable consumer goods. Levels of private consumption fluctuated. This affected the automotive industry but has since then quickly revitalized showing a modest growth of registered new passenger cars in Europe, see figure 7. (ACEA, 2007a)

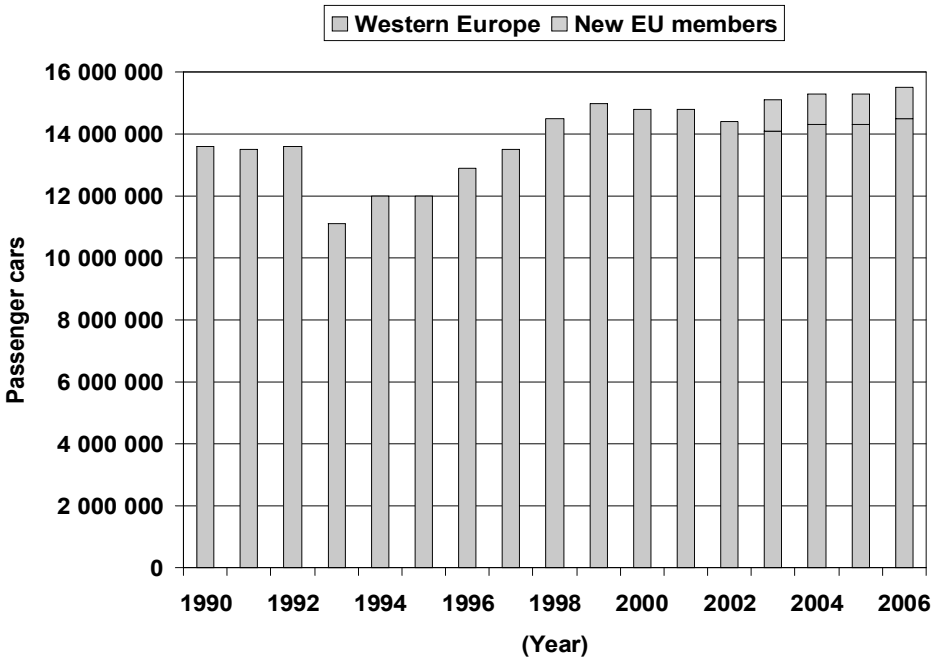

Figure 7. *New passenger registrations in Europe 1990-2006. (ACEA, 2007a).*

The European market is highly competitive with a large group of automotive manufacturers offering products. Thirteen of these manufacturers are major players with a large influence on the European market[19]. This is a greater number than in the other main markets such as the U.S. and Asian markets. The automotive industry is a vital part of the European economy, making a positive contribution to the trade balance. The value of imported motor vehicles to EU was about 29.5 billion € while exports represented 71.1 billions € during 2005, see table 7. The largest trade surplus is with the United States (US) and the largest deficit with Japan. (ACEA, 2007a)

[19] BMW, DAF, Daimler AG, FIAT, Ford of Europe, General Motors Europe, MAN Nutzfahrzeuge, Porsche, PSA Peugeot Citroën, Renault, Scania, Volkswagen and Volvo. ACEA full industry report.

	Imports	Exports	Trade balance
2004	28779	65301	36552
2005	29550	71139	41589

Table 7. *The automobile trade in EU. (ACEA, 2007a).*

Employment situation

Direct employment in the automotive sector in the entire EU reached 2.3 million workers in 2006. This is an increase of 0.9 % from 2005, due to large investment efforts of automobile manufacturers in the new EU member states. Employment in the EU15[20] has been slightly declining over the last five years due to the restructuring efforts related to the investments in the new EU member states. Indirect employment linked to the automobile sector covered an estimated additional 10 million workers in the EU. This number includes activities, such as sales, maintenance and repair of motor vehicles, road transport, manufacturer of tyres the construction of highways and roads, recycling etcetera (ACEA, 2007b). Figure 8 shows the allocation of the workforce in the EU 15. Germany is by far the largest employer in the automobile industry.

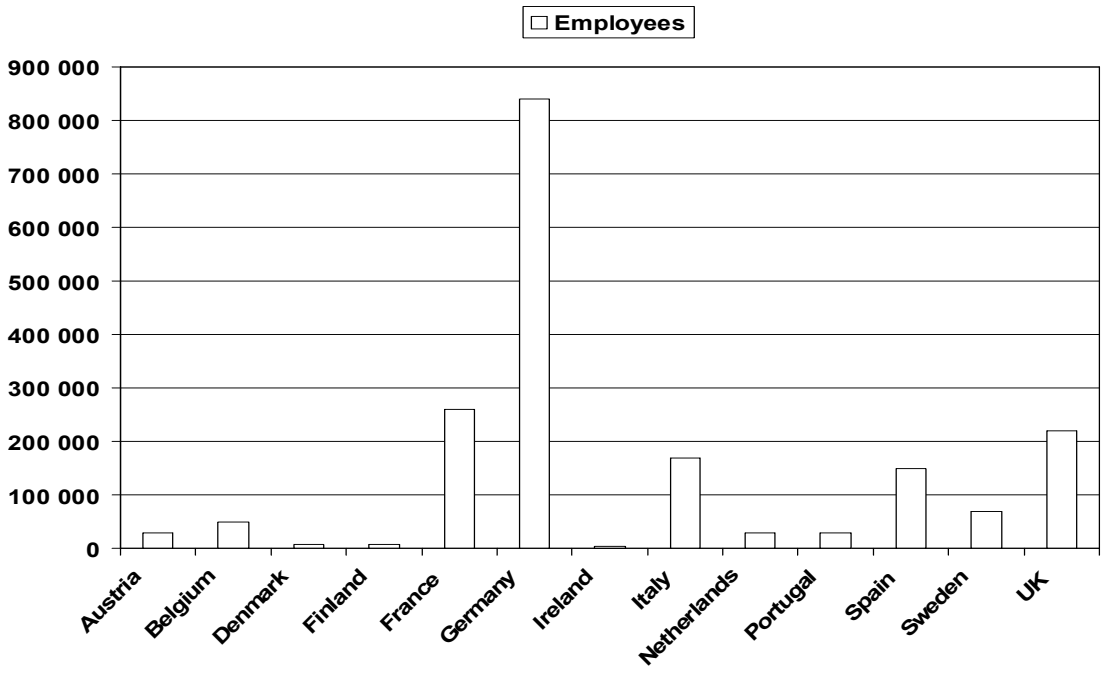

Figure 8. *Employment in manufacturing of motor vehicles by Member State (EU 15). (European Foundation for the Improvement of Living and Working Conditions, 2004)*

[20] The members of EU before the expansion in 2004

The amount of people employed in the automotive manufacturing industry is presented compared to the total manufacturing industry as a whole in figure 9. Sweden is represented as the largest quota in Europe with 10 %. This demonstrates the importance of the automotive industry within Sweden and thereby for its' national economy. (European Foundation for the Improvement of Living and Working Conditions, 2004)

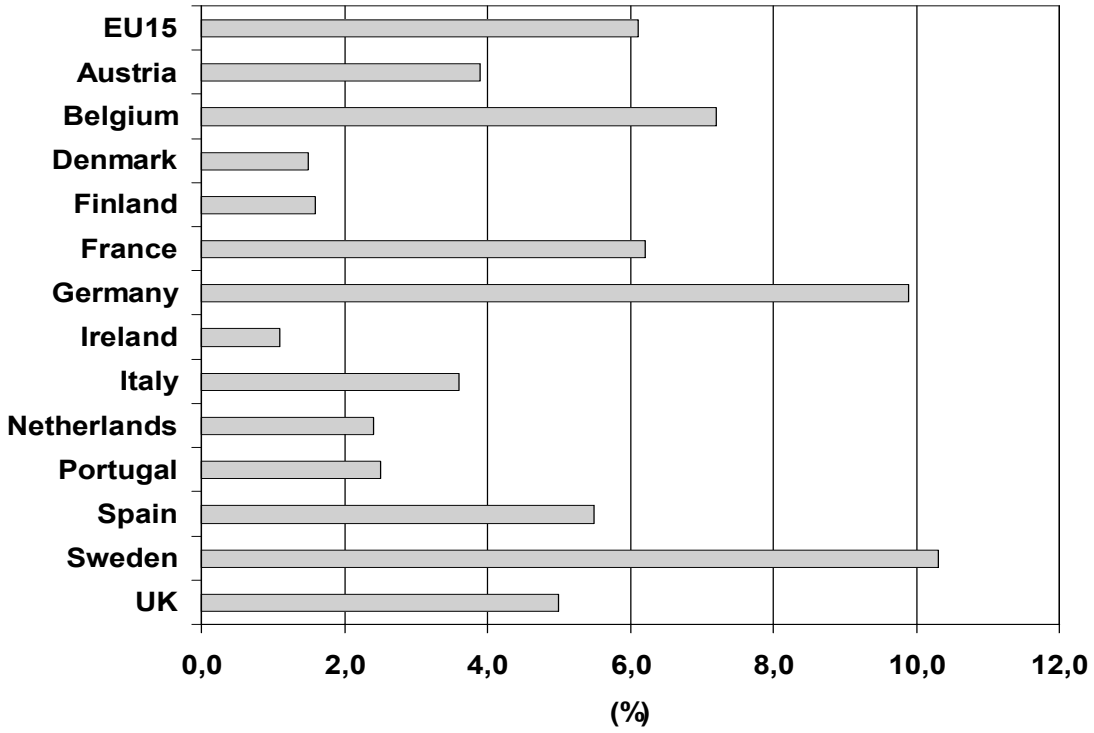

Figure 9. *Industry employees in the vehicle manufacturing business as a percentage of total manufacturing industry. (European Foundation for the Improvement of Living and Working Conditions, 2004)*

5.1.3 Swedish market level

The Swedish OEMs

The automotive industry is one of Sweden's largest sectors. It is highly cyclical and largely driven by economic development. The sector holds only four OEMs with manufacturing in Sweden but even though there are so few of them, they enable business for a great amount of sub-suppliers and other companies within the industry. The automotive industry is a large contributor to the Swedish export, representing 15 percent of total export. The industry does

also account for around 20 percent of total investments in R & D. The sector represents 2.3 percent of Sweden's GDP. (McKinsey Global Institute, 2006)

The OEMs with manufacturing in the Swedish automotive industry are Saab Automobile, Volvo Cars (Volvo PV in Sweden), AB Volvo (with their Volvo Trucks, Volvo Buses and Volvo Construction Equipment) and Scania CV who altogether produce around 560,000 passenger cars (approximately 1 percent of global production), and around 200,000 heavy vehicles (about 8 percent of global production). The four OEMs themselves stand for the employment of almost 110,000 persons, with 45,300 of them in Sweden. (McKinsey Global Institute, 2006)

The passenger car segment OEMs, Volvo Cars and Saab Automobile, are minor players seen globally and have been part in a consolidation process. Ford Motor Company acquired Volvo Cars in 1999. General Motors Corporation acquired Saab Automobile in the year 2000. AB Volvo, active in the sector of heavy vehicles, decided to expand in new geographical markets and leave the passenger car segment. This was carried out in 1999 when selling the passenger car division, Volvo Cars, and the acquirement of Renault and Mack in 2001. (McKinsey Global Institute, 2006)

Corporate governance is an important factor for success in the automotive industry. Due to the small amount of OEMs in the Swedish automotive industry, one bad decision could have a negative effect on the entire sector of automotives, even with favourable prerequisites. This can be expressed with the example of the actions taken by Volvo Cars who, during the 1990s, invested largely in product development, which enabled them to offer more attractive products for the market. They have therefore managed to launch many successful models. Saab Automobile on the other hand didn't take the same actions and have therefore not been able to see the same increase in sales for their passenger cars and are now struggling with their performance. (McKinsey Global Institute, 2006)

To identify challenges for the future of the Swedish automotive industry the perspective has to be lain on global characteristics. Pressures from around the world sees for a continued price-cost enhancement, increased outsourcing to low-cost countries (LCC) and operational improvements. (McKinsey Global Institute, 2006)

5.1.4 Value Driver summary: Automotive industry

Value drivers found in the automotive industry are shown in table 8.

Availability of components	Exchange rates	Operational improvements
Competitive	Fierce competition	Outsourcing to low-cost countries
Consolidation	Financial market turbulence	Overcapacity
Corporate governance	Fragmentation	Price-cost enhancement
Demand	GDP	Production cost
Economic development	High competitive pressure	R & D
Economic growth	High material costs	Raw material costs
Emerging markets	Investments	Swedish economy
Emission standards	Market fragmentation	
European economy	Number of OEMs	

Table 8. *Drivers of the Automotive Industry*

5.2 The Consumer Passenger Car segment

5.2.1 Global market level

The passenger car segment has undergone an immense consolidation process. In 1964 there were 52 independent passenger car manufacturers worldwide. At the end of the year 2007 there were only 13 left. Consolidation of the passenger car segment is likely to continue but will probably do so more slowly because of less existing targets and less suitable due to the most interesting companies for acquisition have already been consolidated. (McKinsey Global Institute, 2006)

Operational improvements are necessary during healthy competition but a challenge lies here with that and with combination of new capacity being added from the East. This leads to an excessive overcapacity, which in theory could reach to 27 million vehicles manufactured in Western Europe by 2015. This is an overcapacity of 10 million vehicles. High overcapacity triggers a price-cost pressure that creates an urge for making more efficiency improvements, which contributes even more to overcapacity. This results in a negative spiral that will affect the entire sector. Focus must therefore be lain to constrain low utilization in the future due to overcapacity and continue with operational improvements for decreasing cost and increase flexibility in manufacturing. (McKinsey Global Institute, 2006)

The Swedish OEMs Volvo Cars and Saab Automobile are competing in the upper-middle-class passenger car segment, which has an intense rivalry. Future growth of passenger car sales will mostly come from the small-class cars due to the motorization of LCC (Low Cost Countries) and increasing environmental concerns. The challenge here is the intensified competition. The importance of R & D and being innovative enough to handle the challenge is therefore crucial. (McKinsey Global Institute, 2006)

Limiting the impact of overcapacity, manufacturers increase the flexibility of the manufacturing plants. There are three areas of flexibility and they are (McKinsey Global Institute, 2006):

- **Succession flexibility** is the ability of producing new models in the same line as previous models.

- **Volume flexibility** is about the ability of how quickly the scale of production can be adapted for changes.

- **Product mix flexibility** the ability to produce different cars in the same production line.

