

SURVIVING POSSIBLE?

A QUALITATIVE ANALYSIS OF THE CURRENT TRANSFORMATION PROCESSES IN THE GERMAN AUTOMOTIVE SUPPLIER INDUSTRY, DUE TO AUTONOMOUS AND ELECTRIC VEHICLES

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ABSTRACT

The importance of the automotive industry for Germany's economy and employment is significant: Before Covid-19, 22% of total revenue for manufacturing and processing goods were gained by the automotive industry in Germany with over 830,000 employees. As the supply side contributes 3/4 to the value chain, the research focuses on German automotive suppliers and how they perceive the shift from combustion engines to electric engines and to fully autonomous vehicles. For the explorative study, a qualitative content analysis based on expert interviews was used. 15 top and high-level managers from 14 German automotive suppliers were personally interviewed. The analysis has proven that most suppliers are significantly affected through these transformations. Only three suppliers evaluate the changes mainly as growth drivers for their business, while the rest faces large challenges and great threats from the industry developments.

KEYWORDS

German automotive supplier industry, paradigm shift, disruption, transformation, autonomous vehicles, electric vehicles, Original Equipment Manufacturer (OEM)

INTRODUCTION

In total, the automotive industry is one of the most important economic sectors in Germany with a 22 %-share of the total revenue for manufacturing and processing goods (Statistisches Bundesamt, 2019). Germany's prospering economy is mainly driven by the export of German automobiles which accounted for €282,7 billion in 2019 (21% of total export) (Statistisches Bundesamt, 2020). However, the automotive sector not only counts in monetary terms for the well-being of Germany. The industry is also one of the largest employers of the country with over 830,000 employees in 2019, based on Destatis (Statistisches Bundesamt, 2020). One group of this industry represents the automotive suppliers that realized around €80 billion revenue in 2019 (18% of total revenue in the automotive industry) (Statistisches Bundesamt, 2020). Compared to manufacturers of automobiles and automotive engines (in the article, this group is considered as OEM) this could imply a rather low significance of the suppliers. However, when looking at the value chain, the automotive suppliers account for 75% of value-added. Also, the suppliers are one of the main drivers of innovation when considering that one-third of R&D expenses are made by suppliers. This again

acknowledges the importance and dependency of OEMs and the automotive suppliers (VDA, 2016).

During the recent years, the technological complexity of manufacturing vehicles increased constantly. The OEMs invested heavily in R&D to develop new products that would differentiate themselves from the competition (Kilian et al. 2017). One important trend is the expansion of assistant systems for comfort and safety towards fully autonomous vehicles. Especially new industry-remote competitors from Asia and North America like Baidu (Madhok, 2018) and Waymo (Waters & Burn-Murdoch, 2019) are entering the market by providing highly sophisticated software to advance the current status quo. They can be regarded as disruptive technology providers familiar with IT-related topics like big data, connectivity, social networks as well as platforms. This situation enables partnerships among different ecosystem players. Another dominant topic targets the emission reduction by downsizing the combustion engines as well as electrifying the powertrain (McKinsey, 2016). Since traffic makes up a large part of the CO₂ contribution with 18.2% of global energy-related CO₂ emission (BMU, 2017), governments decided to subsidize the development of electric vehicles. By 2025, there should be over 400 models of electric vehicles available (Singh, 2018). Thereby, global stock of electric vehicles is constantly increasing (+54% compared to the year before); however, the market is still representing a niche market with around 3 million electric passenger cars sold worldwide in 2017 (IEA, 2018) compared to 73 million total passenger cars sold with China being the largest market (OICA, 2017).

