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How can SMEs integrate themselves in global value chains of global players in the automotive industry?

An Italian – German comparative analysis.

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Abstract

Purpose – The purpose of this study is to highlight the efforts undertaken by four companies, two German and two Italian small and medium-sized enterprises, in order to explain how these firms managed to integrate themselves in global value chains of global players in the automotive industry from a value chain perspective.

Design/ methodology/ approach – The approach used was two-sided, qualitative and quantitative research methods were combined. Four case studies were created after conducting interviews and a survey was applied to test critical success factors.

Originality/ value – To the author's knowledge, there has been no micro firm approach with a global value chain view in the automotive industry that applied qualitative and quantitative research up until now. Therefore, the study contributes to global value chain literature.

Findings – The case studies suggest that firms can integrate themselves into global value chains by implementing different critical success factors such as a clear focus on its core competencies combined with a global supply structure and simultaneously fostering innovation. With a proactive strategy to improve its uniqueness, the study found small and medium-sized enterprises on every supply tier in the automotive value chain.

Research limitations/ implications – Quantitative research was conducted with a low level of participation, thus the quantitative research can only be applied to the case studies. The study is based on specific case studies, therefore its recommendations may be successfully applied to other products with consideration to different settings and competitive environments.

Practical implications – The ideas contained in this study can help entrepreneurs or CEOs of small and medium-sized enterprises to see how one can successfully sustain in a globally active and competitive environment like the automotive industry. Further, it highlights the mutual benefit between small and medium-sized enterprises and lead firms, suggesting competitive advantages through co-operation for the lead firms of the industry as well. Lastly, the study reflects what governments are able to do to support the growth of small and medium-sized enterprises and consequently improve their regional or national performance.

Paper type – Case study.

Keywords: global value chain (GVC), Small and medium-sized enterprises (SME), Automotive, Upgrading, Integration, CSFs, Germany, Italy.

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Glossary/ Index of abbreviations

ACEA	Association des Constructeurs Européens d'Automobiles
ANFIA	Associazione Nazionale Fra Industrie Automobilistiche
BMW	Bayerische Motoren Werke
CSF	Critical success factor
e.g.	exempli gratia (for example)
EPO	European patent office
ERP	Enterprise-resource-planning
etc.	et cetera (and so forth)
FCA	Fiat Chrysler Automobiles
GCC	Global commodity chain
GM	General Motors
GPN	Global production network
GTAI	Germany Trade & Invest
GVC	Global value chain
ICT	Information and communication technology
IT	Information technology
LE	Large enterprise
MRP	Material requirements planning
OBM	Own brand manufacturer
ODM	Own design manufacturer
OEA	Original equipment assembling
OEM	Original equipment manufacturer
OICA	Organisation Internationale des Constructeurs d'Automobiles
PSA	PSA Peugeot Citroën
R&D	Research and development
SCI	Supply chain integration
SCM	Supply chain management
SMEs	Small and medium-sized enterprises
SSCM	Sustainable supply chain management
UK	United Kingdom
U.S.	United States
USP	Unique selling point
VDA	Verband der Automobilindustrie

1 Introduction

Today's economy is increasingly structured through manufacturing chains that connect businesses, countries and other entities together. A recent example is the scandal of the Volkswagen Group, which is one of the largest corporate frauds ever to be detected. The scandal displays the interconnectedness of the automotive market since the ongoing debates discuss what effects an emission scandal can have on the German economy, on German brand perception in general, on the GDP of Germany, if the global manufacturing chain should neglect diesel engines and how the supplier network of the automotive industry has to adapt. Therefore, it is important to understand how GVCs are structured nowadays.

Sturgeon (2000) made a basic distinction between 'chains' to the various "networks". A chain "maps the vertical sequence of events leading to the delivery, consumption, and maintenance of a particular good and service, while a 'network' maps both the vertical and horizontal linkages between economic actors, i.e., recognizing that various value chains often share common economic actors and are dynamic in that they are reused and reconfigured on an ongoing basis."[1] If scholars utilize the latter perspective they take most often a macroeconomic perspective on the value chain and their research is dedicated towards the impact of value chains on nations or unions of states.

Hence, we can subsume value chain analysis as a tool, which is especially useful for macroeconomic studies because it "focuses on the dynamics of inter-linkages within the productive sector, especially the way in which firms and countries are globally integrated [..]." and "allows for an easy uncovering of the dynamic flow of economic, organizational and coercive activities between producers within different sectors even on a global scale."[2] Further, Bair (2009) points out that the GVC perspective is a research tool at the industry level. However, Kaplinsky & Morris (2001) point out that value chain analysis can be particularly useful for new producers who are trying to enter global markets. This affirms the use of value chain analysis as an appropriate theoretical framework to investigate how SMEs can enter GVCs.

To work with value chains, it is crucial to keep in mind that complete value chains do not just start and end within one company, implying that current competition does not only take place between individual businesses, but between entire value chains. According to Horvarth (2001), competition takes place between entire value chains as a derivative function of global markets becoming more and more efficient. Hence, if one enterprise can analyse value chains, offer a distinct part or fraction of them while providing an increase in value, there is a vast potential of improvement for the company's performance. How SMEs can achieve this vast level of improvement is the primary research question of this study.

From a managerial perspective, value chain analysis offers the opportunity to understand one's core business and possibilities to increase value gains from the

[1] See Sturgeon (2000), P.6.

[2] See Kaplinsky & Morris (2001), P.2.

value chain itself. According to numerous scholars (Park & Krishnan, 2001; Quayle, 2003; Andersen & Christensen, 2005; Rao et al., 2006), a competent management of the value chain is key for developing competitive advantages, while the mentioned scholars are using the term supply chain (Bordonaba-Juste & Cambra-Fierro, 2009).

A supply chain is defined as "a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer."[3] On the contrary, a simple value chain in the productive sector is often depicted as the full range of activities which are required to bring a product or service to its end consumer and beyond (Kaplinsky & Morris, 2001; Sturgeon, 2000). These activities can be carried out by a single firm or can be divided among different firms.

In the context of globalization, activities are mostly carried out by a specific network of interdependent firms and are governed by the lead firms of the industry (Gereffi, 1994). Thus, the major difference between a supply chain and a value chain is that within a supply chain, the concept of value does not exist. Since this concept might be an important factor in the process of SME integration, the study will utilize a value chain approach. However, value chains and similar systems are incredibly complex in the real world and defy simple descriptions. Intra-chain linkages are often a two-way relationship, where upstream and downstream have to take into consideration constraints of each party in the chain (Kaplinsky & Morris, 2001; Kaplinsky & Readman, 2001). Furthermore, the simple value chain is depicted linear, while in the real world a linear such a model is almost impossible to utilize.

In recent years, developments on how enterprises interact with each other were altered not only by globalization. These alterations exhibited in the form of declining barriers and growing integration due to great changes in information and communication technology (ICT). These developments made it possible for even the smallest enterprises to trade in a global environment. However, avoiding risks resulting from global competition becomes increasingly difficult as well (Bob & Brindley, 2000). Managers need to understand the global value chain and its dynamics in order to understand the competitive environment. Especially SMEs are obliged to create a balanced supply chain management (Hvolby & Trienekens, 2002).

For the purpose of this study, the most appropriate framework in order to analyse the integration of SMEs into a global value chain in the automotive industry is thus the GVC framework. Its development can be traced back to 1970s, when global commodity systems were researched (Bair, 2005). How the latest GVC framework developed will be covered in-depth in chapter two. For now, it is important to know that the global commodity chains by Gereffi & Korzeniewicz (1994) have produced "most substantial body of chain scholarship to date."[4]

The framework makes a basic distinction between producer-driven and buyer-driven commodity chains. The former are characteristic of more capital-intensive industries and thus subject to this study, representing the automotive industry. According to Gereffi (1999a), in such industries powerful manufacturers control and often own several tiers of vertically organized suppliers. Further characteristics

[3] See Mentzer et al. (2001), P.4.

[4] See Bair (2005), P.154.

of producer-driven commodity chains are that the economics of scale represent the main barriers to entry and core competencies are mainly R&D as well as production.

Gereffi et al. (2005) attempted to develop a more formal theory of value chain governance. They developed a typology of five governance structures that describe network relationships. In the case of the automobile industry, they describe the network relationships linking lead firms to suppliers and vice versa. The theory attempts to describe the variation in respect to how global production is organized and managed. The governance structures are measured by three independent variables (measured from “low” to “high”), namely: (1) the complexity of transactions, (2) the codifiability of information and (3) the capability of suppliers.

According to Bair (2005), there is an important continuity between GCC research and other value chain research. The central question that appears to motivate many value chain researchers is how firms can improve their position within these chains to generate and retain more value, which describes the above-mentioned vast level of performance improvement. Gereffi (2001) suggested that the access to the lead firms is necessary condition for successful participation in global value chains. By 2005, Gereffi et al. expressed their hope that the theory of global value chain governance will help creating “effective policy tools related to industrial upgrading, economic development, employment creation and poverty alleviation.”[5]

But what does upgrading mean in respect to value chains? To understand upgrading in value chain, one first has to look how enterprises can integrate themselves in the global economy. Kaplinsky & Morris (2001) distinguish two paths: (1) ‘Immisering growth’, which is the “race to the bottom” where intense competition happens and, (2) on the contrary, participation where the company realizes sustained income growth. According to the two scholars, the key capability making the difference is “the capacity to innovate and ensure continuous improvement in product and process development.”[6] If the rate of innovation is lower than the rates of their competitors’, this may result, in the extreme cause, also in ‘immisering growth’. They further specify that one has to look at the rate of innovation in comparison to their competitors. That is why the authors formed the term ‘upgrading’. ‘Upgrading’ describes the capability how fast firms, compared to competitors, innovate.

More adequate for the purpose of the study is the definition found by Bair (2005) in the value chain literature. At the most basic level, ‘upgrading’ has been defined as “improving the firm’s position within the chain and this is generally associated with increased competitiveness that allows for the capture of greater value-added through the production process.”[7] It can be achieved through moving up the value chain by increasing the amount of activities performed by one enterprise, namely ‘functional upgrading’. There are four types of upgrading, which will be explained in detail in section two. To be able to upgrade, an enterprise must be part of a value chain or an industry.

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[5] See Gereffi, et al. (2005), P.79.

[6] See Kaplinsky & Morris (2001), P.37.

[7] See Bair (2005), P.154.

In order to analyse a GVC, the study focuses on the automotive industry, which has been expanding ever since the 1890s when people were trying to substitute the transportation from horses to vehicles. The epicenter of automobile production has been for many decades the United States until the 1980s, when Japan caught up to the production level of the U.S. Moreover, since the mid-1980s, the industry shifted from a series of national industry to a more integrated global industry. According to Humphrey & Memedovic (2003), the automotive industry counts as one of the most global of all industries. Not only are cars sold worldwide, the manufacturing process is dispersed over multiple countries. Bearing that in mind, it is notable that the automotive industry has a total production of almost 90 million vehicles per year (see Table 1).

While the dispersion of activities has been expanding and the industry is still growing, Gereffi (1999a) noted that at that time the market could still be characterized as a producer-driven chain. According to the new framework of Gereffi et al. (2005), the automobile market can be characterized as a value chain with a 'captive' governance structure. This means that the industry is embossed by a high complexity of transactions, a high ability to codify transactions, with low capabilities in the supply base. Moreover, the Degree of explicit coordination and power asymmetry tends to be high.

On the contrary to, Humphrey & Memedovic (2003) state that the industry is one of the most global ones. Sturgeon et al. (2008a) point out, that because heavy engineering work of vehicle development remain centralized near to the headquarters of lead firms, that the automotive industry neither is a fully global nor tied to states or specific locations. Yet they confirm that the industry's governance structure can be described as 'captive' or 'relational'. They summarize the current dominant trend of regional integration with a "pattern that has been intensifying since the mid-1980s for both political and technical reasons."[8]

Table 1. Global automotive industry - production figures

Country	Cars	Commercial Vehicles	Total (2014)	%-change to 2013
Germany	5,604,026	303,522	5,907,548	3.3%
Italy	401,317	296,547	697,864	6.0%
World	67,525,346	22,222,084	89,747,430	2.6%

(Source: http://www.oica.net/).

The study focuses on Italy and Germany, nevertheless the industry is for every major country in the world a key sector in terms of income and employment (Humphrey & Memedovic, 2003).

Thus, the global manufacturing process in the automotive industry provides an ideal showcase to investigate how SMEs can enter and profit truly global value chains. Despite being truly global, the industry is dominated by a few large corporations in some countries, namely Toyota, GM, Volkswagen and Hyundai, representing Japan, the United States, Germany and Korea. These LEs produce

[8] See Sturgeon et al. (2008a), P.7.

and sell most vehicles on a global scale according to OICA (Organisation Internationale des Constructeurs d'Automobiles). When segmenting the market, the approach often used results in four product segments, namely passenger cars, light commercial vehicles, heavy trucks and the last segment buses and coaches. For the purpose of this study, which takes a value chain perspective, an approach by a product segmentation does not lead to a value chain view since producers often manufacture products for different segments with sub-brands. Thus, the companies have to source all components for each product. The approach taken in this study is the basic distinction between assemblers and suppliers. According to Humphrey & Memedovic (2003), assemblers in the auto industry are firms such as GM and Toyota, while component manufacturers supply many of the parts for vehicles. The requirements of an efficient value chain in this highly competitive industry drives not only the large organizations, but also the small ones. The key question for the study becomes, "How can the SMEs in the component-manufacturing segment integrate themselves into a global value chain of an assembler?"

To investigate the suppliers' strategy in integrating themselves in a global value chain, the study proceeds two-sided. First, semi-structured interviews with members of the firms taking place in case studies were conducted in order to gain an understanding how SME are working within global value chains. Secondly, data on critical success factors (CSFs) were collected. The CSFs were adopted from Ab Talib et al. (2015) and from Kaplinsky & Morris (2001), combining a GVC approach with a collection of rigorously tested CSFs. Ab Talib et al. analysed the occurrence frequency of every possible CSFs in supply chain management literature, making it a useful tool to distinct vital CSFs to useful CSFs.[9]
According to Kaplinsky & Morris (2001), it is important to crosscheck the answers by the supplier with answers of the buyer. This sort of triangulation results in (1) verifying the data as well as in (2) assessing the capacity of producers to "hear" the final markets, in this case their customer. This method resulted in two case studies from Italy and Germany and the activities of the suppliers were compared.

In this way, the study contributes to the current knowledge how suppliers actually succeed in being a part of the automotive industry by using case studies. While it is a small number of case studies, one has to bear in mind that a single case study can contain a powerful message as well. Additionally, case studies have the ability to get close to the theoretical construct of value chains (Siggelkow, 2007). Thus, the paper tries to unravel the underlying dynamics of value chains and the real-life implications for suppliers in the automotive industry, which is rarely the case for value chain research in comparison research about macroeconomic impacts and theoretical framework constructions. Specifically stated, the paper investigates how small and medium companies (in this case the suppliers) can integrate themselves in a global value chain of a global player in the automotive industry (in this case the assembler).

[9] Ab Talib et al. (2015) used a Pareto-Analysis to distinguish between 9 'vital CSFs', which are crucially important to supply chain success and 16 'useful many' CSFs, which do not have as much impact as the vital ones.

The primary research question implies questions central to the idea, such as what have successful SMEs done in order to be integrated. However, while diving into the subject, other questions, such as who are the global players in the automotive industry, have to be answered as well.
Most of these questions have been researched in some context or are easier to answer. According to OICA correspondent survey (2013), the global players in the automotive industry are the assemblers of the automobiles, the top ten being Toyota, G.M., Volkswagen, Hyundai, Ford, Nissan, Fiat, Hyundai, Suzuki and PSA (see Table 3 in section two). The study's interviewees represent decision makers within the value chain of the automobile industry, both for the suppliers and for the assemblers. In chapter three, the study pinpoints which decision makers were chosen to conduct the interviewees. The findings of the surveys are presented and discussed in chapter four, answering the remaining questions.

The purpose of the study is to answer how SMEs can integrate themselves in global value chains of global players in the automotive industry. The research question has yet to be resolved and therefore represents a gap in the knowledge.

The answer to that question is of great significance for the suppliers in the automotive chain, since there is a "best practice" for how to design the approach to enter a global value chain of a global player. Important to note is that a best practice is not copiable, it has to be adopted to the company's setting that is applying the best practice. The study aims at assisting the suppliers to understand what is required to enter a GVC and how to design their way of entry. Furthermore, the study helps global players to understand how suppliers interact within the value chain and what might be a misconception between them in respect to important decision factors. Scholars should furthermore build upon the case study from the countries Italy and Germany, investigating how suppliers and global players interact in other important countries, such as the U.S., Japan, Korea and France. Alternatively, scholars can build a greater sample of companies upon the later mentioned CSFs and validate which CSFs are important on a larger scale.
Moreover, if it is possible to help specific suppliers to gain a greater share of the value chain or help LEs to improve their value-add in their chains, the study also has implications for regional policies. As stated before, the automotive industry has a tendency to form clusters. If companies within these clusters can improve, the cluster and thus the region's economic performance can increase as well. Likewise, the paper is also useful for nations, as SMEs are a crucial part to the economic performance of every country and are often considered wellsprings of innovation.[10]
The growing integration of the global economy surely provides opportunities for all enterprises. While LEs are obligated to create an efficient value chain with a maximum value gain and minimal costs, the opportunities of globalization on the SMEs side are relatively larger regarding the potential for performance improvement and the scope of additional sales. Highly specialized SMEs can offer the most efficient link in a value chain and thereby be a stand-alone enterprise in a specific part of the value chain. Hence, an integrated SME has an opportunity to increase its income significantly through offering increased efficiencies and cost

[10] See Kaplinsky & Morris (2001), P.37.

savings to the corporation, which thereby can offer its customers the best value. This reflects the idea of Barney (1991) of a sustained competitive advantage, which he describes, can be obtained by implementing strategies that focus on their internal strengths while similarly responding to the opportunities that are presented by the environment and neutralizing external threats and avoiding internal weaknesses.[11]

The organization of the paper is as follows. The first chapter serves as an introduction and provides an important backdrop for the following sections. It provides a statement of the problem, explains the purpose and the significance of the study and defines terms, which are subsequently used throughout the paper. The second chapter provides the context for the study. First, it presents a literature review to gain an understanding of the current literature and the history of GVCs. Furthermore, the industry's current situation is explained in detail, as it is crucial to understand the industry's dynamics to GVC research. The third chapter introduces the methodology and reveals specifically how the analysis can be conducted and why the study was conducted in which way. The fourth chapter will present and discuss the results of the interviews in comparison to current findings of the literature. The last chapter serves as a conclusion and will summarize the study while simultaneously displaying the implications and limitations for practice and academia.

[11] See Barney (1991), P.99.

2 Context of the study

In recent years, developments on how enterprises interact with each other were altered to a great extend due to the technological advances of ICT as well as the declining entry and trade barriers, and business strategies (focus on core competences). These developments made it possible for even the smallest enterprises to trade in a global environment. As a result, competition now takes place between countries and firms and has become increasingly vertical (Cattaneo et al., 2013). However, avoiding risks resulting from increased global competition becomes increasingly difficult as well (Bob & Brindley, 2000). Managers need to understand their global value chain and its dynamics in order to understand the competitive environment. In order to gain an understanding, the following section starts by reviewing the existing literature on global value chains. The second part of this chapter contains the context of this study, the automotive industry, which is followed by defining the competitive advantage. Section two will finish by depicting the aspects that are especially important for the small and medium enterprises. The purpose of the following section is to give the reader a background of the framework used to understand dynamics in GVC by showing where GVC research has its roots, what are the achievements made by scholars in the field and what are its limitations.

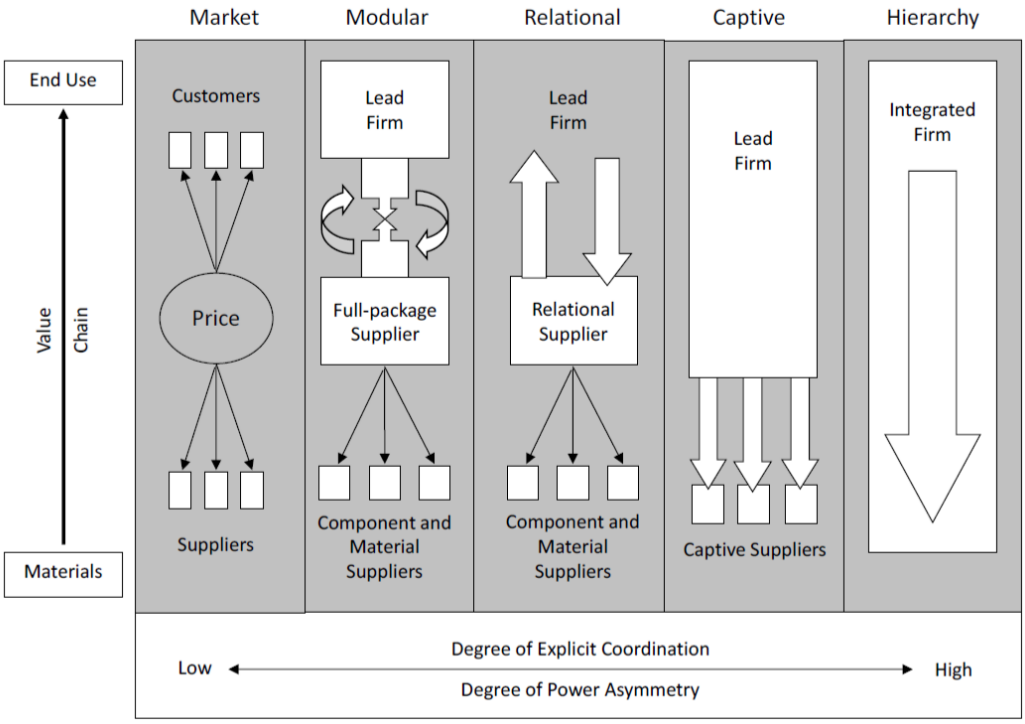
After the second chapter, the reader should be able to place the study into context to know how to interpret the results of the paper. The second chapter prepares the methodology section, which will proceed describing the analysis of value chains in detail.

2.1 Literature review and global value chains

As mentioned before, GVCs have become an increasingly important concept in analysing today's global economy (Elms & Low, 2013) and have been captured by numerous names and concepts.
The concept of GVC can be traced back to an article in 1977 by Terrence Hopkins & Immanuel Wallerstein, who started working on 'commodity chain' (Bair, 2005). The basic idea of Hopkins & Wallerstein was to take an 'ultimate consumable item' and follow the path of all sets of inputs and transformation that lead to the item. The set of all processes is what they described as the 'commodity chain'. When globalization took its impact**,** the concept of 'global commodity chains' (GCCs) was introduced in 1994 by Gary Gereffi in the publication of 'Commodity Chains and Global Capitalism', which was edited by Miguel Korzeniewicz and Gary Gereffi himself. The framework of Gereffi is one of the most influential in the field of GVC. It is important to bear in mind that with the term 'global' he refers not only to the geographic scope of the commodity chain, but he emphasizes the degree of functional integration between internationally dispersed activities.
Afterwards, scholars tended to shift the terminology from 'global commodity chain' to 'global value chain', underlining the importance of the concept of 'value-add' during the production process, incorporating the idea of Porter (1985) of the value chain. According to Bair (2005), the two concepts do not differ but the concept of 'global value chain' is more ambitious towards capturing the determinants of organization in global industries. Furthermore, the framework makes a basic distinction between "producer-driven" and "buyer-driven" chains. The producer-driven GVCs are found in capital-intensive industries, such as for example the automotive industry. These industries are controlled by powerful manufactures and often have several tiers of vertically organized suppliers. Moreover, the core competencies of these industries are principally R&D and production. The main barriers to enter these industries are economies of scale. In buyer-driven chains, the GVCs have a lower need for capital, and are mainly controlled by retailers and the branded marketers, thus, the core competencies are marketing and sales. As an example for a buyer-driven chain, Gereffi (1994) presented the apparel commodity chain. The framework and its applicability as well as the utility of the distinction between producer-driven and buyer-driven value chains have been disputed (Clancy 1998; Gellert 2003; Henderson et al. 2002). Nevertheless, the development of the framework has provided (1) a methodological advance for research, (2) has contributed theoretically to the understanding of how global economy works and (3) has greatly influenced the latest global value chain perspectives, which helped to create effective policy interventions (Bair, 2005).
Based on this concept, Gereffi et al. (2005) provided a new theoretical framework for value chain analysis in 2005. The more analytical framework, which is based on empirical observations, emphasizes governance in GVCs and identifies five different types of value chain governance: (1) Markets, which is characterized by low switching costs of partnerships; (2) Modular value chains, where suppliers make products according to the needs of customers, but using generic machinery and thereby limiting specification costs; (3) Relational value chains, which consists of complex interactions between buyers and sellers and thereby creating mutual dependency and a high level of asset specificity; (4) Captive value chains, where

suppliers face significant switching costs, hence the word 'captive'. These networks display a high degree of monitoring and control of lead enterprises; and (5) Hierarchy, which governance form is characterized by vertical integration.
This framework is based upon and measured by three determinants of value chain governance, namely the complexity of transactions, the codifiability of information and the capability of suppliers. The model can be observed in Figure 1, since the illustration does a very good job summarizing the framework.
Around the same time, Hendersen et al. (2002) and Coe et al. (2004) introduced the 'global production network' (GPN) framework. The framework combines the insights of GCC/GVC analysis with the actor-network theory.[12] It emphasizes the concept of 'networks' rather than 'chains' to "reveal the multi-actor and multi-scalar characteristics of transnational production system through intersecting notions of power, value and embeddedness." [13]

Figure 1. Five global value chain governance types



(Source: Gereffi, Humphrey & Sturgeon (2005), P.89).