Improving the product mix flexibility can move manufacturing towards multi-brands, multi-model and multi-platform plants. This ensures a possibility for companies to hinder further development of overcapacity, by not building up new plants for new models of different brands and produce them at the same plant to gain better economies of scale. In doing so, costs will also be reduced. For development in this direction it is important to keep brand uniqueness in order to keep market shares. (McKinsey Global Institute, 2006)

The U.S. market

Industry sale within the US market has declined since the peak in 2000 and is now rather flat. The industry demand is softening and the competition remains tough. This puts pressure on the OEMs. The product-mix shifts to smaller and less profitable vehicles (due to smaller margins) where vehicles such as SUVs and Crossover utility vehicles (CUV) meet declining. So even the large SUV and CUV vehicle market in the U.S. are having trouble selling large

petrol consuming vehicles and experience a consumer preferences shift. This is why questions about consumer spending, gas prices are keeping sales under pressure in 2007. (Bissinger & Schultz, 2007)

The Japanese and Korean automakers, meanwhile, are receiving higher market share in the U.S. market through Toyota due to the focus on smaller, less fuel consuming, passenger cars. This may give Toyota a large advantage meeting new consumer demands. (Bissinger & Schultz, 2007)

The Japanese market

Top Japanese automakers like Honda and Toyota are continuing to show good results with strong growth in sales in the U.S. and European markets. However they have some challenges in higher material and energy costs. There will also be increased administrative and R&D expenses due to their global expansion and also to the need of a new model mix with smaller passenger cars matching the changing demand from approaching higher fuel prices. (Bissinger & Schultz, 2007)

The European market

The European automakers have during 2007 had an uphill struggle, which is likely to continue over the next year. Saturated demand for new passenger cars have resulted in an average profitability of 1-3 %, equivalent to 500 € per car for most volume manufacturer. Some automobile companies such as Peugeot and Renault set their goals to reach a profitability target of 5.5 to 6 % by the end of the decade. When a new legislation is set for limiting CO_2 emissions, costs for investments to adapt to it will put further pressure on profitability. This discussion will continue in the next chapter. (Bissinger & Schultz, 2007)

5.2.2 European market level

On the European market level, competition gets more and more intense through the increasing cost efficiency trend among the actors of the automotive industry. Fierce and intense competition pressures operations to be extremely efficient. The key has been, for a couple of years, large-scale production to achieve economies of scale. With more advanced and

sophisticated vehicles as well as rising investment costs, the optimum production volume for an economy of scale increases. The manufacturers have been forced to achieve economies of scale by greaten volumes and standardizing parts throughout their model ranges. The outcomes are investment in high capacity, an on-going trend towards mergers and acquisitions, and an increasing amount of cooperative ventures, e.g., sharing R&D costs. (European Foundation for the Improvement of Living and Working Conditions, 2004)

Due to increasing competition, there are those who predict that only six global manufacturers will survive: two in Europe, two in Japan and two in the US. This prediction is has already started to be a reality in Japan and the US, but Europe has a pair of independent passenger car and truck manufacturers that are still in business. (European Foundation for the Improvement of Living and Working Conditions, 2004)

Cooperation

Of course not every merger and acquisition is successful. The purchase of Rover by BMW in 1994 is a good example of this. This business ended in disposal of Rover 2000. The spilt of DaimlerChrysler AG is another example. There are, however, those who are successful, such as the purchase of Seat and Skoda by Volkswagen and the Renault-Nissan partnership. Other alternative strategies, such as alliances on particular models or engines, are also up-and-coming. Examples are the teamwork between Peugeot-Citroën and Toyota to build a new small car in Kolin in the Czech Republic; General Motors and Fiat share the same platform, engine and transmission operations. Peugeot-Citroën also collaborates with Fiat on passenger vans, and with BMW on engines. According to European Foundation for the Improvement of Living and Working Conditions it may be several cooperative ventures that will become a prevalent pattern for European car assemblers in the future. (European Foundation for the Improvement of Living and Working Conditions, 2004)

Overcapacity

Companies frequently overvalue their sales predictions. Fiat, Ford and Opel (a subsidiary of General Motors) have all seen turnovers fall over the last years. This has resulted in holdbacks including factory closures and almost 45,000 lay-offs or redundancies. (European Foundation for the Improvement of Living and Working Conditions, 2004)

The optimism regarding new markets has resulted in new investments in emerging markets. As an example, The Brazilian annual production were expected to reach 2.5 million vehicles and 4 million units sold but has not been fully realized. The real figure reached 1.5 million vehicles produced and 1.6 millions sold during 2002. Comparable investments are being made in other markets, such as China and in the new EU Member States. (European Foundation for the Improvement of Living and Working Conditions, 2004)

As vehicle prices have been calculated and based on forecasted capacities, were reduced capacities are equal to higher costs, they have become an issue for the industry economics. Vehicle producers, therefore, often try a balancing act where a proportion of the excess is discounted heavily through the dealerships. An additional way is through cut-price deals to the hire and leasing business. (European Foundation for the Improvement of Living and Working Conditions, 2004)

Legislations

Profitability levels are shrinking for the European automakers and lies now at levels of 1%-3% as stated in chapter 3.2.1. This is an effect from a decrease in demand for new cars and production overcapacities. The type of demand has also changed to be opting for environmentally friendly and cost-conscious small cars, which have lower prices and generate slimmer margins for the automakers. Large amounts spent on technological improvements due to a voluntary agreement in 1998. This was concluded by the EU and ACEA to collectively reduce average CO_2 emissions for new passenger cars sold in the EU to 140 g/km by 2008. A forthcoming EU restriction on CO_2 emissions will heavily burden the automakers profitability. The pressure to reduce these emissions and fuel consumption is driving vehicle weight reductions, which changes material choices and leads to increased usage of aluminium, magnesium plastics and composites. Changes in the use of materials will also facilitate cheaper modes of assembly, recycling and enhanced occupant and pedestrian safety to meet the New Car Assessment Programme (NCAP), which has become the accepted standard in Europe. (Bissinger & Castellano, 2007)

The average profitability is now less than 500 Euros per vehicle for most volume manufactures. Currently, European automakers spend about 20 billion Euros per year on R&D. With the forthcoming legislation, which was proposed in February 2007 to set a

mandatory limit for new cars of 120 g/km on average to be reached in 2012, and the Euro 5 and 6 standards, destined to improve air quality through the reduction of nitrogen oxide and particulate matter and be taken effect in 2009 and 2014, the cost to achieve these new standards is estimated to lie between 600 and 3,000 Euros per vehicle. With today's level of profitability this poses a real threat to the European automakers financial performance and creditworthiness. Their profitability is dependent on succeeding in optimizing production and cost structures. (Bissinger & Castellano, 2007)

High Tech trends

Another trend that has been popular for the vehicle manufacturers is the offering of more high tech and up-market configurations of their products. With more specifications and the inclusion of more on-board electronics and telecommunications systems, automakers can extract higher profit margins from their products. Volume producers, such as Ford and Opel, have marketed models that overlap the price bands of premium producers. When this has happened, consumers have often chosen the prestige makes in favour for the others. (European Foundation for the Improvement of Living and Working Conditions, 2004)

The focus on new technology will be inevitable and automakers must continue developing new systems such as electric, hybrid ('hybrid vehicle' means a vehicle with at least two different energy converters and two different energy storage systems (on vehicle) for the purpose of vehicle propulsion) and fuel cell drive trains, especially for city passenger cars to meet customer demands and legislations. However, the European Foundation for the Improvement of Living and Working Conditions states that the internal combustion engine will continue to dominate in the nearest future. A major interest is in the more CO_2 neutral alternative of synthetic fuels that are made from biomass. (European Foundation for the Improvement of Living and Working Conditions, 2004)

New market in new EU states

The growth of new passenger car registrations in the new EU member countries boomed during 2007 with a 15.5 % growth over the first eight months (Bissinger & Schultz, 2007). This has become a new market for manufacturers of mid priced to premium priced cars. This growth is expected to last for a couple of years and expectations are positive in the medium

term. This is because of growing GDPs in these countries, enabling more customers to afford more expensive passenger cars. (Bissinger & Schultz, 2007)

Passenger car density

ANFAC (Spanish Automobile Association) stated that the EU15 vehicle fleet reached 224.3 million units in 2005. The passenger car segment made up for 87 % of the vehicle fleet. It also had an increase of 1.8 % from the year before, see figure 10. The ratio in Western Europe between passenger cars and population was 1:2 and in Eastern Europe the ratio was much lower (186 cars per 1000 inhabitants). The demand for passenger cars has increased sturdily in the Eastern European market compared to the Western European market where demand mainly has originated from replacement customers. (ANFAC, 2007 in ACEA, 2007b)

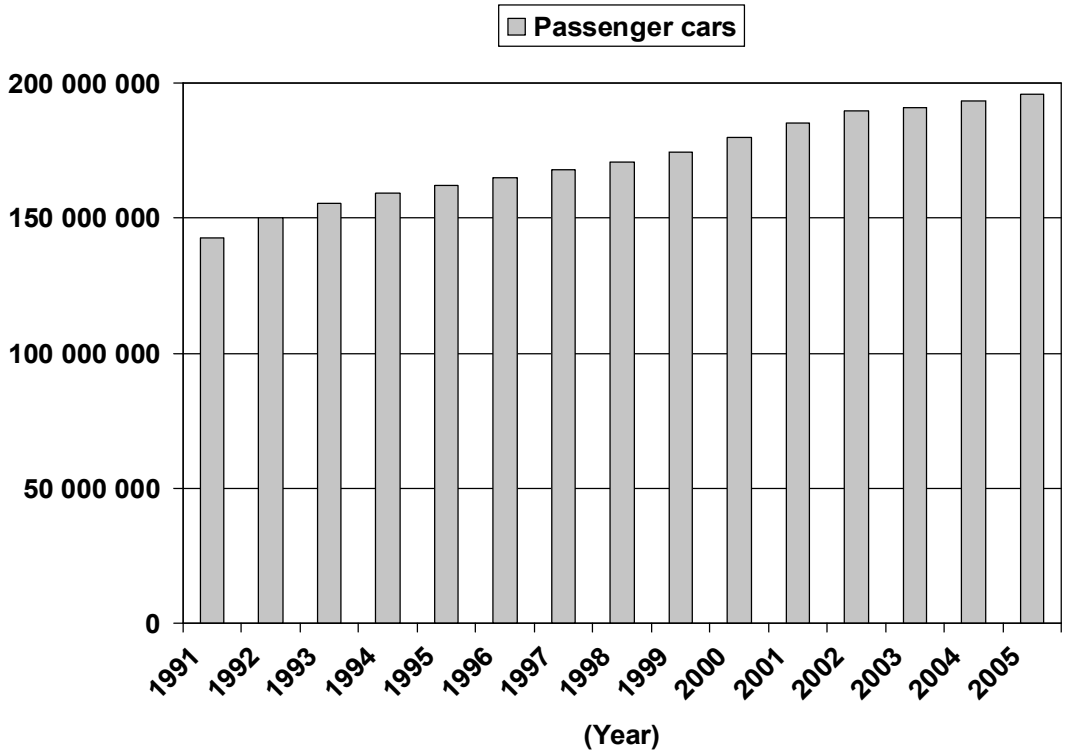

Figure 10. *The passenger car density in EU15 between 1991 and 2005. (ACEA, 2007b)*

5.2.3 Swedish market level

There are two OEMs in the passenger car segment with manufacturing of end products in Sweden. These are Volvo Cars and Saab Automobile. Until the beginning of the 90's, the

passenger car segment in Sweden suffered from difficulties such as low labour productivity compared with other countries. The reason for this was that the segment lacked healthy competition and had a complicated structure of labour unions. This had the effect of operational performance not progressing fast enough. But soon enough when the Swedish currency increased in value, foreign competitors entered the Swedish market and competition started to intensify. The intrusion of foreign competitors put pressure on the Swedish companies to be more cost efficient in order to survive and to improve sales. (Elsässer, 1995)

Sales figures increase for the passenger car segment in Sweden

The year 2007 was very successful in new passenger car sales in Sweden. 306 387 is the preliminary sales number for the year which qualifies as the fifth best year ever. This is an increase of 8.4 % from 2006 when 282 766 new passenger cars were registered. During December the increase was 27.1 % compared with the year before. Even though speculations about a drawback in economic growth is to come, sales for 2008 is predicted to be 285 000 new passenger cars. The share of diesel passenger cars sold in 2007 was 34.6 %, which is a record. In 2006 the share was 19.7 % and the year before that only 9.7 %. The greatest number ever of diesel passenger cars sold in Sweden was during December 2007 with the share of 54.7 %. This is the average European level. The reason for the increase of new diesel driven passenger cars sold and especially for December was the introduction of a discount of 6 000 SEK for diesels with particle filters in January 1, 2008. (BilSweden, 2007)

Other incentives, such as the state of Sweden's subsidy of 10 000 SEK for environmentally friendly passenger cars and free parking in the cities, have boosted sales of them. 18 % of the new passenger cars sold during 2007 were environmentally friendly which is an increase of 49 %. The year before, the figure was 13.5 % and before that only 5.2 %. 65 % of the environmentally friendly passenger cars sold are of the type driven on the ethanol fuel E85. But the group growing fastest is the low petrol and diesel consuming passenger cars that recently qualified as environmentally friendly. This group increased with 146 % during 2007. Almost every fifth passenger car is now environmentally friendly and during December the petrol passenger cars alone stood for 1/3 of total passenger car sales. This trend towards more environmentally friendly cars being sold is the interplay between economical subsidies and the vast growing supply of environmentally friendly passenger car models. (BilSweden, 2007)

It is expected that outsourcing will increase in the future, diminishing the value-adding operations performed by the OEMs, but enabling them to focus on their core competencies. Some areas of outsourcing need to be geographically close for production to run smoothly, but with improved sequence stability in production, distances for outsourcing won't be as much of a hinder as it can be today. This enables increased outsourcing to LCC. (McKinsey Global Institute, 2006)

Operational improvements will always remain as key challenges for every sector, but this chase for cost reduction, which is required for the survival in the industry, may have a negative affect on the Swedish automotive industry. When higher efficiency is strived for in the entire value chain, outsourcing to LCC is likely to steal value adding processes being performed in the Swedish automotive industry. (McKinsey Global Institute, 2006)

Parent companies can affect performances of affiliated companies negatively. If parent companies have difficulties with profitability, such as the case with the owners of Volvo Cars and Scania Automobile, sufficient investments in development may not be allowed to be made and thus affecting the end product. The more integrated Swedish OEMs in the passenger car segment become with their owners, the more exposed they become to changes within the organization that can affect thousands of employees in the Swedish automotive industry. (McKinsey Global Institute, 2006)

Passenger car density

Sweden is number seven in passenger car density with 480 passenger cars per 1000 inhabitants. Germany is the most automobile dense country in Europe (563 cars per 1000 inhabitants in the year 2006), see figure 11. (BilSweden, 2002)