Besides new climate agreements, the increasing demand for alternative vehicles and mobility solutions can also be explained by a changing customer demand. Millennials (people born between 1980 and 1999) are emerging to become the largest purchasing group globally. Their idea of mobility has changed by regarding mobility as a vital service not as a status symbol. In 2016, already 33% of German Millennials used public transport systems compared to less than 15% among all other age groups (VDV, 2016). Also, over 2.1 million users were registered at car-sharing platforms in the beginning of 2018 (+24% compared to last year) (Bundesverband Car-Sharing, 2018). This offers opportunities from an added-value perspective in the direction of servitization and service-driven logic. Seeing service as the fundamental basis of exchange, value is cocreated by multiple actors in adequate ecosystems. Coordination takes place by using actor-generated institutions and institutional arrangements. Inter-organizational networks can be orchestrated with IT platforms: Creating connectivity enables the creation of value in the network (Floranta & Turunen, 2015). Furthermore, sharing proprietary resources can be a benefit for each participant regarding service innovation and provision. The integration logic can establish an efficient service delivery system. Therefore, the importance of IT platform approaches has high potential, especially the manufacturing context (Floranta & Turunen, 2015).

Besides this, suppliers can transform into business partners. On the other hand, this means that classical tier 1-3 suppliers are not only exposed to the threat of being replaced by disruptive technology providers, but also becoming less important than new service providers, regarding the share-of-value. According to Proff, Fojcik and Killian, the European automobile industry will experience a decrease of the value added per vehicle in the future. The OEMs will face the challenge to build new skills for young professionals on one side, and simultaneously break up their previously integrated value bringing architecture on the other side. This might result in a transfer of value added to their suppliers (Proff et al. 2015).

Based on these new industry developments, the study aims to identify in what forms German automotive suppliers perceive their current transformational environment as well as to extract possible variables that could influence these perceptions. Additionally, the analysis seeks to identify possible factors that determine whether a supplier might successfully integrate these changes.

LITERATURE REVIEW

As companies normally align their business model and strategy based on how they perceive their environment, changes within their micro or macro environment can have fundamental consequences for the company, but also for the industry (Tidd et al. 2005). The initiators for a transformation in the business context are always innovations. Hereby, one can distinguish between a technological novelty, business-related changes like

given market structures or rules, or in form of organizational innovation that can concern corporate structures, culture or systems (Tidd et al. 2005). Based on the type of innovation, the effects of transformations to the enterprise or industry vary. Incremental-continuous innovations are subject to an advancement of already existing problem-solving methods. The products are not substantially transformed but the potential of already successful technological designs is exploited through improvements of efficiency and the reinforcement of an established technical order (Tushman & Anderson, 1986). In contrast to that, radical-discontinuous innovations replace old technologies by destroying market structures with the introduction of completely new and revolutionary technologies (Tushman & Anderson, 1986).

Transformation Processes

Joseph Schumpeter defined in his theory of innovation in 1912 the emergence and development of new inventions. The process of transformations can be described in a s-curve based on the degree of maturity of a technology and time as shown in the graph below.

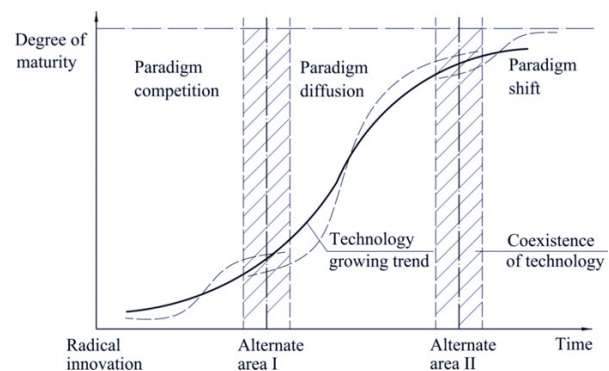


Figure 1: Paradigm shift as S-curve (Zheng & Xu, 2014)

Thereby, new innovations firstly emerge parallel to already existing structures (Schumpeter, 1939). Only when the realignment of means is developed fully and diffused successfully in the market, it competes with the old products and eventually can make the old innovation become obsolete (Schumpeter, 1939). After the technology is saturated in the market, a technology shift appears. In order to derive further profit, Schumpeter argues that many companies are constantly pursuing the process of “creative destruction”: introducing a new set of combinations that eventually destroys the old one (Schumpeter, 1942). Several models have been developed since then and the process of innovation is, based on the work of Kline and Rosenberg (Kline & Rosenberg, 1986), today seen as a complex system depending on hardware, market environment, production facilities, knowledge and socio-economical context (Brunetta et al. 2018).