The three perspectives, GCC GVC and GPN, all have their advantages and disadvantages. While some authors argue that GCC and GVC are not complex

[12] The actor-network theory (ANT) is used to trace a network of connections between interdependent actors, often used to investigate the degree of influence between the actors. For further reading, see Latour (2005).
[13] See Coe & Hess (2007), P.2.

enough[14], other authors state that GVC is "a useful tool to trace the shifting patterns of global production, link geographically dispersed activities and actors of a single industry, and determine the roles they play in developed and developing countries alike." [15]

To summarize the trace of intellectual progression in GVC research, one can conclude that GVCs have been heavily researched through various names and concepts. It is heavily disputed which concept describes all activities which are needed to bring a product or service from conception and design to the end consumer and beyond best. Another reason for the academic disputes is the complexity of the chains and/ or networks in the real world. Intra-chain linkages are often a two-way relationship, where upstream and downstream have to take into consideration constraints of each party in the chain (Kaplinsky & Morris, 2001; Kaplinsky & Readman, 2001). Nevertheless, the systemic interconnectedness of individual enterprises and links in the chain is a key strength of value chain analysis and therefore a useful tool for this study (Kaplinsky & Morris, 2001). Since the focus of the analysis are SMEs and how they can integrate themselves into GVCs, the GVC approach is suitable. Moreover, one has to understand what drives GVCs and how does integration in GVCs work.

While international fragmentation of production and outsourcing do not count as new phenomenon, the scale how internationally dispersed activities are structured today is not comparable to the time when the fragmentation of labour started. It evolved to another level of importance due to our rapid technological progress and our reduced costs of transportation and telecommunication. The dispersion of activities makes the concept of "Made in Country X" inappropriate to almost every product as almost 60% of trade in goods is in intermediates and the average import content of exports is around 40% (Lamy, 2013).

One of the key drivers for the production process are costs, specifically cost minimization, as the goal for each enterprise is having an efficient production process with minimal costs. Thus, the fragmentation of production is heavily influenced by trade costs and coordination costs. As the latter costs describe the costs of managing geographically dispersed activities, trade costs can be described as all costs which accumulate between the place where the goods or services are produced and the final consumer (De Backer & Miroudot, 2014).

In conclusion, GVCs are made out of manufacturing processes, which are influenced by different enterprises, which are having the objective to minimize trade costs and coordination costs. In turn, trade and coordination costs have changed significantly in the last decades due to technological advances (Reduction of transportation and communication costs), due to trade and investment liberalization and finally due to the demand side, for the simple reason that new emerging economies, such as Asia, have increased the size of the world demand. Furthermore, lead firms in a producer-driven industry have significant influence over the structure of the value chain as well as its participants, hence it is also known as a principal chain driver (Bair, 2005). Consequently, one can say that

[14] See Jackson (2002), P.6 (Talking about the case of Nike): 'When one tries to represent the company's supply networks, subcontractors, marketing and distribution systems diagrammatically, the notion of a simple single-stranded "commodity chain" scarcely does justice to the complexity of the processes involved."

[15] See Gereffi & Fernandez-Stark (2011), P.2.

these four main drivers, including technological advances, trade and investment liberalization, the increased size of the market and the lead firms were and still are shaping today's GVCs.

While GVC research has shed much light on how enterprises conduct their business, there are some limitations to GVC research. First, the main limitation to GVC research is that even with good quantitative information, the impact of global integration and fragmentation is extremely difficult to comprehend without an understanding of all dynamics within the chain. For example, trade statistics, specifically compositions of exports, even though they display the composition of trade (Lall et al, 2005; Hausmann et al, 2006), can only be weakly connected to the competence firms and countries (Sturgeon & Gereffi, 2008). For that reason, the latter mentioned scholars propose, in order to understand the complex interaction between entities within a chain, the use of qualitative research. Secondly, Bair (2005) observed that most GCC and GVC research is primarily focused on the upgrading process, and mostly at the firm level. This is partly due to the main limitation of the complexity of GVCs, whereas the second limitation poses the question of how the process of upgrading, which will be explained in the second chapter in detail, can be understood for larger units such as regional or national economies.

Thirdly, Humphrey & Schmitz (2000) point out that while upgrading is one of the main points of interests in GVC research, the framework still underplays the difficulty of the upgrading process in the real world. Nevertheless, the framework can provide valuable insights in specific industries and shows the real effects of global integration**.** Therefore, it is crucial to understand industry-specific factors, their dynamics and interaction, and it requires deep knowledge of the specific industry, which are effectively gained through qualitative interviews. Due to the uniqueness of most research, the scholars develop different industry specific models to display global integration of different industries. These limitations lead to the need of a generic theory, which is able to explain different patterns of global integration and predict outcomes associated with them (Sturgeon & Gereffi, 2008).

In recent years, GVCs have gained an increasing importance when scholars and practitioners look at international trade and development paradigms as well as in business strategies. After capturing the roots, the current state and the future as well as the general limitations of GVC research and the underlying dynamic factors in this section, the reader should keep the two main insights for the following segments in this study: A GVC approach enables a "meso-level view", while at the same time it is a useful tool to investigate upgrading opportunities for suppliers (Morrison et al., 2008). In the following chapter, the paper has a look at the industry, which is investigated in this paper before looking at how SMEs can participate in GVCs.

2.2 The industrial context of the study – the automotive industry

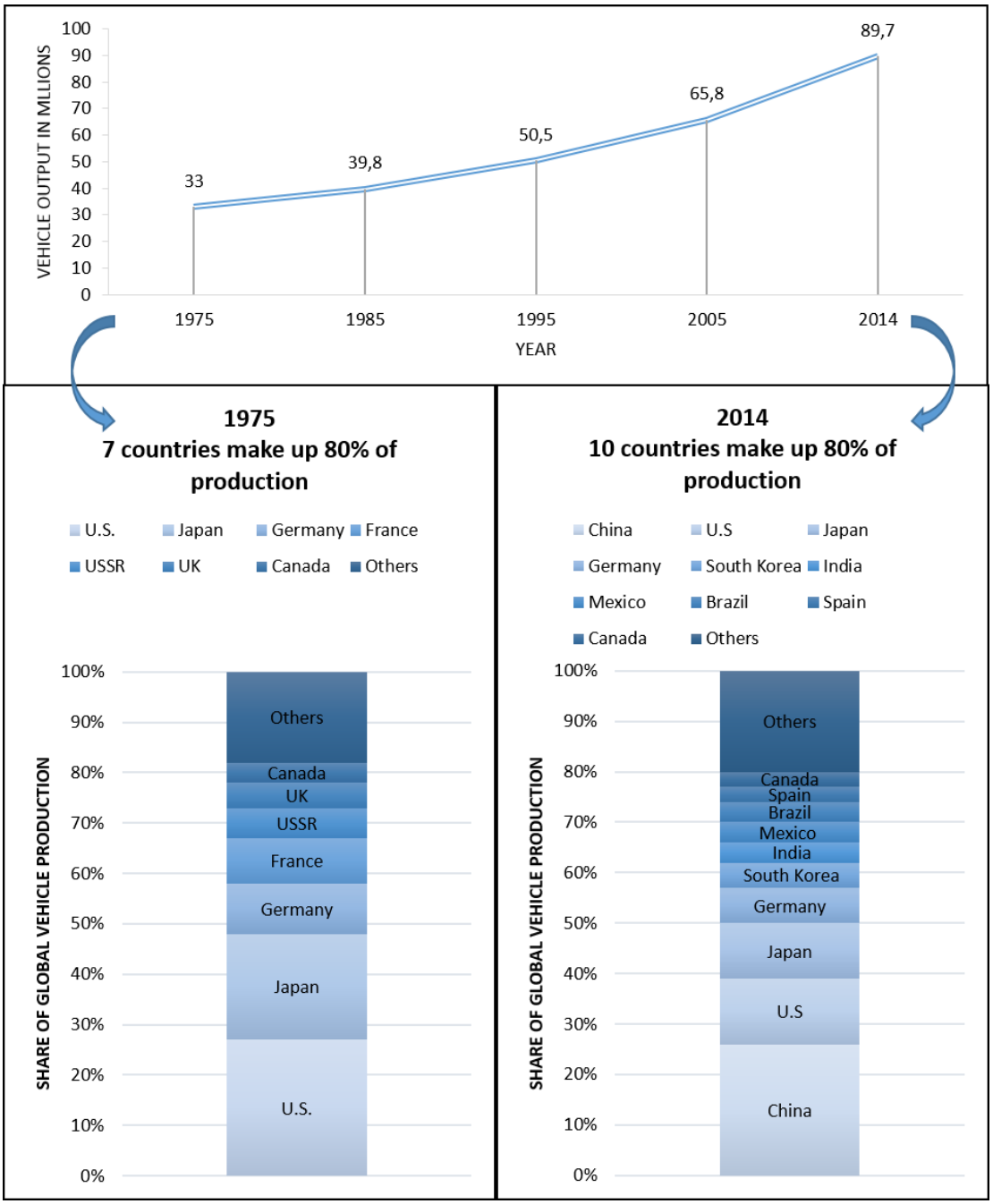
This section provides an overview over the global automotive industry. As discussed before, it is crucial to understand the industry and its dynamics before a value chain analysis can be constructed. After presenting a general overview of the global automotive industry, the study presents the two industries at which we take a closer look, the German and the Italian automotive industry. After this section, the reader should be able to understand the dynamics of the motor vehicle industry, its importance and the depth and length of global value chains, as well as the specific positions of countries in these manufacturing networks.

Since the purpose of this study is to investigate how SMEs can become part of the automotive GVCs, the introduction of the automotive industry is solely focused on aspects of the automotive manufacturing. The automotive industry is one of the most global ones and for every major country in the world and is a key sector in terms of income and employment (Humphrey & Memedovic (2003). The automotive industry covers all companies and activities involved in the manufacturing of automobiles, parts and components and thereby is the largest global industrial sector (Abe, 2013). According to the International Organization of Motor Vehicle manufacturers (OICA, 2015), production of the automotive industry spans over 50 countries with around 90 million produced cars world-wide with around 90 million cars produced annually, in more than 50 countries, with more than 50 million employees (including indirectly involved manufacturing & services) worldwide. In Europe, vehicle manufacturing is being operated in around 300 vehicle-assembly and production plants across 26 countries and had an output of 17.2 million cars, vans trucks and buses. Further, the auto industry is spurring innovation in Europe by being the largest private investor in R&D. In 2014, about 6.000 patents were granted by the EPO with an investment in total over 41.5 billion euros (ACEA, 2015). By now, the average rate of vehicles per 1.000 inhabitants is 174, representing an industry with one of the biggest impacts on the global society and economy. Yet, it shares important characteristics with other global industries, such as the electronics and the apparel industry, e.g. the accelerated growth rate since the late 1980s.
However, the motor vehicle industry has characteristics, which sets it apart from others. Whilst having a huge real market growth in the last three decades and the manufacturing process being spread world-wide, the automotive industry is distinct in the way that political interests have kept final vehicle assembly close to end markets (Sturgeon et al., 2008b; De Backer & Miroudot, 2014), which will be explained in detail shortly. Secondly, due to the high market saturation, vehicle manufacturers tend to assemble their cars in other countries, namely developing countries such as China and India due to their low levels of motorization (Sturgeon et al., 2008b). These characteristics can be observed in Figure 2. Since 1975, global vehicle production has almost tripled from 33 million units to almost 90 million units, displaying the high growth rate of the industry. Furthermore, the shift of the geographic location of production is also shown in Figure 2, as in 1975 seven countries accounted for about 80% of global vehicle production, in 2014 ten countries accounted for the same share. Out of these ten countries, three out of

four BRIC states are included (Brazil, India and China). This distribution shows the importance of the proximity of the vehicle assembly to the customers for the vehicle manufactures. While the production shifted and grew, the industry has also increased its outsourcing and has allocated more value chain activities within suppliers in the last decades (Sturgeon et al., 2008b; De Backer & Miroudot, 2014).

Amongst other industries, Fernandez-Stark et al. (2014) point out the automotive industry belongs to those with the highest index of fragmentation. The aforementioned 'unbundling has been taken place for decades (De Backer & Miroudot, 2014) as lead firms have been pushing the outsourcing and offshoring in the industry. Traditionally, the lead firms design and assemble the car, tier 1 suppliers produce car components or complete sub-systems, tier 2 suppliers provide simpler individual parts and the remaining suppliers are mostly in charge of raw material supply (Veloso et al., 2000). Due to the shifts in automobile production, the tier 1 suppliers are themselves becoming large global firms. Almost all large suppliers are based in advanced countries and are able to serve their customers globally (Sturgeon & Lester, 2004). By serving their customers globally, these suppliers have become powerful actors within the value chain and often provide products and services not only to one lead firm, but to many. However, typical for the automotive industry, there is not one way for these suppliers to serve them, since specifications play an important role to their customers. Therefore, these global suppliers are forced to produce unique parts and sub-systems and ties suppliers tightly to lead firms and vice versa (Sturgeon et al., 2008b). This need for close corporation leads to geographic proximity, in other word words, geographic manufacturing clusters evolve. These clusters, namely the regions of North America, Japan and Western Europe are competitive regions characterized by cost pressures, lower profitability and overcapacity (Humphrey & Memedovic, 2003). Despite the nested structure, suppliers are obliged to provide their products and services worldwide. Examples for having a global network are the main players of the global suppliers, such as Robert Bosch GmbH, Denso Corporation, Magna International Inc. and Continental AG. They built a network of final assembly plants worldwide to provide their products to local lead firms and thereby serve local markets (Sturgeon & Florida, 1999; Sutton, 2005). Through the global supply network, these companies were able to develop a close relationship with the lead firms. Apart from being able to supply one firm globally, one of the other preconditions to be chosen as a key supplier is to be able to design whole systems for a complex part or subsystem (Sturgeon & Florida, 2004). These preconditions and the importance of suppliers within the automobile production create an industry with a unique set of actors.

Figure 2. Total vehicle output worldwide and its geographic fragmentation



Note: Includes all sorts of vehicles
(Sources: Sturgeon et al., 2008b & htttp://www.oica.net/).

Another distinctive feature of the automotive industry is the small number of large enterprises, which have huge economic power in the industry due to the capital and technology intensive characteristic of the industry (Abe, 2009) and are thereby in control over the small and medium firms (Sturgeon et al., 2008b). The relationship between lead firms and SMEs can be described as hierarchical, where the large enterprises are at the top and responsible for design, branding and final assembly while the tier 1 suppliers like the Robert Bosch GmbH deliver complete subsystems by cooperating with a large network of lower tier suppliers and subcontractors. According to Veloso & Kumar (2002), the following suppliers comprise GVCs in the automotive industry: standardizers, component specialists, integrators, material suppliers and distributors. Their individual tasks within the industry are observable in Table 2.

Table 2. Actors of the GVC in the automotive industry and their tasks

Actors	Tasks
Standardizers	- conduct marketing research - develop the vehicle concept and design the specifications of the vehicle including its key modules
Component specialists	- deliver the required goods to integrators or assemblers for the purpose of module and system production or the final assembly of vehicles. - can be further categorized as either tier 1 suppliers that deliver components directly to the assemblers and - lower tier suppliers that provide components to other suppliers or integrators. The lower tier suppliers are mostly smaller enterprises and tend to manufacture simpler and more labour-intensive parts that would later be incorporated by the higher tier suppliers (Veloso & Kumar, 2002).
Integrators	- design and assemble key modules and systems for final assembly and are typically tier 1 suppliers. - must deal with a number of lower tier suppliers, they must possess a high degree of supply chain management skill, while adequately investing in R&D and process engineering.
Material suppliers	- provide various raw materials to automakers and their suppliers for parts and components production. - Materials include steels and metals, textiles, glasses, plastics, rubbers and chemicals

(Source: Veloso et al., 2000; Veloso & Kumar, 2002).

The division of labour between the suppliers displays the governance role between the suppliers, where some suppliers can set standards for others or require them to produce specific products. Furthermore, the governance structure is not only concentrated by hierarchy, but also by geography. The top automobile assemblers are concentrated in just a few regions, considering their Home-Countries. Japan and the U.S. are home to six – excluding FCA for being part Italy – out of the top ten automobile manufacturers (See Table 3).

Table 3. Ranking of automobile manufacturers in 2013*

Rank	Group	Country	Total vehicle production
1	Toyota Motor Corporation	Japan	10,324,995
2	General Motors Company	U.S.	9,628,912
3	Volkswagen Group AG	Germany	9,379,229
4	Hyundai Motor Group	South Korea	7,233,080
5	Ford Motor Group	U.S.	6,077,126
6	Nissan	Japan	4,950,924
7	Fiat Chrysler Automobiles	Italy/ U.S.	4,681,704
8	Honda Motor Company	Japan	4,298,390
9	Suzuki Motor Corporation	Japan	2,842,133
10	PSA Peugeot Citroën S.A.	France	2,833,781

*Note: Data from 2013, while in Figure 1 Data is from 2014. OICA.net did not publish the vehicle production per manufacturer for 2014 yet.
(Source: OICA.net).

One has to keep in mind that these corporations hold a big amount of brands with which they are dominating sales in most markets, as shown in Figure 1. Humphrey & Memedovic (2003) also point out that a small number of lead firms account for a significant share (the lead firms in Figure 1 account for more than 50% of the worldwide production) production. To display the global scope and diversity of these companies, we take an Italian and a German example, namely the Volkswagen Group AG and Fiat Chrysler Automobiles. While Volkswagen Group AG is holder of brands like Audi, Bentley, Lamborghini and 8 more, Fiat Chrysler Automobile holds Alfa Romeo, Dodge, Ferrari and 8 more brands. These ‘conglomerates’ of firms were formed “by a wave of mergers, acquisitions, and equity-based alliances in the 1990s”, creating high barriers of entry into the market of vehicle production (Sturgeon et al., 2008a). The strong ties between suppliers and lead firms due to the highly specific products additionally serve as an obstacle to enter the supplier market, illustrating the maturity of the industry.
The strong tie between tier 1 suppliers and lead firms is demonstrated by the geographic proximity of the two. Although the industry is characterized through having a global product, which has demand all over the world and serves customers worldwide, the vehicles still have to meet local market characteristics. This requires car manufactures to tailor their vehicles to specific characteristics, such as consumer preferences or country standards (e.g. right vs. left hand drive). In order to meet these local market characteristics best, many cars are designed

by regional, globally integrated production systems evolved while being accompanied by strong regional structures at the operational level (Sturgeon et al., 2008b). The shift towards regional integration can be observed since the mid-1980s. Because enterprises simultaneously have to serve a global market, car manufactures and their suppliers have created 'regional production cluster' spread all over the world. To minimize costs, manufacturing moved to locations with lower operating costs. This shift can be tracked in Figure 2, as vehicle production in 2014 is distributed in more countries with lower operating costs than in 1975, such as China and India. For the very reason of the global and regional production structure, GVCs are inherently difficult to track in easy dimensions.

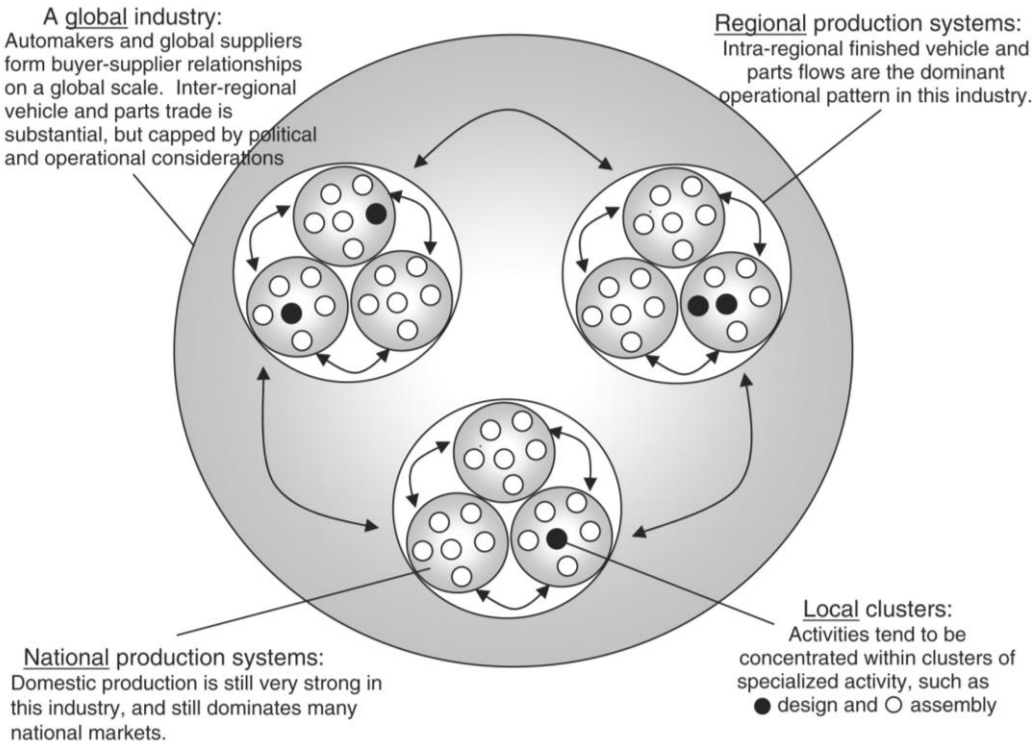
The shift towards regional production has several roots, which can be categorized into technical and economic reason. First, in this highly flexible and dynamic context, the location is one of the variables and close proximity reduces transportation costs, especially if the product and its parts are heavy. Secondly, most of the industry adopted 'The Toyota Way' of production, which emphasizes the concept of 'lean' production. Within this concept, just-in-time delivery is playing an important role and is much easier to achieve with geographical proximity. While the implementation of the just-in-time concept into production does not necessarily require geographical proximity, it certainly eases delivery. According to Sturgeon and Florida (2000), the trend to manufacture parts and vehicles close to end markets can be traced back to the earliest days of the automotive industry. Yet, this shift has accelerated and has become more obvious as the demand side for motor vehicles has grown in different end markets all over the world.

One of the main factors, which contributes to vehicle production being regional, is the political dimension (Van Biesenbroeck & Sturgeon, 2010). Since the automotive industry is one of the major contributors to the GDP in many countries, the industry carries issues of high political stake, such as employment. With over 50 million people employed worldwide (OICA.net), the industry represents a goldmine for employment, and a high employment rate is a good factor for political campaigns. Both parties therefore, politicians and the vehicle producers, are better off if they support each other. According to the two scholars, the political pressure is an additional reason for 'supplier co-location', thus enforcing regional production centers.

The complexity of the GVCs in vehicle production has also stems from the product itself. Barton & Thomas (2009) identified multiple factors, which add complexity to managing the chain, such as the number of parts in the product, the quality and the standard, the wide range of sub-groups for each product family, the distinct process chain which belongs to each product group, the location diversity of the part suppliers, etc. Thus, the product complexity entails a value chain complexity. Masato Abe conducted the interview in November 2012 in Bangkok, where he was told that the Toyota Camry sedan car is made out of over 4,000 parts and components. Hence, the complexity of the product is additionally a barrier to entry the market. According to Sturgeon et al. (2008b), one has to invest more than 30.000 engineering hours, resulting in 3-5 years to complete a car and huge financial investment up-front, up to several billions euros.

To summarize the structure of the car manufacturing process, representing the investigated global value chain of this study, we can conclude that despite the display of global integration within the production chain, the process tends to be concentrated in or near headquarters of lead firms (Sturgeon et al., 2008b) in multiple countries. The main reasons for why are political, technical and economical. Other factors such as social and environmental conditions as well as cultural proximity contribute to the concentration in or near to headquarters of lead firms and translates into one or a few industrial clusters of automotive production per country.

Figure 3. The nested geographic and organizational structure of the automotive industry



(Source: Sturgeon et al. (2008a), P.8).

A closer look at the intraregional sourcing reveals three main regional blocks: European Union member states sources the majority from other European countries, signatories of the North American Free Trade Agreement primarily source from NAFTA partners and Asian countries largely rely on their regional sourcing as well (De Backer & Miroudot, 2014). These clusters are typically meant for a longer period because of the high specification requirements of lead firms and the therefore necessary high investments of suppliers, thereby amplifying GVC lengths and increasing their complexity.

According to De Backer & Miroudot (2014), the value chains of the automotive industry were in 2009, compared to other global industries, the second longest, behind TV and communication industry. Dicken (2007) adds as a characteristic to the complexity and multi-tiered supplier structure the high degree of outsourcing. To display the complexity, Sturgeon et al. (2008b; Page 10) concluded that "as a result, local, national, and regional value chains in the automotive industry are 'nested' within the global organizational structures and business relationships of the largest firms, as depicted in Figure 3." The 'nested' structure is the result of the lead firm's interest for a number of reasons, including a reduction of value loss due to tariff, a reduction of administrative efforts, and an increasing recognition of standards along the production chain (Cattaneo et al., 2013). Despite the regional-global dispersion of the production, the manufacturing chains of vehicles remain global from a GVC perspective, as the manufacturing activities are carried out in inter-firm networks (Gereffi & Fernandez-Stark, 2011).

Baldwin (2012) tackled the fragmentation of production and categorized it into two 'unbundlings' of activities. The 'first unbundling' happened between 1850 and 1914, when production and consumption were separated. The scholar states that the 'second unbundling' took place in the mid-1980s and split the production process itself, both geographically (offshoring) and organizationally (outsourcing) across the globe. Therefore, within the 'second unbundling', new opportunities were created for SMEs to access global markets as providers of intermediate goods and services with a high degree of specialization (Cattaneo et al., 2013).