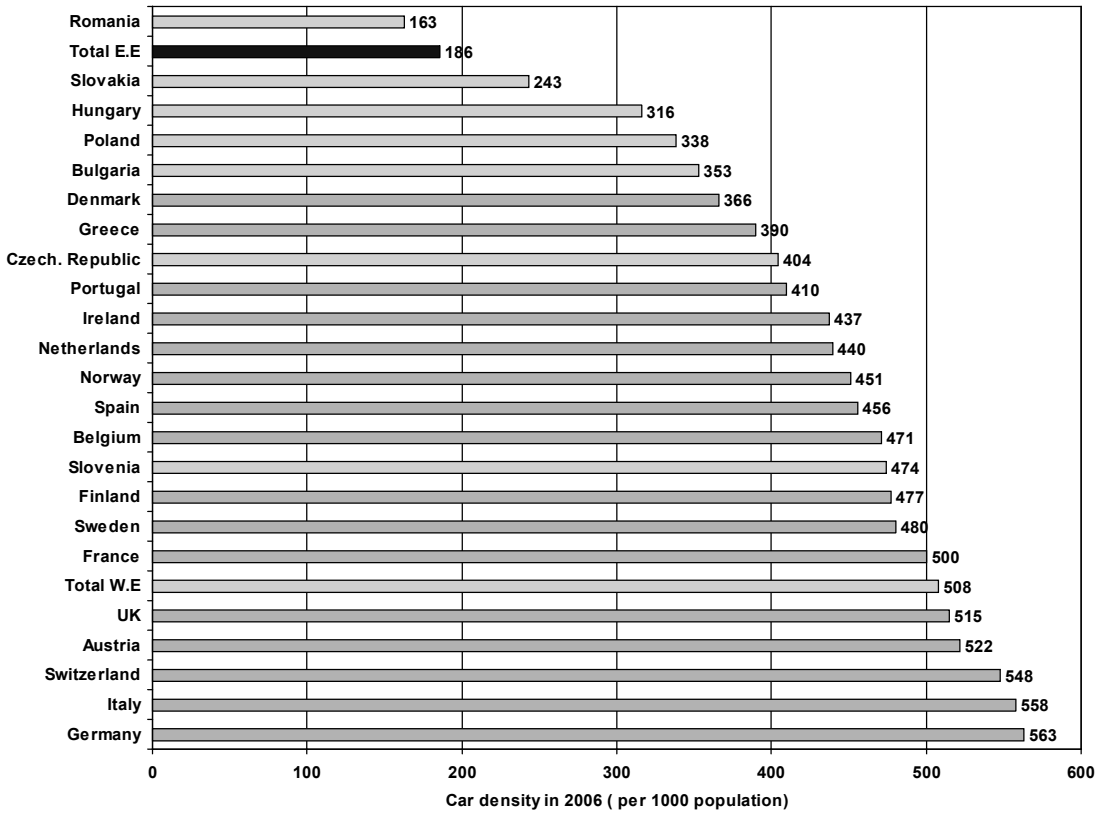

Figure 11. *Showing passenger cars per 1000 inhabitants. (BilSweden, 2002)*

Statistics show that the passenger car density almost never decreases, except perhaps during an extreme recession. This happened once after the post war era, namely during the recession in the beginning of the 90's. The buying power was also decreasing in Sweden during this time. (BilSweden, 2002)

High regularity in the Swedish business activity

The business activity in Sweden can be considered as one with high regularity. This can be correlated to high adaptability to the conjuncture. A peak after the post war era was a direct correlation to the legislation of re-doing the mot and also to the replacement need created by the introduction of dismantlement during the first part of the 1960s. Between 1965 and 1967 the registration of new passenger cars decreased as a result of the change to right-hand traffic. (BilSweden, 2002)

There are however events that doesn't correlate so well with the conjuncture and its cycle swings. As an example there was the oil crisis in 1973/74 when a circumstantial ration of

petrol was introduced in Sweden. It could be expected that sales would go down, but instead it increased. A boom in passenger car sales followed that period. A second event was the increasing demand of larger passenger cars in spite of vast rising gasoline prices and a recession in 1976, which is shown in table 9. Thus the history shows a demand of the Swedish customers that is not totally correlated to the gasoline price. However, during the boom of the stock exchange in the late 90s and fall in 2001, passenger car sales were greatly affected. Aside from these deviations the Swedish business activity can be seen as a one with high regularity. (BilSweden, 2002)

Year / Kerb weight (kg)	1975	1980	1985	1990	1995	2001
-999	33.1	28.5	26.7	21.9	17.2	9.7
1000-1299	52.3	47.7	43.8	42.3	40.3	35.3
1300-	14.5	23.7	29.7	35.9	42.3	55

Table 9. *Showing an increase in demand for heavier passenger cars during 1975-2001 in spite of higher prices in Sweden (BilSweden, 2002).*

An interesting factor is that the proportion of middle-aged and older people possessing a driver's license is increasing. Table 10 shows statistics of the possession of driver's licenses over different age spans. The amount of passenger car drivers above the age of 80 has increased from 10% in 1977 to almost 50% in 2001, which is a trend expected to continue. This sees for a continued increase in ownership of passenger cars. A notion is that the average age for obtaining a driver's license is also increasing, but this group will most likely own a car to the same extent as 40-50 year old people of today so it doesn't affect the passenger car possession as much as people having passenger cars longer in their lives. (BilSweden, 2002)

Year / Age (years)	1977	1987	2001
18	44.4	51.7	25.5
19	66.8	72.8	49.4
20-24	74.7	81.6	65.7
25-47	81.8	88.4	85.7
48-66	57.6	73.3	89.5
67-79	28.7	47.1	71.3
Over 80	10.3	20.4	48.7
Total	**62.7**	**73.5**	**79.6**

Table 10. *The possession of driver's licenses (%) in Sweden. (BilSweden, 2002).*

Other factors will also affect the motoring development in the future such as cost development, road quality and of course technological development. But within a time frame of a decade the factors that have been mentioned in this study are the most important contributors that will drive the passenger car segment forward. Even though gasoline prices have increased, development of motoring industry has increased and the size of the passenger cars has grown (but in the near future it is forecasted that a decrease in size will occur due to the heavy focus on environmental friendly passenger cars). The quantity of passenger cars has also increased as stated earlier, see figure 12. (BilSweden, 2002)

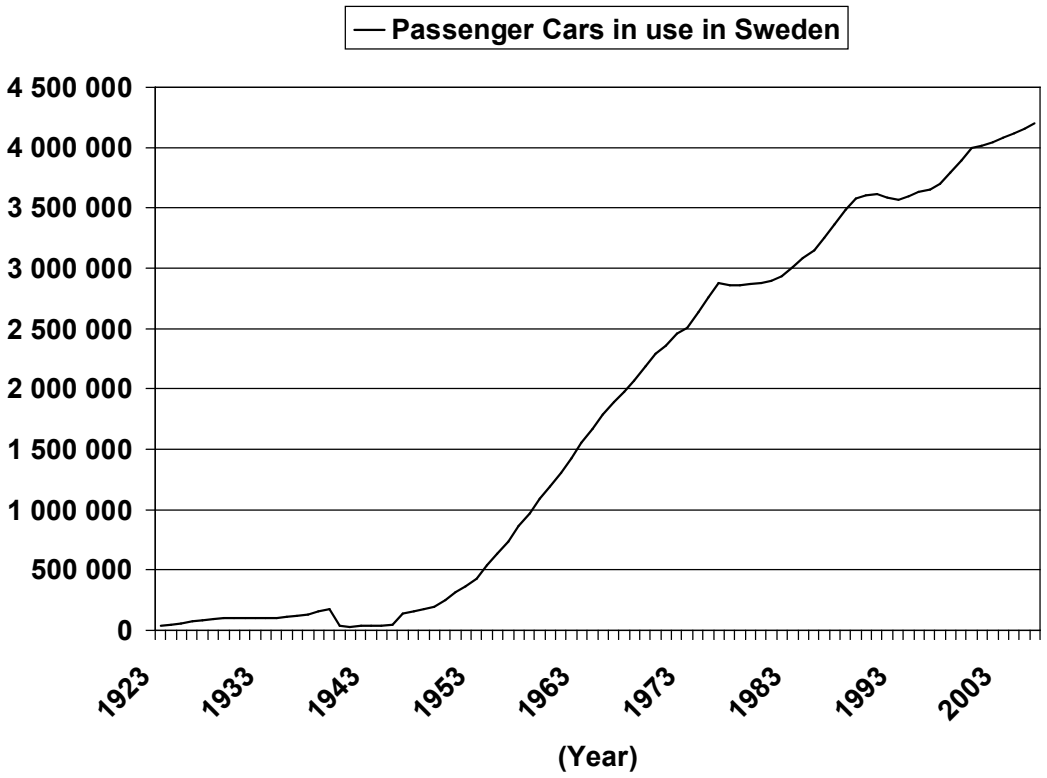

Figure 12. *The growth of passenger cars within Sweden. (Holmqvist, 2008)*

New passenger car registrations in Sweden are shown in figure 13. Forecasts predict that the next trough will not be as bad as the recession in the early 90: s and it is also expected that the passenger car market will be less volatile. (BilSweden, 2002)

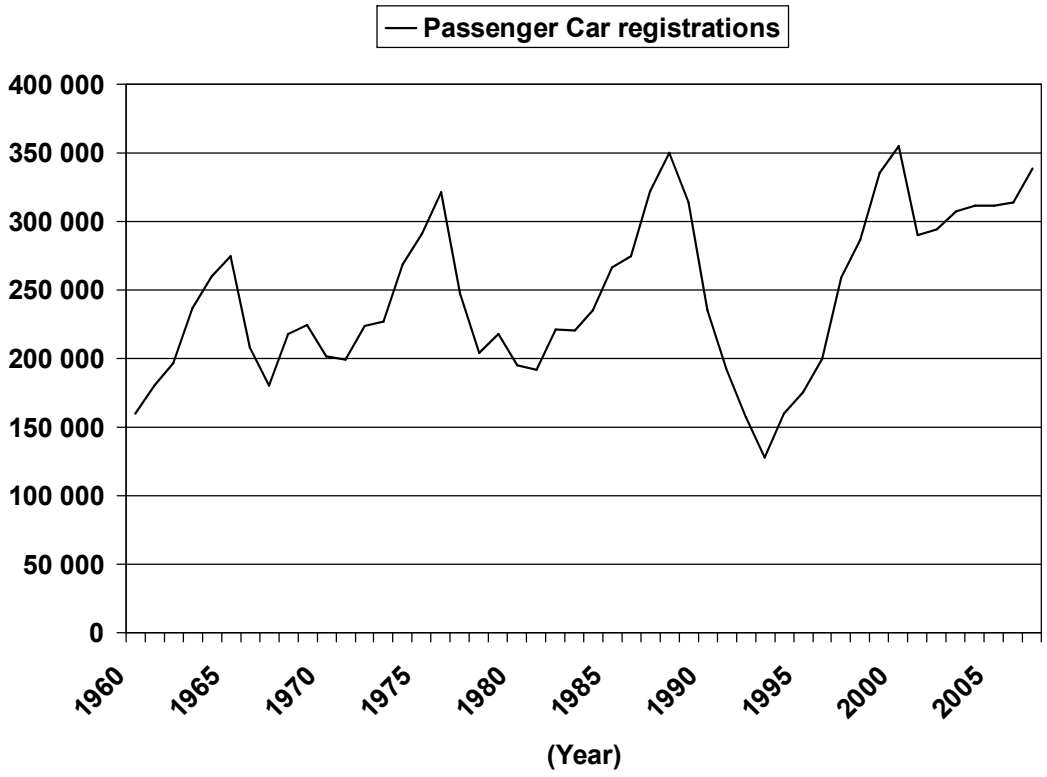

Figure 13. *Registrations of new passenger cars. (SCB, 2008)*

5.2.4 Company level

The segment of passenger cars accounts for about 35 percent of the employment in the Swedish automotive sector. Volvo Cars has since the beginning of the 90's increased their sales with 33 percent and remarkably, only increased employment with 5.2 percent. Saab Automobile has also managed to increase their sales but not managed to achieve the same levels of revenue per vehicle as for Volvo Cars. This is due to Volvo Cars making early investments in product development, which has proved to be successful. Consolidations of platforms and modular components have boosted efficiency and operational performance and also reduced costs. Benefits have been gained with scale advantages after changes in ownership. It is now possible to more easily penetrate other markets that haven't yet reached their full potential. (McKinsey Global Institute, 2006)

5.2.5 Value Driver summary: Passenger cars

Acquisition	Motoring development
Buying power	Motorization of LCC
Changing demand	NCAP
Competition	New legislation
Consolidation	New technology
Consolidation of platforms and modular components	Oil crisis
Consumer preferences	Operational improvements
Consumer spending	Operational performance
Cooperation	Optimizing production
Cooperative ventures	Outsourcing
Cost development	Outsourcing to LCC
Customer demand	Overcapacity
Demand	Ownership
Dismantlement	Parent companies
Economic growth	Possession of driver's licenses
Economies of scale	Price cost pressure
Efficiency improvements	Product development
Emissions	Product mix
Energy cost	Product mix flexibility
Environmental concerns	Profitability
Environmentally friendly passenger car	R & D
Financial performance	R & D costs
Flexibility in manufacturing	R & D expenses
Free parking	Recession
Fuel consuming vehicles	Replacement customer
Fuel price	Replacement need
GDP	Restriction
Growing supply	Road quality
Healthy competition	Sequence stability
Increasing cost efficiency	Standardizing parts across model ranges
Innovative	Stock exchange
Intense rivalry	Subsidy
Investment costs	Succession flexibility
Investments	Swedish currency
Labour unions	Technological development
Large scale production	Technological improvements
Legislation	Trough
Material choices	U.S. and European markets
Material cost	Volume flexibility
Maximum efficiency	Voluntary agreement
Merger	Weight reduction
Mergers and acquisitions	

Table 11. *Drivers of the Consumer Passenger Car segment.*

The value drivers found in the passenger cars segment are summarized in table 11.

5.3 The Commercial Vehicles segment

5.3.1 Global market level

Vehicles in the heavy vehicle segment are produced in smaller volumes than in the passenger car segment. However, each vehicle represents a lot higher value. In addition, large trucks are built on a fixed chassis rather than on a platform. The production can therefore be more adjusted to a modular design than for passenger cars. The market for heavy trucks and buses differs naturally from the passenger cars market. Around 85% of the passenger cars market is in Asia-Pacific, Western Europe and Japan, but stands for only around 50% of the market for heavy trucks and buses. Heavy truck and bus sales are not dependent on private consumption but are an essential part of transportation needs around the world. For example, Brazil, which has not been able to match forecasted expectations in passenger cars sales, is the world's largest bus market. The upcoming new markets such as central and Eastern Europe, Russia, China and India thus represent real opportunities for truck and bus makers. (European Foundation for the Improvement of Living and Working Conditions, 2004)

The cyclicality of the commercial vehicles segment

The heavy vehicles segment is highly cyclical and has larger fluctuations than in the segment of cars. This is due to customers purchasing behaviours, which depend on how strong their own market is. The result of this cyclical market is that pressure is put on companies within the heavy vehicle segment to adopt strategies that will make them less vulnerable during these fluctuations. Ways of doing this can be by balancing different markets or by increasing product flexibility that can adjust to market demand. (McKinsey Global Institute, 2006)

Changing regulations have the effect of enhancing the cyclicality of the market and simultaneously drive up costs for meeting the new standards (McKinsey Global Institute, 2006). Customers try to buy new trucks right before new regulations are enforced to avoid higher costs. The emission standards will affect the whole value chain of the commercial vehicle industry, but the focused truck suppliers will feel downturn the most. Necessary development to meet future emission standards is hard to predict and due to higher fixed costs for development of future power trains, companies might need to partner with other OEMs, or become victims to further industry consolidation. But the impact of new regulations is

temporary and will be dampened due to truck replacement needs. Data from statistics state that heavy trucks are in operation for about five to seven years. This means that trucks sold in 2001 and 2002 are expected to be replaced in 2007. The number of trucks sold in Europe in this period corresponds to a demand of 220 000 replacement trucks in 2007. The corresponding replacement need in 2008 is 210 000 trucks and is forecasted to increase to about 220 000 vehicles in 2009. (Bissinger, Staeblein & Zsiga, 2007)

After a peak right before a regulatory change, participants in the commercial vehicle segment usually end up in price wars during the expected downturn. New emission requirements increase cost for product development and without enabling price increases. This creates a price-cost challenge that eventually needs to be addressed by companies. Two ways of handling this challenge are by improving operational performance and/or an increase in merger and partnering. Increased outsourcing to LCC is likely to occur with their increasing competence. We will also see higher speed and flexibility in the development and manufacturing of products. A continuance of consolidation is also expected with mergers and partnering which will enable development of standardized global platforms, systems and modules with lower cost and risk for the companies. (McKinsey Global Institute, 2006)

The U.S. emission standard, EPA07 taken effect 2007-01-01, resulted in a downturn sale in the commercial vehicle segment. Not all major OEMs will be greatly affected. Industry orders in the U.S. market for the second quarter of 2007 were down 50 % due to the new standards. However, the industry downturn is forecasted to be relatively short and will pick up during 2008 because of the need of new trucks with new engines meeting emission standards taking effect 2010. The forthcoming downturn in the large commercial truck market will have a diversified impact on the following truck makers (Ballantine et al. 2007):

- Daimler AG, former DaimlerChrylser AG, is the largest commercial manufacturer in the world. Before the selling of its U.S. subsidiary Chrysler, which is a car manufacturer and goes under the name Chrysler LCC, they had a 38% market share of the commercial market within the U.S. Daimler Trucks had a 17.2 % global market share in 2006. The passenger car business of former DaimlerChrysler had a far more critical rating factor than the commercial vehicle operations. So Daimler may get better off without the less profitable Chrysler part.