In order to grow through transformations, a company needs to focus its attention simultaneously on three areas:

growing with the current business, developing new business models and identifying new trends and future growth opportunities (Baghai et al. 1999). However, companies oftentimes face difficulties in simultaneously maintaining their old business operations while investing into the radical innovation until the integration process is fully completed. Christensen refers to this managerial balancing act as “innovator’s dilemma” (Christensen, 2008). The integration process usually involves large investments that are mainly financed by the old business operation. Companies with a smaller amount of financial resources and highly specialized products oftentimes choose to stay in the “old” market, which will eventually become a niche market (specialization strategy). However, the growth expectations in niche markets are much lower than in mass markets. Hence, many specialized companies try to transfer their core competences onto other industries besides the innovated one (diversification strategy) (Porter, 1987).

Reasons why some companies are not able to adapt to the transforming circumstances are divers. Christensen and Raynor (Christensen & Raynor, 2013) identified two types of discontinuity: One where an existing market is confronted with a new bundle of performance parameters and the other one where disruptive innovations create completely new markets. Most companies do not fail to “cope with a breakthrough in the technological design [...] but with the emergence of new markets with very different needs and expectations” (Tidd and Bessant 2013, p. 30). Oftentimes, the later disrupted companies invented the disruptive innovation themselves, but they were not able to adapt their inventions to a new set of needs. Other firms struggle to identify the long-term growth potential of newly emerging markets, as the certainty of the full potential is not given at the beginning (Tidd & Bessant, 2013).

Organizational inertia is also considered to be an explanation why large companies fail to adapt to changes within the external environment. It is the tendency of experienced firms to continue their current trajectories. Hereby, it can be distinguished between an unwillingness to invest (resource rigidity) and the inability to adjust established patterns and logic that motivated those investments (Managing Research Library).

Innovation Management

To ensure a company’s success, it is necessary to develop specific structures and capabilities that can detect and adapt to radical-discontinuous as well as incremental-continuous changes (Tushman & O’Reilly, 1996).

In general, the process of innovation management consists of three different steps: searching, selecting and implementing new innovations. In this context, innovation management is “a generic activity associated with survival and growth” (Tidd and Bessant 2013, p.67 et seq.). No matter if the innovation is technology-oriented, organizational or business-related, a company needs to decide whether it wants to be an innovation pioneer or an innovation follower. One advantage of being a first-mover is the benefits that arise from a

temporary monopolistic position in the market. Monopolists usually achieve higher profit margins, reduce their manufacturing costs through learning effects and economies of scale and can increase the barriers to entry. They can also start establishing relations to suppliers as well as customers, which increases loyalty and trust. However, being a first-mover has also its disadvantages. The strong uncertainty concerning the development and acceptance of novelties, as well as financial and resource investments bear high risks. Companies become inflexible to further changes due to high development costs and little experience values (Tidd et al. 2005). Therefore, many companies decide to become early adopters or innovation followers.

METHODOLOGY AND DATA COLLECTION

The aim of this empirical study is to identify the strategic influences of fully autonomous and electric vehicles on German automotive suppliers. As these transformations are currently emerging, there is little to none empirical research conducted about the possible influences targeting the supplier industry so far. Therefore, an explorative research is used to provide a first analysis of this topic. For the analysis of the research questions a qualitative method was chosen (Patten & Newhart, 2017). Semi-structured expert interviews constitute the primary source of data collection. The interviews have been conducted with top-managers of German automotive suppliers since they represent the population of the research study.

Out of this population, a sample is derived through sampling (Stokes & Wall, 2014). Thereby, the selection criteria for possible interview partners included the following conditions:

- the interviewee needs to have a leading position within the company to ensure a realistic presentation of the company’s strategy, processes and assessments,
- the company of the manager manufactures and supplies products for the automotive industry and
- the company’s headquarter is located in Germany.

The aim of the study is to display a realistic picture of the industry. Thus, variations within the sample concerning size of company and type of product were preferred. The products provided by the suppliers range from small electric components to exhaust systems as well as to engineering services, as can be seen in the table below.