The second 'unbundling' of activities in the automotive industry was enhanced by globalization from the mid-1980s, such as the public policy liberalization, showing the importance for companies to keep up with current developments. The 'second unbundling' of activities contributed to a major shift in the automotive industry, specifically to the components industry, due to a shift in the relationships between suppliers and assemblers and due to the tackling of new markets of the assemblers (Humphrey & Memedovic, 2003).

The scholars identified three significant changes. The first crucial shift was the movement from the production of ready-designed parts, which were produced at a large scale in order to serve multiple OEMs, to a greater customization since OEMs involvement in design activities rose significantly. The second major change was the movement from producing individual parts to manufacturing complete sub-systems. With the assembly of parts being carried out by the supplier, value-add of production moved from the OEM to the supplier. The third shift happened due to the increasing importance of just-in-time production systems and the evolving lean management in the 1990s, resulting in more intense relationships between assemblers and suppliers. The three shifts additionally display the adaptability of the industry to trends.

The automotive industry, being global as it is, has to pay close attention to where the industry is developing, thus, the firms have to monitor global trends of the industry carefully. According to Mohr et al. (2013) and Sturgeon et al. (2008b), the following trends can be identified:

(1) **Increasing complexity**. The McKinsey& Company Report by Mohr et al. (2013) points out that due to an increase in regulation towards environmental and safety standards, not only cost pressure but complexity in the production process will increase.

(2) **Diverging markets**. The share of emerging markets of global sales will rise from 50 percent in 2012 to 60 percent by 2020. Simultaneously, their share of global profits is also set to rise by 10 percentage points. Large enterprises, specifically OEMs, need to prepare to the shift, since the current production and supply bases are yet to be aligned to the future markets, potentially creating a "portfolio mismatch". The OEM business models of the future also have to be developed in accordance with the consumer, who tends to think that there is a car for every consumer (GTAI, 2014), leading to increased attention to differentiation of the OEMs' brand reputations.

(3) **Digital demands**. Another big trend is the digitalization, affecting both, the 'car of the future' and the purchasing process itself. According to Mohr et al. (2013), research shows that the primary source of information to buy a car are digital channels. Furthermore, digitalization is also an important issue for the customers' driving experience. By 2020, every fifth car will be connected to the internet. According to GTAI (2014), the vehicle innovation strives to new electronics and software, as in 2012 approximately 90 percent of automotive innovations were featured from there, resulting in active safety of vehicles and infotainment features.

(4) **Shifting industry landscape**. The above mentioned, 'captive' governance structure is likely to change as alternative powertrain technologies are in demand (as well as electronics and software in general). Outsourcing continues to grow and suppliers will likely provide more of the value-add in manufacturing, thereby increasing their importance within the supply chain (Mohr et al, 2008). At the same time, tier 1 suppliers will become consolidated into 30-50 mega-suppliers, thereby becoming more global, establish even closer relationships with lead firms and additionally share more risks with them (Sturgeon et al., 2008b). This trend will increase the importance of the suppliers' role. Furthermore, every company will have to compete with upcoming car and car component producers of the emerging countries, especially with Chinese players.

(5) **Energy Efficiency**. Engineers around the world are working hard to improve energy efficiency by developing alternative drive technologies (electric, hybrid and fuel cell vehicles), exchanging material with lightweight elements, and other activities such as smart traffic management. The market potential for energy efficient cars is expected to grow in a huge manner and is often supported by government subsidiaries, making it the most interesting R&D area for most automotive firms.

Keeping these five main trends, or rather challenges for automobile companies, in mind and adding the sales growth forecast, the industry could raise their profitability by 2 billion euros. However, in a negative scenario, where regulations are put in place in emerging markets, the negative profit impact could be up to 15 billion euros for existing automotive companies for the following years.

As observable in this section, the automotive industry is a truly global industry with a dynamic and complex manufacturing process around the world, facing constant changes such as customer demand, sourcing strategies, technological innovations, legislations and competitive challenges. Most of these changes are ongoing since the 1980s, but the magnitude of change makes it increasingly difficult to prepare for the future, both for the lead firms and for the suppliers. The focus of this study are the Italian and German auto market, at which we will have a closer look now.

2.3 The German & Italian automotive industry

The German and Italian Automotive Industry are important for the European Market and highly intertwined. Germany is the most important country for Italy regarding automotive parts, while the German automotive industry is recognized worldwide for excellence in engineering and the leader in European production and sales. In order to understand the environment in which this study was conducted, the purpose of this section is to compare the German and the Italian market to both each other and to the world, respectively to other countries on the globe.

The German auto market[16]

Europe's biggest automotive market is located in Germany, accounting for over 30% of all manufactured passenger cars and up to 20% of all new registrations (Germany Trade and Invest (2014). Thus, the automotive industry is the largest industry sector within Germany, accounting for a turnover of 362 billion euros in 2013. While the industry is still growing, having increased the turnover by 1.3% to 2012, the domestic market accounts for 127 billion euros, and foreign markets, namely exports, account for more than 234 billion euros. The exports are growing at a faster pace, with an increase equivalent to 2.6% to 2012. Simultaneously, unit labour costs are decreasing. From 2004 to 2011, unit labour costs have decreased by a yearly average of 0.4%, resulting in a more competitive automobile manufacturing.
The turnover is created by more than 750.000 employees, being employed in the industry with the largest concentration of OEM sites in Europe, namely 43 sites in 2013. These OEM sites account almost for two thirds of the total turnover revenue of the German automotive industry and for 51% of the market share in Western Europe. 291.000 of the workers are employed in the supplying industry, where they play a key role of supporting development and production of vehicles. The German auto market has a number of global brands in the automotive market, assemblers being namely Volkswagen, Daimler, Audi, BMW, Porsche and many more, and as well twenty-one of the world's 100 top automotive suppliers are German companies. A GTAI study provided insights in the perception of the label "Made in Germany" and in German products. Specifically for automobiles, associations are typically quality, reliability, durability, efficiency and safety. The result of this perception and the concentration of global brands, suppliers and the workforce results in being the car production leader in Europe, with almost 6 million manufactured vehicles in 2013.
To be able to produce such an amount, which is relatively huge compared to the size of Germany, the industry needs to be quite mature. The matureness of the industry is displayed by the many members of the value chain, which are all to be found in Germany. There are many large and medium sized manufacturers and assemblers, many system and subsystem suppliers (tier 1 supplier), and many lower tier suppliers.

[16] All industry numbers have been retrieved on the 30.07.2015 from vda.de, gtai.de, oica.net and from the E&Y European Automotive Survey 2013.

According to GTAI (2014), around 85% of auto industry suppliers are medium-sized companies, stressing the relevance of this paper. All suppliers combined account for up to 70% of the value-add within the German industry, ensuring the competitive advantage of the country. As noted in section 2.2, the trend is to source more activities from the suppliers, hence shifting the value-add more and more to the supplier side. However, not only German suppliers are successful in Germany. The top ten non-German automotive suppliers have also successfully established operations in Germany. In total, 21 of the top 100 automotive OEM suppliers are located in Germany, and 18 of these belong to the top 50 suppliers in Europe. Regarding the turnover, the OEM suppliers created around 70 billion euros of total German automotive supplying industry in 2013. Within the 70 billion euros turnover, a share of 37% of the revenue was designed for foreign markets, namely exports.

Considering the created revenue in foreign markets, the industry plays a key role for the German economy. The most important section of the German auto industry are the passenger cars and the light commercial vehicles, which accounted for 200 billion euros foreign market revenue in 2013 (GTAI, 2014). The German manufactures know the value of the cars and thus 77% of cars produced in Germany in 2013 were designed for foreign shores, which leads to the fact that worldwide German OEMs production lines account for around 20% of total vehicle production. Most German cars are exported to neighbouring European countries, which are responsible for purchasing around 60% of total German car export. Second place for purchasing German cars is taken by the U.S. before Asia. Asia, specifically China, is very important for the German auto industry since Chinese have a strong impulse to purchase premium brands, thereby making China the most important market for German OEMs.

In order to stay competitive, remain the leading position in for the OEMs and create top-notch vehicles, German OEMs spend more than 18 billion euros in 2014 on R&D, accounting for approximately 30% of international automotive R&D expenditure. A further 6 billion euros is invested in external R&D, accounting for almost half of the Germany's total spend in external R&D, and according to the Ernst & Young European Automotive Survey, more than 40% of German automotive companies plan to increase their investments in R&D still. Apart from R&D spending, Germany has the highest concentration of automotive OEM and tier 0.5 supplier R&D centers in Europe, making it the most important location for automotive development in Europe.

Additionally, a big workforce is behind R&D, with more than 95.000 people being employed within the German R&D automotive sector. These activities result in a positive image for German cars, apart from the global perceptions and associations. A recent Ernst&Young study, which is comprised of 300 companies (15% OEMs; 85% suppliers) conducting business in the European automotive sector, showed that Germany is the most innovative hub in the world in front of Japan and South Korea. However, it is not only surveys, which show the innovative position of Germany. In 2012, 51% of the turnover in the automotive industry is being created from new product innovations and the biggest German automotive supplier, Bosch, filed 4.500 patents in 2014.[17]

[17] See http://www.bosch.co.uk/, → sustainability & innovation → patents

Apart from private spending, the automotive industry in Germany benefits from the potential cooperation partners it has within Germany. According to the Federal Statistical office, institutes of higher education invested around 13.5 billion euros in R&D in 2011. At the same time, there are more than 250 institutes of the four large research organizations in Germany: The Fraunhofer-Gesellschaft, the Max Planck Society, the Helmholtz Association and the Leibniz Association These organizations are home to more than 60.000 experts in applied and basic sciences. For the automotive industry, the Fraunhofer Institute for Communication Systems is particularly important, since they are developing top-notch vehicle ICT. The Institute has developed competencies in the fields of automotive networks, infotainment, diver assistance and model-driven software.

The importance of the premium segment for the German automotive industry can be observed not only by the German R&D segment, but also by the production numbers. According to GTAI (2014), worldwide around 80% of all premium branded vehicles manufactured are produced by German OEMs, and 46% of these are produced in Germany. Being the leading producer in the premium segment, the automotive industry in Germany is equipped perfectly to meet the demand of the premium segment. In the study of GTAI (2014) is also mentioned, that there exists a broad consensus “among reputable industry analysts that, globally, the premium segment will grow at a much faster rate than the total passenger car segment in the next decades”.

Additionally, the German automotive prepares to stay successful. In order to stay on top of the market, most companies will concentrate on the premium market segment, since it has the highest growth rate of all (2.8%). Since the European and U.S. markets are quite mature, sales will mostly be done in developing countries, such as China and India. The new risks companies have to take are uncertainty concerning the growth rates in developing countries and currency fluctuations.

Gaining access in global markets is also one of the four activity areas in the “CARS 2020 Action Plan” by the European Commission from 2012. The initiative offers funding with the European Investment Bank to achieve objectives such as advancing in technology by investment in order to develop ‘clean’ vehicles, improving the market conditions and train the personnel.

Further circumstances are also in favour of the automotive industry’s development. More than 80% of the German population have been trained to university entrance level or possess a recognized vocational qualification, representing a good basic workforce. In comparison, the OECD average is 67%. With the steady flow of university and college graduates, a dual education system[18] and a share of 30% of natural sciences or engineering degree background, skilled personnel is not a factor about that the industry has to worry. Other than the skilled personnel, Germany also provides the industry with a reliable infrastructure (quality of roads, air transport, railroads, port infrastructure, communication and energy infrastructure) [19], with a stable economy (economic growth in Germany is expected

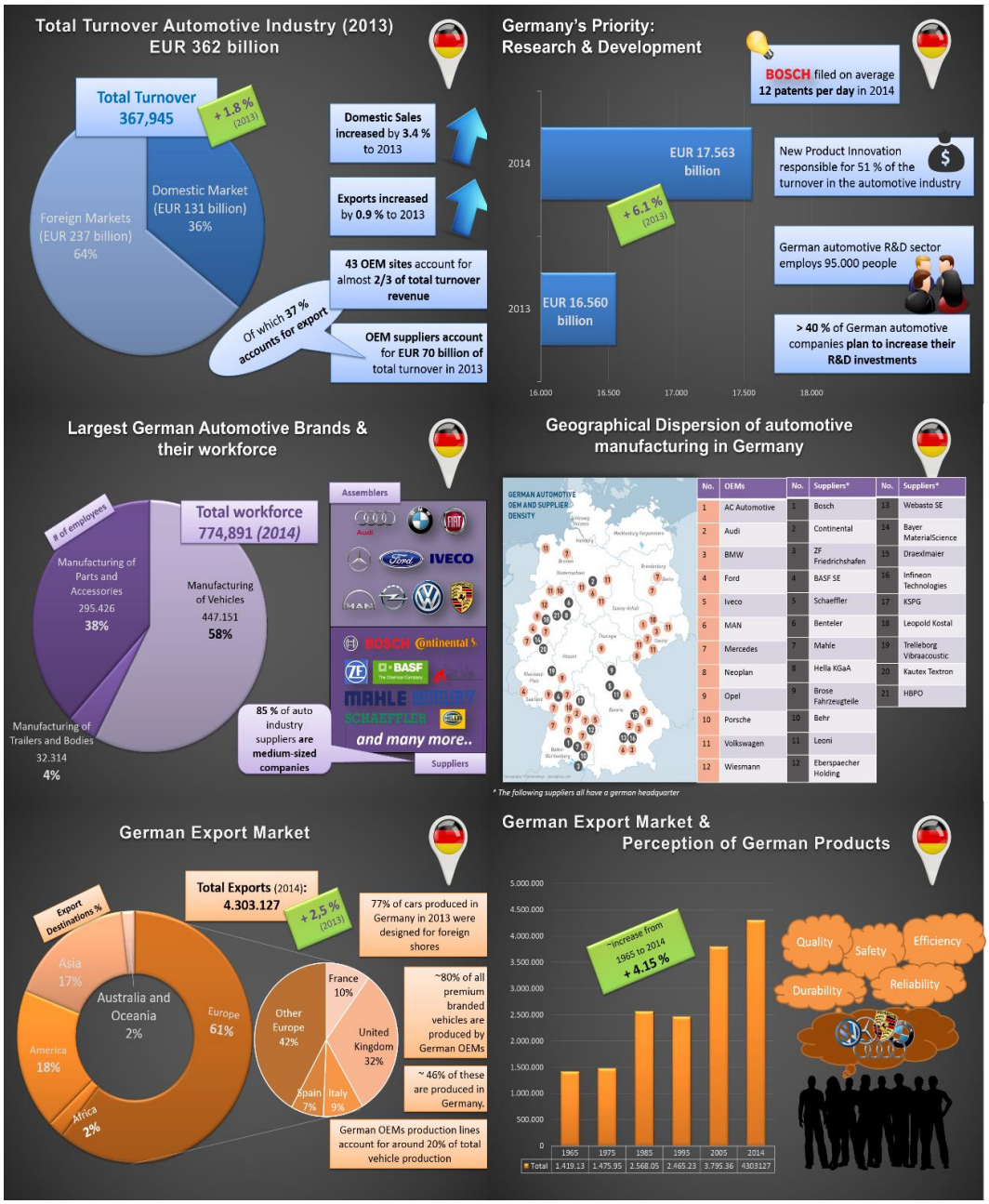
(Accessed on the 10th of August, 2015)

[18] The dual education system in Germany combines the benefits of classroom-based and on-the-job training over a period of two to three years. In close cooperation with industry and the government, the German Chambers of Industry and Commerce (IHKs) and the German Confederation of Skilled Crafts (ZDH) ensure that exacting standards are adhered to.

[19] WEF (2013-2014). The Global Competitiveness Report.

to be significantly higher than in the wider Eurozone), a secure legal framework (planning and operating security, intellectual property protection, protection from organized crime, contractual agreement security) and a competitive tax system, where companies have to face an overall tax burden of less than 30% and in some municipalities as low as 23%.

Figure 4. Summary of the German automotive Industry



(Sources: vda.de/, gtai.de/, oica.net/, E&Y European Automotive Survey 2013).

Italian market[20]

The Italian automotive industry has gone through a small recovery year in 2014 regarding its sales, after the period from 2007 to 2013 has halved the sales of Italian passenger cars. The economic crises has had a huge impact on the car industry in Italy, reducing the sales, new car registrations and production numbers. Additionally, actions from the government to counter the crisis, such as increasing taxes on gasoline, increasing the value-added tax to 22% and taxing larger engine sizes as a luxury tax added further obstacles for the automotive industry. On the contrary, the Italian government also supported the car industry by subsidizing the purchases of low emission cars. The financial aid supports equally consumers and businesses.

Since 2014, the fourth largest automotive market of Europe (behind Germany, UK and France) is trying to recover. From 2013 to 2014, production numbers have gone up 6%, new car registrations increased by 4.2% and sales went up by 5%. The recovery is also displayed by the sales of the most successful car assembler of Italy, FCA, who has recovered its sales by 1%, whereas other large companies such as Audi (+4,6%), BMW (+2,4%) and Mercedes-Benz (+1,6%) have increased their sales as well. The large German car assemblers and their success in the last few years in the Italian market display again how intertwined the largest and the fourth largest car industry in Europe are. As an example, behind FCA, Volkswagen has a market share of around 14% in Italy with around 190.000 sold vehicles in 2014.

From a European production perspective the Italian automotive market ranks 7th in 2014 behind Germany, Spain, UK, France, Czech Republic and Slovakia with a production of around 700.000 vehicles. Within these production numbers, Fiat Chrysler Automobiles is responsible for 99% of the domestic production, which is done in five different Italian production plants (Turin, Piedimonte San Germano, Pomigliano d'Arco, Naples, Melfi and Grugliasco). Apart from large Assembly plants, the Italian car parts industry holds around 2.400 enterprises. In 2013, these enterprises accounted for a total revenue of around 38 billion euros. Around 3% of the revenue is reinvested in R&D. The links between Germany and Italy can also be seen in the supplier industry. Bosch is one of the most important suppliers for the Italian assemblers, delivering high-pressure diesel pumps to Bari as well as vacuum pumps to Cremona. The total import of car parts according to ANFIA (Associazione Nazionale Fra Industrie Automobilistiche) [21] is valued at 11.1 billion euros in 2013, equivalent to a 4.2% increase in comparison to 2012. Most parts were imported from Germany with a percentage of 26.6%, followed by France (13.4%) and Poland (8.9 %). However, for the parts industry not only the imports are important. Italy exports also a big amount of car parts due to high production numbers of foreign car producers who manufacture parts for their European assembly facilities, especially Bosch and Daimler. These corporations are also responsible for stabilizing the Italian supplier market apart from the rising share of exports, which help to reduce the dependency of the Italian car industry on FCA.

[20] All industry numbers have been retrieved on the 30.07.2015 from gtai.de, oica.net, anfia.it and from the E&Y European Automotive Survey 2013.

[21] National Association of the Automobile Industry (Torino, Italy)

Furthermore, the large suppliers that belong to the FCA Corporation, namely Magneti, Marelli, Teksid and Comau are delivering parts to foreign production plants of FCA and other enterprises. The lower tier suppliers often work as a subcontractor for foreign subsystem- and parts producer, and especially often with German enterprises.

Table 4. Sales of passenger cars from different large assemblers in Italy

Producers	2014 Sales	Variation 2013 / 14	Market Share 2014
FCA	378.185	1.0	27.8
Volkswagen-Group	190.047	7.8	14.0
PSA	124.398	3.1	9.1
Renault-Group	119.518	28.8	8.8
Ford	91.541	4.6	6.7
GM-Group	82.721	-14.7	6.1
Daimler-Group	62.218	-5.8	4.6
Toyota-Group	62.775	12.4	4.6
BMW-Group	62.722	4.7	4.6
Nissan	48.489	4.1	3.6
Total	1.359.616	4.2	100.0

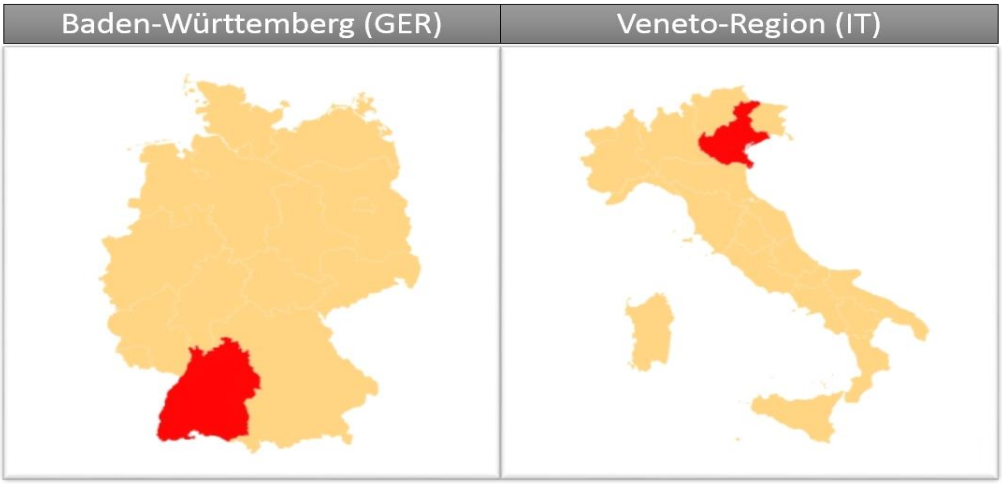
(Source: ANFIA.it/).

To investigate how German and Italian suppliers are able to compete within their markets, this paper focuses on two regions of Germany and Italy, namely Baden-Württemberg in Germany and the Veneto Region in Italy. Baden-Württemberg is located in the south of Germany, while the Veneto Region is located in the northeast of Italy, as can be observed in Figure 5.
The two regions are inherently different. Baden-Württemberg is approximately double the size, has more than double the inhabitants and almost triple the GDP of the Veneto region (see Table 5). The major difference regarding the two regions and the topic of the theses is the automotive sector. The industry represents a major backbone of the economy of Baden-Württemberg, whereas in the Veneto region most of the GDP is created by Tourism and Fashion. The economic importance of the two regions, or rather the difference, can be observed from the categorization of the European Union. The NUTS classification (Nomenclature of territorial units for statistics) was created by Eurostat (one of the leading providers of statistics about Europe) to divide economic territories in the EU in order to collect, develop and harmonize European regional statistics. In these classifications, Baden-Württemberg accounts as NUTS 1, which are “major, socio-economic regions” and Veneto accounts as NUTS 2, a “basic region for the application of regional policies.” [22]

[22] See also: http://ec.europa.eu/eurostat/web/nuts/overview.

Box 1. Baden-Württemberg (GER) and Veneto (IT)

Figure 5. Location of the SMEs subject to the case studies of this paper



(Source: author's elaboration).

Table 5. Comparison of Baden-Württemberg and Veneto

Region	**Veneto**	**Baden-Württemberg**
Area (km²)	18.379	35.751
Inhabitants (million)	4,927.596 (e 2014)	10,703.000 (2014)
Density Population (per km²)	268	299
GDP (EUR bn.)	149,527 (2011)	438,27 (2014)
Car Assemblers	-	Daimler, Porsche, Audi
Automotive Suppliers		> 1000

(Sources: citypopulation.de/; statistikportal.de/; ec.europa.eu/; automotive-bw.de).

There are further differences between the Veneto region, which is famous for its Tiramisù, and Baden-Württemberg, which is known in its area as "Ländle". The Veneto Region is divided into seven provinces and its largest cities are Venice, Verona and Padua. On the other hand, Baden-Württemberg consists out of four administrative districts and the highest population is to be found in the cities of Stuttgart, Mannheim and Karlsruhe. Both regions belong to the richest ones of their countries, although Baden Württemberg is one of the most prosperous regions in Europe.[23]

[23] See http://www.baden-wuerttemberg.de/.

The economic attractiveness, among other reasons, is the reason that both regions are exposed to a high level of immigration.[24]
Baden-Württemberg's economic situation is not only shown by the high GDP, it is furthermore characterized by a low unemployment rate, the highest export value of all German regions (Export value of 181 billion euros in 2014) and a high average income (33.700 annually in 2014). Of course, the impact by its automotive industry is large, as Daimler, Porsche and Bosch are located in Stuttgart.
With its capital city being Venice, the Veneto region's main revenue stream is the tourism industry as well as real estates. Nevertheless, the country's strong suits, such as the fashion industry, are largely represented in the region with Benetton, Diesel, and Replay being Venetian brands.
To summarize, the background of this study are two very successfully regions from an economic and a cultural perspective.

[24] See http://demo.istat.it/ & https://www.destatis.de/.

2.4 How can small and medium sized companies participate in global value chains

The subject to this study, SMEs, are crucial to every industry in the European Union. According to the annual published report on European SMEs by the European Commission (2013), 99,8 percent of all enterprises, which are active in any other sector than financial services, are micro-, small- or medium enterprises. In fact, in the non-financial sector there were about 21.6 million SMEs in the EU28, which employed 88.8 million people and generated a value-add of 3.666 trillion euros.
Similar situations are to be found in Germany and Italy. Although, after extensive research, there was no specific statistic for the automotive industry found. Different sources, which group markets into sectors such as 'accommodation and food services', point out that the sector in which most activities of the automotive industry can be found is 'manufacturing', where the share of SMEs is also above 95%.[25] There are more than 3,7 million SMEs in Italy, compiling a value-add of more than 450 billion euros, while in Germany a lower number of SMEs, around 2,2 million, create a value-add of almost 800 billion euros (See Table 6). They are considered the backbone of the economy for both countries since SMEs are creating a higher value-add than the LEs and are naturally far greater in number and employ more people. These value-creations by SMEs present a he opportunity for LEs as their success depends upon the strength and vitality of their GVCs (Krywulak & Koukouchkine, 2009). Through building effective value chains, that is, incorporating stable and sustainable relationships with well performing SMEs, LEs have a substantial potential of improvement. The authors further highlight that an alliance with SMEs can increase productivity, drive innovation and enable access to more talent and markets, among others.

