

# Upstream Relationships in the Automotive Industry: A Contractual Perspective\*

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## Abstract

The automotive industry provides the most complex mass marketed product to date. Taking a contractual perspective, we present results from a series of case study interviews of automotive producers and their first tier suppliers in the German automotive industry, in a critical phase of their interaction.

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# 1 Introduction

Game and contract theories, with their extensions to the design of allocation mechanisms and their applications to the theories of the firm and industry, are arguably amongst the most interesting and influential microeconomic theories that have emerged during the last thirty-five years. However, when bringing these theories to the data, the problem arises that many assumptions essential in driving the results are well beyond the detail captured in these. Hence many theories remain unchecked empirically.

An additional important facet is brought in by the fact that efficient contracts or other mechanisms proposed by theory are often never implemented in practice, because sophisticated mechanisms may be unnecessary, infeasible, or too costly to implement. In view of this, it seems important to see which mechanisms are actually used, to seek the reasons for apparent inefficiencies, and possibly to improve on them. Indeed, the development of new theory in this realm should rest on assumptions that can be verified empirically at least in principle, if not with available data.

With the present research we attempt to fill the gap between theory building and empirical observation and testing, by introducing a case study approach in which the case questions discussed are based on theory, and the context in which they are raised is hopefully specified to an extent that allows the reexamination of extant theory, and new theory building. The case data are generated from in-depth interviews of the management personnel of German automotive producers' procurement divisions and their counterpart, the personnel of upstream suppliers' R&D, production, and sales divisions.

The automotive industry exhibits properties that rather ideally serve the purpose. No other mass market consumer product is more complex and consists of more individual product specific parts than a modern vehicle. The parts substantively differ in complexity and size, and the interfaces between the parts are often of a complexity that necessitates particularly detailed coordination. Modern vehicles contain an enormous amount of innovative features in many technological dimensions.

Against our expectations, vehicle parts in Germany are idiosyncratic to an extent that extremely few parts are used in any two different vehicle models, even if the two models are supplied by one automotive manufacturer (henceforth called OEM, Original Equipment Manufacturer). All these properties lead to contractual relationships, in particular between OEMs and their direct suppliers, that span between very personal relational contracts and impersonal arms length relationships.

Many features of automotive production processes have already been presented in the literature. In particular, the striking difference between the Japanese and the U.S. way of organizing upstream supply has been discussed in detail.<sup>1</sup> Also the question of in- vs. out-sourcing has been subject of research, as presented, for instance, within the classic example of General Motors and Fisher Body.<sup>2</sup>

Yet a large number of open questions remains related to positive and normative aspects of organizing the upstream sector in the automotive industry as a paradigm example. Some of them are derived from the case study evidence in the sequel of the paper. They largely relate to the mode of upstream innovation, and series supply procurement and compensation schemes.

Our research is geared by two interests. Firstly the methodological one introduced before. We wish to bring data closer to the theory and vice versa, in the hope of mutual cross fertilization. In particular, we attempt to show where theory in its current state helps us interpreting what we observe, and complementarily, where additional theory is needed to explain the empirical observations. More importantly, however, by bringing data closer to

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<sup>1</sup>See ? or ? amongst many others.

<sup>2</sup>See ? among others.

theory, we hope to develop a device that filters out the pertinent economic models from the overwhelmingly rich set of model variants offered.

Secondly, we wish to contribute specifically to an understanding of the players' actions in the automotive industry by analyzing and evaluating the consequences of their actions, towards recommendations for a more efficient upstream interaction, and industrial structure in this important sector.

The sequel of the paper evolves as follows. In Section 2 we outline our case study interview approach. In Section 3 we give an overview of the procurement structures found. In the ensuing Section 4, we survey key findings from in-depth case interviews with senior management sales officials of first tier suppliers, and procurement officials of OEMs in Germany, detailed on the basis of microeconomic principles. In Section 5 we focus on first-tier contractual structures. We summarize in section 6.

## 2 Case Study Interviews: Approach

Our case study focussed on the incentive structures involved in upstream procurement and their change, primarily in view of research and development, production planning and execution, and also quality management and logistics. All these dimensions can be addressed within formal contracts between the parties, as well as within informal arrangement that are enforced by repetition, within a relational contracting context.