Table 1: Overview of interviewed suppliers based on several variables

ID	Company Structure			Type of product		
	Company Size	Profitability	Legal Structure	Product Type	Part of the Value Chain	Automotive Dependency
1	medium	small*	private company*	powertrain	components	large
2	large*	small*	private company	powertrain*, chassis*, electronics*	systems*	medium*
3	medium*	medium*	public corporation	powertrain*	components	small*
4	medium	medium*	private company*	powertrain, others	components*	medium, large
5	medium*	small*	private company*	powertrain*	systems	large*
6	medium	small	private company*	powertrain	systems	large*
7	small	n.a.	private company*	electronics	parts	large*
8	large*	large	public corporation*	powertrain	systems	large*
9	medium*	large*	private company	others*	parts	small*
10	medium*	medium*	public corporation	powertrain, chassis	components	large
11	large*	small*	private company*	powertrain*, others*	systems*	large
12	small	n.a.	private company*	others	parts*	large
13	medium	n.a.	private company*	electronics	components*	small

* No answer provided in the interview. Value is based on quantitative research.

The representatives of the interviewed suppliers hold the following positions within their companies:

- Head of department (four interviewees)
- Head of division (eight interviewees)
- CEO (three interviewees)

They assume responsibility in the fields of strategy and business development (six interviewees), product development (six interviewees), sales (one interviewee) and public relations (two interviewees). The interviews were conducted from September 20th, 2017 until October 30th, 2017. The duration of the interviews varied between 30 and 80 minutes and were carried out face-to-face (nine interviews) or via telephone (five interviews).

In all interviews the language spoken was German to create a comfortable interview environment for the interviewees. All interviews were transcribed subsequently by applying simplified rules of transcription. Although the study was already conducted in 2017, a consultation with the majority of the interview partners in June 2020 showed that the central statements are still valid.

Data Analysis

The analysis of the expert interviews aims to answer three research questions:

1. Which strategic influence does the transformation represent for German automotive suppliers?
2. Which variables could have a possible influence on how the suppliers perceive the transformations?
3. Which capabilities should a company hold in order to be fit for the transformations?

To answer these questions, a qualitative content analysis based on Mayring was chosen. This research method was used as it applies a systematic, theory-guided approach to text analysis where “the category system is the central point...” (Mayring 2014, p. 40). Hereby, a combination between summarizing and structuring the interview transcripts was chosen. To summarize the different forms of strategic implications for the first research question and the characteristics of fitness for the last research question, an inductive category system was used (Mayring, 2000). To identify possible variables that could have an impact on the strategic influence (second research question), a deductive category assignment was applied (Mayring, 2014). Since the three variables Size of Company, Type of Product and Innovation Management were targeted in the analysis, they constituted some of the categories.

FINDINGS

Strategic Influence

Based on the interviews, at least one of the two transformations will take influence on the business model and strategic orientation. Especially e-mobility was identified to be the main factor influencing the industry while by the majority autonomous vehicles are expected to affect the company only indirectly. The main reason for this presumption is that the production of autonomous vehicles not necessarily abdicates combustion engines and thus does not automatically threaten sales for vehicles with combustion engine: *“We do not address autonomous driving for it has no relevance to us. As we are a supplier for modules, we do not care if the vehicle is driven by a person or by itself”* (S05). Another supplier argued that autonomous driving *“does not present any linkage to our core-competences”* (S08). However, several interviewees conceded that the emergence of autonomous vehicles could reduce the vehicle stock and would have influence on the companies ((S11), (S04)).

Only one supplier identified autonomous vehicles also as a growth driver: *“The revenue potential for the suppliers will increase significantly due to the transformations and the fully autonomous driving. In the next six to seven years, our company will generate 2 to 2,5 billion EUR additional revenue through autonomous driving.”* (S14). On the other hand, electric vehicles influence all interviewed suppliers *“dramatically”* (S13), *“significantly”* (S11), *“largely”* ((S01), (S07), (S09)), *“on the highest organizational level”* (S08), *“as an absolute strategic orientation”* (S04). However, the nature of this influence can be diverse. In total, only three of the surveyed suppliers benefit completely from electric vehicles. For (S09), electric vehicles imply *“one of the main growth drivers for several product types”*. The manager argued: *“We are already present in the battery market with our products. To put it simple: the transformation of e-mobility is not possible without our type of products.”*