Table 6. Comparison of the size distribution of companies in Germany & Italy

	Germany	Italy
Number of SMEs	2.201.144	3.718.236
Value-add by *SMEs* (in EUR billion)	792	459
Number of employees in *SMEs*	16.720.674	11.516.365
Number of LEs	10.608	3.139
Value-add by *LEs* (in EUR billion)	664	201
Number of employees in *LEs*	9.941.295	2.960.003

(Source: European Commission, 2014 SBA Fact Sheet Germany & 2014 SBA Fact Sheet Italy).

[25] Eurostat Pocketbooks (2011).

The vast amount of SMEs reveals the high level of competition for every other SME in every industry situation, implying that if a SME understands its situation within its value chain, it could benefit from knowing where the value-add is and how to offer it. At this time of an industry shifting more production to suppliers, this knowledge is significantly important for SMEs. The question remains - how can this knowledge be defined? How can firms identify their value chains, spot the demanded value-add and how can they enter into a situation where they are able to offer this value-add?

To understand how SMEs participate in GVCs in the automotive industry, we have to have a look at the GVCs in the automotive market. With markets (and respectively the manufacturing process) that are steadily increasing in competitiveness and expanding globally, it becomes a necessity to have an innovative company culture and efficient value chains, both of which can be achieved by upgrading the company's value chain. But what is upgrading in respect to value chains, and what is the difference to innovation?

As mentioned earlier, being innovative is a key capability to be successful. Many studies found that innovation and firm performance are positively correlated and identified that the innovation capability is one of the major factors for a better firm performance (Desphande et al., 1993; Han et al., 1998; Edwards & Delbridge, 2001; Yam et al.,2004).

Innovation itself is defined as the continuous improvement and process development. Thus, if the rate of innovation of a company is lower than those of the competitors, the company is likely to lose market share and have less added value to their products than the competition. Hence, innovation has to be put into a relative perspective, namely with the competition of the enterprise. Innovation-speed compared to competitors is phrased as "upgrading". It distinguishes itself from innovation since it explicitly recognizes relative endowments, and hence the existence of rent.[26] The comparative component of upgrading makes it distinct to innovation and for why it is selected in this study, since it aims to put the value chain analysis into a competitive context.

Two schools of thought have addressed the different types of upgrading, with one focusing on core competences (Hamel & Prahalad, 1994) and one focusing on dynamic capabilities (Teece & Pisano, 1994), both of these provide an important backdrop for understanding the phenomenon of upgrading. Building on these two concepts, which are restricted (1) by the level of the firm and (2) by not involving groups of firms and thereby leave out the systemic nature of value chains, Kaplinksy & Morris (2001) identified four trajectories which firms can adopt in the objective of upgrading, which can be observed in Table 7. According to the authors, these upgrading trajectories have the advantage of capturing the central idea that upgrading involves changes in the nature and mix of activities, both within each link in the chain, and in the distribution of intra-chain activities. Further, in order to understand the process of upgrading, one should utilize a value chain framework, as it is the easiest to apply the process to.

[26] See Kaplinsky & Morris (2001), P.37

Table 7. Possible upgrading challenges by firms

1	Process upgrading	increasing the efficiency of internal processes such that these are significantly better than those of rivals, both within individual links in the chain (for example, increased inventory turns, lower scrap), and between the links in the chain (for example, more frequent, smaller and on-time deliveries)
2	Product upgrading	introducing new products or improving old products faster than rivals. This involves changing new product development processes both within individual links in the value chain and in the relationship between different chain links
3	Functional upgrading	increasing value-add by changing the mix of activities conducted within the firm (for example, taking responsibility for, or outsourcing accounting, logistics and quality functions) or moving the locus of activities to different links in the value chain (for example from manufacturing to design)
4	Chain upgrading	moving to a new value chain (for example, Taiwanese firms moved from the manufacture of transistor radios to calculators, to TVs, to computer monitors, to laptops and now to WAP phones)

(Source: Kaplinsky & Morris (2001), P.38).

Upgrading is defined as a movement within the value chain from one stage of production to another with higher value activities and increased benefits and often referred to as “moving up the value chain” (Cattaneo et al., 2013). The paraphrasing suggest a hierarchy, which begins with process upgrading, then moves to product upgrading, afterwards to functional upgrading and last of all to chain upgrading.[27] An often-mentioned practical example is the transition of East Asian firms from OEA (original equipment assembling) production to OEM (original equipment manufacturing manufacturer), to ODM (own design manufacturer) to OBM (own brand manufacturing).[28] Details of each upgrading activity are displayed in Table 7. Since an upward movement in the value chain is considered to be the best long-term strategy for preserving a firm’s participation in a value chain (Cattaneo et al., 2013), we will have a look at which upgrading methods are used most often by SMEs if they are likely to be successful with any of these upgrading methods in the result section four.

During part 3, the paper describes what practices belong to which type of upgrading and how performance measures can be undertaken to benchmark the different upgrading trajectories. Although upgrading is a necessity for SMEs and corporations in order to become or stay competitive, there are some exogenous and endogenous blockers as well as enablers for upgrading activities. Kaplinsky & Morris (2001) summarized them into the examples mentioned in Table 8. If a SME want to upgrade their value chain successfully, it is important to consider both blockers and enablers inside and outside of the enterprise.

[27] This hierarchy is mentioned by Lee & Chen (2000).

[28] See Kaplinsky & Morris (2001), P.39.

Table 8. Examples of blockers and enablers to upgrading

	Blockers	Enablers
Inside the firm	• Resistance from middle management to new work practices; • failure of senior management to commit resources to new product development; • lack of adequate skills.	• CEO committed to upgrading; • effective R&D management; • structured processes for continuous improvement.
Outside the firm	• Buyers who block suppliers from using own designs; • Intellectual property rights; • Lack of skills in the economy; • Poor IT infrastructure.	• Chain governor which promotes and assists upgrading by chain members; • Well established and proactive business service providers allied to facilitative government programmes; • New legislation forces firms to upgrade; • Rising prices for inputs and/or increased competition

(Source: Kaplinsky & Morris (2001), P.78).

Not only is it the interest of the enterprise to participate in GVCs to increase their own performance. It is a matter for regions and respectively, whole states to incorporate SMEs into value chains because they are, as mentioned in the introduction of the section, the backbones of all economies. Furthermore, they contribute positively to GVCs as they are considered to be wellsprings of innovation (Kaplinsky & Morris, 2001). With a clear operational focus, the GVC approach provides guidance for firms that willing to join, maintain participation, and/or move up global value chains. The ultimate objective of these three activities is to increase value and it offers firms guidance how to maximize the benefits and minimize the risks.

Subsequently, as SMEs are engines for innovations, the LEs in the automotive industry should put a large emphasis on their incorporation into GVCs. Yet, participation globally or the internationalization of SMEs tends to be difficult for SMEs given they relatively low level of resources and therefore an upgrading is

significantly more challenging to SMEs than to their larger competitors (Knight, 2001).

After gaining an understanding why SMEs are important and methods for SMEs to place themselves into GVCs as well as explaining the difference between innovation and upgrading, we have to link the upgrading activities to the question of how these activities help gaining a competitive advantage, for the SMEs themselves as well as for the LEs, which are buying the product or service.

2.5 Gaining a competitive advantage in a value chain from upgrading activities

The key issues to this study are how SMEs and LEs can gain a competitive advantage through adapting their value chain to circumstances, namely upgrading the value chain for SMEs and incorporating SMEs into their value chain for LEs, and what are the key challenges for SMEs to overcome to be integrated. Value chain analysis is particularly helpful since it (1) addresses the nature and determinants of competitiveness, (2) it focuses on all activities in the chain in order to identify which are subject to increasing/ decreasing returns and (3) as a result shows which activities are subject to be protected or to be upgraded by other links to facilitate greater returns.[29]

Additionally, it is necessary to map key characteristics of global markets in order to understand value chain dynamics, which has been done in section 2.2. Therefore, this study shows (1) the segmentation of the automotive industry (market characteristics combined with market size and growth) and (2) the market characteristics in specific. The market characteristics are referred to as Critical Success Factors (CSFs) and are explained further in the methodology of this study. Examples for CSFs are, for example, the market competence of an enterprise or its use of ICT.

There are many different definitions of competitive advantage. Michael Porter, who defined two types of competitive advantages, introduced one of the most cited definitions of competitive advantage in 1985: If an organization possesses lower costs or if they differ significantly. Although defining the competitive advantage itself, in his view, the strategic management is supposed to aim for a sustainable competitive advantage. According to Barney (1991), “a firm is said to have a competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors”.[30] While for some scholars (Jacobson, 1988; Porter, 1985) a sustained competitive advantage is a competitive advantage that lasts a long period of calendar time, Barney (1991) defined the adjective sustained as if other firms duplicate the strategy and the competitive advantage remains with the first strategy implementer (Lippman & Rumelt, 1982; Rumelt, 1997).

In the background of global value chains, innovation, upgrading and CSFs, we have to define competitive advantage, hence, for the purpose of this study, we use the following definition of a competitive advantage:

A competitive advantage is to the extent to which an organization is able to create a defendable position over its competition by implementing a strategy, which helps them to sustain a higher share of the global value chain even if competition duplicates the approach taken by the enterprise having the competitive advantage.

[29] See Kaplinsky & Morris (2001), P.22.

[30] See Barney (1991), P.102.

According to numerous authors (Cleveland et al., 1989; Roth & Miller, 1990; Kessler & Chakrabarti, 1996; Safizadeh et al., 1996; Koufteros et al., 1997; Tracey et al., 1999; Rondeau et al., 2000), possibilities for a competitive advantage can be tracked into five dimensions: competitive pricing, premium pricing value-to-customer quality, dependable delivery and production innovation.
Once one of the five competitive advantages is achieved, one has to maintain that position. Fine et al. (2002) note that competitive advantage has to be won repeatedly, which require a constant dis- and reintegration of organizations. SMEs have either to use the opportunity of being exactly there, where the reintegration happens or to maintain their position not to be disintegrated. Competitive advantages were exposed to the impact of globalization as well, the diminishing barrios to international trades has given consumers the opportunity to purchase whatever they want wherever they want. The constant evaluation of suppliers is one way to work against complacency within the firm. Another crucial shift that globalization implicated on competitive advantages is that companies now have to focus more on what value they offer the consumer than they have to focus on surpassing competition. The Institute of Management Accountants (1996) noted that value chain analysis is the adequate tool to do so.

To demonstrate how SMEs can integrate themselves into global value chains, this study is based on two case studies from Italy and two case studies from Germany. Since the companies are successful, they can be used by other SMEs as “best practices”. Important to note is that success always has to be put into context (success is relative to its environment), and should be translated into the current environment of the firm which wants to apply the best practice.

3 Methodology

The purpose of this chapter is to summarize the methods used in a way that another scholar is able to replicate the study. Therefore, this section describes the methods used to investigate the question how SMEs can integrate themselves in GVCs of global players in the automotive industry and gain a competitive advantage for themselves and for the global players. Furthermore, it explains the appropriateness of the research design, the research design itself, the setting and participants of the study, the procedure as well as the Data processing and analysis.

3.1 Appropriateness of research design

The study's focused issues address single firms and take a global perspective on solving, thus it is obligatory to pick the right set of tools to investigate whatever matter one wants to investigate regarding value chains. For the research question, we have to pick the right tools how to map value chains, display product segments and CSFs in final markets, how production and its efficiency is structured within the markets and how upgrading in value chains can be measured. For the research approach used for this study, the work of Kaplinsky & Morris (2001) has been instrumental.

The appropriate way to conduct a study given the research question leading this paper appeared to be a qualitative approach, as most often used by value chain researchers if they investigate single firms. The question leading this paper is dominated by a 'how', and according to Yin (1994), when questions such as 'how' and 'why' are asked, a qualitative approach is recommended. Important to note is that even though quantitative methodology has been used throughout the field of value chain research, these studies had a holistic, macro-economic view on the value chain in order to achieve policy recommendations to improve whole economies, respectively value chains and thereby improve situations for a certain group of companies or for whole countries.

Usually, for single firm research, a case-study approach is used and has been one of the most powerful research methods in operations management (Voss et al., 2002). Traditionally, a case study research focuses on understanding the dynamics of single settings and it can be used to provide description, test or generate theory (Eisenhardt, 1989). However, the paper uses a value chain perspective to resolve the research question, and as described before GVCs tend to be complex. At the simplest level, a "value chain analysis plots the flow of goods and services up and down the value chain and between different chains."[31], and has been used for analytical and heuristic research. The difficulty of mapping value chains is depicted in Figure 6 and the industries have been described to give an overview over the manufacturing chain in the automotive industry. Kaplinksy & Morris (2001) suggest as entry points to collect market characteristics interviews with buyers in retailers, sales managers in producers and consultants.

The production of vehicles and the exchange of materials for the production, which we can observe in section two, is very complex. The manufacturing chains differ both within and between industrial sectors (raw material, electronics, automotive, etc.) and differ between national and international contexts (structure, endowments, scale, etc.). Kaplinsky & Morris (2001) also note that it is unlikely that any single value chain study will be able to utilize the full diverse set of methodologies that can be used to investigate value chains. Thus, the study focuses on qualitative research, as it allows to gain a fine understanding of the complexity and plurality of the socio-economic dynamics that globalization has brought with it (Cheng, 2007; Birkinshaw et al., 2011; Doz, 2011). At the same time, a qualitative approach ensures a consideration of relationship issues, which are typically not considered by quantitative research (Miles & Huberman, 1994), and yet, they play a crucial role in the value chain perspective.

[31] See Kaplinsky & Morris (2001), P.25.

The study's research question, 'how SMEs can integrate themselves' in the automotive industry originated from an Italian university and therefore investigates the Italian automotive industry. However, since the Italian automotive sector and the German automotive sector are greatly intertwined and the author originated from Germany, a multiple and cross-country case study was chosen. The different case studies enabled an in-depth understanding and help to identify which factors are important on a national level as well as which factors are important on an international level in one of the most global industries. Therefore, four in-depth case studies were conducted, with two SMEs from the Northeast (Veneto-Region) of Italy and two SMEs from the south of Germany (Baden-Württemberg). Further, the Italian and the German automotive industries belong to the most important ones of the European automotive market.

The case study firms had to meet a set of a priori criteria. Namely, they had to (1) be a small or medium sized company in the automotive sector, (2) operate in the automotive industry, (3) be located in either the Veneto Region (Italy) or in Baden-Württemberg (Germany), (4) be located in the manufacturing chain of vehicles as tier 2 or 3 producer and are therefore exposed to the dynamics of international competition, such as offshore outsourcing and exploration of foreign markets.

For this study, if they met the first criterion, enterprises had to be a small or medium sized company. The study was conducted in the automotive sector, and Kaplinsky & Morris (2001) note in their handbook of value chain research that size is a relative concept and the categorization may have to be adjusted to each industry. Generally, SMEs are to be found in the lower tier of suppliers in the value chain. But what does constitute to the smallness? Up until now, we have used the common and broadly used definition of small and medium enterprises of the European Commission, where the categorization is as Table 9 depicts.

The European Commission tried to capture all industries with one definition. One can argue that that this definition does not make sense for the automotive industry because lead firms tend to be inherently large. Not only the assemblers of cars have an incredibly large revenue stream (Toyota Motor Corporation and Volkswagen Group AG had a revenue of approximately 200 billion euros in 2013), the suppliers like the Robert Bosch GmbH and the Denso Corporation respectively have had a revenue from automotive part sales of more than 30 billion euros alone and are thereby one of the biggest global supplier industries.

Thus, for the automotive industry, we acknowledged that SMEs tend to be larger and therefore re-adjusted the categorization of SMEs. The adjusted categorization (See Table 10) seems more appropriate since it considers the higher turnover for automotive companies. Additionally, the number of employees has been cut off because the industry is very capital intensive and firms might make a huge revenue despite having only few employees.

Having defined what constitutes to smallness, there was a large number of firms active in the automotive industry, especially in Baden-Württemberg. The author categorized the SMEs into tiers and contacted those first, which appeared more innovative and globally active. They were first contacted due to resolving the issue of 'upgrading' and the GVC perspective. An appropriate approach is purposeful sampling (Patton, 2002), that is, select those case studies which are rich of information with which one can learn a great deal about the research question. Unfortunately, due to shortage of time, and lack of co-operation of a number of

companies, those case studies that have been conducted have to be sufficient. However, Eisenhardt (1989) indicates that four case studies are sufficient. Future researcher should try to collect data from a plurality of sources, which Yin (1994) suggests, as there were held only a handful of additional interview. However, if possible, the interviews were conducted on-site.

Table 9. European Commission recommendation concerning the size of SMEs

Company category	Employees	Turnover	or	Balance sheet total
Medium-sized	< 250	≤ € 50 m		≤ € 43 m
Small	< 50	≤ € 10 m		≤ € 10 m
Micro	< 10	≤ € 2 m		≤ € 2 m

(Source: ec.europa.eu).

Table 10. Adjusted classification of SMEs in the automotive industry

Company category	Turnover	or	Balance Sheet Total
Medium-sized	≤ € 500 m		≤ € 430 m
Small	≤ € 100 m		≤ € 86 m
Micro	≤ € 25 m		≤ € 21 m

(Source: author's elaboration).

The interviews were structured two-sided. The objective of the first part was to obtain as much knowledge about the company, its environment, how it acts within its chain, its whole set of activities involved in a manufacturing value chain, from design and product development, to manufacturing, and distribution and further circumstances. Therefore, the questionnaire asked for attributes that characterized the surveyed companies. At the end of the first part, which lasted from 30 to 45 Minutes, the interviewee was free to add some points that were missed by the interviewer and he or she thought was crucial to be mentioned. Additionally, during the whole session, the interviewee was encouraged to add whatever information they considered valuable, as the first part of the interview was held largely open-ended way. The interviews were designed to give the informants as much freedom as possible to gain an understanding and collect information as widely as possible to meet the objective of the first part.

After the first part and towards the end of the interview, the interviewees were handed a questionnaire in order to identify CSFs for the integration of SMEs. CSFs research in the area of logistics and supply chain has been around since the mid-1990s (Neng Chiu, 1995; Tate, 1996; Korpela & Tuominen, 1996). CSFs are by definition those factors that determine success or failure.
The purpose was to combine qualitative with quantitative research, while CSFs investigated market characteristics in a broad sense, meaning that they were not specified upon the final market, but they were specified upon suppliers' delivering to their customers. It is important to note that CSFs usually highlight the characteristics of a final market that has been segmented before. A description and interpretation of the two automotive industries has already been done in section two, and the segmentation of the market divided the automotive sector only in two categories: suppliers and assemblers. One might argue that this segmentation is not specific enough to identify CSFs for the different customers (e.g. passenger cars, premium cars, trucks, etc.). The paper already listed the size and growth of the market, as suggested to do so if one wants to conduct a value chain analysis (Kaplinsky & Morris, 2001), but did not segment the automotive industry further. But does a segmentation of the final market make sense when investigating how tier suppliers can integrate themselves into GVCs of OEMs?
The study chose not to make a difference between final markets not because demand for the final product does not differ, but because of the industry's structure. Most suppliers usually serve more than one final market; therefore, they have to meet every CSF for every final product they end up in. Hence, a detailed segmentation would end up in identifying different CSFs for different departments within the suppliers.
An example for a CSF is quality, which might be more important for a specific final market than for others because of the different quality requirements of its customers. But the final markets are only one part of the survey. The second purpose of the CSFs is to investigate how to integrate a company into a value chain. Since the focus of this study, the CSFs that were asked in the survey are split into three categories:

- Characteristics of the company: These CSFs are conducting the general business setup of a company to investigate if there is a specific structure upon successful lower tier suppliers.
- Characteristics of the chain: These CSFs pinpoint the most important factors regarding the relationship management and what should be done to get a hold of the manufacturing chain.
- Characteristics of the product: The impact of the final market is not deniable, yet not the focus of the study. These CSFs are included to see if there is great consensus upon the success criteria in general.

The CSFs were adopted from two sources. The first source is a study that was conducting a Pareto analysis of existing CSFs in supply management in order to identify vital CSFs. The study by Ab Talib et al. (2015) reviewed 55 and selected 26 of them for further analysis, displaying the rigorous research the authors provide in the CSFs area. By doing so, the study provided a platform for future CSFs for

supply chain management. As this study investigates the relationship between suppliers/assemblers and assesses the flow of goods, the criteria filtered out by Ab Talib et al. (2015) are useful for this study. This study identified 25 CSFs and categorized them into the aforementioned three areas company, chain and product.

The handbook by Kaplinsky & Morris (2001) covered the CSFs for the product in respect to the final market or the customer. The authors also point out that different markets have distinctive combinations of CSFs and are increasingly volatile in a shorter period of time. The authors further suggest using a 1-10 or 1-7 scale for ranking the importance of the CSFs.[32]

The targeted interviewees were the CEO, personnel from the sales and purchasing department as well has the head of marketing and the head of supply chain management or personnel to which these people referred. This selection of interviewees enabled to gain a global view of the companies and as much information as possible about strategy and the relations to partners in the supply chain. They were asked to rank the importance of the CSFs on a scale of 1-7 from 'not important' (1) to critically important (7) with 'moderately important' (3) and 'fairly important' (3) in between. Therefore, if the survey would have unveiled a CSF rated below three, the factor had have not been considered to be a necessary factor in order to be successful, thus, not a CSF. If one interviewee did not understand a CSF, explanations were attached and the interviewer was always there to resolve unclear issues. If the interviewees found CSFs to be missing, they were asked to attach them. However, in all of the case studies, the CSFs used were found to be sufficient to investigate the topic.

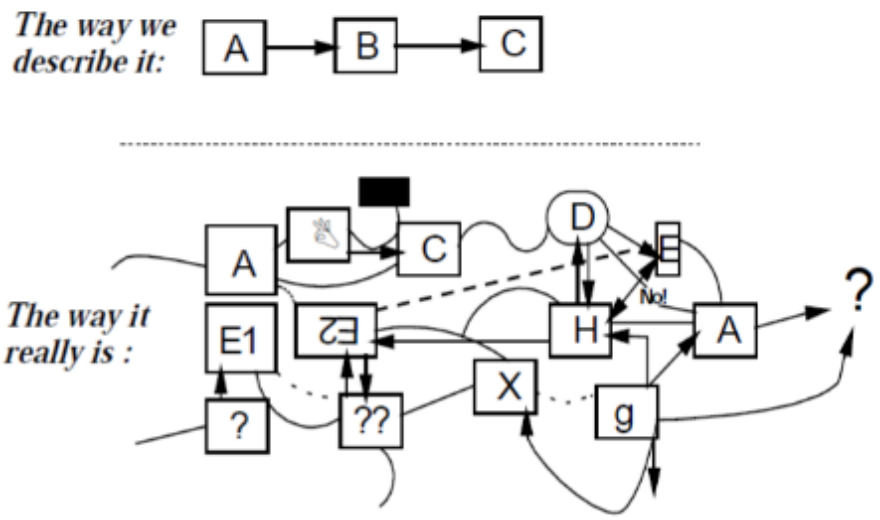
The responses will be plot on radar charts in chapter four, which are commonly used for displaying CSFs because it clearly shows the set of preferences for multiple CSFs. Furthermore, the radar chat will also include the verification if the data, namely the triangulation. The crosschecking of the responses was done by using the responses of the clients of the lower tier suppliers, namely the tier 1 suppliers and the assemblers. With their answers, the methodology used shows both sides of the market transaction, the suppliers and the buyers and is therefore the adequate tool to triangulate the data and ensure internal validity.

The interviews were conducted in English and German and lasted around one hour on average. In total, five interviews were conducted, two of them on-site**.** Further, interview protocols can be found in the appendices, which include the questions based on the main research question.

The next step of the study was to map the value chain for the suppliers. Forward mapping for these suppliers requires mapping the customers in a variety of sectors and backwards to the suppliers and their suppliers (Kaplinsky & Morris, 2001). Keeping in mind the new definition of what constitutes to small and medium enterprises, the results of mapping the Italian and German automotive industry will look different, as with the definition of the European Commission SMEs account for over 95% of enterprises.

[32] See Kaplinsky & Morris (2001), P.57. The authors describe that a scale from 1-5 does not provide sufficient scope for nuanced responses. According to them, ordinary people tend to think in percentages or decimal numbers, and an odd-number scale might be more suggestive of nuancing than an even numbered scale.

Figure 6. Value chain mapping: theory and reality



(Source: Brown, Beissant & Lamming, 2000).

After having identified the value chain in question, the task for the researcher is to put numbers and values to the chain. Most value chain analysis include a sort of “tree” of input-output relationships (e.g. gross output value, the physical flow of commodities along the chain, the flow of services consultants and skills along the chain, etc.). If possible, these numbers should be collected over time, giving an overview over the dynamics of the value chain. Data in the case of the integration of SMEs into the value chain can be plotted by using how much of their sales went to tier 1 suppliers or to vehicle assemblers. Another crucial point is to track the flow of services, consultants and skills. Both data are only receivable through direct contact with the company, both the sales and purchasing department. The required data up until now pinpoints a qualitative research procedure, as most information is gathered through interviews and data is not or hardly accessible. Additionally, as Kaplinksy & Morris (2001) stress, benchmarking in general is best undertaken with firms producing similar products. Unfortunately, this is not the case for this study but future researchers should bear that in mind.