Due to the complexity as well as the sensitivity of the issues addressed, we chose an open, personal interview format. Interviews averaging two hours in length were conducted at the supplier level with senior management personnel responsible for research and development, production and sales; and at the OEM level with management personnel responsible for parts procurement.

The interviews were organised around eight thematic blocks, with a total of some 70 questions. These concentrated on a particular product range, its buyer and supplier market, the contracting process for research and development, as well as for series and spare part production, and finally the resulting after sales market activities.<sup>3</sup> The sequencing of topics pursued in the interviews was flexible. The questions served to control for completeness rather than to prescribe a strict schedule. The Appendix contains questionnaire versions for the upstream suppliers and the OEMs that mirror procurement from the two player categories' point of view. The questions discussing the same subject matter in both questionnaires have the same number. The interviews were conducted between November 2005 and May 2006.

Overall 45 upstream suppliers and 7 OEMs were approached towards an interview. The companies were collected from the member list of the Association of German Automotive Producers (Verband Deutscher Automobilunternehmen, VDA). All OEMs producing motorcars were considered. Upstream suppliers were selected to generate a representative sample of the industry, where product complexity, customer specificity and strength of market position are the key characteristics that differentiate suppliers. Interviews were conducted with 15 suppliers and 3 OEMs. Each interview with a supplier focused on a representative product range for that company. One of the suppliers was available for interviews in two divisions that are acting in economically as well as technically different markets.

Of the OEMs interviewed, one is a high-volume vehicle producer and one is a pure premium vehicle producer. The third offers a mixed product portfolio. Amongst the 15 suppliers, one was characterised by simple products with a low customer specificity and a weak market position, seven were characterised by complex products with a low customer specificity and a

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<sup>3</sup>After sales market activities involve selling parts of car models that are no longer produced and sold anew, for which the OEM extends an implicit guarantee that these parts are made available for about 15 years after the model production terminates.

medium market share, six by complex products with a high customer specificity and a medium market share and one by complex products with a high customer specificity and a large market share.<sup>4</sup>

The interviewees' sales summed up to well in excess of EUR 100 billion. In 2004, they employed in total more than 350.000 staff. The diversity of the interviewees is also illustrated by their highly varying size, ranging from sales of 200 million up until several billion Euros, and employment figures between 2000 and well over 10.000. Average sales of all interviewed companies were 6.8 billion and the median was at 1.9 billion Euros. The average number of employees was 21.000, and the median number was 9.000.

The interview results may be subject to bias. We observe only the firms surviving in the market. Firms unsuccessful in the past are likely to have exited. Since the typical OEM appears too big to fail, this self-selection bias is relatively more pronounced at the upstream supplier level. In addition, of the companies still active in the automotive industry, managers of more successful companies might be inclined to talk more openly about their business than managers of less successful ones. Our interviewees may also tend to overemphasise current business developments relative to long-term changes. For example, while we observe a long run increase in outsourcing activity, the interview partners emphasised the recent slight backswing.

Many answers given in the interviews include very sensitive information. In addition, supplier markets for certain parts are thin, sometimes with only two or three players in Europe or even world wide that are relevant for the German automotive producers because of a consistent history of high R&D intensity and quality production. Also the number of OEMs is limited. We have taken utmost care to anonymise all statements.

## 3 Procurement Structures in the Automotive Industry: An Overview

### 3.1 Basics

Almost all automotive manufacturers nowadays develop and sell a multitude of car models.<sup>5</sup> A car model—such as a VW Golf, or a Mercedes S model—is based on a particular space frame that defines its dimensions. On its basis, each car model is offered in many variants, that may involve engine power, door number, interior quality, or rooftop characteristics.

A model is produced and sold for 6 to 8 years, the so-called *production period*. Within that period, smaller features may be changed.<sup>6</sup> These are called face-lifts. The production period is preceded by a *pre-development period* in which the OEM's strategic planning department conceptualizes the model including its so-called Unique Selling Properties. This is the period in which parts producers conduct mostly independent R&D on new gadgets. Pre-development is followed by the *development period* involving detailed blueprint development and parts procurement and production planning. In this period, the parts suppliers engage in model-, and thus buyer-specific development of the part. Pre-development and development periods together involve about 8 years.