Initiated by the transformations, other suppliers have also started to develop and produce new products needed for the shift towards e-mobility ((S02), (S03), (S04), (S05), (S08), (S10)). Nonetheless, the integration of e-mobility into the strategy was executed at different times. (S10) started to research and develop new products for the battery since 2009: *“I think we are in a relatively comfortable position since we have not just now started to engage in e-mobility”*. Hence, the company is currently able to offer three serial products for batteries to the market. Other suppliers included the development for products concerning electric vehicles later: *“Of course, we have positioned ourselves somewhat towards e-mobility in the past years. We offer components that can be used in these vehicles”* (S03). This second group of automotive suppliers considers electric vehicles as an opportunity for some parts of their businesses. But when looking at the company as a whole, other departments and divisions will face severe difficulties when production and sales of e-cars gather speed or even prevail against the combustion technology. The most frequently mentioned challenges faced by the interviewed suppliers are displayed in the table below:

Table 2: Challenges

Challenge	Suppliers
Investment dilemma	S01, S02, S03, S04, S06, S07, S08, S10, S12, S14
New competence requirements	S02, S06, S08, S11, S12, S14
Increasing competition	S05, S06, S07, S11, S12
Reduction of parts	S01, S04, S05, S12
Others	S01, S04, S07, S08, S11, S14

Most of these suppliers are highly dependent on the combustion engine. As they do not expect that the conventional powertrain has reached its saturation point so far, they are pursuing multiple strategies. Their investments aim to both, conventional and electric powertrains: *“We need to earn money by doing what we*

did in the past to make investments into e-mobility possible” (S04). The difficulty for many suppliers is that the demand for their new products is still very small: “Currently, we do not make one cent with our technology we developed for e-mobility. The market is just too small at the moment” (S04). This conflict refers to the “innovator’s dilemma” by Christensen (Christensen, 2008). Most of the interviewed suppliers struggle to find the right timing to invest into an innovation and still being able to innovate their existing products efficiently. Also, the suppliers recognized that dynamic capabilities become necessary in order to maintain serving the market demand properly: “Each supplier will have its own starting position in terms of capabilities and will have to strive for the ultimate competence in electronics software, electric motor and transmission, coupled with the ability to manufacture this efficiently” (S02). These requirements emerge since new market participants from other industries are entering the market.

However, for some of the suppliers it might not be easy to transfer their capabilities of producing parts for conventional powertrains: “The electrification presents a large influence [...] as we currently do not manufacture products of this kind” (S11). This third group perceives the development of the electrification of the powertrain not only as challenge, but also as a “threat” ((S01), (S05), (S06), (S11) (S12)). Their know-how is very specialized and therefore it is difficult for them to adapt the transformation into their business models. (S01) and (S06) believe that the complexity and requirements of their products will further increase within the next years which implies that they expect further growth generated by combustion engines. Additionally, this group of suppliers faces great investment dilemmas: “We need to evolve and innovate simultaneously, but we also need to manage our core business. That means there are two parts, and the part of the core business has to finance and enable the innovative part” (S11). As a reaction to this, (S05), (S06) and (S12) decided to diversify their product portfolio horizontally in order to become less dependent on the automotive industry: “Our actual strategic aim is to distance ourselves from the automobile, at least from the powertrain” (S06). However, diversification is only one measure chosen to react to the transformations as seen in the table below:

Table 3: Reactions

Reactions	Suppliers
Internal restructuring process	S01, S02, S08, S09, S10, S11
New investments made	S02, S03, S04, S10, S12, S14
Move-up the value-chain	S02, S08, S10, S11, S14
Diversification	S05, S06, S10, S12
New corporate alignment	S01, S08, S11
No reaction	S07, S13
Others	S01, S05, S07, S09, S13

Another tendency observed: companies seek to move up the value chain to become system suppliers. Their aim is to compensate future losses from a reduced growth of combustion engines. Since electric vehicles will also increase the competition for a considerable smaller number of automotive parts, they hope to realize additional value by providing complete systems for batteries, electric engines and other systems related to EV. Other suppliers try to realign their focus on other parts of the company, for example thermal management, where an increasing demand through EV can be expected ((S01), (S11)).