After mapping the industry, the firms subject to this study will be compared both with each other and to the leading companies of the supplier industry, while the focus will be the SMEs themselves. Additionally, the CSFs will be compared and the different answers given interpreted.

Table 11. Examples of indicators of innovation and upgrading

Type of upgrading	Practices	Performances
Process Improvement **Within the chain link**	R&D; changes in logistics and quality practices; introducing new machinery	Lower costs; enhanced quality and delivery performance; shorter time-to-market; improved profitability; enhanced patenting activity
Between chain links	R&D; supply chain management procedures; e-business capabilities; facilitating supply chain learning	Lower final product costs; enhanced final product quality and shorter time-to-market; improved profitability throughout value chain; enhanced patenting activity
Introducing new products or product improvement **Within the chain link**	Expansion of design and marketing departments; establishment or strengthening of new product development cross functional teams	Percentage of sales coming from new products (e.g. products introduced in past year, past 2 and past 3 years) Percentage of sales coming from branded goods
Between chain links	Cooperating with suppliers and customers in new product development – concurrent engineering	Number of copyrighted brands Increase in relative unit product prices without sacrificing market share
Changing the mix of activities, Changing funct-ional positions **Within the chain link**	New higher value-added chain-specific functions absorbed from other links in the chain and/or low value-adding activities outsourced	Division of labour in the chain Key functions undertaken in individual links in the chain
Between chain links	Moving into new links in the chain and/or vacating existing links	Higher profitability; increase in skill and salary profile
Moving to a new value chain	Vacating production in a chain and moving to a new chain; adding activities in a new value chain	Higher profitability; proportion of sales coming from new and different product areas

(Source: Kaplinsky & Morris (2001), P.77).

A way for SMEs to integrate themselves in GVCs was mentioned in chapter two, namely upgrading. Thus, it is a part of the research method to measure the efforts taken to upgrade the value chain, no matter if it is only the value chain within the company or within chain links. As explained before, the concept of upgrading cannot be easily separated from the concepts of rent, barriers to entry and distribution and there is a specific trajectory to upgrading. To recall, the four upgrading trajectories are (1) Process improvement, either within one firm or the process of a chain due to interlinked firms to one process; (2) Product improvement, either within one firm or the process of a chain due to interlinked firms to one process; (3) Changing functional positions, meaning that activities, which are taking place within a particular link are to be adjusted; and (4) Moving into a new value chain.
There are many different indicators when upgrading takes place within a value chain or between the chain links. Apart from the indicators, which can be observed in Table 11, it is also important to note who initiated the upgrading. The enablers and blockers both within and outside of the enterprise have already been depicted in section two.
But identifying the efforts taken to upgrade one's production is only one part. The following is to make them measurable. There are numerous ways to measure upgrading efforts. In this study, if data was available, the following numbers will be identified in the result section:

- Investments in R&D
- Statistics of Patents
- Investment in Human Resources
- Improved processes along the chain (smaller inventory, improved quality, shorter lead time)

It is harder to ensure internal validity for these numbers, as this study has only the numbers from the cases. However, in chapter four, we will display usual numbers of the industry in comparison.

3.2 Data analysis and operationalization

After collecting the data, the data were elaborated in two phases. First, the four case studies were written as standalone case histories. Emphasis was put on each case to find out why this specific firm has and is currently succeeding in its value chain. This includes mapping the value chain forwards and backwards from each case and identifying the role the firm takes within its chain and how the share of control is spread within the total chain as well as the company's production chain. Furthermore, if available, actions that were taken by the firm to upgrade its value chain were highlighted. During the second phase, the standalone studies were compared in order to detect the differences and similarities between the enterprises.
To operationalize product and process innovation, indicators have already been listed in Table 11. If additional data is available, it will be again measured, compared and displayed in chapter four with additional indicators such as patent registration.
The primary research question implies questions such as:

- Who are the global players in the automotive industry?
- Who are the decision makers in respect to value chain management within global players?
- Why do these decision makers pick certain suppliers?
- How do decision makers choose their suppliers?
- When are these decisions made, as in: Is there an optimal timing to enter the market or does timing play an important role?
- Where do the global players pick their suppliers, as in: Is there an optimal location or does the location play an important role?
- What have successful suppliers done to be integrated?
- How did suppliers do whatever they have done to be integrated?

3.3 Case study participants

As pointed out in section two, the participants to the case study originated from Germany and Italy, specifically from Baden-Württemberg and the Veneto-Region. In this sub-section, the firms that met the four a priori criteria and that agreed to build a case study following the conducted interview are briefly described.

3.3.1 Inglass S.p.A.[33]

The *Inglass* S.p.A. (subsequently referred to as "*Inglass*") was founded under the name of 'Incos' in 1987 and focused on activities that aim to provide engineering services for the production of plastic products. The *Inglass* division is specialised in the designing and manufacturing processes of moulds for headlamps and rear lights for the automotive sector. The company possesses two other divisions, namely HRSflow and ERMO, which are responsible for the designing and manufacturing processes of hot runner systems and for the manufacturing processes of high-precision injection moulds. Through the years, the group added additional activities and services to their portfolio, such as

- rotating multicolour and multicomponent moulds for automotive lightning,
- hot runner systems for plastic injection moulding,
- injection compression moulding technology and the production of large transparent polycarbonate surfaces (Plastic Glazing),
- SLM (Selective Laser Melting), helping clients to tailor inserts, and many more.

Today the group has developed a wide portfolio of activities in the prototyping and plastic mould department. The portfolio enabled *Inglass* to attract customers from all over the world and offering them everything from being a simple supplier of plastic moulds and hot runner systems to being a supporter in order to optimize the entire production chain. The benefits of being a customer of *Inglass* are a reduced cycle time, minimized production waste and improved quality as well as reduction of part costs which ultimately results in an overall cost reduction for the end consumer. To serve their customers, the group has established new production plants, e.g. in Hangzhou (China) in 2009 and a new branch in India in 2012. Today the company is comprised of 705 employees and has a turnover of 109 million euros (2014) per year.

[33] See http://www.Inglass.it and Appendix A.

3.3.2 TEXA S.p.A.[34]

TEXA S.p.A. (subsequently referred to as "*Texa*") was founded in 1992 and was one of the first companies to focus on diagnostic tools for vehicles. Today, *Texa* is a global leader in the design, development and production of

- multibrand diagnostic tools,
- exhaust gas analysers,
- air conditioning recharge stations and
- telediagnostic devices

  for cars, bikes, trucks, boats and farm machinery.

The focus of *Texa* remains on diagnostic products for vehicles, while all *Texa* products are produced by ultra-modern assembly lines in the company's headquarter in Monastier di Treviso, Italy. The production plant was set up in 2012 and occupies over 100.000 square meters. At the same time, employees have the chance to visit social and relaxation areas right next to the production. Today, *Texa* is comprised of 500 employees and has an extensive, worldwide distribution network, which creates a turnover of 58 million euros (2014) per year.

3.3.3 Sitronic GmbH & Co. KG[35]

The *Sitronic* GmbH & Co. KG (subsequently referred to as "*Sitronic*") was founded in 1969 and is developing and producing electric components with different complexity with an emphasis on vehicle air-conditioning and vehicle communication. The company operates with 98% of its turnover as tier 1 and tier 2 in the international automotive industry. The remainder of the turnover is created by specialized industrial applications.
Besides the self-developed products for customers *Sitronic* additionally provides services called E²MS (Electric Manufacturing Service), which shares of sales account for 38%. The product range of *Sitronic* consists of

- sensors,
- controllers,
- control units,
- air conditioning control units,
- communication interfaces,
- vehicle lightning and
- special potting- and adhesive technologies.

[34] See http://www.texa.com/ and Appendix B.
[35] See http://www.Sitronic.com/ and Appendix C.

Sitronic sees the U.S. and Asian automotive markets as its growing markets, while it sets itself apart in the 'stagnating' European environment by USPs. Today the company is comprised of 170 employees and has a turnover of 18 million euros (2014) per year.

3.3.4 Menzerna polishing compounds GmbH & Co. KG[36]

The *Menzerna* polishing compounds GmbH & Co. KG (subsequently referred to as "*Menzerna*") was founded 1888 and is family lead. Most know-how of the company has developed during the long existence and is used for the production of polishing materials for the automotive and marine industries as well as industrial applications, resulting with *Menzerna* operating in five market segments: automotive, woodworking, industrial applications, artisanship and jewelry. Further, through decades of experience, *Menzerna* developed an extensive knowledge of the raw material markets. However, the automotive sector of the polishing material supplier is the most lucrative, accounting for 50% of the turnover (8 million euros). The product portfolio in the automotive sector ranges from

- polishes (Heavy Cut, Medium Cut, Finishing, Protection and more),
- polishing systems (Preparation and recovery of painted surfaces, Repairing/ Matting of automotive clear coats, Eliminating of paint defects, Producing water beading and noticeably smoother surfaces),
- automotive Trainings (Training on the materials and machines, increasing user knowledge of theory and practical use) and
- consulting on the polishing process.

The product portfolio finds its utilization with automobile OEMs, decorative car parts and in the automobile aftermarket, such as body & paint, refinishing and car repair.
Furthermore, *Menzerna* has a global network of sales partners and subsidiaries that continues to grow. The company is serving their customers through a widespread network of distributors and subsidiaries in relevant markets. Subsidiaries are located in the U.S., in China and in Belgrade. Today the company is comprised of 50 employees and has a turnover of 16 million euros (2014) per year.

[36] See http://menzerna.de/ and Appendix D.

4 Findings and related discussion

The multiple case studies discussed in this section refer to the participants mentioned in the latter chapter. The discussion contains each two participants from Italy and Germany, resulting in four SMEs, located in the Veneto-Region in Italy and in Baden-Württemberg in Germany. The author decided to consolidate the findings and the discussion into one section in order to achieve two research objectives. First, the study combines the findings directly with the industry background to ensure connections between the two. Secondly, it enables to explain the findings with the current literature.

The objective of this report is to help foster partnerships between SMEs and LEs from a value chain perspective in the automotive industry. As a result, the following section first compares general firm demographics and characteristics. Afterwards, the activities of the firms are being connected to their success in the competitive environment. Thirdly, the results of the CSF survey is displayed and discussed. The key findings and the discussion on this research are summarized below.

4.1 Cross comparison from the firms general characteristics

First off, we compare the general characteristics of the SMEs subject to this research. The multiple case studies discussed in this study examine four automotive suppliers. The SMEs compete in the same industry but are not in direct competition, as the product range differs. *Inglass* and *Menzerna* are the only two companies that produce both parts for the automotive lightning, but the products differ in detail, resulting that the companies are not competing directly. Nevertheless, the GVC approach is applicable as it presumes a product-specific value chain, in this case a vehicle.
Apart from the location differences, the companies have two more differentiating characteristics. The companies' years of establishment differs since the German companies are older than the Italian firms. However, the fact that the German SMEs are older does not lead to a larger company size. In fact, the Italian companies have a higher turnover and more employees than the German SMEs (see Table 12).

Table 12. General firm characteristics of case study participants (2014)

	Inglass	Texa	Sitronic	Menzerna
Founded in	1987	1992	1969	1888
Based in	Veneto, Italy	Veneto, Italy	BW, Germany	BW, Germany
Revenue (in EUR million)	109	58	18	16
Percentage of Revenue in R&D	1,8 %	12 %	10 %	4 %
# of employees	705	500	170	50
Products & Services	rotating multicolour and multicomponent moulds for automotive lightning, hot runner systems for plastic injection moulding, etc.	multibrand diagnostic tools, exhaust gas analysers, air conditioning telediagnostic devices, etc.	Sensors, controllers, air conditioning control units, communication interfaces, vehicle lightning, etc.	Polishes, Polishing systems, Automotive Trainings, polishing process consulting

(Source: authors' elaboration on based on provided information of the firms).

The second differentiating characteristic is that the Italian SMEs have a larger turnover, thus more resources. More resources lead to a higher level of employment within the company. Nevertheless, one of the most important

expenditures, the budget allocated for R&D, remains similar. As we will see later, innovativeness is a crucial factor for all sorts of companies. In Germany, the medium share of innovation expenditure of turnover was 10.2% in 2013 (GTAI, 2014), which the SMEs are also investing with one exception. *Menzerna*'s lower investment in R&D could be traced back to the turnover, as it is the lowest of the four case studies. However, *Sitronic* has only 2 million euros more in terms of turnover, yet double the percentage, which can stem from *Sitronic*'s activities as an electronic component producer/ assembler.
Another indicator of innovativeness is the number of patents that the companies register annually. Unfortunately, data collection was not possible for all firms. The numbers that were available indicated differences among the SMEs concerning their patent numbers, as they ranged from zero to twelve annually. If the company did not register patents, the interviewee indicated that the production process itself is inherently difficult to copy, and therefore, patents are not a necessity.
While every firm subject to the case studies is unique, there are some similarities. Taking current GVC frameworks to analyse the firm, the firms can be identified as tier 2 or tier 3 suppliers. Further, according to this study's categorization, all firms are rather small companies in the context of the automotive industry (See Table 10). As the companies are small, the form of ownership is similar as well. All firms are privately led. Finally, although their financial allocation in R&D differs, all firms place a high importance towards innovativeness, as the interviewer observed (Compare CSF 'Innovativeness').

Having compared the general characteristics of the case studies and discussed where differences may stem from, the study proceeds with a closer look at the strategic actions.

4.2 Identification of central strategic actions of the SMEs to integrate themselves in automotive GVCs

As the study compares the actions undertaken by SMEs to integrate themselves, the application of the GVC framework at the firm level has enabled the study to detect a number of factors concerning how firms are able to shape their value chain in order to become integrated in GVCs of global players in the automotive industry.

Inglass

The company that has been operating in the injection sector of thermoplastic materials for almost 30 years has evolved into the market leader in the automotive industry for the whole production process of moulds and hot runner systems. Up to now, 68% of the turnover is created in the by the hot runner systems, while the moulding sector accounts for 32%. Today, *Inglass* is active in three different continents or respectively 51 countries worldwide. While the firm is already producing in China and in Italy, a plant in the U.S will open soon as well. The internationalization of *Inglass*, which now possesses eight different production plants, is one of the main attributes that integration in the GVC took place. As *Inglass* is aware of the positive influence a worldwide company structure has, the firm recently expanded again and purchased a French company, namely ERMO. The acquisition was one of the biggest decisions regarding its financial and managerial importance and will help *Inglass* to diversify its activities further. The diversification will not only happen in the automotive segment, where more than 90% of the turnover stems from. The interviewee of *Inglass* stressed repeatedly the importance of internationalization and described *Inglass* as "a medium company with a global vision"[37]

A benefit of a global structure are learnings from markets other than the home country. The firm has established a system that identifies weaknesses that are reported back to the headquarter, resulting in a continuous improvement process. However, there is more to setting up a global structure than simply expanding the network. In order to have a functioning supply system, which is able to serve customers efficiently worldwide, the adoption of standards set by the industry and manufacture accordingly was another crucial factor to ensure customer satisfaction. The interviewee sees the company serving its customers at a tier 1 and a tier 2 level, depending on which products they serve.

The action of *Inglass* in setting up a global network suggests another key factor to be successful in the competitive automotive industry. While *Inglass* invests heavily in new relationships and new subsidiaries, another large upfront investment goes into the automation of the production process. An example for the high degree of automation is its plant in China. Many companies move to China in order to save upon labour costs and thereby production costs. Certainly, this activity can add value to the manufacturing of any chain. Nevertheless, labour costs increased dramatically over the past decade in China, which most companies were expecting when moving their production into emerging countries, they just did not assume it would happen that quickly. *Inglass* has protected itself from labour cost variations

[37] See Appendix A, P.94: "Therefore, you could say it is a medium company with a global vision…".

with additional investment in automation. Therefore, *Inglass* is now able to produce cheaper than the competition.
Not only is the production process highly automated, in addition, the production process is, in some cases, highly specified. By broadening the product range *Inglass* has been able to increase its revenue and is able to receive large margins due to some highly specified products.
Finally, *Inglass* is not only focusing on its manufacturing. To maintain margins in the competitive automotive industry, innovation is, as previously described, a necessity. *Inglass* is forging research centers and collaborates with universities to foster innovation outside of the production. Among fostering innovation, the alliances with the research centers serve the goal to gain reputation, add know-how to the company and find skilled personnel. The importance of innovation was clearly indicated by the interviewee, as he stated that "whenever you have innovation, you have margins."[38]

Texa

Texa has its headquarters in Italy and is active around the globe. With subsidiaries in Spain, Germany, France, UK, Poland, Russia, the U.S., Japan and Brazil and a sales network with more than 1.300 participants, the company is truly incorporated in GVCs of the automotive industry. With the broad network, *Texa* delivers its products to a large amount to workshops (approximately 150.000) and additionally to 15-20 OEMs. Therefore, *Texa* regards itself as a tier 1 supplier and the global leader in the design, development and the production of multibrand diagnostic tools, among other products.
One of the crucial decisions, which led *Texa* to be where they are today, was the focus on their core products, diagnostic tools for the automotive industry. As the firm was founded in 1992, the company experienced a massive growth during the last two decades and made the right decision to grasp the potential of the market niche in the 1990s. Contributing to their success was the decision to offer multi-brand solutions, enabling a modular production of similar products while saving costs. The interviewee pointed out that *Texa* is selling its products at a low price concerning its quality, to which he attributes a large share of the company's success.
The second decision, which was critical to *Texa*'s success, is the high level of vertical integration within the company. *Texa* has invested heavily in its 100.000 square meter production plant and is thus able to produce their products from raw materials. According to the interviewee, the firm profits heavily from its vertical integration as it enables *Texa* to accumulate a vast amount of know-how and serves as a potential creator of incremental or disruptive innovations.
The third key aspect to *Texa*'s successful integration into automotive GVCs is the constant investment in R&D. Within the enterprise, 200 out of the 500 employees are focused on development, which accumulates with further R&D investments to 12% of the turnover in 2014. The interviewee stressed that within a competitive environment like the automotive industry it is impossible to survive without bringing a unique value to the table, which is also revealed in *Texa*'s strategy as its

[38] See Appendix A, P.99: "Whenever you have innovation, you have margins."

competitive advantage is its know-how and applying it to current trends such as the electrification of the automobiles and the ‘Internet of things’.

Sitronic

Sitronic develops and manufactures electronic components with different variances and complexity, with 98% of its turnover allocated as a tier 1 and tier 2 supplier in the automotive industry.

The company is also active on three continents, as it has sales operations in the U.S. and in Korea. Since *Sitronic* is planning to establish an own site in the U.S., it is safe to say that internationalization, or respectively, creating a global network is one of the strategic actions of the firm to further establish itself as an integrated supplier in the automotive industry.

Sitronic sets itself apart by offering high quality products and services. An example is the ‘Rapid Prototyping’, which translates into a 24/7 service for producing prototypes of electronics and plastics from a single source. The prototype will additionally be finished in less than 24 hours. Additionally, *Sitronic* is characterized by acting according to its customers’ wishes. This organizational setup enabled *Sitronic* to win contracts with large OEMs to the point where one OEM had implemented *Sitronic*’s products in 98% of their vehicles. The highly customer-orientated organization enables *Sitronic* to be a rather exotic SME supplier as 30% of its revenue originates from OEMs. Additionally to its customer-centric approach, *Sitronic* relies largely on its R&D, observable by the three plants in Germany and by the expenditure of 5-10% into R&D in total, resulting in 16% of the employees being active in R&D.

The firm underwent a major strategic shift in the early 1990s as it went from a cable producer and assembler to an electronic component producer/ assembler. The right timing on following the trend in the automotive industry enabled *Sitronic* to stay in business, up until this day, very successfully. Since *Sitronic* is active in the electronic industry, one critical factor to its success is the sourcing and its related IT, as *Sitronic* receives parts from up to 400 different suppliers.

A second crucial addition from a strategic perspective are the services that resulted from studying and understanding its processes. A consulting service that is based upon its electronic manufacturing was introduced and accounts for 38% of the turnover. The addition of the electronic manufacturing services called ‘E²MS’ helped *Sitronic* to gain additional turnover and is can be categorized as a functional upgrading.

The interviewee repeatedly underlined the importance of having a USP. The costumer- and innovation-oriented strategy secures *Sitronic*’s position in the automotive GVCs.

Menzerna

Menzerna accumulated a great deal of know-how in formulation and production technology for polishing compounds over several decades, covering all areas of mechanical polishing today. While *Menzerna* is active in different industries, such as woodworking and jewellery, the main revenue stream, around 50%, stems from their activities in the automotive industry. Being active in different industries with a

product that works well in the automotive industry, *Menzerna* is able to diversify their risks by minimizing the dependency on one industry.
Menzerna is, as the other cases, engaged in a widespread network of distributors and subsidiaries in their relevant markets. Menzerna is able to serve its European market from its headquarter, which is based in Germany. Additionally, *Menzerna* has a representative site in China and a subsidiary in the U.S.
The interviewee stressed the importance of a motived CEO, which is the driving force behind *Menzerna*'s success. Specifically for the automotive industry, there were two crucial events that helped *Menzerna* to integrate themselves in the GVC of the automotive industry.
The first event took place in the mid-1990s, as one big OEM came with a problem they needed to be solved. Therefore, the first event was not as much a decision of the company as it was seizing the opportunity or as the manager put it: "It is the small companies job to 'catch the ball' and do a good job."[39]
The second event was a decision to approach their core product, the polishing compounds, methodologically, resulting in a greater understanding of the whole polishing process and a level of know-how that no one else in the industry can provide. The know-how of the company is further improved with a precursor to a R&D department that develops the next generation polishing compounds. However, the R&D expenditure of *Menzerna* is relatively low in comparison to the other case studies. Despite the relatively lower R&D expenditure, the interviewee highlighted the importance of innovation and described that without a new idea it is not possible to survive within the automotive industry.
Menzerna's position in the GVCs can be described as a mixture of tier 1 and tier 2, with more weight on the latter as only 10% of the automotive revenue stems from the OEMs.

Following these case studies, one can identify a number of strategies or strategic actions that SMEs typically implement that tend to increase the likeliness of a successful integration in the automotive value chain, namely building up a global firm network in order to develop towards being a global supplier, support any activities linked to increase the know-how and thereby fostering innovations, focusing on the core competences or respectively the internal processes and optimize the manufacturing chain by gaining additional understanding as well as a high level of production automation, offering a high level of manufacturing flexibility and a diversification of risks by competing in different markets.
Further, the activities each company undertakes are tightly tied to the products and services the enterprises offer. Important to note is that the firms, which are able to offer individualized products and services tend to have relatively more revenue from OEMs than the ones that are focusing on scaling its productions. The strategic actions undertaken by the firms are summarized in Figure 7.

[39] See Appendix D, P.108: "If there would not be such a big industry, we would not be involved. These "lighthouses" are extremely important, but on the other hand, it is the small company's job to "catch the ball" and do a good job."

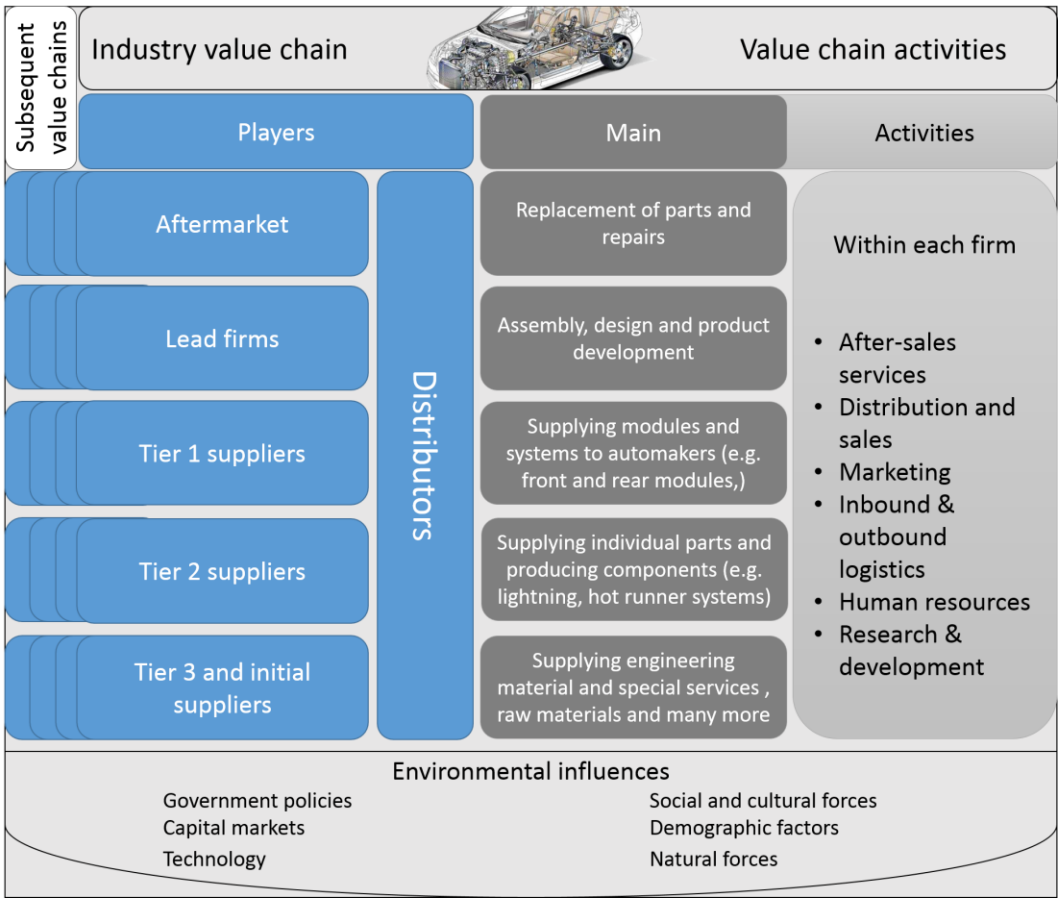
Figure 7. Central strategic activities by SMEs

	Inglass	Texa	Sitronic	Menzerna
Development towards global supplier	✓	✓	✓	✓
Fostering innovations	✓	✓	✓	✓
Focus on internal process optimization	✓	✓		✓
High-level production specification	✓	✓	✓	
High-level production automation	✓		✓	
Risk Diversification through other markets	✓			✓

(Source: author's elaboration).