The automotive company extends an implicit guarantee to the buyer of a particular model that the parts needed to maintain its functionality are produced and commercially available in the so-called *after-sales period* for 15 years after the termination of the production period of the current model. Altogether this implies that one model—including all its variants—figures

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<sup>4</sup>The characterisation of suppliers was performed outside in via a cluster analysis, based on annual reports and auxiliary information available on their web sites.

<sup>5</sup>Amongst the exceptions are specialists developing and producing sports, or racing cars.

<sup>6</sup>A typical change is an increase in engine power—that, however, may necessitate an improvement of the brake system.

in the automotive company's books for about 30 years. It also implies that planning for the consecutive model is initialized at the start of production (SOP) for the current model.

The typical automotive company tends to introduce one new model per year to the market. This implies an Overlapping Generations (OLG) structure of all activities involving the models—in particular of model development and parts procurement. Accordingly we observe an OLG structure of supply contracts, often involving the same supplier—an aspect that has important implications on the enforcement of informal arrangements.

## 3.2 Overview of Procurement Structures

As indicated before, the German automotive industry was exposed to rather dramatic changes in the 90es of the last century. A first change involved the increased outsourcing of parts production, motivated by cost reduction incentives and complexity reduction at the OEM level. In this period, Ignacio Lopez, a Spanish procurement specialist was poached with his entire team from GM by Ferdinand Piech, then CEO of VW, to rescue the company from financial trouble by fostering outsourcing and exercising price pressure by arms length contracting.

An accompanying second change involved the reduction in the number of first tier buyer-supplier interactions from about 3000 per automotive model, in an attempt to reduce the complexity of development and parts procurement, and to delegate responsibility associated with those. Before this move, parts were roughly classified into two groups: *commodities* that are similar across vehicle models and produced without major R&D effort. They involve a large share of parts but a small share of the total value procured. The second group involves *high-tech components* that are dissimilar across vehicle models and produced with major R&D effort. Within this move, this classification was extended to include two more groups, *modules* and *systems*. The first involves physically neighbouring parts. Examples are a car's front end, or its dash board. The second involves technically related parts such as the car's electronic system, or its power train.

In spite of serious attempts to reduce the number of separate buyer-supplier interactions, roughly 1500 suppliers currently contribute parts to the production of a particular vehicle. Very few of them are standardised across vehicle models. Literally no commodity is taken off the shelves to be sold to different car producers, or even to one car producer as carry-over parts, towards use in different models. Most parts, even O-rings or screws in a vehicle are produced specifically for one vehicle model, in specific size, material, durability, or machining.

The various parts are highly complementary in development, production and delivery. The production process is very sensitive to supply delays, as most parts are not produced to be held in stock. Often the parts are characterised by very complex interfaces to each other, a feature that affects research and development, production, and part functioning, including part failure and its consequences. Consequentially a problem involving one specific part affects the activities of most, if not all parts suppliers towards the production of a particular car model.<sup>7</sup>

Returning to R&D efforts, research and development for a particular part could in principle be performed by the OEM, by his supplier, or by a joint effort. By a ballpark cross-country comparison between the main automotive producing countries Germany, Japan and the U.S., the share of R&D undertaken by suppliers in Germany is traditionally much larger than in the two other countries. The supplier undertakes basic R&D efforts (about 10 per cent of his total R&D outlay) at his own expense and risk, often in close contact to universities and other research facilities, and presents the results to one or several OEMs. In the ensuing pre-development phase the supplier engages, sometimes in cooperation with a particular OEM, in the development of a prototype not geared towards a particular vehicle model, with the

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<sup>7</sup>An example: A failure in a car lock specialist's process computing facilities, Kiekert, resulting in supply delays, brought down Ford's entire Mondeo assembly line for weeks. See ?.

costs again borne by the supplier, or sometimes shared with the OEM. Within the development phase, the adaptation of the prototype to a specific car model is in most instances also pursued by the supplier, but under the OEM's close supervision. Sometimes this supervision is extended into a joint development effort with the OEM.

The unique selling properties conceptualized by the OEM should provide innovative advantage of the model over similar models offered by competing OEMs.<sup>8</sup> The OEM then either directly contacts particularly innovative suppliers and adopts one of the gadgets developed by them, or initiates a tender involving a preselected small group of potential suppliers, towards the development of a concept for the innovative parts, with the desired specifications specified by her. The concept competition phase for that part ends with each supplier submitting a blueprint for the construction of that part, including a price quote for the development, the adaptation of the part within the new model's grand design, and the production of the part. Supplier efforts during this phase are most often not directly compensated by the OEM.