Variables

For some suppliers, their size and internal structures determine how they invest and handle new industry trends. (S06) for example argued “as a medium sized company you can spend your money only once”. Therefore, the variable company structure was evaluated in detail. Another performance indicator of a company is its profitability: “Basically, we have to finance ourselves from our own profits” (S02). Linked to a company’s structure is also the organization form. This category was chosen as some interviewees highlighted their fortunate position of not being a public corporation but to have a corporate culture that targets “a long-term orientation towards sustainable growth” (S14), also (S01), (S02) and (S09). On the other side, the public corporation (S03) admitted: “It is always a fine line [to invest into the future without waiving dividend payments].” However, many suppliers also emphasized the benefits of working for a family-run enterprise or where the majority rights are held by a foundation: “[...] we are lucky to be a corporation but also a family business which means 52% of shares are held by one family. This family is highly interested that we continue our operations for the next 50 years [...]” (S10).

Since many new players are currently entering the market, the international orientation might also imply how the companies are handling new trends. Here, one can analyze whether a company develops, manufactures and distributes its products mainly in its home country or if the business operations surpass national boundaries. Concerning the answers from the interviewees, large differences could be identified. One needs to distinguish whether a company generates a large part of its revenue outside Germany, where the production plants of the suppliers are located and if also R&D is sourced abroad. (S13) for example has not only its production plants abroad but also engages 400 R&D employees outside Germany. Therefore, the supplier was assigned to the subcategory large international orientation. (S12) on the other side operates mainly nationally with customers and employees coming from Germany. Thus, this company represents a small international orientation.

Within the environment of a company, decisions by their customers towards or against the transformations could also have a large impact on the supplier’s scope of action.

Thus, customer dependency was considered in the analysis. Hereby, the dependency on customers can be reflected in the share of revenue of the largest customers: *“The top key accounts make 80% of our revenue with an 80-20 rule”* ((S08), or (S01), (S06), (S09), (S13)). Besides the revenue share, the actual number of customers might also be affecting the dependency. Some of the suppliers described their customer base to be *“all OEMs worldwide”* ((S02), (S05), (S10), (S11)) which represents a smaller dependency on each customer. Others claimed to have *“three automotive customers in total”* (S12). The reliance of the suppliers on their customers can also target the development of new products or location decisions as confirmed by (S05): *“We always choose the location for production facilities based on the request by the customers. Normally, they want us to build close to their own facilities. We are mostly following our OEMs”*.

In the answers provided by the interviewees, some suppliers mentioned that they intend to increase their share of the value chain in the automotive industry. However, being a tier one supplier can also bear a lot of risk: *“The products become more complex. Development expenses are increasing. Also, the responsibility is becoming larger [...] The risk is higher and production becomes more complex”* (S10). Also, not everyone has the expertise and competitive advantage to become a system supplier by itself. (S08) for example intends to secure an additional share of the value creation process by acquiring companies: *“[Many] products that we implement into the electrified powertrain today [...] have a smaller additional value since we need to buy them externally from other suppliers”* (S08).

When asking the interviewees: *“Do you believe that the automotive supplier industry will generally increase their share of the value chain in the future?”* the answers were not unanimous. Some believe that they can increase their share while others believe that the OEMs will try to regain larger parts of the value chain. An increasing dependency on the automotive industry is not for every supplier the appropriate strategic move. Many suppliers are aiming in the opposite direction by reducing their large automotive dependency: *“We are trying to become less dependent on the automotive industry by entering completely new areas. It is our goal to generate one third of our revenue within business areas outside the automotive industry in 2030”* (S05). They diversify their product portfolio into other applications ((S03), (S12)) or industries ((S06), (S11)). Advantages from being independent are mentioned by (S13): *“We continue with what we did in the past. We benefit from the fact that we have not only been an automotive supplier”*.