The case studies revealed a lot of information on how the value chain is structured. The theoretical constructs that exist about the GVC in the automotive industry suggest that SMEs are generally to be found in tier 2 or tier 3 (e.g. Abonyi, 2005). Yet, three out of four customers deliver directly to OEMs, indicating that a SME can be located anywhere within the chain with almost no respect to the amount of the revenue. *Sitronic* proved that point since at one point an OEM had an electronic component from *Sitronic* in 98% of the OEM's product. Therefore, the automotive value chain model proposed below does not make a difference between company sizes, as SMEs can be located anywhere. The model is based upon interview observations.

Figure 8. Adjusted automotive value chain model



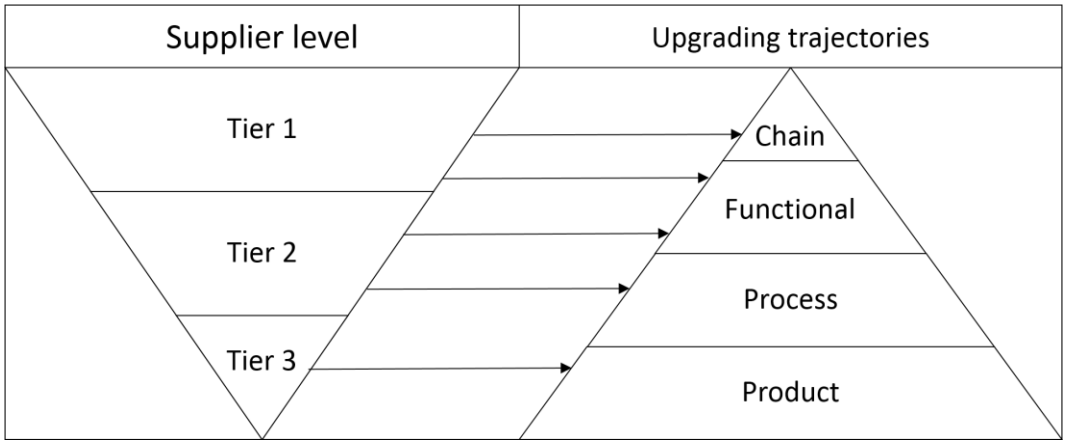
(Source: author's elaboration).

The model is divided into actors within the chain, namely into players, and into the players' value chain activities. Environmental aspects are also considered as they play an important role for the dynamics and structure of value chains.
The suppliers located at a tier 3 level or lower, up to initial suppliers, provide the most rudimentary products. If suppliers are able to provide more than basic products, they can be considered active on a mid-level where competition is not solely based on price, quality and a timely delivery. Tier 2 suppliers must be able to manage their lower tier suppliers and should be able to deliver to a higher degree of geographic reach. Additionally, tier 2 suppliers need to be more responsive to its customers in comparison to its lower tiers, as products often need to be adapted to their clients' specifications.
The model does not differ between tier 1 suppliers and global mega suppliers, which are often referred to as 'tier 0.5' due to the high integration with the lead firms. The companies summarized as tier 1 in this model have to be able to supply globally, have a high degree of flexibility requirements and have to have high innovation and design capabilities as well due to the close collaboration with lead firms.

Another aspect, which is often neglected in the GVC of the automotive industry, is the aftermarket. This segment has to be included in any model of the automotive industry as it is a multi-billion dollar industry. The aftermarket describes the segment that is responsible for the spare and replacement parts.
While not observable in the model, especially suppliers are linked with the aftermarket. Integration arrows between the players were not included for the simple reason that there is a large number of inter-industry linkages and drawing arrows for the linkages would result in a similar model as displayed in Figure 6.

Lastly, the upgrading trajectories appeared during conducting the interviews. The more integrated a firm was, the higher the upgrading possibilities to its value chain were. Therefore, we can categorize the suppliers according to the services they provide and combine the results with the construct of 'upgrading'. Figure 7 therefore shows that the higher a supplier is located within the GVC industry, the more likely is to have undergone a higher upgrading trajectory.

Figure 9. The concept of supplier ties linked to upgrading activities



(Source: author's elaboration).

4.3 Critical success factors comparison[40]

The last findings summarize the survey, which was conducted at the end of each interview. The survey is not representative for the automotive industry nor does it have a high level of participation (four responses by suppliers, three responses by buyers). The questionnaire's premise is to highlight important factors, which the suppliers subject to this study perceive as important. The CSFs were helpful in order to gain a full picture of the value chain analysis. Each average valuation by the suppliers and the buyers can be observed in Table 13.

Table 13. Averaged perceived importance of suppliers and buyers of critical success factors in the automotive industry

Group	CSF	⌀ Supplier	⌀ Buyer
Characteristics of the company **⌀ Buy total = 5,1** **⌀ Sup total = 5,5**	Processes	6,5	5,7
	Resources Capability	6	6
	Skilled Employees	6,5	5,3
	Planning and Implementation	6	5,7
	Use of Information Technology	6,25	5,3
	Top Management Commitment	6	5,3
	Data Security	5,25	5,7
	Adoption of Standard	5,5	5,3
	Internationalization	5,75	4,7
	Market Competence	5,25	4,7
	Image/ Reputation	5,25	4,7
	Infrastructure Readiness	4,75	5
	Location	3,75	4,3
	Organizational Hierarchy	4,25	3,3
Characteristics of the Chain **⌀ Buy total = 4,3** **⌀ Sup total = 5,4**	Trust	6	5,3
	Open Communication	5,75	5
	Partnership/ Integration	5,75	4
	Government Intervention	5	4,3
	Customer-Supplier Experience	5	4
	Assurance and Empathy	5	3,3
Characteristics of the Product/ Service **⌀ Buy total = 5,8** **⌀ Sup total = 6,2**	Delivery reliability	6	6,7
	Quality	7	5,3
	Flexibility	6	6
	Innovativeness	6,5	5,3
	Price	5,5	5,7

(Source: authors' elaboration on survey responses).

[40] See Appendix E: Result operationalization CSF survey.

4.3.1 Critical success factors – company characteristics

Figure 10. Survey Results: Characteristics of the company.

(Source: author's elaboration on survey responses).

Processes		
℮ Supplier: 6,5	℮ Buyer: 5,6	℮ **total: 6,1**

Processes are critically important for all sorts of purposes as they have an impact on delivery (Just-in-Time), which processes are done in-house and which processes are outsourced, which processes are automated, etc. Thus, processes affect the whole manufacturing chain within and outside of the company. Good process management leads to optimal results. Moreover, process redesign offers potential to improvement if the processes are not optimal. If processes are not optimized or if they are not well managed, they lead to inefficiencies and are greatly affecting the performance result of the SME. The impact of processes has been heavily researched (Tummala et al., 2006; Singh & Al-Hakim, 2009; Hu & Hsu,

2010; Thoo et al., 2011; Dinter, 2012; Hwang & Lu, 2013; Kumar et al., 2014) and hence affirms the highly ranked importance of the CSF.

Resource Capability		
e Supplier: 6	e Buyer: 6	e **total: 6**

The resource capability is the range of operational elements and services the SME can provide, as well as price responsibility and delivery capability. The focus of this aspect mostly draws back to the financial resources the company has to work with. As SMEs are mostly poorly equipped with financial resources in comparison to global suppliers, the CSF is in comparison to other SMEs, where millions of euros can already make a big difference. In other words, the financial equipment can be the deciding factor if one company accomplishes successfully a project or not. LEs expect SMEs to be financially stable as it minimizes the risks for the buyer in the relationship (Krywulak & Koukouchkine, 2009). Achanga et al. (2006) further note that SMEs are in general financially incompetent, leading to thorough audits conducted by the LEs (Krywulak & Koukouchkine, 2009) and making the CSFs resource capabilities an opportunity to improve themselves for integration into GVCs. The resource capabilities lead to whether a buyer can rely on the financial stability of the supplier and if his financial situation will affect its performance in any way. Huang (2002) pointed out that the resource capability is a key factor for suppliers. That is why it is included in the analysis.

Skilled Employees		
e Supplier: 6,5	e Buyer: 5,3	e **total: 5,9**

Skilled employees are crucially important for every company. SMEs have a smaller amount of resources and, hence, a smaller pool of talent. Nevertheless, skilled employees are a necessity as the survey score points out. Skilled employees are often very important when it comes to creating new products, thereby contributing to the innovativeness, which is the highest ranked CSF in the survey. Further, skilled employees not only in R&D are crucial, as soft skills significantly contribute to the perceived status of relationship. Similarly, the skills upon the tasks given to the employees shape the partnership, since skilled employees can offer their customers a higher level of reliability, e.g. a skilled logistician does a better performance than an unskilled one and therefore he improves the overall performance of a company. As indicated by the companies' homepages, personnel, especially in the R&D department, receive a large amount of training, proving Cattaneo et al. (2013), that the workforce development is one of the key elements of competitiveness, participation and upgrading in GVCs.

Planning and Implementation		
e Supplier: 6	e Buyer: 5,7	e **total: 5,9**

Planning and implementation describe the planning of projects, its implementation and thus also the strategy of the companies. Planning and implementation are very important for SMEs, as SMEs have to cope with smaller resources. Hofmann & Schlosser (2001) found out that companies without a clear and strategic position (e.g. differentiation or cost-leadership) were more likely to fail in establishing alliances. Therefore, if SMEs want to be successful in the competitive environment, that is, the automotive industry, companies are obliged to have a clear strategic position and a consistent implementation of the strategy through all activities. If SMEs are able to establish partnerships through a clear strategic setting and a good planning and implementation of activities SMEs have the opportunity to improve their competitive position, as new partnerships help overcoming resource shortages and thereby decreased the level of jeopardy SMEs are exposed to due to globalization and rapid technological change (Hofmann & Schlosser, 2001).

Use of Information Technology		
e Supplier: 6,25	e Buyer: 5,3	e **total: 5,8**

It is not surprising that the use of information technology scored high in the survey. The scale academia is investigation IT (Gunasekaran & Ngai, 2003; Gunasekaran & Ngai, 2004; Ngai et al., 2004; Thoo et al., 2011; Kim & Rhee, 2012) reflects the importance of the scale of IT implementation in the real world. Therefore, the utilization of IT is described as the “driving force for competitive supply chain strategy”.[41] The amount of studies highlight the importance for SMEs in regard to the SCM. The utilization of IT exhibits in many different ways, for example, tools like ERP and MRP, e-procurement systems. Additionally, the compatibility and reliability of the software show how intense ICT is used within the company. The most simple way to analyse this factor in future research is to measure the investments by firms in IT.

The use of information technology serves many objectives, such as improved communication, from which an optimized supply chain management is expected. The increased level of efficiency can lead to lower costs and higher quality (Bordonaba-Juste & Cambra-Fierro, 2009). Yet, each ICT has to fit size, situation and enterprise to what use it is implemented, as some ICTs require resources that not all SMEs possess.

In spite that not all companies can use every ICT, there is one that all companies use: the worldwide web. Many authors highlighted the importance of the internet and noted that the internet is playing an important role to create easy, unified economical networks between suppliers and buyers. (Fraser et al., 2000; Humphreys et al., 2006). If we follow the logic of transaction-cost economics, ICT

[41] See Christopher (2011), P.146.

systems linking companies are important since they increases efficiency and derease transaction costs greatly (Hofmann & Schlosser, 2001).

Top Management Commitment		
e Supplier: 6	e Buyer: 5,3	e **total: 5,7**

Top management commitment describes the level of participation by the management and the organizational commitment to a corporate culture. Many of the interviewees described it as very important. One interviewee said that the management is the driving force behind the success of the company.[42]
In essence, top management is able to facilitate integration of all infrastructures within an organisation, through vision and strategy, while permitting a flexible organisational structure. Therefore, good management practice contributes effective skills and knowledge enhancement amongst its workforce (Achanga et al., 2006). However, if top management does not contribute in a positive way, SMEs could lack strategic drivers that derive from good leadership.
When establishing an alliance, the top management commitment and support is one of the main reasons for its success or respectively failure, as it belongs to one of the top management most important tasks to maintain relationships (Hofmann & Schlosser, 2001).

Data Security		
e Supplier: 5,25	e Buyer: 5,7	e **total: 5,5**

The data security is another obvious factor that contributes to the successful integration of SMEs in GVCs. Data security is of fair importance as it is regarded as a prerequisite for collaborative action. Especially nowadays, with an exponential use of ICT, companies are able to accumulate more data than ever before (Ngai et al., 2004). The data allows managers to improve the decision making process. Yet, this data comes with a great value and the value will be lost without a certain level of security measures. Therefore, data security is an important factor and a prerequisite for participation of SMEs in GVCs.

Adoption of Standard (being up-to-date)		
e Supplier: 5,5	e Buyer: 5,3	e **total: 5,4**

As described above, implementing an efficient supply chain requires to meet a number of universal and industry-specific standards. Apart from the standards, LEs might expect that suppliers meet internationally recognized certifications as well

[42] See Appendix D, P.108: “We are an owner-operating enterprise and the main engine for us is our CEO.”

(Krywulak & Koukouchkine, 2009). Therefore, as suppliers have to produce according to the standards set by OEMs and tier 1 suppliers, the SMEs rank the importance of the adoption to standards fairly high. Acting according to standards and its impact onto successful SCI has yet to be researched more extensively, as to the author's knowledge it has only been explicitly researched by Wittstruck & Teuteberg (2012), who tried to identify key success factors of sustainable supply chain management (SSCM). However, the scholars' result indicated that, among others, the adoption of standards is a crucial precondition for the overall success of sustainable supply chain management (SSCM).

Internationalization		
e Supplier: 5,75	e Buyer: 4,7	e **total: 5,2**

Internationalization exhibits in a variety of modes, such as exporting, licensing, franchising, joint ventures, strategic alliances, mergers and acquisitions, etc. Most SMEs tend to start participating as suppliers in GVCs through their production which was created with the aim to supply a domestic market. After gaining recognition and large OEMs as customers, SMEs begin to deliver internationally through exporting. This is the starting point where SMEs see internationalization as more of an obligatory commitment for suppliers than as a choice. As the interviews revealed, most car assemblers are globally active and require suppliers with a global structure as well. The task of internationalizing is, for SMEs, inherently difficult, as it devours lots of resources and takes a large upfront investment. The importance of internationalization stresses the importance of location, being next to the customer, especially for heavy parts, as described in section two. Nevertheless, the opportunities lie in enhancing competitiveness and thus supporting the long-term performance and the sustainability of enterprises (Abonyi, 2015). Further, studies of the European Union show that internationally active SMEs have a higher growth of employment (European Commission, 2010) and tend to introduce more new products or services in their home country (Roland Berger, 2013). All of the case studies subject to this study are active internationally and benefit from best practices they observe in other countries. According to Abonyi (2015), the firms which are active on global markets have a higher possibility of adding value through these best practices, as with the observation of best practices comes innovation in terms of improved products, production process and business models, presenting three forms of upgrading (product, process and functional upgrading). The fact that all the aforementioned case studies are active in internationalization is opposed to the Abonyi's note (2015) that most SMEs, particularly smaller ones, are focused on domestic markets. These differences stem from the industry the firms are competing in, since he describes lots of low-tech firms and case studies usually have capital intensive machinery, e.g. *Inglass* has a plant in China which is highly automated.[43] However, internationalization does not work without adapting to a variety of international production standards

[43] See Appendix A, P.98: "What we did at that time was to invest a lot in automation and now the plant is highly automated."

and further requirements, which is often difficult to fulfil for SMEs, regarding their restriction of resources.
In general, through internationalization, that is, participation in GVCs, SMEs are able to seize growth opportunities and a diversification of risks through serving additional markets. Furthermore, international markets bear the opportunity to gain insights and additional know-how to upgrade their value chain, but internationalization does not happen without significant investment of resources.

Market Competence		
e Supplier: 5,25	e Buyer: 4,7	e **total: 5**

Market competence is on the one hand the company's ability to understand the market and the competitive nature of the industry they are active in, on the other hand it means how well the enterprise can handle the pressure from competitors. The importance of market competence is at the same scale as its academic research efforts – it is limitedly researched (Hidalgo & López, 2009; Wittstruck & Teuteberg, 2012); Luthra et al., 2014), but its importance cannot be denied. An increasing competence in the market can be a factor that drives the implementation of new technologies, thereby increasing the firm's innovativeness (Dawe, 1994). Market competence is inherently connected with the performance in every aspect of the company, and is additionally valuable if a company decides to upgrade its activities to participate in GVCs since a greater understanding of the market does make it easier to enter.

Image/ Reputation		
e Supplier: 5,25	e Buyer: 4,7	e **total: 5**

The image or reputation is the commercial image of the brand, the product or the service that it represents. The interviewees pointed out that image is an obvious obstacle for SMEs as they suffer from being unknown. A practical example is that LEs tend to source from larger suppliers since they know what to expect from the product having the brand in mind.[44] Value chain analysis often indicated the same result, that is, due to their size and reputation SMEs are forced to use intermediaries to sell their products. These buying networks tend to be very complex and the intermediaries siphon off much of the value created by the suppliers (Kaplinksy & Morris, 2001).
Therefore, SMEs are in need to push their reputation, but it tends to be a vicious circle from a GVC perspective. SMEs want to integrate, but do not have reputation. If they do not possess an image in the buyers mind they cannot integrate themselves. One key ability to enter the market is the aforementioned market

[44] See Appendix B, P.102: "That is very simple. In my opinion, the biggest obstacle is brand recognition. If a distributor, client or someone else sees a logo of Bosch, they know what they are dealing with. If you would ask people, who did not came in contact with *Texa* before, they do not know who we are and what we do. That leads to difficulties in Sales and Distribution channels, as well as additional costs."

competence, because if SMEs understand their clients and have a high ability to hear the market, they can start to serve LEs and get a 'supplier number'.[45] If other companies start to notice the company through other LEs, the vicious circle develops in a spinning wheel of incoming corresponding orders.

Infrastructure Readiness		
⌀ Supplier: 4,75	⌀ Buyer: 5	⌀ **total: 4,9**

Infrastructure readiness describes the ability within the company to adapt to changes, the company's internal desire to improve and challenge external standards of SCM (Richey et al., 2009), with the difference being to flexibility that it does not only refer to product features. One key attribute is an effective ICT technology that score is higher than the CSF Infrastructure Readiness. Therefore, we can assume that company adaptability is not as obvious to suppliers as product adaptations. Nevertheless, flexibility within the company results in value-adding opportunities such as service optimization and is seen as one of the most important assets that SMEs have to offer. They are seen more responsive than larger suppliers in terms of service and support requests and often show higher intentions to offer on-site service (Krywulak & Koukouchkine, 2009). We have to keep in mind that a high organizational flexibility requires a large amount of resource allocation, which is not always possible for SMEs, especially when it comes to a sudden increase of production volume. However, if possible, buyers tend to pay a higher margin for increased flexibility and the company's ability to change.
The infrastructure is closely linked to the concept of standards, which are crucial in the automotive supply chain,[46] because a globally dispersed production is impossible without standards.

Location		
⌀ Supplier: 3,75	⌀ Buyer: 4,3	⌀ **total: 4**

This CSF describes the geographical proximity of the supplier to its buyer. The location of the supplier has a surprisingly low score on the supplier side and the lowest of the survey in total. After analysing the automotive industry structure many scholars concluded that although there is a globally dispersed manufacturing chain, the shift towards regional production is easily observable. Additionally, good reasons, technical and economical, indicate the advantages of close proximity between the two. One of the reasons why location did not appear with the importance in these case studies as one would assume having read the second chapter, can be the characteristics of the suppliers' products. The SMEs main products are often smaller items and therefore easier to handle in terms of logistics.

[45] See Appendix C, P.105: "This is about the famous 'Lieferantennummer '(supplier number). If you have a one, it is a lot easier to get new projects."

[46] See Appendix A, P.97: "Therefore, it is extremely important that whenever they are purchasing the tools, everything has to be the same standard."

If this is the case, of course, the location of the supplier does not matter as much as it does for higher tier suppliers that deliver sub-parts. A second reason is the decreasing freight expenses due the effects of globalization, which made it possible to achieve global logistics at a fraction of the product costs (Cheraghi et al., 2011). Another reason for the low score is the low level of participation in the survey. The location did not matter for one company at all and therefore decreased the average score dramatically.
The author argues that in spite of the low score, location is a CSF and is a major contributor to the successful integration of SMEs in terms of technical and cost aspects.

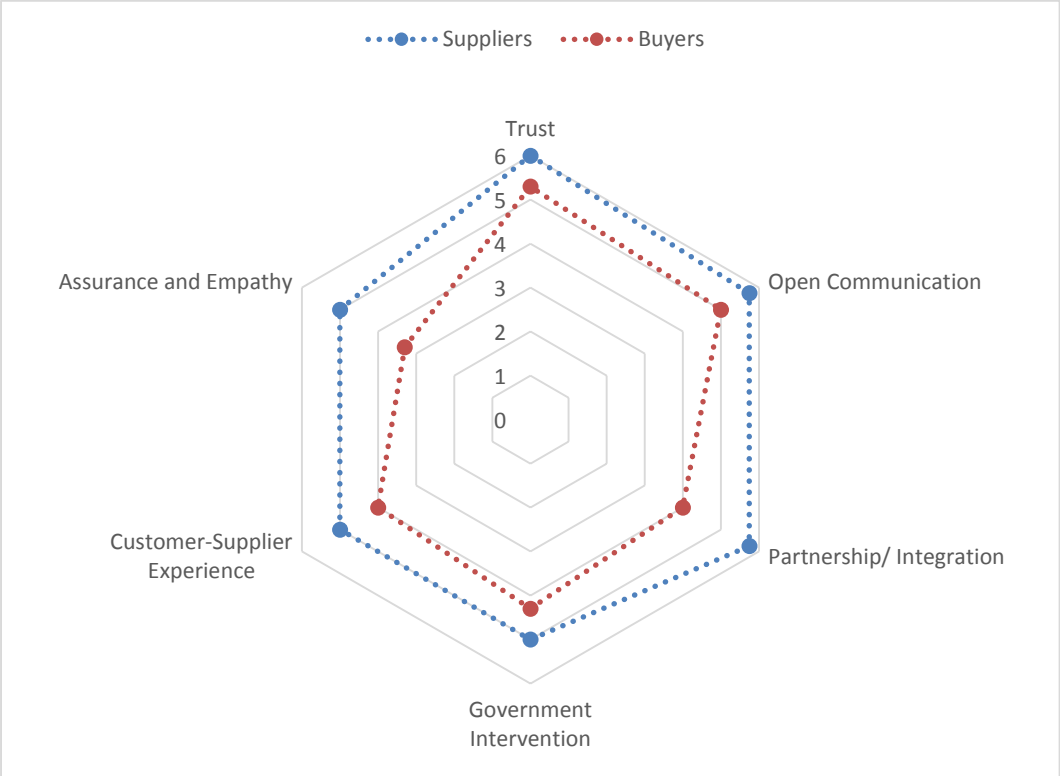
Organizational Hierarchy		
e Supplier: 4,25	e Buyer: 3,3	e **total: 3,8**

Organizational hierarchy can influence the performance of a company greatly, and there are advantages and disadvantages to each organizational structure. Interviewees pointed out that the organizational hierarchy is more a result of top management commitment than it is a factor by itself. In fact, Zeithaml et al. (1988) found out that service quality problems are related to barriers between customer contact personnel and top managers. Therefore, the organizational hierarchy is linked with the end product. One can argue that since organizational hierarchy is a result of top management commitment, the factor has one of the lowest scores in the survey. Furthermore, organizational hierarchy is more often researched in the context of services, while the case studies have their core competencies in producing products. Therefore, Rejseh et al. (2011) have used organizational hierarchy in their study as a CSF to investigate service providers, where the hierarchy of an organization plays a role of greater importance.

The company's characteristics play an important role when buyers are evaluating potential suppliers, with the most important benchmarks being the use of IT, the top management commitment, processes, resource capabilities, skilled employees and the planning and implementation processes. LEs look for responsive and information-driven companies with a high degree of technical and distributional capabilities. The measurability of these benchmarks varies from easily measurable like the resource capabilities to a lower degree of accuracy, such as processes.

4.3.2 Critical success factors – chain characteristics

Figure 11. Survey Results: Characteristics of the chain.



(Source: author's elaboration on survey responses).

Trust		
℮ Supplier: 6	℮ Buyer: 5,3	℮ **total: 5,7**

As previously mentioned, the well-being of a partnership depends also on trust issues. Trust has to be mutual and describes the confidence of each partner in the other, which is additionally strengthened by a higher level of transparency. Integration within the chain is an ongoing challenge because firms have a consistent lack of knowledge when to collaborate and with whom, with trust playing an essential role (Barrat, 2004; Ha et al., 2011; Näslund & Hulthen, 2012).