The OEM then selects one or possibly several suppliers to develop the part to production maturity. Thereafter often another tender is held, and the winner is awarded the series production contract or portions thereof; for instance, the initial year of series production. Dual sourcing, with the second firm assigned a smaller share of production volume, is rarely used amongst German OEMs. Second sourcing, with a second source nominated, but no production share availed unless the first source drops out, was not observed at all.

Schemes to reimburse the supplier's development efforts for model specific parts vary between coverage of a fixed share by the OEM, and coverage by a mark up on production costs, rarely with a volume guarantee by the OEM. Almost all production contracts account for learning cost savings varying between 3 and 5 per cent p.a.

In the following section we use microeconomic principles to structure upstream-downstream interactions, and with their help, to structure our case study evidence. This helps the development of research questions and hypotheses on upstream procurement behaviour and its economic effects pursued in the ensuing section 5.

## 4 Procurement Structures in the Automotive Industry: A More Detailed View

### 4.1 Complexity of Buyer-Supplier Interaction

The engineering complexity of vehicles has increased enormously in recent years, owing to increasing demands on vehicle features such as engine power, energy efficiency, active and passive security, or operating noise reduction. This has incentivized outsourcing the development and production of parts rather than producing them in-house. When procuring a part, problems arise from the delegation of control over development and production processes.

We have identified three components of increases in complexity:

- *Development complexity*

The delegation of development tasks may lead to local rather than global optimisation in the development process. This problem is more relevant for parts that are essential for the functionality of, and very much integrated into, the structure of the vehicle such as the power train; rather than those that are inessential but with functions that contribute to the vehicle's overall quality, such as the car seats.

The main drivers of development complexity are the essential part's interfaces to other parts and the intensity of required interaction in the development of the related parts.

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<sup>8</sup>These properties sometimes extend into other models that are part of the OEM's portfolio.

One attempt to cope with this complexity problem is to have the supplier's engineers take residence at the OEM's development site. We have found this being common practice during the development phase of essential parts.<sup>9</sup> However, this only partially resolves the problem, since innovation in systems or modules may be driven by parts suppliers further upstream which contribute to the respective system or module. In this case the system or module developer in charge has to orchestrate these development efforts.

- *Logistics complexity*

This is the complexity incurred in the assembly of the system or module, and the supply scheduling of the parts to be assembled in the specification that is in immediate demand. The logistics complexity is driven by the number of sub-suppliers involved and the complexity of the interfaces between the parts procured by the supplier. For essential parts this interface tends to be very complex. Some of the scheduling problems are accounted for by the establishment of Just-In-Time (JIT) production facilities by the supplier in immediate vicinity of the location where the vehicle is assembled.

- *Contract complexity*

This is the complexity incurred by contractual agreements between the business partners, that arises from the outsourcing of more complex parts. It contains the cost of administering business contacts with potential suppliers (including quality certification, etc.) and the actual cost of designing and executing the contract between the OEM and actual suppliers (including the cost of quality control, administration, lawyers, etc.)

Overall the OEMs have reacted to these different forms of complexity by the bundling of parts otherwise procured separately into systems or modules. In principle, this should reduce total complexity problems between the OEM and the so-called first-tier supplier. However, the reduction of complexity by increased procurement of systems and modules and systems at the level of the OEM leads to longer supply chains, involving delegated monitoring.

We found two distinct types of system or module suppliers: A first type procures and assembles all parts contained in the system or module independently of the OEM, and delivers it as one part to the OEM. While in this case the OEM enjoys minimum complexity at least for logistics and contracts, he loses the direct contact to the parts suppliers further upstream. The downside to the OEM is a loss of control over the development of the part. The upside is the delegation also of responsibility in part-failure cases.

A second type only assembles all the parts, which are procured by the OEM. Whilst only the assembled part is shipped to the OEM such that the logistics complexity for the OEM is reduced, as with the first type system supplier, the OEM, by procuring himself, keeps contact to parts suppliers further upstream, at the expense of a higher contract complexity. Hybrids of the two types are common.