When comparing the supplier's resource utilization for R&D (employees and revenue share), large differences in the scope and target of the investments can be detected. Some suppliers claimed that they continuously reinvest around 10% of their total revenue into new developments ((S02), (S04), (S06), (S08), (S09), (S14)). They argue that being innovative is one of their biggest competitive advantages (S09). A medium investment rate including

R&D expenditures between 5 and 7% is being spend by a smaller group of suppliers: ((S01), (S03), and (S05)). But there are also suppliers that address only little attention on research and development: *“[...] only one or two people are actually developing at R&D”* (S07), also (S12) and (S13). They reason that the development of new products is mainly customer-related. This means that each product is individually developed for and in close coordination with the OEMs: *“At the end of the day we are just a contract producer for the automotive industry. We do innovation management mainly through orders from customers. Therefore, we invest very little resources to have a base – only one or two employees – and the innovation is developed together with the customer”* (S07). (S12) relates this kind of innovation management to the size of his company: *“Our innovation management is closely linked to customer projects. Due to our size, we do not pursue own product visions or developments”*. These different approaches of innovation management cannot only be measured with the spending rates but also when comparing the different internal structures to identify new industrial changes. On the one side, there is (S02) who has highly advanced R&D structures that include *“think-tanks”* where employees can experiment with new ideas in separate modern spaces. In other companies, the R&D Structures are rather moderate (compare to (S12)). Here, the employees *“stay up-to date”* (S12) by attending trainings.

Since many innovations are generated internally, the analysis also focused on how companies incentivize their employees to develop new products and to come up with new ideas. Most interviewed suppliers have an internal improvement suggestion system ((S02), (S04), (S05), (S08), (S14)). This serves for the presentation and evaluation of new ideas. If an idea is accepted and developed in the state to be patented, the company usually rewards the inventor with financial bonuses. Besides monetary benefits, others ((S04), (S08), (S13)) honor their innovative employees by transferring responsibility. (S11) motivates its employees by *“acknowledgment, involvement and management attention”*. Nonetheless, there are also companies that do not incentivize their employees in any particular form. For (S06), thinking economically and being innovative *“is part of the corporate culture”*. That means, the company does not award its employees specifically. However, since companies are sometimes not able to develop innovations internally, collaborations are another way to gain expertise in certain fields. When asked how many and which type of collaborations the suppliers have, the answers differed considerably. Concerning the amount of collaborations, the responses ranged from none to many. The variety of answers regarding the type of collaborations is represented in the following table:

Table 4: Types of Collaborations

Collaborations	Suppliers
Customers	S01, S02, S04, S05, S06, S07, S09, S10, S11, S12, S13, S14
Other suppliers	S02, S03, S04, S05, S08, S09, S10, S11, S13, S14
Universities and Institutes	S01, S04, S05, S06, S08, S13
Consultants	S04, S05
Others	S05, S12, S14

Most suppliers work closely with their customers. Besides having development projects with the OEMs and system suppliers, collaborations among other suppliers are also quite common. In this way, participants hope to build up long-term partnerships with other suppliers: *“When working together with other suppliers, the aim is to expand our competences which can be applied for several projects”* (S02). The third type of cooperation was collaborations with universities and institutes. This type of partnerships is often chosen since universities research on subjects of the future that could become relevant for the industry: *“They have an expertise in areas which we typically don’t have and which we don’t need permanently but temporary”* (S01). Also, universities represent a great source to find and hire qualified employees. Furthermore, some companies mentioned working with consultancies: *“We are advised by consulting companies, which tell us what they hear from the OEMs”* (S04). Most interviewed suppliers maintain at least one collaboration agreement. Companies that tend to have only a few partnerships mentioned that they experienced some difficulties in the past especially with partners of another cultural background. They also fear to lose their competitive advantage by transferring their know-how (e.g. (S01) or (S11)). Others believe that collaborations are indispensable: *“You have to collaborate with others, for it is not possible to cover the whole value chain”* (S14). Investing in start-ups is another possibility to enhance innovation of a company’s business activity. Within the group of investors, some maintain own venture capital departments that are scouting new investment possibilities ((S02), (S03), (S09)). Others finance their own start-up factories internally where employees can work in small start-ups that emerged from the parent company ((S05), (S08), (S14)). Two suppliers also mentioned that they finance start-up initiatives that evaluate new business ideas and support the winners financially ((S05), (S11)). Nonetheless, not all suppliers have the resources or see the necessity in investing into young businesses: *“We can’t afford to invest in a risk portfolio where from 100 start-ups only one survives”* (S06).