- PACCAR Inc. is a focused OEM among the heavy truck industry with a narrow medium truck and non-truck business. Due to its flexible structure, PACCAR is predicted to stay profitable even during declines. It has been able to do so because of high cash levels and modest financial leverage.

- AB Volvo is a diversified OEM of trucks, construction vehicles, buses and other various types of industrial equipment. It is a flexible company in many ways and will not be greatly affected by a downturn through emission standards because of their diversity and range of products. Their share of commercial vehicles sold in the U.S. account for 20%. To adapt for lower demand in the U.S. they are cutting down on labour force by 30% and increasing labour force within Europe.

- Scania AB is mainly a European manufacturer, meaning not active in the U.S. and will therefore not be heavily affected by lowering demand in the U.S.

As already stated in section 3.3, the European and Asian truck emission regulations are not to be set at the same time as the U.S. regulations. This will provide a less volatile result statement from global suppliers. Examples of companies in this group are (Ballantine et al. 2007):

- Cummins Inc., which is a major OEM of diesel engines, electric power-generation systems and engine-filtration and exhaust systems.

- Caterpillar Inc. The world's largest OEM of construction equipment, and the world's leading diesel engine manufacturer. This company is benefiting from the strengths of heavy industrial industries and large infrastructure needs in emerging countries.

- Knorr-Bremse AG is the world's largest supplier of truck brake systems, with 44 % global share of the OEM market. The company has 30 % of its revenues within the U.S. market.

The Economy's importance as a value driver

The emission standards will be an important driver of the cyclical behaviour that characterizes the commercial vehicle market. Nevertheless if the *U.S. economy*, though slowing down a bit, will continue with a moderate growth, it should dampen the depth and length of a crash in truck sales. With the U.S. emission standard, EPA10, set to kick in 2010 and a possible positive economy outlook, buyers of heavy trucks will still have confidence to purchase new vehicles in 2008 and 2009 to be prepared for the next round of tougher standards, see chapter 2.3 for more information about emission standards. Hence, if economic factors such as industrial capacity utilization, unemployment, corporate profits, consumer confidence or interest rates turn in the wrong direction heavy truck OEMs will face a tough challenge. (Ballantine et al. 2007)

5.3.2 European market level

Europe still has six truck manufacturers left. These companies are active with different brands on the European market and some also have manufacturing of different brands in other parts of the world, which makes them more diversified. The contestants over the years can be seen in figure 14, which also shows the affect of the consolidation process. DaimlerChrysler doesn't exist anymore. The company now active in this segment is called Daimler AG. (Scania Annual Report, 2006)

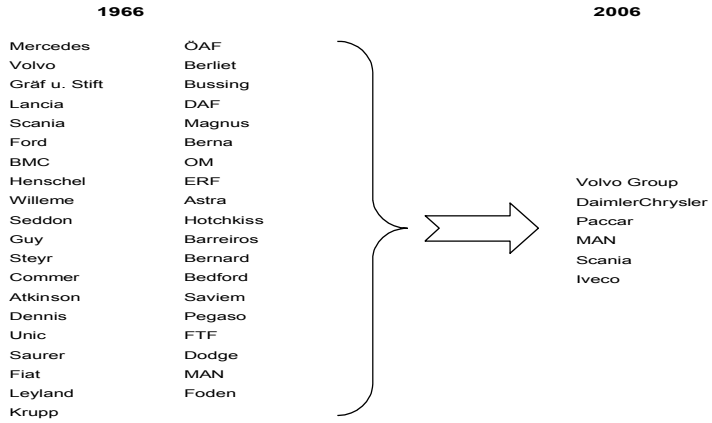

Figure 14. *Companies involved in the consolidation process in Europe between 1966 and 2006. (Scania annual report, 2006)*

European commercial vehicle manufacturers are strongly positioned compared with their competitors. Daimler AG, in Europe active with its brand Mercedes, is the world's largest truck and bus manufacturer. Together with MAN, Iveco, DAF (owned by PACCAR), Renault (owned by Volvo) and the Swedish OEMs Volvo and Scania, they possess a dominant position in Europe. (European Foundation for the Improvement of Living and Working Conditions, 2004)

European Truck Markets Exhibit Less Volatility

During the past two decades, the cyclical swings of the U.S. heavy-truck market has been larger compared to the European counterpart, see figure 15. The compound average growth rate (CAGR) has been 4.1 % in the U.S. vs. 2.9 % in European market, see figure 16. (European Foundation for the Improvement of Living and Working Conditions, 2004)

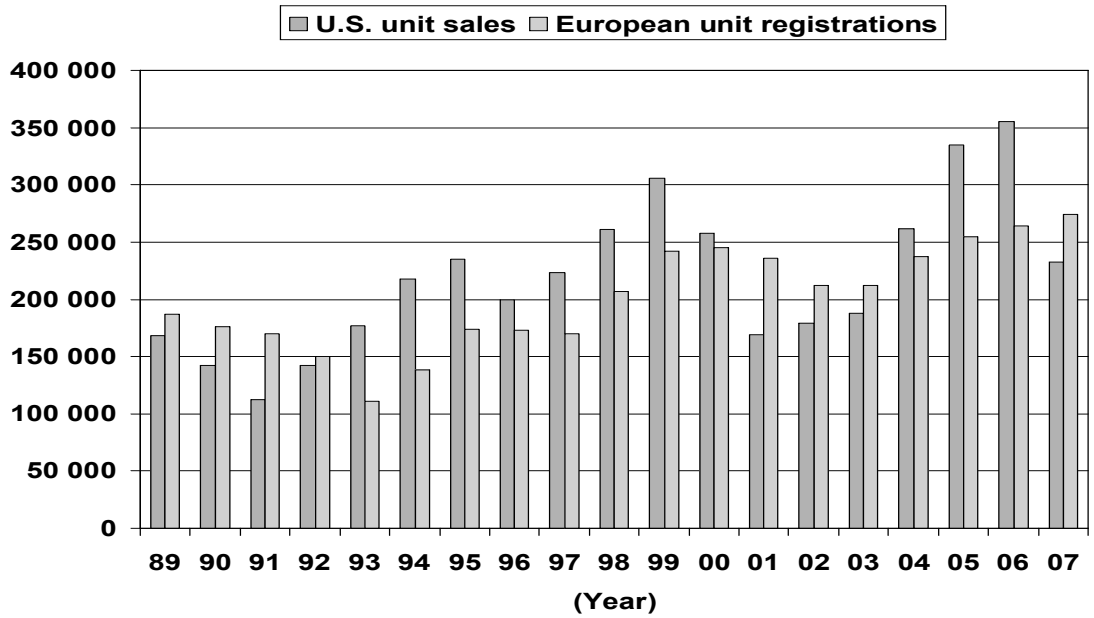

Figure 15. *The European market shows less volatility than the U.S. counterpart. (European Foundation for the Improvement of Living and Working Conditions, 2004)*

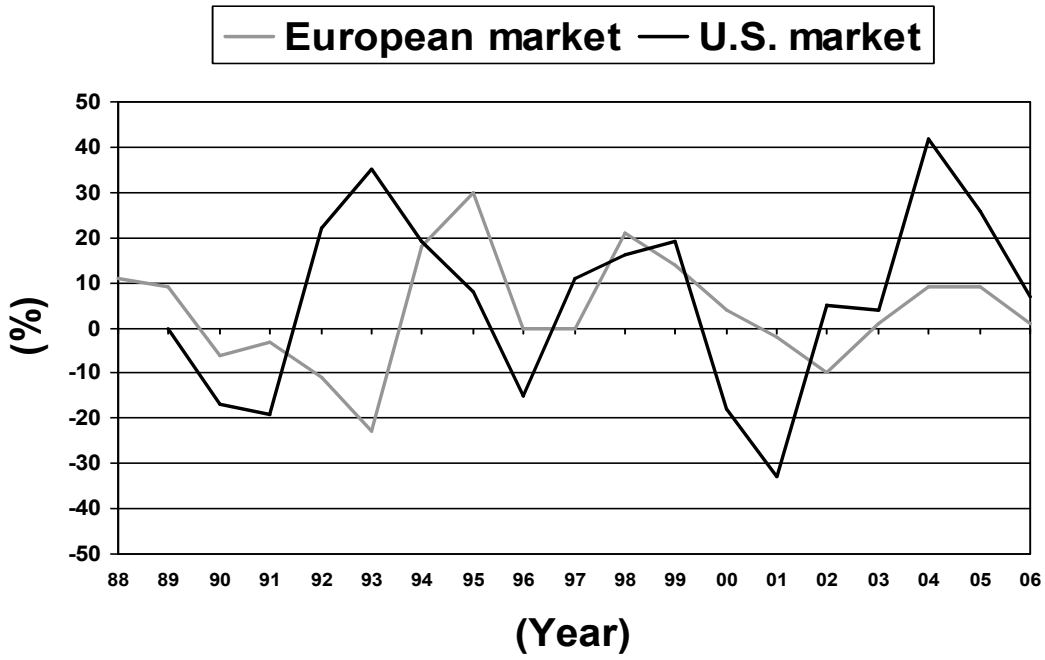

Figure 16. *Growth rates of U.S. and European heavy truck markets. (European Foundation for the Improvement of Living and Working Conditions, 2004)*

The new emission standard in Europe (Euro V) will be set in Oct. 2009, which replaces Euro IV that took effect in 2006. The corresponding U.S. standard, EPA10, will be even more demanding than the European one. The Euro VI standard will be more equivalent to the U.S. standard and is being set in 2012, see chapter 3.3 for more details. The truck market has become more predictable since the introduction of the emissions legislations for commercial vehicles. (Bissinger, Staeblein & Zsiga, 2007)

Truck market more predictable since introduction of emissions standards

The truck market has become more predictable since the introduction of the emissions legislations for commercial vehicles. The government-mandated emission technologies can synthetically change the timing of scope of replacement cycles because of changes in emission legislation that have become more predictable than market demand corresponding to more intense economic activity or replacement needs. In response to this, the majority of truck makers within the Western European truck market for heavy trucks, exceeding 16 tons, have received increasing orders in 2007. The truck makers' business risk assessment is likely to be improved by these developments through diversification and decreased cyclicality. (Bissinger, Staeblein & Zsiga, 2007)

There are seven truck brands that are dominating the Western European market for Heavy-trucks. The US market has only four dominating players. The brands active on the European market are less concentrated towards the heavy-trucks segment than the ones active in the U.S. The most concentrated companies in Europe are AB Volvo and Scania AB. IVECO, the commercial unit of Fiat SpA, has only 27% of their total deliveries within the heavy-trucks segment but are a major player in other types of business in Europe. Daimler AG's truck division (excluding buses) is exposed with 20% of their business on the European truck market. DAF, the European subsidiary of the U.S. truck manufacturer PACCAR Inc., answers to 30% of PACCAR's revenues and 33% from the global units volume. MAN AG from Germany is more heavily exposed to the European market. Figure 17 illustrates some of the companies' sales proportion with commercial vehicles. (Bissinger, Staeblein & Zsiga, 2007)

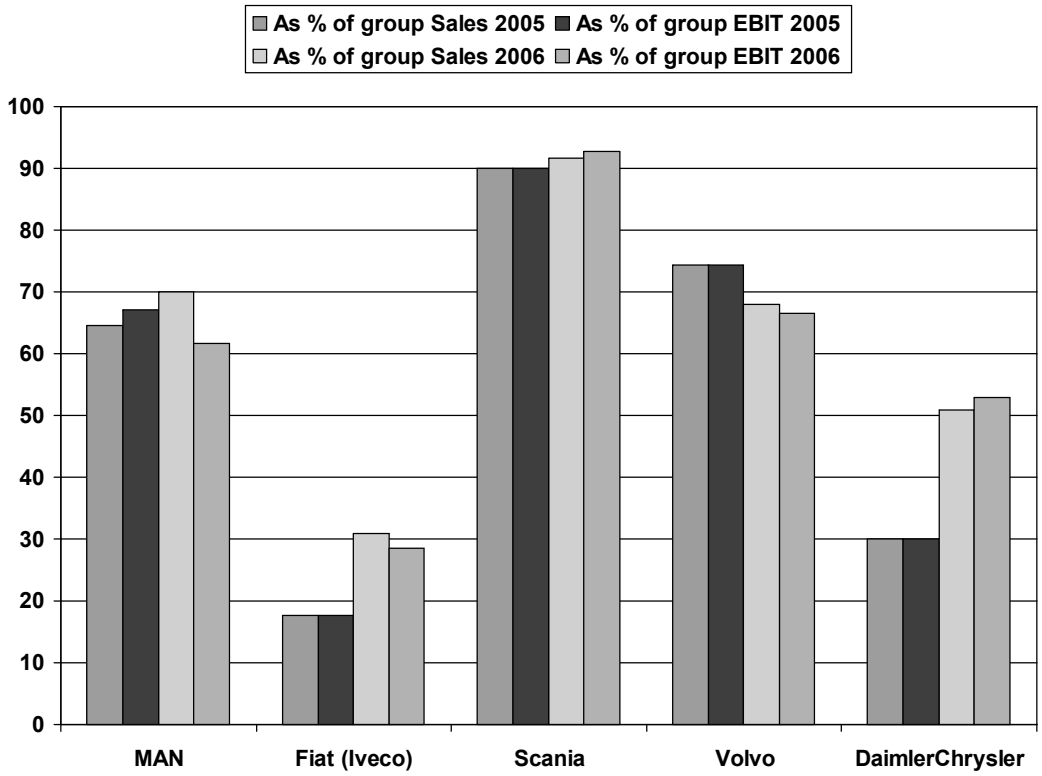

Figure 17. *Global truck makers' proportion of group sales and EBIT generated with Heavy Vehicles. (Bissinger, Staeblein & Zsiga, 2007)*

The healthy economy drives demand for Heavy trucks

Just like the drivers of commercial vehicles within Global market level, drivers within European market level are corresponding to economic factors. Healthy macro economic cycle drives the demand for heavy trucks. Changes in economic activity affect freight-hauling demand that in turn leads to changes in the demand curve for heavy trucks. In spite of this statement it is not as straightforward to derive the correlation between changes in GDP and demand for trucks just by equating higher growth with a higher demand for heavy trucks. For example the German market did grow in 2003 despite negative GDP growth, which were due to high replacement needs and high prices for used trucks that were exported to Central and Eastern European Countries (CEE). This, in turn, buoyed the demand for new trucks. Another driver of new truck sales were in 2006 the highway tolls in Germany, which affected 1/3 of heavy-haulage traffic by an estimation made by Scania. This did in turn stimulate heightened demand for Euro IV-compliant trucks from haulers that drive freight through Germany. (Bissinger, Staeblein & Zsiga, 2007)