## 4.2 Incomplete Information and Risk

For each part of a vehicle in development, incomplete information involving both buyer and supplier creates three major classes of risk that need to be borne by both parties, namely innovation risk, volume risk, and reliability risk. Portions of all risks are only to some extent endogenous to the supply chain. Volume risk is influenced by macroeconomic conditions and competitive position that determine the demand for the new model.

However, there are also important endogenous portions. Volume risk is to some extent influenced by the OEM's choice of USPs, or by her marketing efforts. Reliability risks depend on the efforts by all parties in the supply chain that influence the development (including testing) and the production of all the parts. In view of this the risks need to be allocated

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<sup>9</sup>Interview results on participation in resident engineer schemes: Yes=7, No=0, N/A=11.

between the participants of the supply chain so as to create efficient effort incentives towards controlling these risks. More systematically, we consider the following components of risk:

- *Innovation risk*

This is the risk that either an innovation effort fails to achieve an ex-ante stated objective, or the innovation is not achieved at the ex-ante expected cost. Obviously the innovation risk is higher in model unspecific basic research than in model specific adaptation development. Our case study evidence suggests that independent basic research by the supplier constitutes a only small share (about 10 per cent) of his R&D effort. However, the innovation risk involved in this remains fully with him. The larger share of basic research is ordered by the OEM, and sometimes jointly pursued with him in a research joint venture, which reduces the supplier's risk. The remaining share of the supplier's R&D effort constitutes the model specific adaptation of innovation results. While project success is almost sure, the remuneration of project costs is the major risk resting with the developing supplier, if the development costs are reimbursed via a mark up on risky volume.<sup>10</sup> Another kind of innovation risk arises from the fact that final consumers' willingness to pay for a particular innovation embedded in a part may be too low, relative to the cost of producing the innovative part.

- *Volume risk*

This is the risk that the realised sales volume for a vehicle is at variance with the capacity determined on the basis of expected volume. To the upstream supplier the downside risk that volume is below expectations and thus production capacity remains idle carries more financial weight. To some extent this risk is exogenous also to the OEM. The OEM's marketing efforts are obviously influential, however. As car parts are perfect complements to each other, the risk carries over into the entire supply chain. Supply contracts almost never specify exact quantities. Even minimum quantities to be absorbed by the OEM are rarely specified. If they are specified and the actual volume demanded by the OEM falls short of these, the OEM may agree to compensation payments that cap suppliers' risk.<sup>11</sup>

- *Quality, in particular reliability risk*

This is the risk that parts are subject to a higher than the expected failure rate. Additional complexity is due to an important externality. The failure of one part can induce the failure of other parts. An extreme example is the failure of an O-ring that may destroy a car's entire engine. The risk of individual part failure is to a large extent endogenous and varies with the supplier's development and production effort. Yet due to the externality, the reason for the failure of a specific part cannot always be identified.

Visà vis the final customer the OEM is primarily exposed to the quality risk. He responds with various forms of commitment—most prominently a formal warranty. Irrespective of a warranty, reputation losses may inflict substantive additional costs, often outweighing by orders of magnitude the direct costs of resolving a problem, e.g. via a recall. Our case study evidence suggests that in the majority of cases failure can be attributed to the faulty part and the supplier is billed the direct cost. Reputation risk, however, remains with the OEM.

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<sup>10</sup>The remuneration risk was amplified by Ignacio Lopez's strategy to procure production world wide, by using an innovation without reimbursing the innovating firm. In reaction, some suppliers declared very clearly that they would not come forward with up-to-date research on the relevant parts.

<sup>11</sup>Interview results on minimum purchase quantity guarantees by OEMs: Yes=2, Outright rejection=7. Out of the latter, 4 consider renegotiation in case quantity falls short of expectations. N/A=9.



### 4.3 Asymmetric Information

In upstream markets for buyer-specific parts, informational asymmetries between the OEM and her supplier take particular forms. The supplier knows better the effort and cost involved in developing the part, and the cost of producing it. The OEM knows better what is accepted in the market, summarised in the expected sales volume and the final consumer's willingness to pay for the entire vehicle. As that vehicle is composed of many complementary parts, she has to decompose this into her willingness to pay for the individual part, including its idiosyncratic features. Altogether, informational asymmetries extend in both directions, so both sides of the market may suffer from adverse selection and moral hazard. They are dampened by repeated interaction within the OLG structure of model development and production. In more detail:

- *R&D effort*

The R&D effort exerted by the supplier can only be incompletely monitored by the procurer, which invites moral hazard on the supplier side. Lagging development effort eventually expresses itself much later when using the car, by the failure of the part.