Most suppliers prefer to stay close to their core competence, whether this concerns their own R&D activities, collaborations or M&A: *“[...] there always has to be something similar. Whether the same customers, the same production processes or the same*

product technology [...] otherwise there are others that can do it better because we cannot rely on our experience”, (S01). However, as the transformations require new capabilities in some areas, it is advised to broaden a company’s field of operations. One example for expanded business activities is (S11): The supplier does not only invest in companies that are close to the core competence but represent an *“additional value”*.

Fitness

The final question for the interviewees was: *“What characteristics will be important for the future success of suppliers?”* The most frequent answer was: *“The right employees”*. Hereby, S04 pointed out that *“[...] new employees with new competences are required while the existing employees continue to work for the old products”*. Also, high degrees of flexibility, agility as well as fast and lean processes are required to be well prepared for the future. Nonetheless, external forces are also playing a large part and it is therefore essential that suppliers monitor possible market developments closely: *“[...] you need to develop a good understanding of market developments”* (S03), as well as having the capabilities to react to these changes. Some suppliers addressed cost-efficient production and a strong financial position as essential characteristics. Finding the right timing for identifying, developing and investing will be, based on the interviews, the main task of the future: *“We still have time to shape the transformation processes, but we know that we have to do it actively”* (S14).

CONCLUSION

Most of the interviewed suppliers are strongly affected by the disruptions. The emergence of digital innovations within the automotive industry, e.g. self-driving cars, connectivity and car sharing offer opportunities for new business models and services (Riasanow et al. 2017). New participants may feel attracted as they expect a *“Blue Ocean Strategy”* (Chan Kim & Mauborgne, 2005) in this area by creating is possible. Therefore, a new value network for the automotive industry is probable to arise (Riasanow et al. 2017). The traditional automotive industry model can be characterized by a one-sided supplier-buyer relationship. According to Christensen (Christensen, 1993), emerging technology providers stand for the elimination or replacement of established technologies. Furthermore, value added service providers are able to capture a position of higher relevance in actor-to-actor networks. They can e.g. come from telematics services or driver assistance software. Another type of value-added service providers offers digital services like entertainment or location-based information services. Especially, the trend towards e-mobility seems to influence most of the suppliers directly. Only three companies consider the changes as strong growth drivers for their business model. Nevertheless, the suppliers found ways to adapt to these changes by developing new products that will increase in demand in the future. Others seek to move up the value chain to secure a larger

share of value-added. An alternative reaction from some suppliers that are negatively affected by the transformations is a diversification into new industries. However, it is still questionable if these measures will lead to the same growth rates as in the past, particularly in terms of increasing competition for a smaller number of vehicle parts. In this context, the European Automobile Manufacturers Association (ACEA) mentions – besides sustainable propulsion with clean and energy efficient technologies – two further challenges for the automotive sector that mainly require investments and R&D-efforts: safe and integrated mobility as well as affordability and competitiveness to new automobile regions like Asia (Pries, L. and Wäcken, N., 2020). Also, the findings need to be interpreted with caution as one can assume that all interviewees intended to portray a quite optimistic picture of their company.

This paper intends to provide a first evaluation of the arising structural changes for the German automotive suppliers. The qualitative study identified several variables that could influence the strategic importance of the transformations on the suppliers: company structure, type of product and innovation management. However, it can be expected that there are interdependencies between several variables that extend the complexity to predict future industry developments. One of them might be seen in the digitalization of transport processes and/or innovation forced by climate change resp. global climate protection policies (Canzler, 2020). Another challenge is the emissions scandal at Volkswagen and its future impact on the international automotive industry (Pries, L. and Wäcken, N., 2020). Furthermore, the pandemic consequences are not easy to predict in this context.

In order to increase the understanding about the dimensions of the transformations, further studies with a large scale of participants will be necessary.

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