The heightened economic activity will profit OEMs in two ways: First, demand will continue to be high in CEE. Second, CEE countries are gradually more developing into a market for new trucks. The increased demand for transportation between western and eastern borders is highlighted as a major driver for Volvo, Scania and MAN. This smoothes out the total European truck volume and dampen the volatility, which until recently has been influenced by the developments in Western Europe only. (Bissinger, Staeblein & Zsiga, 2007)

It is not assumed that the GDP forecast will push truck demand further; this also includes the replacement demand from the years 2002 and 2003. Overall it is expected to be a flat market development in 2008 compared to 2007. (Bissinger, Staeblein & Zsiga, 2007)

5.3.3 Swedish market level

The OEMs in the segment of heavy vehicles in Sweden had the highest labour productivity in comparison with other key players within the industry from other countries. Scania and Volvo have had 90 percent of their sales on markets with high competition, mostly in Europe. They have also set up production with high vehicle variety and still managed to mass manufacture effectively due to developed modular components. Since then, the Swedish Automotive

industry has managed to continuously increase its labour productivity without having to downsize employment. It has instead increased. This has been driven by a decrease in working hours per vehicle, and strong value added development per vehicle. It has been possible due to implementation of lean manufacturing principles and through better and more cooperation with suppliers. (McKinsey Global Institute, 2006)

The two Swedish heavy vehicle OEMs, AB Volvo and Scania, have stated their goals of increases in productivity. The former stated that a 6 percent growth shall be achieved annually and the latter is to double productivity within a ten-year period, which is equal to approximately 7 percent annually. (McKinsey Global Institute, 2006)

2007 turned out to be the best sales year ever for the light and heavy vehicles segment. Sales for the heavy vehicles segment for 2007, in which the Swedish OEMs are competing, landed on 6 842 vehicles, which is an increase of 6.1 % from the year before. Heavy trucks stood for most of the increase with its sales of 5 858 which gives the growth rate of 10.6 %. Scania's heavy truck sales topped the league with 2 543 new vehicles registered. Volvo, not far behind, had 2 470 new vehicles registered. (BilSweden, 2008)

New registrations in the segment of buses on the Swedish market went down during 2007 by 26.9 % with 986 buses registered. 2006 was a better year when 1 348 were registered. The Swedish OEMs active in the segment of commercial vehicles are both manufacturing buses. Volvo was the only one of them that managed to have an increase in registrations of buses. The increase was only 1.2 % but compared with registrations of Scania buses, which went down by 44.9 %, and almost all the other competing brands that showed a decrease in new registrations by 35 – 70 %. The exception is Kässbohrer-Setra who had an increase of 32 % but only has a market share of 12 %. Volvo has the largest market share of 41.7 % followed by Scania who has 16.5 %. An interesting notion is that during December, the registrations of Volvo buses fell with 71.9 % while Scania's went up with 133.3 %. (BilSweden, 2008)

5.3.4 Company level

The heavy vehicle segment of Sweden has 26 percent of the total workforce in the automotive industry. The Swedish market level has kept up the improvement work and is still very successful. This is due to the high commonality level of component design. The two OEMs

AB Volvo and Scania are niched within the premium class, which enables greater profits and thus realizing high value added per hour worked. (McKinsey Global Institute, 2006)

AB Volvo

Volvo showed good continuing results for the first half of 2007. The group's operating margin was 8.6 % compared with 8.6 % in 2006 and 7.9 % in 2005. This was because of higher capacity utilization as a result of raised production volume. The central and eastern countries (CEE) demand continue to drive truck orders, which made improved profitability possible of 8.8 % in the first half of 2007 despite the lack of demand in the North America and integration costs of Nissan Diesel. (McKinsey Global Institute, 2006)

Scania AB

After MAN AG expressed interest in a merger with Scania in September 2006 the ratings on Scania were removed from S&Ps CreditWatch with negative implications. Scania showed strong earnings performance with a group-operating margin of 14 % in the first half of 2007 compared with 12.4 % in 2006 and 20.8 % in 2005. (McKinsey Global Institute, 2006)

5.3.5 Value Driver summary: Commercial vehicle

The value drivers from the commercial vehicles segment are summarized in table 12.

Alliances	Emission regulations	Operating margin
Balancing different markets	Emission requirements	Operational performance
Capacity utilization	Emission standards	Outsourcing to LCC
CEE demand	Emission technologies	Price war
Changing regulations	Flexibility	Prices for used trucks
Consolidation	Flexible company	Product flexibility
Consumer confidence	GDP	Raised production volume
Cooperation with suppliers	Healthy economy	Range of products
Corporate profits	High way tolls	Raw material prices
Customer purchasing behaviour	Interest rates	Replacement need
Demand	Lean manufacturing	The economy
Diversity	Merger	Transportation needs
Economic activity	Merger/partnering	Unemployment
Economic cycle	Modular design	Value adding development per vehicle
Economic factors	Niche	

Table 12. *Drivers from the Commercial Vehicles segment.*

5.4 The Automotive Suppliers segment

5.4.1 Global market level

On a global market level diversity lessens the impact of downturn for large investment-grade suppliers. Business profiles that reflects geographic and product diversity are of great importance for global leading suppliers. Their participation in other sectors than automotives enables them to endure a down-cycle. The European and Asian emission standards do not come in force at the same time as the U.S. and therefore create some stability for global suppliers such as Caterpillar, Cummins Inc. and Knorr-Bremse AG. (Ballantine et al. 2007)

5.4.2 European market level

The cost pressure from the automakers also affects the suppliers. This has started a trend of supplier consolidation. A major development of the industry has been the restructuring of the supply industry and the growth of major large-scale suppliers. These large-scale suppliers have become major employers through the increasing trend of outsourcing production from the OEMs. (European Foundation for the Improvement of Living and Working Conditions, 2004)

Outsourcing

As passenger carmakers seek to minimize their costs, they outsource more and more to the supply industry. Outsourcing does also allow greater economies of specialization and scale, since suppliers are able to supply several carmakers due to the greater experience they posses in certain functions.

For the highest efficiency, the supply system needs to use lean manufacturing. Every company in the value chain has to organize logistics to buy, make and sell components "just in time" or "just in sequence" and to cut costs through flexible working and the elimination of waste. According to the European Foundation for the Improvement of Living and Working Conditions this has had the following effects (European Foundation for the Improvement of Living and Working Conditions, 2004):

- A quick growth in value of the supply industry from €530 billion in the late 1980s to over €1,000 billion today and the growth of large-scale suppliers;

- A very high technological level among the large suppliers; were Europe has a strong lead;

- Up to 60% of the value of a brand new car coming from suppliers;

- High pressure to minimize costs on the network of small and medium-sized enterprises (SMEs) that make up the lower links in the supply chain – many of which have gone out of business;

- Outsourcing of design and engineering functions. This leads to growth in companies that offer high value-added services. Examples include Pinin Farina, Bertone (Italy), Mayflower, Prodrive, Ricardo (UK) and AVL (Austria); again, Europe has a strong lead in this area.

Consolidation of suppliers

The cost pressure from the automakers also affects the suppliers. This has started a trend of supplier consolidation that is likely to go further. It is predicted to be a reduction in tier-one suppliers to 30 by 2010 and major reductions in numbers at the second tier and lower: a forecast reduction from 10,000 tier-two suppliers to less than 1,000. (Otterbeck, 2006)

Modules and systems

Suppliers have taken greater responsibility, especially in areas such as electronics. A result has been for whole modules or systems to be pre-assembled by the suppliers and delivered (just in time and just in sequence) to the vehicle factories. This contributes to make assembly faster and more convenient for the OEMs, and does also transfer the responsibility for quality and logistics to the suppliers. (European Foundation for the Improvement of Living and Working Conditions, 2004)

For the suppliers, a module or system supply adds greater value and a greater stake in innovation. The OEMs benefit from cost savings but lose competence; jobs are also lost

through ‘hollowing out’. This may be a probable threat; hence some companies do resist too much outsourcing, notably Mercedes and Toyota according to the European Foundation for the Improvement of Living and Working Conditions. (European Foundation for the Improvement of Living and Working Conditions, 2004)

5.4.3 Value Driver summary: Suppliers

The value drivers from the automotive suppliers are summarized in table 13.

Diversity	Outsourcing
Flexible working	Product diversity
Geographic diversity	Supplier consolidation
Investments	Systems
Lean	Timing of enforcement of emission standards
Modules	

Table 13. *Drivers from the Automotive Suppliers.*

6. Analysis

6.1 Analysis of empirical value drivers

Many value drivers found in the empirical study are synonyms or are similar enough to be categorized and grouped under principle value drivers. Since the found value drivers are very many, the complete grouping have been placed in appendices 2, 3, 4 and 5. This chapter will only analyze the principal value drivers.

Contemporary importance and how heavily value drivers influence the Automotive Industry is valued by the order of which the principal value drivers are analyzed. The more influential are first analyzed followed by the less important. Their importance and effectiveness on the Automotive Industry varies over time and in different places, segments and situations making it impossible for an accurate ranking of them. Keep therefore in mind that the order of the value drivers is merely a contemporary suggestion of their degree of influence.

6.1.1 Value drivers of the Automotive Industry

The principal value drivers found in the empirical study are summarized below in the table 14. All of them will be described and analysed in the three main segments throughout the following chapters.

Buying power	External resources	Possession of driver's license
Competition	Financial performance	Production costs
Consolidation	Flexibility	R & D
Cooperation	Industry vehicle supply	Regulations, legislations and agreements
Corporate governance	Investments	Replacement needs
Customer costs	Market characteristics	Size of industry
Demand	Operational performance	Subsidies
Diversity	Outsourcing	Type of product
Economic activity	Overcapacity	Used vehicle market

Table 14. *Value drivers from the entire empirical study.*

Economic activity: The global economy is highly intertwined with all of its sectors, especially the Automotive Industry. In Sweden the Automotive Industry is the greatest sector with 10 % of all manufacturing employees (European Foundation for the Improvement of

Living and Working Conditions, 2004) and represents 2.3 % of Sweden's GDP (McKinsey Global Institute, 2006). Manufacturers make products and if they are attractive enough and fulfil a certain purpose of value for a customer, a trade-off will hopefully occur. If there is a slowdown in economic growth, it reduces consumer and business confidence. This may lead to a decreased industrial production, including the production of durable consumer goods with fluctuating private consumption, which may lead to a decline in demand. But eventually a trough will be overcome, followed by an upturn. History has shown this economic cyclicality but also proven a constant growth over time. The Automotive Industry needs huge working capital and has high capital expenditures. So it is important that automotive companies aren't heavily exposed to the financial market that can be very turbulent. OEMs within the Automotive Industry need to have the benefit from economies of scale in order to survive, which is why they exist on various markets. Existing on different markets exposes them for currencies. Largely unfavourable exchange rates can drastically affect results from sales in foreign countries.

Demand: The demand for products of the Automotive Industry is a major factor for its economical performance. If a company fails to match its production volume with the sales outcome, it can cause brutal economical effects. Strategic decisions on how to manage fluctuating demand need to be taken. There are a lot of factors affecting the demand and they will more easily be identified by the aid of other value drivers brought up in this study.

R & D: The Automotive Industry has evolved to being highly competitive. Operations constantly need to speed up and products need to more quickly be adapted for requirements and preferences. This task isn't easy so it is vital that R & D is a part of manufacturers' core business. If not, they will quickly be out of business. The Automotive Industry is the largest R & D investor in Europe (ACEA, 2007a). It accounts for 20 % of total R & D investments in Sweden. Also to reduce costs, R & D can be performed cooperative and need to be so when more and more activities are being outsourced.

Diversity: Existing on one market, with one product in one segment creates almost a perfect correlation between the company and factors that affect the market. The risk lies with the cyclicality of a market. In a competitive market, profit margins can't be high enough to endure a trough in sales. So the level of how much a company is diversified spreads that risk of a slowdown in one or more markets. Diversity can be achieved by balancing different markets,

be geographically diversified with production in various countries and by having a range of products with different niches.

Regulations, legislations and agreements: There are regulations and legislations that enforce certain requirements on end products in the Automotive Industry. These can vary depending on which market the products are being registered in. You can read about some of these regulations in chapter 3.3 emission regulations. New emission requirements set to come in force in the future affect companies in the Automotive Industry. This forces them to adapt which means huge expenditures on R & D. Purchasing behaviours is also affected, thus causing a higher cyclicality, but then at least it has become easier to predict the outcome of sales. Price wars between OEMs often occur after an enforcement of a new emission standard.

Competition: This value driver drives companies to use resources more efficiently, i.e. improved operational performance. It also puts pressure on them in being more innovative and to come up with more attractive products. If competition is intense, as in the Automotive Industry, price wars can occur resulting in slimmer margins for profitability. The highly competitive atmosphere can bring companies down and lead to further consolidation. The European Automotive Industry still has a large amount of automotive manufacturers, but predictions state that only a few of these will stay independent. This has proven to be reality for U.S. and Asian manufacturers.

Operational performance: Healthy competition puts focus on a company's operational performance. It forces them to compete and which often is the means of manufacturing more cheaply and with better quality. So improvements in operational performance are therefore ongoing processes. The effects from operational improvements are both positive and negative. Positive is that manufacturing becomes more efficient and thus creating more value for the company, but the negative side is that with more capacity being added in CEE and Asian counties, overcapacity has become a large threat to the industry. Overcapacity triggers a price-cost pressure, so more focus must be laid on operational improvement which leads to even more overcapacity. Focus is starting to be redirected towards another strategy which boosts cooperation between manufacturers and spurs the consolidation process.

Cooperation: The need for good cooperation is vital for every business or industry concerned in high profits or growth. This driver can create great synergy effects when two companies

form an alliance combining different skills used to reach a mutual goal. Cooperation is also needed throughout the value chain. If a supplier isn't delivering as desired the whole company may face immense trouble delivering their products, or delivering products with a certain quality required by the costumer.

Not all cooperations manage to be successful. There are some recent examples of this, mostly from the passenger car segment but also in the heavy vehicles segment. The trend is however moving towards increased partnering according to our empirical findings. More complex products and tougher conditions for manufacturers spur the need for combined solutions in the future.

External resources: The supply of external resources in a country, such as availability, prices and structure of them, affects companies in industries. Raw material and energy prices can fluctuate vastly, which puts pressure on production. The workforce in the Automotive Industry plays an important role. It can largely affect the prerequisites for an industry like the structure labour unions, workforce competence, unemployment and wages. The advancements in production possibilities have enabled companies to reorganize their manufacturing units to how they see fit. It can either be to automatize more of the operations or to move production to low-cost countries due to the Automotive Industries price-cost pressure. The supply of components for the manufacturing of products also affects manufacturers. This for example is seen in the China market that has faced a lower availability of components, which in combination with other weakening factors have reduced profitability.

Overcapacity: Overcapacity occurs when markets become saturated and when adequate operational improvements become complicated to pursue. Overcapacity is a fact in the Automotive Industry but sales is still up due to high demand in CEE countries. When a downturn in economic growth affects those markets, companies will have to struggle even harder in order to survive. Overcapacity forces companies to act and ways of acting are either acquiring other companies to gain market shares or to apply a more flexible structure to reduce costs while still being able to manufacture current and new vehicle models at already existing factories, instead of building up new plants and thus adding even more to the overcapacity.