Informational asymmetry of this type is reduced by joint development efforts, in particular those involving the residency of the OEM's engineers at the supplier's plant. Moral hazard is particularly reduced by repeated interaction: the supplier's effort incentives are increased by the possibility that the OEM orders a similar part in another car model.

- *Cost*

The information on the part's development and production costs is key private information of the individual supplier. When procuring a part for a new vehicle model, the OEM can elicit cost information from the supplier. Since products are idiosyncratic, their production is idiosyncratic, so it requires extraordinary effort for the OEM's to develop and sustain skills to evaluate these cost structures.<sup>12</sup>

Contracts, so the suppliers, typically differ in their attractiveness by volume. They indicate that large volume contracts are more profitable to the typical supplier than small volume contracts, and that some information about cost savings with increasing volume—and increasing time over which the part is produced—remains proprietary to the supplier. The basis seem to be learning effects enjoyed by the supplier. Towards reducing that informational asymmetry, some OEMs generate cost estimates from the internal production of similar parts, as well as by re-engineering the part and analysing its production cost. This task is quite involved in view of the fact that on average, 1500 parts are procured per car model.

When prices are renegotiated annually under a framework contract, some OEMs organise inverse auctions, often by passing on construction blueprints to competing firms towards obtaining competing cost estimates. These are often used to press on the incumbent supplier for cost reductions. Some OEMs require so-called open book accounting, whereby they force the supplier to disclose his cost accounting scheme. In this case production can only be profitable for the supplier by hiding profits via "creative accounting",<sup>13</sup> or by requesting that the OEM's guarantees him an acceptable profit.<sup>14</sup>

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<sup>12</sup>One OEM stated that, while fostering outsourcing, he was losing this judging ability due to the loss of technical expertise. Currently he is engaging in measures to stop this drain of expertise, by retaining in-house production facilities.

<sup>13</sup>One supplier, who produces parts as well as the part specific tools, stated that cost accounting for the tools is much less transparent than for the parts and, that thus margins for tools are significantly higher.

<sup>14</sup>The open accounting scheme was apparently adopted from Toyota, today considered the world's most efficient and profitably vehicle producer. However, Toyota seems to guarantee an acceptable profit (or even profit sharing) in return, while this appears not to be done by the German automotive producers.

Cost monitoring by the OEM appears more concentrated on more valuable parts.<sup>15</sup> Also, the suppliers feel more squeezed when dealing with a module supplier rather than directly with the OEM. Indeed, system and module suppliers also may be forced to disclose their upstream contractual relationships. The OEM may prescribe the upstream partners and impose a particular contractual relationship, via so-called directed business.

- *OEM's willingness to pay for a part*

In principle, the OEM's willingness to pay (WTP) for a certain procured part with idiosyncratic characteristics is derived from the final consumers' willingness to pay for the entire car in the downstream market. Anticipating, and decomposing that willingness to pay into the components supplied is one of the more difficult tasks in the design phase of a car. The OEM implicitly performs a hedonic price decomposition,<sup>16</sup> and derives his expected benefits by mirroring this with target cost accounting. This cost accounting scheme serves to derive the OEMs WTP for the part.

If a supplier has developed a novel gadget or feature on the basis of his own R&D efforts, he can exploit monopoly power against the OEM buyers. We found that when faced with the alternative to offer the gadget to one OEM towards its monopolistic exploitation in the final market, vs. to offer it more or less simultaneously to several OEMs, he never prefers to offer it to one, but always to several OEMs—possibly after the short term exploitation of monopoly under a short term exclusivity contract with one OEM extending from six months to one year. The rationales given are twofold. First, due to limited enforceability of intellectual property rights, competing suppliers could shortly flood the market with close, yet improved product variants; and second, most gadgets are produced subject to substantive learning cost reductions, so large scale production secures competitive advantage.