Open Communication		
e Supplier: 5,75	e Buyer: 5	e **total: 5,4**

Open communication is an important factor when it comes to collaboration. It comes along with trust and empathy and needs a broader comprehension than technological intensity. Bordonaba-Juste & Cambra-Fierro (2009) point out that some resources combined with a customized strategy can increase the efficiency, if a firm does not have adequate resources to invest in proper ICT. Additionally, the scholars point out that the factor of open communication in form of a cross-organizational common language and adequate information channels is very often neglected. Constant communication can lead to better results and therefore must not be neglected by SMEs, as it can be designed cost efficiently.

Partnership/ Integration		
e Supplier: 5,75	e Buyer: 4	e **total: 4,9**

Partnership or integration describes the interfirm collaboration, and how the relationships with suppliers are embraced. A good integration within the value chain is a key aspect to be successful. Academia has researched the topic extensively as a part of SCM, and identified that SCI (Supply Chain Integration) as one of the keys to a successful management of the supply chain (Mentzer et al., 2001) and offers opportunities to lower costs and service improvement (Narasimhan & Kim, 2001; Chapman et al., 2003; Duffy & Fearne, 2004; Gimenez & Ventura, 2005; Richey et al., 2009). However, this CSF does correlate with other chain success factors such as trust and communication and they have to be fulfilled simultaneously in order to work properly (Ogden, 2006; Cullen & Taylor, 2009; Kim & Rhee, 2012; Thakkar et al., 2013).
The integration of partners or partnership remains a consistent challenge for SME because companies are constantly re-evaluating which partners are the perfect fit for the SMEs products and strategy. A greater understanding of one's manufacturing and service requirements contribute positively to see which suppliers meet the requirements best (Youngdahl & Loomba, 2000). Subsequently, if suppliers understand the manufacturing and service requirements of the OEMs, they can offer the best product or service possible. However, an important issue of a good partnership starts in the beginning of the relationship. Clear and realistic objectives have to be set in order to have an alliance, which is both goal-oriented and measurable (Hofmann & Schlosser, 2001).

Government Intervention		
e Supplier: 5	e Buyer: 4,3	e **total: 4,7**

Government intervention describes all policies including those policies that positively and those regulations that negatively influence the SME's performance and was researched as CSF before (Hong et al., 2008; Mothilal et al., 2012; Hwang

& Lu, 2013). As previously described, governments do have a great interest in keeping the automotive manufacturing chain within their boundaries as it consists of great economic value and creates large direct employment (Holweg et al., 2009). Therefore, governments support local and sometimes restrict global competition. Overall, governments do play an important role, but it is up to the SMEs to cope with the difficulties. The interviewees' responses differed but showed exactly the two sides which are applicable to government policies – embrace the policies useful for SMEs and cope with the difficult ones. As an example, the German government incentivizes the R&D of new technologies through a government programme on electric mobility (GTAI, 2014). At the same time, the German government regulates car emissions in the hope to foster new innovations, while it detains sales as well.

Customer-Supplier Experience		
e Supplier: 5	e Buyer: 4	e **total: 4,5**

The customer-supplier experience is described as important by the suppliers overall, yet in the interviews a manager pointed out that it is a lot easier to acquire new projects when a company has a supplier number. Therefore, a supplier number within an OEM describes the company as a reliable partner who can serve its customers well[47] and represents a customer-supplier experience. Additionally, an important factor for the suppliers are the learned lessons they take away from their experiences. According to Hofmann & Schlosser (2001), the learning capacity is described by the intention and by the capability to learn, and the greater the capability, the better the results in learning and thus the better the chance for a successful co-operation.

Assurance and Empathy		
e Supplier: 5	e Buyer: 3,3	e **total: 4,2**

Assurance and empathy describe the soft skills each business partner has. Rated lower as trust, one can assume the difference stems from the continuous evaluation process of the buyers, as trust and good personal relationships are more of a prerequisite for co-operation. (Hofmann & Schlosser, 2001). Upon establishment of good personal relations, the authors further note that the alliances need to be planned professionally, highlighting the importance of a strategic planning and implementation of the business relationship.
This means that all important theories that describe and explain inter-organisational relationships provide empirically significant factors influencing alliance success. These findings also show that nothing is gained by arguing which theory is superior. Instead, one should strive to find a productive synthesis of the most important proven theories.

[47] See Appendix C, P.105: "This is about the famous 'Lieferantennummer '(supplier number). If you have a one, it is a lot easier to get new projects."

The characteristics of the chain play an important role for both parties, as suppliers and buyers both have to understand the value creating process before collaboration is possible. The CSFs that protruded were the partnership, open communication and trust, while all chain characteristics ranged between 5 and 6. The critical chain success factors are the most difficult to measure and therefore should be analysed within a framework or new measurements systems have to be found.

4.3.3 Critical success factors – product characteristics

Figure 12. Survey Results: Characteristics of the company.

(Source: author's elaboration on survey responses).

Delivery Reliability		
e Supplier: 6	e Buyer: 6,7	e **total: 6,4**

Delivery reliability describes that the expected product arrives in a timely and accurate manner. This CSF scored high with both parties as 'time' is a valuable aspect by itself. Therefore, when it comes to supplier selection, delivery is a prerequisite for collaboration and gains importance due to the highly competitive industry environment. Delivery and the reliability of it enables minimizing inventory and warehousing costs and is essential for maintaining production schedules (Krywulak & Koukouchkine, 2009).

Quality		
⌀ Supplier: 7	⌀ Buyer: 5,3	⌀ **total: 6,2**

Quality of the product or service appears in many ways to the customer. First, quality has to be perceived superior to all the other product, meaning it has to be superior in 'conformance quality', that is, the absence of defects and the 'design quality', that is, the degree of the customer satisfaction with product characteristics and product features (Krywulak & Koukouchkine, 2009). The authors' survey, which interviewed LEs how they select suppliers, supported the findings of this survey, because the authors note that product or service quality is of top priority. Depending on which product it is, system quality can be an issue as well (software, sub-systems, etc.). Quality also exhibits in the level of quality of information the customer receives as well as the ease of use. Overall, the goal of producing a quality product is to achieve a competitive advantage in product differentiation and aims at obtaining loyal customers. The importance of the quality as a CSF is as observable in this survey as it is by the vast amount of research on quality (Tummala et al. 2006; Hong et al. 2008; Cullen & Taylor, 2009; Singh & Al-Hakim 2009; Wu & Weng, 2010; Lao et al., 2011; Luthra et al., 2014). For example, Cullen & Taylor (2009) investigated CSF for B2B ecommerce and their study indicated that system quality, among others, belonged to the most important. Therefore, it is no surprise that quality scores the highest of all.

Flexibility/ Conformance to specifications		
⌀ Supplier: 6	⌀ Buyer: 6	⌀ **total: 6**

As mentioned before, flexibility and conformance to specifications only refer to the product itself. It is to expected that SMEs and buyers rate the CSF high as it is one of the main attributes of small suppliers to be more adaptive and one of the main advantages an SME has in comparison to global suppliers. There are positive and negative effects to flexibility. Contributing to the competitive position is flexibility in the sense that lots of SMEs find a market niche through their flexibility and become highly specialized in that niche, enabling many medium sized companies to become world market leader. Negative implications swing with the dependency of that market or the customers. The dependency exhibits if the particular market or customer experience difficulties, which affects the supplier respectively as large tier 1 suppliers or car assemblers account for the majority of the revenue.

Innovativeness		
⌀ Supplier: 6,5	⌀ Buyer: 5,3	⌀ **total: 5,9**

We focused on the three most important sources of competitive advantage a firm should invest in to maintain a good position in the market as they emerged from the survey: product innovation, product quality and reduction of production costs.

Innovativeness of the product or the service scored very high. Additionally, all interviewees described that without innovativeness there is no possibility to have a unique product. Without a USP to offer, all interviewees were sure that one cannot survive in the competitive automotive environment.
The other possibility, as opposed to innovation, is to offer the lowest price possible. The strategy of the lowest price has its difficulties as it comes with great dependence of the buyers because products have to be sold at a large scale. Further, for this research producing on a large scale is not easy for SMEs as it couples with a great upfront investment in the capital-intensive automobile production industry. The interviewees pointed out that entering the market based on lower prices always ends up being at a disadvantage compared to larger enterprises. Moreover, all interviewees stressed how important it is for SMEs to propose the business value through innovative ideas, as LEs can achieve a higher efficiency and other goals more effectively as a result of SME innovation.

Price		
e Supplier: 5,5	e Buyer: 5,7	e **total: 5,6**

The traditional thinking in SCM proposes to select the suppliers that offered the lowest price. Much has changed during the last years and companies started to realize that the price equals the quality one receives. Yet, for buyers, price plays an important role as all buying decisions are based on the comparison between value and price, and should result in a financially sound solution. Since the mid-1980s, when Japanese vehicle producers started to conquer the market, a different method than electing suppliers at arm's length was to be found with profound success. Eventually, all companies figured out that only leveraging the supply chain to achieve the lowest purchase price is not as successful and sustainable as viewing the supply chain management as a process to design, develop, optimize and manage internal and external components of the whole chain (Spekman et al., 1998). The paradigm shift results in the lowest rating of this survey for the product category from the supplier side and affirms the observed decrease of the overall importance of price in supplier selection (Ulaga & Eggert, 2006)
However, Price remains an important factor when selecting suppliers as LEs products are competitively priced. Dickson (1966) noted that price and the complexity of the product are inversely related and other studies (Krywulak & Koukouchkine, 2009) confirmed his notation. Therefore, the main goal of LEs is to find an equilibrium between price and quality, with a higher emphasis on quality. The score in this study indicates the same result.

In summary, the findings indicate that suppliers have to meet an optimal balance of quality, price, and delivery reliability, while being flexible and innovative at the same time. Due to the non-avoidable trade-offs it is not possible to offer products or services that attract every LE. As a result, it would be advisable to identify the crucial areas that the firms consider critical to the success of their products or services. On these grounds, the SMEs can focus on improving in these areas.

Altogether, the analysis of the CSFs show a high average score of almost all factors and thereby highlight the complexity of managing a value chain, as the CSF where averaged at a 5.66 at the supplier side and at a 4,99 on the buyer side on a scale from 1 to 7. Further, both placed the highest importance on the product or service category, the second highest important at the company's characteristics and regarded the (value-) chain characteristics as the least important for a successful integration of SMEs in the automotive industry. However, the chain characteristics were still fairly important, showing that none of the factors should be easily neglected.

5 Conclusion, implications & limitations

While GVC studies in general focus on the international organization of economic activities in the form of governance and suggest that lead firms shape the international value chains in general, the contribution of this study is related to a firm level GVC approach. The study offers SMEs insights on how to design the value chain within an outside of the firm by investigating strategies and critical success factors in order to compete successfully in the automotive industry with four case studies. Since the industry offers a good example of an internationally dispersed manufacturing process, the study contributes insights to SMEs on what it takes to survive in the increasingly competitive and globalized sector by offering an industry analysis of the German and Italian automotive industry.

The first outcome is an addition to the GVC literature in terms of a strategic analysis from the company with an integrated GVC approach. The GVC approach enabled the study to identify key strategies of the case studies. Simultaneously, the study combined the approach with a comparison of critical success factors. Therefore, this study contributes to the GVC literature on a firm level and focuses on understanding the dynamics within four single settings, and extends the application of CSF research.

Additionally, as GVC studies are often focused on the concept of governance and therefore investigate lead firms, this study contributes by taking the perspective of SMEs, specifically of suppliers in the automotive industry. The analysis revealed a number of implications, namely managerial for SMEs and the lead firms, as well as policy propositions.

First, since SME managers often fail to gain a proper understanding of their respective market (Kaplinsky & Morris, 2001), a proper market research has been made. An understanding of the dynamics is required for SMEs, since hearing the market is imperative to the success. When understanding the market, the managerial implications for SMEs include ensuring that product and company characteristics meet the lead firms' expectations. According to this study, the SME should place the highest priority on to product characteristics, ensure the financial stability and offer an open and trustworthy communication backed up by reliable ICT. From the practitioners' point of view CEOs, marketers and other employees can utilize the findings from this study to focus their efforts on the most crucial ones. Further, SMEs should identify their key capabilities and ensure a complete understanding of all processes related to the capability. Without clearly defined core competences, it will be difficult for SMEs to participate effectively in GVCs, especially in highly competitive markets such as the automotive industry. Strategies have to comply with the core competences and enhance the product as well as the manufacturing and its upstream and downstream links.

While gaining a higher level of understanding, SMEs should simultaneously focus on improving the uniqueness by fostering innovation, which requires investment and R&D as well as in skilled personnel. The challenge of innovation will be its implementation, because such an activity will require additional resources. Further investments are vital for establishing a global supply network to comply with the lead firms' global presence.

The study claims that combining these aspects plays a central role in the process of integrating SMEs into GVCs in the automotive industry and leads to a better

performance of SMEs overall. One can conclude that if SMEs want to integrate themselves into GVCs, the firm has to offer a clear benefit and proactively contribute its strengths towards a potential relationship or as one interviewee put it: “Relationship is more of a consequence of strategy.”[48]

Additionally, lead firms should place a greater effort to connect with SME suppliers as suppliers offer a number of advantages in alliances. Small suppliers offer high value gains through their innovative culture and flexibility. By setting up a relationship aimed at the long-term, lead firms can diversify risks and reduce dependency of large suppliers. Furthermore, SMEs are often active in market niches, which puts them arguably to the position where they are the company with the most know-how around the world. Apart from the lead firms’ and the SMEs’ benefits, a collaboration between the two offers social benefits for the region the firms are active in, resulting in creating a positive image for both. Since lead firms tend to collaborate with larger suppliers, LEs need to raise their awareness about the benefits such a collaboration can initiate.

The social impacts are also an interest of the government, which thus has to make efforts to foster the relationships. First, the government can provide more research of the benefits of the collaborations between lead firms and SMEs. Further research will enable a greater knowledge on how to successfully integrate SMEs into GVC. Further investments can be undertaken to assist lead firms with information about SMEs, since lead firms have a huge pool of SMEs to choose from. On the other hand, SMEs need to understand the buying process of lead firms and the priorities, to which the CSFs provided in this study give a small insight. In general, it is the government’s task to bring SMEs and LEs together in order to gain economically and exploit the social benefits of local collaboration. Governments can help fostering the connections between the two by organizing trade fairs, conferences and other events as well as access to financial aid. In order to help SMEs set up a global network, governments can support joint efforts of SMEs and LEs as it may be more cost effective to support an existing connection.

However, there are a number of limitations to this analysis. The main objective of the study was to contribute to the GVC research by utilizing the single firm view. Despite using a theoretical approach with practical focus, the results hold implication for future research. Although there is a vast amount of publications on the GVC literature, the firm level, especially the linkage between GVCs and firm performance remain a lack of knowledge. Therefore, there is yet to be the need of developing a practical framework that links the GVC research with firm performance. More empirical insight into GVC research at the firm level could stimulate future theory building and with relevant theory, a framework for analysing firm performance measurably could evolve. Moreover, the proposed CSF should be tested in practice in order to gain a better understanding and to validate the CSFs. Therefore, an industrial survey is highly encouraged for future research.

Secondly, by using a CSFs research method, the study’s results indicate that linking CSFs with firm performance is merely a listing of critical success factors, which accedes Ram et al.’s (2013) notations. Figuring out an effective way to combine the GVC approach with a firm level approach holds high incentives for all

[48] See Appendix A, P.96: ”The Relationship is more the consequence of the strategy.”

economies, as most companies are small or medium sized companies and are therefore crucial to any country or region.
Thirdly, further research should explore results in other national and industrial contexts, since this study was solely focused on four individual settings in two nations. Additional empirical investigations in this field would contribute to the knowledge and thereby improving the capabilities of SMEs integration possibilities, thus improving the SMEs viability. Once the nature of GVCs and success factors of successful international SMEs are largely understood, research should investigate how government interventions or other initiatives can contribute and promote the development of SME.

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Appendix A: Interview transcript with Inglass

Correspondent: Roberto Fagarazzi (in the following R.F.)
Interviewer: Alexander Volk (in the following A.V.)

After the welcoming...

A.V.: Could you please tell me how INGLASS and HRS work and which role you play within it?
R.F.: Okay. Inglass is the company. There is only one company, which is called Inglass. Now it is a group with around 700 people with plants in three different continents. So, it is still a medium or small medium company, as you said, but the target is to be organized like a global company. This is one of the key factors of the expansion in the last years. We have the headquarter in Italy and we have manufacturing plants in China and in the U.S. We just produced the first products in the USA in 2014 and we have purchased a French company with another five plants in France and Poland. Now we have eight different plants worldwide. Therefore, you could say it is a medium company with a global vision, because we also have 15 different branches for sales and after sales support. Inglass is the only company, but we have different product branches. The main one, which represents 70% of turnover, is HRS and HRS is the hot runner division (for plastic injection moulding). The company was born in 1987 as a tool producer. As a tool maker we focused since the beginning on the automotive lighting applications, and inside this particular sector we are very known and our expertise is on multicolour lighting applications, which means mainly in the beginning real lenses because they are made of two different components, which means two different materials or the same material in different colours. The production of the lens, which is the main product, is done in two or three different stages. I do not know if you are familiar with the moulding technology...

A.V.: Not really...
R.F.: We have some big injection machines with the size of 800 to 2500 tons. The mould is composed on the one hand by the cavity side and by the core on the other. Afterwards, the plastic is injected by a temperature of 200 to 300 degrees. The materials flow into the cavity by a hot runner, which is a system with a heating technology inside in order to inject it with the right temperature or rather keep it at the right temperature profile inside the cavity. The company started with this moulding technology and the customers were the big companies, which are delivering the lenses to automobile customers. At the beginning, the big companies were and customers for automotive lightning were, for example, Hella.

A.V.: I will look them up.
R.F.: And for these companies we were mainly producing colour or two colour lenses, mainly rear lenses and today additionally front and head-lenses, which are made out of two different colours, because we have an integrated part of the frame inside the lens. This is a particular technology because of the very high requirements on the bumper. If there are small imperfections, they will be visible

on the bumper if you look close. However, if you have damage on the lens - of course - automotive lightning will show this effect on a big scale. Therefore, the quality requirements for these products are extremely high. Also, the treatment of the material is very complex because of the narrow process windows and tolerances allowed by the rapidly degrading materials at high temperature. They will not flow properly and we will have other defects. In total, the manufacturing process is very sensitive to all production parameters and the production technology for producing head lenses in comparison to rear lenses is completely different.
The focus of the company was on these multicolour technologies and with these particular materials. In 2001, we started the production of hot runners, which are the specific parts of the mould, where the materials flow through. We used to be one of the most important customer of big companies that produce these hot runners. We started to manufacture and commercialize this product line, which is now HRS. The main application for our hot runner remains the lighting, so polycarbonate and polyamide-based material, but it only presents now 30% of the turnover.
Just to summarize that you understand: Of the turnover, we have 30% in the lightning moulds/ injection moulds, and 70% in hot runners. My position in the company is lightning division business manager, which means I am following from the commercial point of view all the applications in the lighting, meaning the hot runners dedicated to the lighting and the injection moulds, which are 100% dedicated to the lightning business.

A.V.: Okay. You spoke a lot about the clients you serve. In addition, I would like to know how many clients to you serve approximately. Additionally, I understood that *Inglass* would be a tier 2 supplier. Is that correct?
R.F.: Yes and No. You are right in the sense that who makes use of our products is the tier 1 or the tier 2 who are producing the parts. Our customers in the mould division are the tier 1, which are producing the plastic components but for your research, the most crucial parts are the hot runners, and the customers for our hot runners are the toolmakers, which are all around the world. Our production number is around 15.000 hot runners per year and we are selling to approximately 1.500 to 2.000 different customers. Every year there will be a little bit less, so probably we should make a calculation, but in around 30 years, it will be around 600 customers. These are the toolmakers, who are integrating our hot runners in their production and they are selling to the end user. The usual toolmaker has a dimension in average of approximately 50-100 people. The big parts producer, we are talking about companies with a large number of employees, like Magna (approximately 125.000 employees), they are the big suppliers of the part components. The firms are normally born as a spinoff for the car manufacturers, as they were initially supplying internally. Afterwards, they split up and start to supply different car producers with different supplies. Some of them are still linked with the car manufacturer, like Marelli Motori in automotive lightning, which is still linked to FCA or others like Mobis, which is linked to Hyundai. In Korea, or respectively in Asia, it is typical that these networks are simply big conglomerates. In China, the big car producers are controlled by the government, like Shanghai General Motors (Shanghai GM), where the government is the major shareholder

of the suppliers. In the Far East, the part component producer is still part of the car producer company but normally they were split ten years ago and now they are different companies. They are big conglomerates with plants all over the world. The big ones have around 40 to 50 plants all around the world and close to the car assembler's production centers.
To summarize, we have completely different customers and completely different business models. Our customers, as said before, are the small customers, the toolmakers. They have limited decision freedom or limited power in the chain to choose the supplier because the toolmaker is assembling the tools and then selling them to the end user. So to say, the products stay in facility for the first six months and the rest of its life it stays in the production of the moulder. Therefore, we need to establish good relationships with the end user, which should be the tier 1 or tier 2 suppliers.

A.V.: So, when I would ask you about the crucial points of your company's success, would that be the relationship to the tier 1 supplier?
R.F.: Ahh, yes. The Relationship is more the consequence of the strategy**.** The strategy was to provide a global network because most of these big part suppliers, as I said, were obliged to follow the car producers and to expand themselves. They set up plants wherever the car producer is located. The car producers are interested in suppliers that have a similar global structure, both commercial and technical support everywhere. Of course, it is easy for big suppliers or conglomerates because they have 20.000 employees or more, but it is impossible for the toolmaker, because it is a company of around 1.500 employees. It is difficult, but not impossible, for the hot runner supplier. They can make use of some economies of scale. Normally, these companies employ around 300-500 people, so for them it is difficult but not impossible to have a global footprint. There are not many companies that can provide worldwide support; we are talking about two to three companies worldwide. This is the main reason for the success in a market that is constantly globalizing, since there is a big need for global supply. Additionally, there are only few companies in this field because the entry barrier for new companies is very high. It took many years for the company (*Inglass*) to build this worldwide structure and now we are really exploiting this advantage. In the beginning, it was a very high investment, but it is depending on the economies of scale. Since the last five years, we have a doubled our size and the global structure enables us to be close to our customers wherever they are. This is not only a matter of after sales. Pre sales are even more important. Normally, these projects take place in different parts of the world. For example, one of the most important lightning producer is Hella, which is based in Germany. They have their headquarters in Lippstadt. Project decisions are made there, but maybe the production plant is in Mexico and the toolmaker could be placed in Portugal. It is very difficult to negotiate and convince all of them and it is very difficult to manage the projects, because - as you may imagine - the tool is designed in Portugal, but then you have to have a contract with Portugal, Germany and Mexico in order to put together all the pieces of the puzzle and to avoid mistakes, e.g. adjustments of the product once it arrives in Mexico. If a company has not only a sales structure but also a technical structure in all of these countries, it can be for the best support of the project.

A.V.: The global barrier issue was very important, because I read in almost every paper that globalization is an opportunity for businesses. Seeing it as a barrier of entry, it is an interesting approach, which I have not thought about enough.
R.F.: It is definitely a very high barrier to entry because of the size. First, it takes a lot of time to build a structure with reliable people. You begin by putting some Italian people at someplace else - you start to introduce yourself. So let us say in the last 5-10 years, we have enabled all global branches to not only be everywhere but also let them take part in the decision making to enable global management, and not management solely from the headquarters. This is important since every branch is sending proposals to the headquarter about the features and weak points of the product.

A.V.: We were also talking about the customers, about the clients. How about the companies that supply you, the lower tier suppliers. How is the structure of the relationship with them?
R.F.: Everybody develops his or her own language in the chain. So for us, the tiers are the suppliers of the car producers. If we talk about the tier 2 or tier 3 in our language, tier 3 is supplying parts to the tier 2 who then is supplying the tier 1. The tier 2 are those who are perhaps assembling the parts and who are selling to the car producer. Therefore, we use the word tier only for the component producers. We consider ourselves as a supplier. This is a good question. One of the keys - as you may imagine - is to have a global structure, but absolutely the same standard. We were talking about Hella, with the production in Mexico and the HQ in Lippstadt. Since production is taking place in one country, they are buying also the injection and mould machines there and then deliver it, for example to Volkswagen. This means that there will be a Portuguese lens, a Chinese mould and all of these parts will be assembled together. Therefore, it is extremely important that whenever they are purchasing the tools, everything has to be the same standard. This is for us extremely important as we also have production plants all over the world. It is crucial to understand that we are not talking about a commodity. Every single product is customized. We are producing 15.000 hot runners per year but 15.000 different products, because there is no one identical to the other. We need to produce and design these hot runners in exactly the same way. We have design centers now in Brazil, the US, Canada, Portugal, Spain, France, Germany, Poland, Turkey, India and China. Almost all of them design hot runners according to the same rules in order to - whenever we are at our Mexican plant, and we have two machines running side by side, one made in Portugal and one made in China - be sure that design, the performance, the working conditions are the same. This means also the materials - and now I come back to your question - has to be the same, or they have to have the same characteristics. We need global suppliers who are delivering parts with the same quality. One of the solutions is supplying ourselves, and this is what we do in China. I would say 90% of the production is done in-house. Therefore, we are producing the very small and know-how intensive parts internally. Many times, we are also exporting them, for example from Italy and the US. In Italy, we have more outsourcing concerning the small parts because we have a supplier network in this region, which is very friendly, and we are working together with them very well. The quality control is directly done

within the suppliers and, of course, we are tracking internally. However, most of the tracking is done within the suppliers. In China, we have to produce everything by ourselves. I hope I answered the question correctly.