Production Costs: Keeping costs for production down is a central part of a company's activities. It isn't all that easy doing that. Not all factors affecting costs can be handled internally. Lowering costs per vehicle can be achieved by operational improvements, cut-down in the workforce, changing suppliers and maximizing capacity utilization, but other factors can't be managed by the company itself. Energy costs, raw-material costs, political factors and other unpredictable factors, e.g. accidents, war, storms, earthquakes etc., also affect production costs which are driven by other factors that aren't in the reach for the managerial team of the company.

Type of product: The type of product is a determining factor for sales. A product needs to be attractive and useful enough to be able to sell it. Companies have a certain power and sometimes might even try to create a demand for a certain type of product, but there is a high possibility that factors can be misjudged and so the outcome won't be as expected. The U.S. manufacturers have for example misjudged a change in customer preferences over the last couple of years, which has caused troubles for them. The type of product a manufacturer offers is therefore vital.

Flexibility: Increased flexibility offers companies the advantage to more easily adjust to changes in market demand. If customers suddenly change their preferences or production needs to be adapted due to other factors, a flexible company is better prepared for an adjustment. The most common types of flexibilities are:

- *Succession flexibility*: Ability to produce new models in the same line as previous models.

- *Volume flexibility*: Ability to quickly change the scale of production when changes occur.

- *Product mix flexibility*: Ability to produce diversified products in the same production line.

Market characteristics: Characteristics of the market include its size, development and fragmentation. The motorization of the world is an ongoing process where living standards and welfare is increasing and where the infrastructure is improved. These markets are emerging which drives demand forward. A saturated market normally doesn't see the same growth rate as emerging markets and risk for a decline in sales is greater, but over time when such fluctuations are flattened out they still show a steady growth driven by replacement needs and an increase in business activity.

Replacement needs: After a vehicle has served its purpose over a certain time, it normally needs to be replaced with a new one. For trucks, that time is about seven years. For passenger cars, that time is more of a variable kind. The replacement need is not only driven by when a vehicle has been fully used for its purpose and needs to be replaced, it also depends on introductions of new emission standards.

Customer costs: Costs for consumers affect the type and size of demand for automotive vehicles. This includes all type of costs for customers, which affects their buying power. An example that frequently is a topic for discussion is fuel price.

Financial performance: Profitability is essential for the survival of companies. Many factors affect costs for manufacturing and sales fluctuates over time, so strategic decisions and actions constantly need to be taken to stay profitable.

Consolidation: The Automotive Industry undergoes a consolidation process. Large companies aren’t only relying on organic growth any more. Globalization has made it possible to more easily organize trans-national business organizations. To gain market shares, corporations target other independent manufacturers for acquisition. The process has slowed down due to less existing targets. The European market, that still contains quite a lot of independent manufacturers, is probably where we will see more of the consolidation process. The increased cooperation between companies results in further consolidation.

Outsourcing: Companies need to take means to enhance their total performance and profitability in a tightening business sector. In many businesses it has therefore become vital to concentrate on what they do best, which mostly is their core business. The Automotive Industry is a sector holding lots of operations being performed through outsourcing from

OEMs. Vehicles have become technically complex that has hindered a lot of operations from being outsourced, but with smarter manufacturing principles enabling tighter cooperation with suppliers, we now see more technically advanced assignments being outsourced. Outsourcing enables OEMs to benefit from cost savings, but in the mean time they lose competence. Jobs are also lost but looking at it with a higher perspective you might conclude that jobs are created in the supplier segment and resources are being used more efficiently.

Buying power: Economical factors, fuel prices and the inflation affect the buying power. The buying power of customers in turn affects sales and demand by changing customer preferences. Hence consumer spending and their buying power are important factors to look at to analyze market sales.

Subsidies: Subsidies have shown to have an affect on the demand for vehicles. Environmentally friendly passenger car sales have flourished recently and they are still capturing market shares. This is due to the timing of subsidies in combination with an environmental trend and investments and political pressures for extending the supply of environmental fuel.

Used vehicle market: The used vehicle market can affect sales of new vehicles. If the market for used vehicles is strong and prices for old vehicles are low, there can be difficulties in selling new ones. On the contrary, if prices are high for used vehicles and the supply of them is short, demand for new vehicles can be positively affected.

Industry vehicle supply: The supply of various attractive products can affect sales. The larger the supply of a type of product is, the greater the confidence of the product becomes. This has been seen in the increase in sales of environmentally friendly passenger cars. It is also vital with the timing of the introduction of these products.

Corporate governance: A company's future possibilities lie in the strategic decisions taken by corporate governance. It is important that management teams possess the right competence and constantly are updated with sufficient information. If bad decisions are taken, it can affect not only the company itself, but also cooperating companies and suppliers. If the size of a country's industry is small the impact can be hard. Even the roles of parental companies affect their subsidiaries. The Automotive Industry is highly consolidated and if the parent company

struggles with profitability, sufficient funding for their subsidiaries' development may be reduced. Parental companies can on the other hand have positive effects on affiliated companies enabling an increased financial strength and access to their distribution network with the benefit of scale advantages.

Size of industry: The size of an industry in a country matters to the participants in it. The larger it is, the less vulnerable it is for when large companies subside. Greater size also attracts more businesses to the industry. Knowledge and competence is exchanged between companies and competition sees for continuous operational improvements.

Possession of driver's license: The possession of a driver's license is mostly a value driver for the Non-Commercial Vehicles segment. In this segment, the proportion of the possession of driver's licenses is correlated with sales of vehicles. The proportion in Sweden is rising for middle-aged and older people but is opposed by a decrease for younger people. Young people wait longer before they take a driver's license. This might be the reason for more and better substitute transportation possibilities and their weak buying power.

6.1.2 Passenger Cars segment

The principal value drivers found in the segment of Passenger Cars are shown below in table 15. Only the most important for this segment will be analyzed.

Buying power	Economic activity	Production costs
Competition	Flexibility	Profitability
Consolidation	Industry supply	R & D
Cooperation	Market characteristics	Regulations, legislations and agreements
Corporate governance	Operational performance	Replacement needs
Customer costs	Outsourcing	Resource costs
Demand	Overcapacity	Subsidies
Diversity	Possession of driver's license	Type of product

Table 15. *Value drivers from empirical Passenger Cars segment.*

Economic activity: Economic activity is a major driver in the passenger car segment. It has affected the segment in several different markets. The U.S. and European market have favoured advancement in sales for Toyota, meanwhile the sales on their home market have been worse. The U.S. economy greatly affects the rest of the world's, and since economic

cycles also affect demand for vehicles an upcoming recession in the U.S. will probably negatively affect passenger car sales in Europe as well. A recession is a strong economic driver directly affecting the passenger car market, even in markets that are not so adaptive to the conjuncture. The Swedish market is such a market that is characterized by strong regularity to economic cycles but is, and has been, affected by very strong drivers as oil crises and stock exchange markets that resulted in sales that were opposite the expected. Another exception in regularity among passenger car sales in Sweden is a predicted diesel boom in 2008, despite a forecasted negative economic growth. This is an interesting forecast that may state a new regularity pattern in the Swedish passenger car segment following new demands in environmentally friendly passenger cars. With this type shift in demand, the next pattern of regularity may be future emission standards, which is seen in the Commercial Vehicles segment.

Another important driver in economic activity is the increasing GDPs in Eastern European countries. The passenger car market has boomed due to increasing demand for medium and premium passenger cars. This demand will probably help to withhold total sales for larger and more luxurious vehicles.

Cooperation: Alliances and cooperative ventures is a trend we're seeing between vehicle manufacturers. It is become a prevalent pattern for passenger car manufacturers where examples are Peugeot-Citroën and Toyota who are together going to build a new small car in the Czech Republic, General Motors and Fiat share platforms, engine and transmissions, Peugeot-Citroën also collaborates with Fiat and BMW. R & D and production costs can be reduced due to these cooperations. A tighter relationship also occurs vertically between OEMs and their suppliers and distributors, which can reduce costs for them.

R & D: R & D's importance to the passenger car industry is obvious. Advanced products need advanced research to meet a changing demand. Manufacturing of passenger cars is no exception. The increasing interest in environmentally friendly cars has forced R & D teams to enhance the development of new innovative solutions. To make vehicles consume less fuel, weight reduction is one obvious alternative. This value driver drives investments in R & D to make products adapt to new emission standards. New hybrid engines or clean diesel engines have also contributed to make new passenger cars succeed in meeting these standards.

R & D is also an important driver for companies in a competitive position. To gain high profits and to make growth possible, investments in R & D is of major importance. Operational performance or special product development may be needed to withstand intense rivalry from innovative competitors.

Diversity: Diversity helps passenger car companies to spread risks. Product diversity also helps them to increase market shares. The need for diversified products or geographic diversity drives investments in new emerging markets like China and new EU member states.

Regulations, legislations and agreements: The increasing environmental concerns among customers drives demand for smaller environmentally friendly cars changing the product mix. Regulations, legislations and agreements enhance this effect by penalising those who doesn't use low consuming vehicles or vehicles with low emissions of CO_2. On the Swedish market level, this has had an immense effect and resulted in a change in demand, profiting manufacturers producing environmentally friendly passenger cars, but disfavoured others by putting more pressure on profits as a consequence. This will presumably affect OEMs even more in the near future pressuring the already low profit margin of 1-3 % to an unreasonable low margin. Those not able to invest large amounts on R & D or those with disfavourable corporate governance will not be able to compete with growing rivalry and may be acquired or bankrupt.

Regulations, legislations and agreements are strongly focused on decreasing the global warming and can sometimes be too focused on this goal missing out some vital restrictions, e.g. allowing small environmentally friendly passenger cars be subsidised and recommended without any reflection on safety. Light vehicles can be a real danger according to NCAP's tests and customers should therefore think twice before investing in a new passenger car.

Demand: The overall demand within the passenger car segment is slowing down on several market levels. The U.S. and European (except CEE) markets have all suffered weakening increase in demand due to economic activity or environmental concerns. The demand for environmentally friendly passenger cars is however increasing as stated earlier. We believe that this will be a continuous trend in the nearest future where not only environmental concerns, but also concerns of scarce resources of raw material will worry customers and drive demand for vehicles driven on renewable environmentally friendly fuels.

The demand is however increasing in the new EU states, India and China. Manufacturers balancing these markets won't see a downturn as badly as those who aren't.

Operational performance: Operational improvements are vital in healthy competition. Manufacturers need to strive for optimized production and maximized efficiency to evolve and increase growth and profits. This drives R & D and investments but is also time consuming and risks lost focus on demand or other external factors such as competition. If competition becomes unhealthy and demand doesn't reach supply, overcapacity occurs. This may be the case with capacity added from the China or India. This overcapacity may drive or trigger a price-cost pressure that in turn creates a need for even more efficient improvements that create overcapacity once again.

Competition: Due to the increase in cost efficiency among the passenger car manufacturers in Europe and U.S. markets, rivalry becomes more intense. Rivalry can be a good driver for innovation. New conditions like new emission standards intensify competition but do also give incitements for new innovative solutions. Competition may be developing but can also be corrosive to the economic growth and profit when expressed as unhealthy. Passenger car manufacturers not able to manage the intensified competition or changing demands will face an uncertain future. European Foundation for the Improvement of Living and Working Conditions (2004) believes that there will only be six major players left in the global passenger car segment due to increasing competition. This is arguable when there are opposite trends e.g. bad consolidations where companies split due to miscalculations. The consolidation trend is however strong as we speak and may not be affected in the near future.

6.1.3 Commercial Vehicles segment

The same as for the value drivers from the Passenger Car segment will be done for value drivers found from the Commercial Vehicles segment seen in table 16.

Competition	Flexibility	Regulations, Legislations and agreements
Consolidation	Market characteristics	Replacement needs
Cooperation	Operational performance	Resource costs
Demand	Outsourcing	Size of industry
Diversity	Production costs	Type of product
Economic activity	R & D	Used vehicle market

Table 16. *Value drivers from empirical Commercial Vehicles.*

Economic activity: Value drivers of the Commercial Vehicle segment correspond to economic factors. The demand for these vehicles is driven by healthy macro economic cycles. So changes in economic activity affect the freight-hauling demand, which also leads to changes in the demand for trucks. But it is wrong to judge demand for trucks just because of a negative GDP growth. It does affect, but other factors such as replacements need, high prices for used trucks and emission standards may be more relevant that can increase sales even during a slowdown in economic activity.

Cooperation: Cooperations are becoming more and more important within the commercial vehicle segment. Several OEMs have introduced lean manufacturing, which helps industries to work more efficient and to lessen costs. An important prerequisite for the lean system is the cooperation throughout the entire value chain. If any part of the value chain shouldn't cooperate with the next, a bottleneck should appear and the lean system wouldn't work as intended. The actual working hours have decreased within companies who have good cooperation with their suppliers and this trend is likely to result in further supplier consolidations.

This driver is also driving alliances with companies in different regions. Leading European companies have started to cooperate with Asian companies and this trend is likely to continue in the future. This may result in more consolidations and fewer companies within the commercial segment.

R & D: The driver R & D is always important for gaining higher end profit and growth. This is also true within the commercial segment. Improvements in standardizing parts, product development and operational improvements all contribute to produce advanced commercial vehicles with minimal costs meeting the customer demand. R & D is driven by the need for diversified products, changing demands and tightening competition etcetera. Commercial

vehicles are produced in smaller quantities than passenger cars and therefore need a modular design that can handle a vast amount of configurations adding special value to each vehicle. This drives the product flexibility that is possible through investments and effort lain on R & D.

Diversity: The commercial vehicle segment is highly cyclical. This puts pressure on vehicle manufacturers to not fall into a downturn in sales every time entering a trough. Emission standards are one reason for the highly cyclical swings in this segment found in empirical findings. A solution that is often used to avoid these downturns is to balance different markets or to increase product flexibility mentioned in R & D. Geographic diversity meaning production and sales in different regions that may have different emission standards enabling a flat balance in the corporate total sales. This will directly drive profit and growth.

Regulations, legislations and agreements: As mentioned, this driver is a major contributor to the cyclical characteristics of the commercial vehicle segment. This driver is therefore one of the most important drivers in this segment. During an expected downturn this driver can create price-wars due to increasing costs and no possible price increases. This accentuates the need for R & D and especially the improvement of operational performance or consolidations. This trend is likely to proceed in the future because of the incremental need for regulations, legislations and agreements concerning environment improvement.

Demand: The demand in the commercial vehicle segment is largely focused on transportation needs. Transportation is always needed and during a boom period transportation is needed even more, due to increased goods sold. This makes this driver one of the most important drivers in the commercial vehicles segment. Emerging markets does also create new needs for transportation, which drives the demand further.

Operational performance: This driver has been mentioned earlier as a driver or as been driven by another driver, e.g. R & D. Lean manufacturing or Toyota production system has been introduced ever since the commercial vehicle manufacturers, like Scania, adopted this way of thinking and applied it into their core business. It is a helping tool if maximum efficiency, increasing cost efficiency etcetera is prioritised. Kaizen, or continuous improvements in English, is a well known term in this type of manufacturing system. It

includes a constant procedure of improvements, driving employees and management to develop processes and also to achieve personal improvements.