- *Expected sales volume*

Knowing expected sales is an important prerequisite specification for the supplier when determining his production capacity and his unit cost; the latter especially once both the fixed costs of development and production must be financed via a mark-up on the unit price. Since these fixed costs contribute to decreasing total average costs, the OEM has an incentive to overstate the expected production volume when negotiating a new contract. Upstream excess capacity induces a more favourable ex post bargaining situation for him than a capacity shortage, as the supplier's initially quoted per unit mark-ups would be reduced. By our observations, all suppliers anticipate this and determine their capacity, as well as their price offers, by discounting the numbers quoted by the OEM down up to 40 percent.

By their own statements, the players do not consider critical the informational asymmetries between first tier suppliers and OEMs. This should lead to relatively low information rents for all players. The observed fact speaking against this is that open accounting requests, and other rough measures cultivated by Lopez to reduce informational asymmetries have generated strong concerns amongst suppliers.

In all, premium and volume OEMs assign differing importance to the measures taken to improve on their information about upstream supply conditions. We found that premium OEMs are more reluctant in the use of external measures to gain information such as procurement auctions, and thus leave rents to the suppliers in order to not curtail their innovation incentives. In particular, they never moved from limited development procurement to open

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<sup>15</sup>Statement by one supplier: "Best way to earn money is by not attracting (the OEM's) attention".

<sup>16</sup>In all cases observed, this is done implicitly by asking the question of How much more would the consumer be willing to pay for the car if the gadget in question were included.

production procurement, thereby inviting producers to compete for low prices in production without having spent cost and effort in development. Instead, learning from past joint development activities and from procurement with the same supplier seems to be dominant among premium producers. By contrast, one volume OEM stressed the importance of frequent pseudo-auctions, as well as of re-engineering of parts, as information gathering devices.

#### 4.4 Mutual Hold-Up

Hold-up of the other party could in principle occur in various ways. The OEM faces hold-up risk by the supplier, as by delaying or discontinuing delivery that supplier can bring the entire assembly process to an expensive halt. Particularly pressing is this hold-up in times of excess demand for a particular car model that can be satisfied only when *all* parts are produced in the appropriate quantity.

The supplier in turn faces the threat of potential leakage by the OEM of his intellectual property incorporated into the product, and the risk of not being ordered the volume for which he had invested in capacity at a fixed cost. This problem is magnified when the supplier is not fully compensated upfront for his development and production fixed costs, as is frequently the case. He then is uncertain about the compensation of these fixed costs in the face of uncertain quantities demanded by the OEM.

Although the OEM very often faces potential hold-up situations with his suppliers we rarely see a supplier actually engaging in hold-up.<sup>17</sup> We found it only in the rare situation in which a supplier not originally under contract for series production was asked to step in, because the original supplier was confronted with quality problems.

Conversely the hold up of suppliers by OEMs seems to figure more prominently in two contexts: Some OEMs tend to pass on intellectual property to competitors; others tend to delay payments for delivered parts. While contractual penalties could remedy the problem, they seem not to play a major role—if any—in supply contracts. Altogether, enforcing contractual clauses before the courts was never mentioned as a strategic option.

#### 4.5 Switching Cost and Lock-In

The production of buyer-specific, and even more so, of model-specific parts by one supplier potentially induces switching costs to both the supplier and the OEM. More specifically, switching cost may arise from the following sources:

- *Product specific intellectual property rights*

They often reside with the upstream supplier. There is a generic conflict of interest between the upstream supplier and the OEM. Whilst the OEM would like to exploit such rights by exclusively using the part in his model (or models) as a unique selling property, the upstream supplier is interested in selling variants of such a part to competing OEMs. As indicated before, he is interested in exploiting cost reducing learning economies, which induce higher rents and also shield him to some extent from imitation by competitors.

No matter the resolution of this conflict, the protection of the supplier's property rights increases the OEM's cost of switching to another potential supplier of that part. While sometimes the OEM exerts her market power to enforce the licensing of the property right to the supplier's competitors, she suffers a reputation loss as a reliable business partner.

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<sup>17</sup>A famous exception is the hold up of Ford by Kiekert, a one time monopolist in the production of car locks, discussed in ?.