A.V.: Certainly. Because I am new to the topic, of course I cannot understand the value chain as good as you do but I try to get a picture of the value chain. For example, now I wrote down that it takes a big coordinating effort to have the same quality standard everywhere around the world and that this is linked to the question before - to the quality standard and the global scale.
R.F.: Indeed, it is very linked. For example, we are selling the same project in Mexico, Portugal and in China. But the standard of each plant initially differs. Because, if you ask the Portuguese and the Chinese which standard they need for their product, you will get two different answers because of the different experiences and the different attention to details and so on. Therefore, we have to go directly to the Mexican plant to ask them what they want and tell their requirements to the mould deliverers in China and Portugal. Another big step which is for sure one of the big factors and for sure is linked what you said about automation is when we started to establish the new plant in China in 2010, we started immediately with a high degree of automation, which is quite the contradiction in China because of the low labour costs. What we did at that time was to invest a lot in automation and now the plant is highly automated. This is also great for us since we first developed this automation in Italy and we have this automation now not only in Italy, but in China and in the US as well. If we now have to move production from the Italy to the US or vice versa, it is no problem for us to do so. The second big advantage of this, which is not as obvious but may be interesting for you: in china, the labour costs have been consistently increasing. The wages were increasing by almost 10% a year. Now we have a big advantage since our plants are highly automated and we are not as sensitive to wages as our competitors are. Therefore, the competitors who came before us and relied on low labour costs now have two options: Either invest a lot in automation as well or move to the next country with lower labour costs.

A.V.: Which is costly anyway. Where do you think in the car value chain production - when you consider the whole process from the raw materials to the vehicle - where do you think are the biggest value-adds are in the chain?
R.F.: This is a very difficult question and I can only answer what I see from my point of view. In the toolmaking industry, the value-add is very low because the competition is very high. There is an increasing level of competition and the concentration of the market is still at the beginning. Some companies are joining efforts to do consolidate work. The toolmakers have a very little leverage with their clients, since the toolmakers have a size of 50-100 people but are selling to companies with around 20.000 people. Thus, their power is very low. On the side of the hot runner production, there is the possibility to have more leverage since the know-how required for hot runners is very high. The tools are not a commodity, they are fully customized. The technology and the core process behind the tools are the hot runners, and that is where the leverage is. 99% of the intervention and the after sales are at the hot runners because the process is there. This gives us a higher risk, but also higher margins. Therefore - what we just said about the

beauty of an international structure – it gives us much more value of the market, and this is what the market recognizes. The side of the end user, this is very difficult for me to say, but what we have noted that there have been very big movements in the market and a higher concentration of small producers purchased by bigger ones and this may be a sign that the economies of scale are very important. From my perspective, this means that the scale is very important considering that the big buyers have a number of alternatives to buy from. It is not comparable with a product like the iPhone, that is, a B2C business. When you have a brand there, then of course you can have a much higher margin. In the car manufacturing, for sure, the OEMs have a big share of the margins because they can sell emotions. However, normally it is much more difficult to get margins.

A.V.: I understand. I researched your company before concerning how you increase your know-how and I found that you established relationships with universities in Naples, Padova and two others.
R.F.: Yes. We are also working with RWTH Aachen with the “Kunststoff department” (synthetic material department) and we need other co-operations to differentiate us because of people like you who are making a degree in order to supply all our knowledge and our tools and in order to do research on new materials.

A.V.: I think with the know-how created from these researches, there is a possibility for higher margins.
R.F.: Yes. Whatever you have for innovation. Let us put it this way: Whenever you have innovation, you have margins. There is also another point to this, which I think might be very interesting concerning your research. Do you know that in Italy we have quite a different business model or a different structure, a smaller size of the companies? In addition, the companies are owned by families, or by one person. This is quite common for Italy or for the north of Italy. This is also true for big companies. Fiat, for example, is a family-owned company. This is normally seen as a disadvantage, but in our case, I would also say that we are exploiting the benefits of this. Because most of our companies are owned by international funds, investment funds. The innovation capacity is lower of these companies because they have to pay dividends to their stockholders. What the big difference between *Inglass* and most of its rivals as well as suppliers is that we have never paid a single euro in dividends. This is due to the owners who are constantly investing a share of the profits. This is a big difference, because we had the possibility to invest in new plants, in internal structure, and we are not as dependent on margins as other companies may be. In a way, it could be interesting for you because it is a very different business model between Italy and Germany. Of course, we have the limit of being a family company, but also we can exploit the freedom that the funded ones do not have.

A.V.: That is very interesting. One of the only German companies with a family structure that comes to mind now is Bosch. I will look more into this. What tips would you give in general for start-ups in the automotive sector? I know the question seems odd, but the purpose behind the question was ‘what are the general working conditions in a very competitive sector and how would you cope

within it'. An example would be a start-up that would decide now to produce car batteries in the Veneto Region.
R.F.: I will give an example. First, I have to say that no big customers are Italian. That is consistent with what you said. There is only one car component producer, which is quite big. All the other Italian companies are very local, with the production only based in Italy. They are not global companies, which means that our growth has been done mostly outside of Italy. Therefore, the first point of this is, unfortunately: Do no look at Italy as a market. This is for the time being not the strategy. However, the point that I was trying to make is... We are still a young company in the market. We have started 15 years ago to appear on the market. The main difficulty was to be specified within the big conglomerates. As I said, the big conglomerates are taking part into the choices of the toolmakers and they are specifying two or three toolmakers as key suppliers. Our big difficulty was to be part of this two or three. This decision is made by the big companies who have a large number of employees. Normally, they are not willing to change their suppliers or there are no good reasons to do it. (Connection Lost).

A.V.: I am very sorry.
R.F.: Ok do not worry. It is Venice. I was saying: It was difficult for us to increase the numbers of sales or to incorporate ourselves within these two or three suppliers. This has also to be a similar situation in Germany, since our biggest competitors are based there. This is why it (globalization) is a barrier to entry because these companies have their headquarters in one country, but of course, production plants everywhere. We managed to be specified by many of them thanks to innovative products. The innovation we have managed last year, which I will try to explain in a non-technical way: There are some moving parts, which are commending the flow of the plastic so that the plastic can be printed in a specific way. These moving parts, which are opening and closing the channel for the flow of the plastic, were commended through air. As you can imagine, air is easily affected by the weather etc. You are never exactly sure about how the air is affected by the circumstances and the oil leakage that you can have. We have replaced this with an electric motor. The electric motor is completely clean; you can have a perfect control of position and speed of the moving parts. Therefore, it is really something that no one had ever done before. This innovation gave us access to many new and different customers. It sounds obvious, but I wanted to give you an example. You need innovation. In order to create a successful start-up, you need innovation; you need an innovative product, and you have to able to sell to international customers.

A.V.: Thank you so far. This has been the general question part.

Appendix B: Interview transcript with Texa

Correspondent: Elvis Colla (in the following E.F.)
Correspondent: Bruno Vianello (in the following B.V.)
Interviewer: Alexander Volk (in the following A.V.)

After the welcoming...

A.V.: How do you think the automotive market will develop and how will this affect *Texa*?
B.V.: I think that the mega trends, such as the electrification and the digitalization will affect the automotive sector greatly. This trend will help us expanding since the end consumer can use our diagnostic tools. We hope that we can help end consumers repairing their car by themselves and make a visit to the workshop more redundant.

A.V.: Could you tell me a little bit about *Texa* and what role you play within it?
E.C.: My role within the company is Sales and Marketing Director. *Texa* has had 500 employees in 2014. As you know, we are unconventional with our location as a car supplier because we are based in Monastier di Treviso, and most of the car industry in Italy is based in Turin and Modena. We are experts when it comes to car diagnostics and are competing with suppliers on a global level.

A.V.: What would you say was the most important strategic decision, which has helped *Texa* to become what they are today?
E.C.: We started in 1992 and focused on diagnostics in the automotive industry as a core business. That was already an important decision since there was a huge potential for this market. One of the most important decisions within our business was to offer multibrand solutions to the workshops. Nowadays, we look towards the future and keep up with the trend of “the internet of things”, where everything is connected and digitalized. The crucial question we have to ask ourselves for our success in the future is: who will be responsible for paying our services - the end user or the OEMs (concerning our diagnostic tools)?

A.V.: What would you say is crucial for the success of *Texa* and why does your product/service stand out?
E.C.: There are two main points, which we can provide. First, we offer a premium service at a low prize. It is crucial to satisfy your customers at the lowest price possible without cut-offs at the quality and the service. The second point is R&D - you have to be innovative. We are spending around 12% of our turnover on R&D and have currently 200 employees focused on development.

A.V.: As your company evolved, did you become increasingly vertically integrated? In general, would you recommend small business to focus on its core business or to become a “Full-Service provider”?
E.C.: I would argue that your core business is very important in the early phase of the enterprise. Right now, we are able to produce everything out of raw materials

and offer many additional services. For example, if workshops become customers of ours, we help them with training on our devices. We even help training the workshops with the repairing process and if there are any other questions left, we have a call center where our customers are able to pose any of the leftover questions.

A.V.: What would you say is the biggest obstacle for SMEs as opposed to large companies?
E.C.: That is very simple. In my opinion, the biggest obstacle is brand recognition. If a distributor, client or someone else sees a logo of Bosch, they know what they are dealing with. If you would ask people, who did not came in contact with *Texa* before, they do not know who we are and what we do. That leads to difficulties in Sales and Distribution channels, as well as additional costs.

A.V.: How many clients do you serve and what is the downstream structure of them?
E.C.: We see ourselves as a tier 1 supplier, since we deliver not only to workshops but to OEMs as well. The workshops are served via distributors and we serve up to 150.000 workshops I would say. The number of OEMs is of course limited, but we now have 15-20 OEM customers as well.

A.V.: How many suppliers do you have and what is the upstream structure of them?
E.C.: We do not have many suppliers, because we are very integrated from a vertical perspective. We start with raw materials and end with our products that we sell. We believe that this structure is one of the main reasons for our success. First, it gives a competitive advantage in the production process concerning the know-how. Secondly, by doing the whole production process, we assure our understanding within the process and have potential for innovation, incremental as well as disruptive.

A.V.: If a start-up would start in the Veneto region in the car industry, what advice would you give this company?
E.C.: In my opinion, it is almost impossible to enter the car industry right now. If you want to enter at the times we have now, you have to focus on the new trends, as I mentioned before. Moreover, following the trends will not be enough, you have to come up with new, innovative ideas ready to implement. If you fulfil these criteria, you can start a company.

A.V.: Since we are now at the end of the open questions, I would like to ask you if you have any additional aspects, which I should consider for my study.
E.C.: You cannot stress enough how competitive the market is. Furthermore, it takes a long time until you are established in the market, which is a huge obstacle for small and medium enterprises. However, the car industry undergoes major shifts. The future of the car is electric, interconnected with “the internet of things”. Tesla is a good example of utilizing the trends. With just paying attention to one of the key trends, they have the potential to establish themselves along the already well-known brands, although it also did not happen overnight. In my opinion, the product itself is also changing, as young people do not really see the car as a status

symbol anymore. This will lead to a change of the ownership relationship between the people and the cars.

A.V.: Thank you so far. This has been the general question part.

Appendix C: Interview transcript with Sitronic

Correspondent: Dr. Markus Beck (in the following M.B.)
Interviewer: Alexander Volk (in the following A.V.)

After the welcoming...

A.V.: Where does *Sitronic* have sites around the world?
M.B.: We have sales agents in Seoul and in the U.S. So far, we are planning to found an own site in the US with around 180 employees and a revenue of 18 million euros in 2014. We spent 5-10% on R&D, but we do not register many patents, since our process is inherently difficult to copy.

A.V.: Could you tell me how you fit into the product portfolio of *Sitronic* and what *Sitronic* does with it?
M.B.: I am responsible for all operational tasks. I am responsible for quality assurance, for the production, for maintenance, logistics, for the materials management and for purchasing. Everything except for administrative tasks.

A.V.: When you look back at the history of *Sitronic*: What strategic actions did *Sitronic* take in its early years that helped the company to survive in the automotive industry?
M.B.: You have to consider this: *Sitronic* has been founded in 1969 as cable and sensor manufacturer. Thus, *Sitronic* has grown; it also has established, inter alia, a site in Tunisia. Then, in the early 1990s, electronics came into play. The cable business was overdue. Tunisia was abandoned and nowadays we produce no more cables. Cables are for us now only a part for purchasing. The major strategic shift was from being a cable producer and assembler to an electronic components producer and we solely produce for the automotive sector, about 95% -98%.

A.V.: In your opinion, what are the critical points for the company's success?
M.B.: As we are a medium sized company, our flexibility is a major reason. USPs are equally important. This applies for all medium sized companies in the automotive sector; most of them are between the tier 2 or 3. We are rather exotic since one-third of revenues emerges from our tier 1 position, because we supply directly to OEMs. This went on until one OEM customer had our parts included in 98% of their vehicles, as a single source. This shows how strong *Sitronic* can be. However, of course we also deliver to LEs in the tier 1.

A.V.: Has *Sitronic* evolved into a full service provider?
M.B.: We are active in the market electronics, which means that we cannot just take steel and produce a component. We are obliged to source lots of different parts, as you have to do as a small and medium sized company in the electronic part production. We mostly assemble the electronic parts.
.

A.V.: In that case, was it better for *Sitronic* to focus on its core business?
M.B.: That is correct; our level of vertical integration is not too high. Nevertheless, as I pointed out, it is difficult to achieve a high level of vertical integration in electronic manufacturing. For example, the conductor production process has completely different production steps as a resistance production process. However, there are also companies that are trying to produce everything themselves. From the copper rod to cables. We are still too small and we lack the necessary expertise to do all that. If you want to gain the know-how of these production processes, a larger volume of sales is necessary and the appropriate personnel equal a company with 60-70 employees.

A.V.: What do you see as the main obstacles for SMEs?
M.B.: Larger companies have easier access to suppliers. You have to imagine it as follows: In the automotive industry, the electronics are supposed to be of the highest quality, the parts are subject to lots of quality tests. Roundabout, the automotive industry is ought to have the best electronics. However, the automotive electronics account for only 3% of the electronics market in the world at the bottom line. Now you can imagine the importance Infineon places on the automobile market. They are far more interested in the entertainment and the communications market, since in this segment they are able to scale production and sales. We, as small and medium suppliers, often do not have the possibility to access the vendors and thus we have to work through distributors who do not work for free. It is hindering. Larger suppliers get other conditions and source directly from the suppliers.

A.V.: How would you describe your supplier structure?
M.B.: We have about 300-400 different suppliers. However, these are often disguised behind distributors, since we buy from the same distributor different supplements from different companies, e.g. Infineon and *Texas* Instruments chips.

A.V.: What does your customer structure look like?
M.B.: We have around nine clients, which account for 90% of the revenue. Additionally, we have around 30-40 small customers, which account for the remainder of the revenue.

A.V.: Where in the value chain of automobile production do you think is the largest value-add?
M.B.: The biggest gain in the value chain is always there where the most USPs are, who brings these first to the market and if the end customer, in this case the OEM, is excited about the product. There is money lying on the floor.

A.V.: Which advice would you give to start-ups in your area in the automotive Sector?
M.B.: Invent something that is not on the market yet. We have orders from OEMs as we have a ‘number’ of Daimler and VW. This is about the famous ‘Lieferantennummer ‘(supplier number). If you have a one, it is a lot easier to get new projects.

A.V.: When it comes to my topic, can you think of something that I forgot to ask?
M.B.: Maybe you could pose the question what prevents value creation or the success of small and medium enterprises. Many companies are preventing themselves from being successful, e.g. by denying paying the average salary of OEMs. Thus, they lose skilled employees to OEMs and hence, miss out on innovation.

A.V.: Thank you so far. This has been the general question part.

Appendix D: Interview transcript with Menzerna

Correspondent: Peter Kreuter (in the following P.K.)
Interviewer: Alexander Volk (in the following A.V.)

After the welcoming...

A.V.: The company was founded in 1888, is family-owned and your greatest expertise lies in polishing material. I found a fact on the homepage that you have a global network. Where are you active exactly?
P.K: We have a representative site in China and a subsidiary in the U.S.

A.V.: Okay. Furthermore, you are active in five market segments, but my research focuses on the automotive sector. How big is the share of your automotive operations?
P.K.: Calculated across all stages, including aftermarket sales the automotive sector accumulates to around half of over revenue, to 8 million euros. So, the whole company has a revenue of 16 million euros in 2014 produced by around 50 employees.

A.V.: Who is your biggest competitor?
P.K.: 3M in the automotive sector.

A.V.: What share of the revenue do you invest in R&D?
P.K.: In total around half a million euro.

A.V.: I have had an extensive look at how *Menzerna* works, but I would like to hear from your side again how *Menzerna* works and what role you play within it.
P.K.: How it works… My function is commercial director. Well, how does it work...? My function is commercial director. We see ourselves as experts when it comes to polishing, that means not only car polishing materials but also for musical instruments or furniture. There are basically two different segments, the automotive segment and the other segment, which is comprised out of many sub-segments. The automotive segment is distinct since first, we try in this field to enter over a broad network of dealers, and secondly, we try to find industrial users via direct contacts. That is the biggest difference within the sector. At the moment, we are trying to expand our know-how. Previously our knowledge was limited to the development of polishing material, while now we try to understand the whole polishing process. The process consists of several stages. On the other hand, it is about machines, and about grinding. We are trying to reconstruct these processes in applications engineering and to understand them. We want to be those who are able to tell the customer not only how the polishing material but how the polishing process works.

A.V.: Ok, I will come back to this topic later again. You are already a slightly older company. What would you say was the most important strategic decision that has helped *Menzerna* to become what they are today?

P.K.: We are an owner-operating enterprise and the main engine for us is our CEO. There were two main points to our automotive section. First in the year 1995, Daimler came to us since they have known us from other applications. They said: “Hey, look, see that you can produce a polishing material for us.” That is now the main reason we started with car polishing material. They knew us because of our other applications for our polishing material, such as for wood. This initial contact was the trigger. It was a car assembler that asked us to do something, not a decision within our company. That is quite often the case for us: the customer has a problem and asks for a solution.
The second crucial point to our success happened in the year 2010, when we decided to build exactly the application technique to broaden our portfolio and to approach the complete polishing matter methodological. Now, we have an empirical development with a “trial and error” approach and we founded a department which solely focus is the application technique. That are in my opinion the two crucial issues.

A.V.: That is very interesting, since my research question is directed towards how SMEs can integrate themselves in global value chains of global players.
P.K.: I have to point out that these opportunities are created by the large enterprises. If there would not be such a big industry, we would not be involved. These “lighthouses” are extremely important, but on the other hand, it is the small company’s job to “catch the ball” and do a good job.

A.V.: Earlier you have mentioned that most of the revenue streams from the small and medium customers, and only 10% is received from OEMs.
P.K.: That is correct, since the OEMs consumption of polishing material is way too low. However, after an accident, cars have to be repaired. This leads to a higher consumption in the aftermarket.

A.V.: What would you say is crucial for the success of your enterprise? What makes your product/service stand out?
P.K.: I think due the fact that we have made an effort to understand the polishing process, we have developed a know-how, which basically no one has. If we talk to the polishing experts in the company of our customer, we talk on an equal footing, and we actually know more. We have built an autonomous department, which calls itself “Consulting”. It is still in its infancy, but has some lucrative contracts for that matter. These global companies now employ our expertise.

A.V.: Of course, it is much more exciting if you are also able to acquire consulting projects. Would you say that small and medium enterprises, in general, should focus on seizing the value chain completely or to focus on the core business?
P.K.: This is a very difficult question and depends on many variables. For the things that we do now, of course, you need good people. We have a doctorate chemist, we have a physicist in the development, and it is not cheap. Sometimes the margin situation in some companies simply do not add up. Then you come back to what you can. We can achieve cost leadership; we can take over the leadership in innovation. It is important to consider what is financially possible. I can see what the research and development costs. If you employ a physicist who is a precursor

to the development, someone who develops ideas for second and third generations, you pay a lot of money. For us it was the right way, for other companies, the cost leadership might be the right way. However, cost leadership comes with the problem of dependency. We also benefit from serving multiple market segments at the same time; therefore, we are not as dependent as other companies are on one segment. The automotive business is one, but if there is a downward development in the automotive industry, it might be the case that the demand in the other segments rise (jewelry, etc.)

A.V.: What would you say is the biggest obstacle for SMEs as opposed to large companies such as 3M?
P.K.: Quite simply, development capacity. Unfortunately, we cannot hire indefinitely people; it needs to pay off somehow. We are a bit handicapped in that point. What still is a big problem: we have more difficulties to find distribution channels. Such a distributor of polishing material for cars takes more from brands that he knows - you have to uplift your products through service and quality. Those are the main points. If a steamboat such as 3M is running then it runs. We are a small motorboat; we have to come around the corners faster.

A.V.: How would you describe your supplier structure?
P.K.: Overall, we have about 80 suppliers with a typical Pareto distribution. 20% of suppliers cover about 80% of demand. Now, we are also forced to purchase worldwide. Nowadays, we must measure the performance of our suppliers. By the way, there are development projects, which originated precisely from these application techniques.

A.V.: Then I have two open questions: Where are the greatest value gains in the value chain of the automobile?
P.K.: For household goods, this is easier to answer, as there are in my opinion polishes. Without revamping, the household goods are usually not presentable, although we cannot deny building the household goods is a valuable process itself. For vehicles, it is difficult because there are many factors at play. My personal opinion is that most value is added through the body. Because frankly, most cars are bought for their appearance.

A.V.: If a start-up would start in your region in the car industry, what advice would you give this company?
P.K.: They should consider whether they wish a leadership in innovation or cost leadership. You cannot have your cake and eat it too. Cost leadership means to move towards dependencies. For example, when producing car components you simply need to adapt the process according to the specifications of the automotive industry, and the cheapest. The other possibility is to think of new solutions regardless of the automotive plants. Develop these ideas and dive into the market. Through innovation, you will quickly become an interlocutor. I can remember a certain situation when a car manufacturer suddenly had a problem with tougher lacquers. Here you have to enter as an SME and solve the problem as quickly and as unique as possible.

A.V.: Thank you so far. This has been the general question part.

Appendix E: Result operationalization CSF survey

Step 1: CSF identification.
The CSFs of SMEs that help the firms integrating into GVCs were adopted from two sources, namely Ab Talib et al. (2015) and Kaplinsky & Morris (2001). Twenty-five reliable CSFs were identified and grouped into three CSF categories: company, chain and product.

Step 2: Survey responses.
After completing the open question part, the interviewees were asked to fill out a survey that included the 25 CSFs. They were asked to rank the importance of the CSFs on a scale of 1-7 from 'not important' (1) to critically important (7). Additionally, surveys were send to customers.

4 responses on the supplier side

3 responses on the buyer side

Step 3: Excel Calculation.
After gathering the responses, the data was analysed using Microsoft Excel and grouped under the following indicators:

- Average score of each CSF combining the supplier and buyer responses, namely "e total",
- Average score of each CSF on each side, namely
  - "e Supplier" and
  - "e Buyer",
- Average score of all CSF of in one category, namely *
  - "e Buy total" and "e Sup" of company characteristics,
  - "e Buy total" and "e Sup" of chain characteristics,
  - "e Buy total" and "e Sup" of product characteristics.

Step 4: Indicator interpretation.
The results were illustrated in a radar chart in figure 10, figure 11, figure 12 and subsequently interpreted.

* Note: Buy = Buyer; Sup = Supplier.

Appendix F: Overview top ten global OEM suppliers

Rank	Supplier	Home-Country	Products	Total OEM automotive parts sales (in EUR million, 2013)*
1	Robert Bosch GmbH	Germany, Stuttgart	Gasoline systems, diesel systems, chassis system controls, electrical drives, starter motors & generators, car multimedia, electronics, steering systems, etc.	36.710
2	Denso Corp.	Japan, Kariya, Aichi	Thermal, powertrain control, electronic & electric systems; small motors, telecommunications	32.751
3	Magna International Inc.	Canada, Aurora, Ontario	Bodies, chassis, interiors, exteriors, seating, powertrain, electronics, mirrors, closures & roof systems & modules	31.404
4	Continental AG	Germany, Hannover	Electronic & foundation brakes, stability management systems, tires, chassis systems, safety system electronics, telematics, powertrain electronics, etc.	30.605
5	Aisin Seiki Co.	Japan, Kariya, Aichi	Body, brake & chassis systems; electronics, drivetrain & engine, components	24.781
6	Hyundai Mobis	Korea, Seoul	Chassis, cockpit & front-end modules; ABS, ESC, MDPS, airbags, lamps, ASV parts, sensors, electronic control systems, hybrid car powertrains, parts & power control units	22.544
7	Faurecia	France, Nanterre	Seating, emissions control technologies, interior systems, exteriors	21.880
8	Johnson Controls Inc.	U.S., Milwaukee, Wisconsin	Seating, overhead systems; door & instrument panels, center & overhead consoles & interior electronics, lead acid & hybrid batteries	21.414
9	ZF Friedrichs-hafen AG	Germany, Friedrichshafen	Transmissions, chassis components & systems, steering systems, clutches, dampers	18.668
10	Lear Corporation	U.S., Southfield, Michigan	Wiring harnesses, connectors, junction boxes, power distribution boxes, instrumentation, high-voltage systems	14.831

*Note: Original sales value in $, transferred to € with an exchange rate of 1$=0.91€ (Source: http://www.autonews.com/).