Flexibility: The flexibility value driver is a great driver for the commercial vehicle segment's production procedure. Profit and growth are dependent on a customer demand that craves flexible solutions. The grade of product flexibility available is crucial for heavy vehicle production lines due to the customised demand in trucks: the customer orders quite unique vehicles that wouldn't be possible in a mass manufacturing passenger car assembly. This is why this driver is an important value driver and also will be in the future.

Replacement needs: The commercial segment is partly driven by emission standards regulating emissions by legislations. These contribute to the cyclical characteristics presented earlier. Every time a new emission standard is launched, vehicles need to be replaced. This is why the replacement needs becomes a strong driver for the commercial vehicle segment.

Consolidation: The trend of consolidations will probably continue within the commercial vehicle segment. This is because of the need of standardised global platforms, system and modules with lower cost and risk. Consolidations, more specific: mergers and partnering, are also a solution for undesired price wars during expected downturns.

6.1.4 The Automotive Suppliers segment

Again the same method is used here as for the previous segments. Table 17 shows the principal value drivers from the Automotive Suppliers segment.

Consolidation	Outsourcing
Diversity	Regulations, legislations and agreements
Flexibility	R & D
Operational performance	

Table 17. *Value drivers from empirical Automotive Suppliers.*

Outsourcing: The increasing trend of outsourcing production from OEMs has benefited the supply industry. A tighter relationship is therefore needed when whole systems now are being outsourced. Suppliers can make core business of certain functions that OEMs couldn't and therefore allow a greater economy of specialization. Their specialization can also be supplied

to several OEMs, thus enabling growth opportunities for suppliers which hardly was possible in the industry before the trend for outsourcing.

R & D: Now with more technological advanced parts being outsourced to suppliers, more R & D needs to be performed by them. A system gives additional value adding operations being done by suppliers and a greater stake in innovation. Tight cooperation with OEMs is therefore necessary for the design of products and also to develop the logistics between them.

Operational performance: A cost pressure sees for maximizing efficiency, why the whole supply system needs to be lean. The increased responsibility in specialized parts has led for whole modules or systems to be pre-assembled by suppliers JIT and JIS to the OEMs, which makes assembly quicker for them. More responsibility for quality and logistics lies on the suppliers.

Diversity: Suppliers have been dependent on OEMs, mostly on a national level. But increased sequence stability and an outsourcing trend has enabled suppliers for doing more business and across national borders. This has helped large suppliers to become more diversified geographically and with products that can lessen the impact of a downturn and help endure a down-cycle.

Consolidation: A larger supply industry that now functions cross-nationally has also enabled a process of consolidation. It has undergone an immense development and the growing of major "mega-suppliers". Predictions calls for a reduction in tier 1 suppliers to 30 by 2010 and tier 2 suppliers may shrink from 10 000 to less than 1 000 (European Foundation for the Improvement of Living and Working Conditions, 2004).

6.1.5 Compilation of value drivers

Connections between the identified value drivers have been explained in the empirical data gathered. The principal value drivers can therefore, based on these empirical findings, be correlated to each other. Illustrating these connections in a figure helps getting an overview of them. We will hereby present a model of value drivers as a concluding analytical correlation visualised in a schematic model. It has evolved through analysis and discussions by the authors and by the using of a white-board, the connections where bundled out. The model is

shown in figure 18 below, where connections have been added and are shown as arrows between the analyzed value drivers. Internal value drivers are placed within the inner rectangle and the rest on the outside.

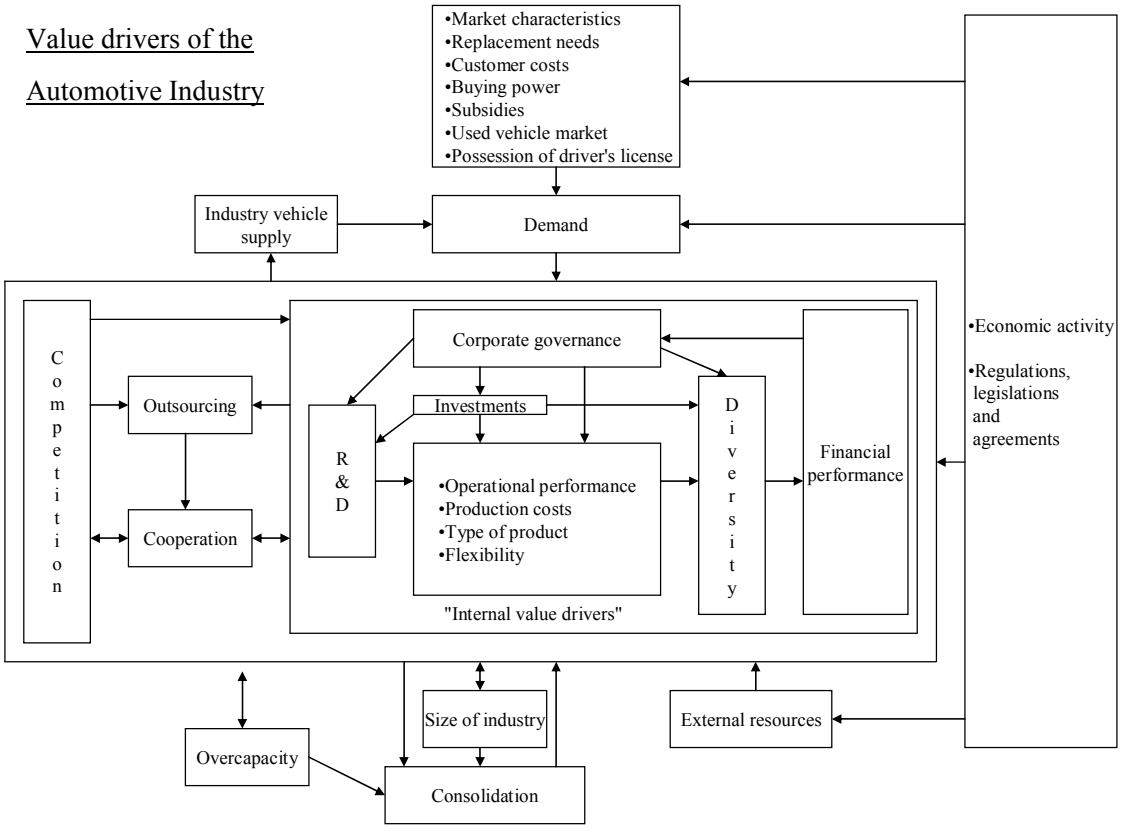

Figure 18. *Value drivers shown in our schematic model based on the empirical findings.*

6.2 Analysis of former researches

6.2.1 Analysis of the former study of the Automotive Industry

To supplement the model of correlating value drivers from the empirical findings with value drivers from previous studies, they will be compared with each other in tables 18 and 19. They are treated the same way as value drivers from the empirical findings by placing them under principal value drivers. New principal value drivers are formulated that enables a derivation of an updated model.

Value drivers from former research of the Automotive Industry	Comparable value drivers from empirical findings	Proposal for new categorized value driver in model
Strategic decisions	Corporate governance	
Product development	R & D	
Marketing		Marketing
Manufacturing	Operational performance	
Financing	Investments	
Organization		Organization
Demand	Demand	
Customer preferences	Demand	
Income development	Buying power	
Changes in fuel price	Customer costs	
Substitute and complementary products		Substitute and complementary products
Supply of new technology	External resources	
Supply of components	External resources	
Changes in price of production factors	External resources	
Power of competitors	Competition	
Relationships to suppliers and distributors	Cooperation	
Relationships between competing companies	Cooperation	
Production technical know-how		Internal resources
Economic political factors	Regulations, legislations and agreements	
Legislation	Regulations, legislations and agreements	
Tax system	Regulations, legislations and agreements	
Actions taken by certain organizations	Regulations, legislations and agreements	

Table 18. *Comparison of value drivers from former research of the Automotive Industry and empirical findings.*

Value drivers from former research of the Automotive Industry	Comparable value drivers from empirical findings	Proposal for new categorized value driver in model
Capacity building	Operational performance	
Build-up of knowledge	R & D	
Product technical competence		Internal resources
Production technical competence		Internal resources
Flexibility	Flexibility	
R & D	R & D	
Capacity of the business management	Corporate governance	

Table 19. *The continuation of table 18.*

Most of the value drivers from the former research of the Automotive Industry fit in under the principal value drivers from the empirical findings. The proposed new principal value drivers are explained below:

- **Financing** can be placed under the Investments category. To finance investments can be performed in different ways. It is necessary to find the best solution of financing to enable best possible prosperity for the company.

- **Income development** falls under the Buying power category.

- **Supply of new technology** goes under External resources. The cost and amount of it affects costs for production and type of product.

- **Changes in price of production factors** is compared with External resources as it contains production factors such as raw-material prices, energy costs, wages, etc.

- **Economic political factors** means for the legal framework and set of regulations companies need to follow. This includes **legislation**, **tax system** and also agreements from **actions taken by certain organizations**. These value drivers can therefore be placed under the Regulations, legislations and agreements category.

- **Internal build-up of knowledge** is central for a company's competitive power. This knowledge can be obtained through R & D, but it can also come through "learning by doing". This value driver falls conveniently under the R & D category.

As seen in tables 18 and 19 there were value drivers found in the former research of the Automotive Industry that weren't found in the empirical study. They are described below and proposed to be merged with the schematic model of value drivers from the empirical study. Table 20 includes the proposed new categorized value drivers.

Marketing: In order to reach customers and affect their purchasing behaviours and decisions, marketing is an effective approach. It is fundamental to any business growth. Marketing in the Automotive Industry is normally performed nationwide by general agents and locally by resellers. This is because they do the sales towards end customers. This is called business to consumers (B2C), which is the case for the Non Commercial Vehicles. Then there is business to business (B2B) that markets products aimed for other businesses. This kind of marketing is different from the marketing normally seen for consumers in media.

Organization: The organization and set-up of a company's activities plays a great role of its performance. The organization is an issue for corporate governance.

Substitute and complementary products: The supply and prices of substitute and complementary products affect demand for automotive vehicles. Examples of substitute products are trains, subways, airplanes and watercrafts. Examples of complementary products can be trailers, truck bodies and tail gate lifts.

Internal resources: This value driver will include the human capital and the company's knowledge and competence, i.e. **Production technical know-how**, **Production technical competence** and **Product technical competence**. These are defined as resources because they can contribute to the value adding process.

The new updated constellation of principal value drivers are shown in table 20.

Buying power	Flexibility	Production costs
Competition	Industry vehicle supply	R & D
Consolidation	Internal resources	Regulations, legislations and agreements
Cooperation	Investments	Replacement needs
Corporate governance	Market characteristics	Size of industry
Customer costs	Marketing	Subsidies
Demand	Organization	Substitute and complementary products
Diversity	Operational performance	Type of product
Economic activity	Outsourcing	Used vehicle market
External resources	Overcapacity	
Financial performance	Possession of driver's license	

Table 20. *Proposed new principal value drivers.*

6.2.2 Analysis of former studies of other industries

In this chapter we will compare our principal value driver with value drivers found in former researches from other industries. The same analyzing process used in previous sub chapter will also be used here. The industries compared are: restaurant industry, airline industry, biotech industry, IT industry, energy industry and environment industry. Finally there will also be a comparison with drivers gathered from mixed industries. The reason for choosing these industries is to investigate if any value drivers found in other mixed industries could complement our principal value drivers in a final model.

	Value drivers from former researches of other industries	**Comparable updated value drivers from 6.2.1**	**Proposal for new principal value driver in model**
Restaurant	Revenue per customer	Financial performance	
	Seat turnover		
	Return on investment	Financial performance	
	Return on sales	Financial performance	
Airline	Talent of workforce	Internal resources	
	Quality of labour	Internal resources	
	Diversity	Diversity	

Table 21. *Comparison of value drivers from proposed new principal value drivers and empirical findings.*

	Value drivers from former researches of other industries	Comparable updated value drivers from 6.2.1	Proposal for new principal value driver in model
Biotech, IT, Energy and Environment	Reputation of research team and firm	Marketing	
	Uniqueness of innovation	R & D	
	Profitability	Financial performance	
	Growth prospects	Investments	
	Economic factors	Economic activity	
	Risk (business risk, all forms)	Investments	
Universal	Innovation	R & D: innovative	
	Quality		Quality
	Customer care		Customer care
	Management skill	Corporate governance	
	Share price	Economic activity	
	Customer relations	Cooperations	
	Management capabilities	Corporate governance	
	Profit margin	Financial performance	
	Growth rate	Financial performance	
	Working capital investment	Investment	
	Cost of capital	Investment	
	Fixed capital investment	Investment	
	Market capitalisation	Marketing	
	Technology	External resources	
	Safety	Regulations, legislations and agreements	
	Government regulations	Regulations, legislations and agreements	
	GDP	Economic activity	
	Labour supply of nations	External resources	
	Consumer spending	Buying power	
	Environmental issues	Regulations, legislations and agreements	
	Community issues	Market characteristics	
	Employee relations	Internal resources	
	Brand value	Marketing	
	Brand equity	Marketing	
	Alliances	Cooperations	
	Human capital	Internal resources	
	Patent		Patent

Table 22. *The continuation of table 21.*

New value drivers from former research: Other mixed industries

As shown in the comparison in tables 21 and 22, the column "proposal for new principal value driver in model" reveals possible complementing principal value drivers. These are analyzed below:

Quality: Pleased customers, is what most companies want to achieve. This is easiest done when they feel they get value for their money. One important ingredient in value is the quality of the product. Good quality is achieved through good design and accurate production operations. The design needs to help fulfil the products purpose in a smart way and that its dimensions are durable and easy to work with. Better quality can be achieved through investments in R & D and operational improvements. Quality affects demand and brand value and therefore also affects sales so higher profits can be generated. It is definitely a value driver within the automotive industry and is proposed to complement as a new categorized value driver.

Customer care: The value driver customer care found in former research within other industries in chapter 4.1.1 is an important value driver for every type of business. It helps create more value for customers, which leads to them being more satisfied with the product. All types of services are included like sales, maintenance, repair etc. The importance of customer relations is obvious, but not always seen for by companies. Customer care is proposed to be another categorized value driver.

Patent: This value driver is not found in our empirical study, but is nevertheless very important to every technological industry. Companies of the Automotive Industry mostly produce technological products where it is vital to protect innovations with patents. Patents help vehicle manufacturers in being competitive and affect a company's financial performance.

6.3 Final results from the analyze of value drivers

The final constellation of principal value drivers are shown in table 23. It includes principal value drivers analyzed from chapters 6.1.1, 6.2.1 and 6.2.2.

Buying power	Flexibility	Production costs
Competition	Industry vehicle supply	Quality
Consolidation	Internal resources	R & D
Cooperation	Investments	Regulations, legislations and agreements
Corporate governance	Market characteristics	Replacement needs
Customer care	Marketing	Size of industry
Customer costs	Organization	Subsidies
Demand	Operational performance	Substitute and complementary products
Diversity	Outsourcing	Type of product
Economic activity	Overcapacity	Used vehicle market
External resources	Patents	
Financial performance	Possession of driver's license	

Table 23. *Proposed new value driver categories.*

The proposed new principal value drivers can now be incorporated into the schematic model proposed in chapter 6.1.5. The placing of them in the model was conducted through the same process as before. The result of the new model is seen in figure 19.

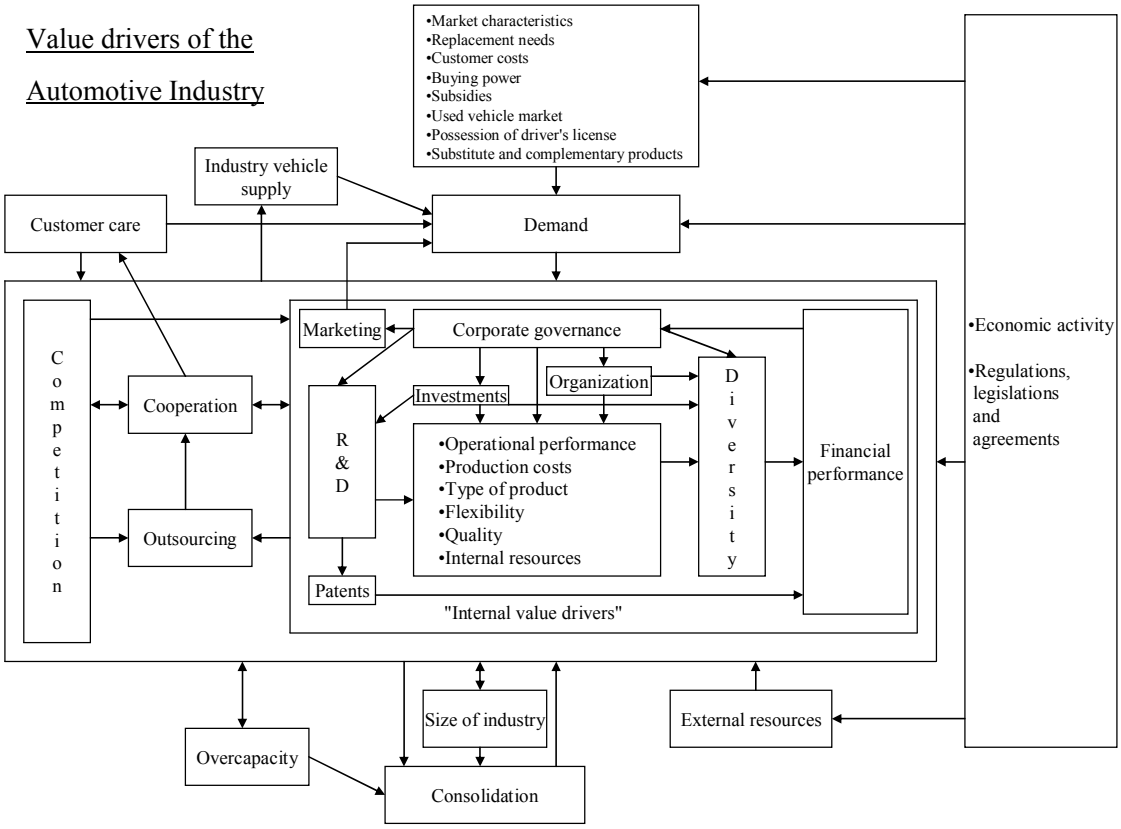

Figure 19. *The updated and final schematic model of value drivers of the Automotive Industry.*

6.4 SWOT analysis of value drivers

In this chapter we will analyze the Swedish Automotive Industry's strengths, weaknesses, opportunities and threats. This research has analyzed value drivers in different segments and on different geographical levels, but it is wrongful to exclude value drivers and trends from other segments and levels, if an analysis is to be made for example on a Swedish company in the Automotive Supplier segment. The entire sector of the world needs to be analyzed in order to understand trends, do forecasts and appreciate company values. The following analysis will focus on placing contemporary important value drivers affecting the Swedish Automotive Industry in a SWOT analysis.

6.4.1 Strengths

Demand: Loyal customers in Sweden will continue to profit Swedish OEMs. The loyalty among the customers is often bond to the vehicle brand. This is typical in Sweden and also in other markets where Swedish OEMs are doing businesses. The demand for environmentally friendly cars does strengthen the Swedish automotive industry even further due to their know how within the environmental friendly area.

Flexibility: The flexibility of the Swedish automotive vehicles manufacturers is considered to be strong. Both Volvo and Scania have invested in their R & D to achieve higher product flexibility. Scania has invested in several line manufacturing advancements to bring succession flexibility. This enhances the ability to produce new models in the same line as previous models. Volvo Cars has invested in the early 90's in product development that incorporates consolidated platforms, which has gained them higher profit. It is likely that they will continue this trend.

Operational performance: Is strong due to large investments in this area. Scania CV has their SPS (Scania Production System) that is an implemented lean manufacturing system originally from Toyota. This system has enhanced their production capabilities and minimized waste and costs. AB Volvo has also invested in operational performance and Volvo cars are considered to be efficient partly due to the combined technological knowhow between Volvo cars and Ford.

Quality: The product quality is high within the Swedish OEMs. They are producing mainly premium or mid-premium vehicles known for their high quality and reliability. The operational quality is high and will probably also be so in the near future sustaining premium products.

R & D: Strong R & D performance is vital to achieve high profit and growth. The focus on R & D improvements and production performance has gained high quality and also a more satisfied human capital. Innovative and well engineered products are signs of Swedish automotive products.

Internal resources: The Swedish automotive industry is an industry with a strong internal workforce. The industry is equipped with qualified workers to be able to produce high quality, high-performance and very complex premium products. The human capital of the Swedish automotive industry possesses a strong know-how base that results in innovative solutions.

Diversity: The Swedish automotive industry is widely spread across the geographic landscape. This is a key strategy to avoid downturns in some areas by balancing to different markets. The new emerging markets are already becoming new areas for increasing demand of premium vehicles. The China market is growing in an extreme speed, which will need products from the Swedish automotive industry, so does the CEE market.

6.4.2 Weaknesses

Corporate governance: The consolidation between Volvo cars and Ford may not be all good to the Volvo cars brand. The less profitable Ford, due to poor corporate governance, may weaken Volvo cars and disfavour its development. GMs recently pronounced major profit loss might also weaken Saab Automobiles in the same way.

Production costs: Even if production costs are quite low in the Swedish automotive industries, it is even lower in the Asian industries, like China and Japan. Especially the labour costs are hard to compete with. This is why the Swedish automotive manufacturers have to continue investing in cost reducing solutions to meet new competition from eastern industries.

6.4.3 Opportunities

Cooperation: New future cooperations will make an increase of profit and growth for the Swedish automotive industries. The cooperation is vital for future success not only between external competitors but also between companies in the own value chain. Swedish OEMs have opportunities to gain success in new emerging markets allying with, e.g., Asian companies. This will in the end constitute a competitive advantage.

Replacement needs: The replacement need is growing in China and other new emerging markets. Old vehicles are being dismantled and increasing wealth among the Chinese people drives customer spending to purchase new luxury vehicles. Western vehicles represent high status why newly and already wealthy Chinese individuals crave premium vehicles like Volvo and Saab. The cyclical replacement pattern of heavy vehicles, due to new emission standards, will also contribute to increasing replacement needs in the future and hence will create new opportunities for Swedish OEMs.

Subsidies: Subsidies that will profit owners of environmental friendly vehicles will also profit OEMs manufacturing these vehicles. The best selling environmental passenger cars in Sweden are the Volvo V70 flexi fuel and Saab 9-5 Bio power. Being a company that has knowledge of environmental friendly technology will grant great opportunities in the future.

Outsourcing: Increasing outsourcing to LCC will hopefully increase profit for the Swedish automotive industries. The outsource will probably continue to these regions, making it possible to lessen wages, impact of labour unions etcetera.

6.4.4 Threats

Economic activity: The forecasted downturn in economic activity may be a threat to the Swedish automotive industry. The growth may decrease for the Swedish automotive industry as a result of forthcoming tough economic conditions.

External resources: Fossil fuels are not infinite raw materials and with decreasing resources, prices will increase which will put pressure on fossil fuel driven vehicles sales. Large

investments in R & D or expensive outsourced technologies are inevitable for the OEMs, not excluding the Swedish OEMs, to survive the new competitive landscape.

Competition (existing markets): The Swedish automotive industry, are of today, mainly represented in Europe and the U.S. (especially Scania and Volvo trucks). These markets are characterized with high competition. This competition may be intensified due to forthcoming tougher economic activity and scarce external resources.

Consolidation: The latest consolidation propositions on Scania have weakened its position in S&Ps rating system. The owners and management neither want to be consolidated with another company. Hostile takeovers are a threat to Scania if their intension is to be independent.

7. Conclusion

In the beginning of the research we noticed that there were various definitions of the Automotive Industry and its segments. It was therefore necessary to formulate a definition of our own that could easily be handled with and used on all the other definitions, see figure 1 in chapter 3.1. The result of the definition was thereby used throughout the entire study and enabled a necessary delimitation of what segments that where needed for the analysis to be done. The segments of the Automotive Industry analyzed for this research were Consumer passenger Cars, Commercial Vehicles (mostly Light and Heavy Vehicles within the segment) and Automotive Suppliers.

Identification and categorization of value drivers

The main objective was to identify and categorize value drivers affecting the Swedish Automotive Industry so a model of value drivers could be compiled. In so doing, the segments were also divided into different market levels to make it easier for a categorization. The identification resulted in a large number of value drivers. Many of the value drivers could be categorized under a principal value driver, meaning a value driver synonymous or similar with others found that can be unified under one name. For example, maximum efficiency is a level of operational performance and is therefore placed under the categorized value driver operational performance.

The model

The main task was to analyze the value drivers' correlation with each other. To do this, we created a model that incorporates the principal value drivers. The purpose for the model is to show the connections between them. The result was a system of value drivers that helps to understand what driving forces that cause certain situations in the Automotive Industry. Both external and internal value drivers are represented making it more straightforward to see both external effects and internal effects. Combining the reviewed value drivers with the model helps to see important areas for an analyze of the industry and it may be possible to derive a more secure forecast to what scenarios might occur due to certain trends. Unidentified value drivers can easily be added either within a principal value driver or as a new one.

8. Discussion

This research of the Automotive Industry has established a model that can identify and analyze correlations between actual value drivers within an industry. It is build upon the Automotive Industry but can also be applied to other industries as well. This may be done by minor changes to the model. The model can also be used in Automotive Industries different from the Swedish Automotive Industry. If important value drivers are to be identified or analyzed in, e.g., the Asian industry, this model may be a simple way to accomplish the task in a quicker and more efficient way than with no model. Some value drivers may be more important in the Asian Automotive Industry than we have identified in our study. If this is true, the model could easily be modified with those value drivers and restructured to suit the new industry. The SWOT analysis complements our analysis of value drivers with a competitive perspective were the Swedish Automotive Industry's value drivers are analyzed by their advantages or drawbacks compared to other market levels.

Our research shows that it is possible to collect important value drivers that are the force behind certain profit or growth in an industry and also show what effect they might have on each other. The research is more qualitative to its nature, leaving other more quantitative aspects to continued studies. An example of a continued study could be to quantify our results by ranking the identified value drivers compared to each other. By so doing, a company could easily see which value driver that is the most important to them and their special interest. This would make it even easier to make strategic decisions correlated to their specific desire. Another study could involve focus on value drivers that we weren't able to identify through our empirical study. As explained in chapter 1.4 delimitations, further focus on value drivers in the segments of Automotive Services, Suppliers and to some sub segments in Commercial Vehicles could be of interest.

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Appendix 1.

	Light & medium trucks	Medium & heavy trucks	Heavy on & off road trucks
Gross vehicle weight (tons)	6-17 (2 axles) up to 24.5 (3 axles)	17.5-19 (2 axles) up to 26 (3 axles)	18-19 (2 axles) up to 40 (3 axles)
Cabin type (priority)	Width 2100 mm 2 or 3 seats easy passing from left to right	Width 2300 mm easy access	Width 2300 mm & 2500 mm easy access & space long distance
Engines	74-198 kW 3.9 to 7.8 liters	171 to 254 kW 7.8 to 9.5 liters	221 to 382 kW 9.5 to 17.2 liters
Frame	Parallel width: 850 mm	Front: width 1030 mm Rear: width 850 mm	Front: width 1030 mm Middle: width 850 mm Rear: width 770 mm

Source: Fisita, 1992

Appendix 2.

1	2
Economic activity	**Demand**
Economic cycle	CEE demand
Economic development	Changing demand
Economic factors	Consumer confidence
Economic growth	Consumer preferences
Exchange rate	Customer purchasing behaviour
Financial market turbulence	Emerging markets
GDP	Environmental concerns
Healthy economy	Environmentally friendly passenger car
Recession	New consumer demands
Trough	Transportation needs
Interest rates	
Stock exchange	
Swedish, European, US, Asian economy	
Swedish currency	
The economy	

3	4
Investments	**R & D**
Investment costs	Consolidation of platforms and modular components
Investments in R & D	Emission technologies
R & D costs	Innovative
R & D expenses	Material choices
	New technology
	Operational improvements
	Product development
	Standardizing parts across model ranges
	Technological development and improvement
	Technological improvement
	Value adding development per vehicle
	Weight reduction

5	6
Diversity	**Quality**
Balancing different markets	
Geographic diversity	
Product diversity	
Product mix	
Range of products	

Appendix 3.

7	8
Regulations, legislations and agreements	**Marketing**
Changing regulations	
Emission regulations	
Emission requirements	
Emission standards	
Emissions	
Environmental concerns	
High way tolls	
NCAP	
New legislation	
Restriction	
Timing of enforcement of emission standards	
Voluntary agreement	

9	10
Competition	**Internal Resources**
Competitive	
Fierce competition	
Healthy competition	
High competitive pressure	
Intense rivalry	
Price wars	

11	12
Operational performance	**Cooperation**
Capacity utilization	Alliances
Efficiency improvements	Cooperation with suppliers
Lean	Cooperative ventures
Lean manufacturing	Merger/partnering
Maximum efficiency	Partnering
Modular design	Sequence stability
Modules	
Operational improvements	
Operational performance	
Optimizing production	
Raised production volume	
Systems	

Appendix 4.

13	14
Organization	**External resources**
	Availability of components
	Energy cost
	High material costs
	Labour unions
	Material cost
	Raw material costs
	Raw material prices
	Unemployment

15	16
Patent	**Overcapacity**

17	18
Production costs	**Type of product**
Increasing cost efficiency	Fuel consuming vehicles
Price-cost pressure	Niche
Price-cost enhancement	Attractive product
Value adding development per vehicle	

19	20
Flexibility	**Customer care**
Consolidation of platforms and modular components	
Flexibility in manufacturing	
Flexible company	
Flexible working	
Product flexibility	
Product mix flexibility	
Succession flexibility	
Volume flexibility	

21	22
Market characteristics	**Replacement needs**
Economies of scale	Dismantlement
Emerging markets	Replacement customer
Fragmentation	
Large scale production	
Market fragmentation	
Motoring development	
Motorization of LCC	
Road quality	

Appendix 5.

23	24
Customer costs	**Financial performance**
Cost development	Corporate profits
Fuel price	Operating margin
Oil crisis	Profitability

25	26
Consolidation	**Outsourcing**
Acquisition	Outsourcing to LCC
Merger	
Merger/partnering	
Mergers and acquisitions	
Supplier consolidation	

27	28
Buying power	**Subsidies**
Consumer spending	Free parking

29	30
Used vehicle market	**Substitute and complementary products**
Prices for used trucks	

31	32
Industry vehicle supply	**Corporate governance**
Focus on environmentally friendly passenger car	Ownership
Growing supply	Parent company

33	34
Size of industry	**Possession of driver's license**
Amount of OEMs	
Number of OEMs	