- *Production tools*

Production tools are the product specific elements of a machine to produce a part. For example, the production of a body part necessitates a welding press that can be used to press many different body parts, and a tool that shapes the particular body part. While the welding press is owned by the supplier, the tool is owned by the OEM in all cases we have observed—but only operated by the supplier. In principle, this enables the OEM to withdraw the tool and to set it up with a competing supplier.<sup>18</sup> Yet the cost of reorganising the supply stream appears so high that this incident arises extremely rarely.

- *Process know-how*

Process know-how complements the use of the tools to produce the part. It consists of the capability to manage a particular technology. It includes the supplier's logistic capabilities. In most cases this knowledge is technically difficult to transfer, and such a transfer is not enforceable. Together with the tools, the complementing process know-how is idiosyncratic and creates sizable switching cost to the OEM.

- *Internal certification of a new supplier*

Supplier certification on process and product quality for a specific gadget, as often induced by the OEM, is costly. Indeed, internal supplier certification costs by the OEM exceed the costs of external process quality certification that are the prerequisite for a supplier to participate in a tender at all. When switching suppliers the OEM duplicates these costs. The case study evidence suggests that this is one of the main elements constituting switching costs in a supply relationship.

- *Production capacity*

Capacity that has been built up to supply the parts ordered for one vehicle model often represents a substantive component of a supplier's total order book. Within a Just-In-Time (JIT) manufacturing scheme the capacity may have been built close to the OEM's manufacturing outlet. This capacity can not be easily relocated or adjusted to the production of other parts, which constitutes the most important switching cost to the supplier.

- *Production downtime*

A switch of supplier is necessarily connected with downtime in the assembly of a car. It is a sizeable part of switching cost. Even the transfer of one tool across suppliers causes downtime if, as usual at current production logistics, the OEM does not hold a buffer stock of the part in question.

In all, since the procured parts are complementary to each other, and decreasing cost technologies in development and production invite procurement from one supplier only, that supplier has, largely due to the switching costs arising for the OEM, an ex post monopoly in the supply of any part that is essential for the production of that vehicle. However, that supplier also faces high short run costs of switching to another buyer.

Both, OEMs and suppliers can strategically influence the level of switching costs. Within limits, the OEM can try to avoid product idiosyncrasies and the associated jeopardy of being held-up. She could engage in industry-wide standardisation, but this is limited by her interest in specifying unique selling propositions for her vehicle models in the market.

Keiretsu-like structures as used by the Japanese OEM's could also resolve the hold-up problem.<sup>19</sup> The OEM may also employ dual sourcing as a safeguard against lock-in by the

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<sup>18</sup>It also allows the OEM to indirectly control the market for spare parts produced with the tool.

<sup>19</sup>See ? for a description of Keiretsu structures.

first supplier. Yet this option must be weighed against an increase in overall production costs (i.e. double the fixed cost and lower economies of scale at the margin).

The typical supplier has fewer means to decrease the switching cost for him. By contrast, he can increase the typical OEM's switching costs by increasing the level of intellectual property embodied in the part supplied, so that circumventing the innovation is inefficient and costly for the OEM.

Despite the high switching cost and lock-in potential we rarely see hold-up strategies being played. The most important reason appears to be that buyer and supplier repeatedly meet in the market, and that both can punish the supplier for any past exercise of hold up. The buyer can primarily punish by not employing the supplier, and the supplier can punish by not employing up to date technology in the provision of a part.

## 5 First-Tier Contractual Structures

### 5.1 Contractual Incompleteness

First tier buyer-supplier contracts in the industry naturally vary between pre-development, development, and production contracts, with contract specificity increasing from pre-development. The incidence of competitive procurement via procurement auctions also increases.

Production contracts for a specific part vary between contracts that are renewed annually, and general framework contracts that specify a general understanding between the supplier and the OEM on the procurement of that part during the entire life cycle of a car model. A typical variant within this range foresees a framework contract and an exclusive initial delivery period, e.g. one year. The shell for all contract forms is provided by the OEM within her *General Terms and Conditions*. In turn the German Association of Automotive Manufacturers (VDA) provides a shell contract for these.

The contract typically specifies contract duration; dates and terms of supply; parts specifications and changes of those; quantity, logistics (order flow); quality and warranty management; payment terms; cancellation payments, and intellectual property rights on newly developed features.

There are literally no contracts that can be called complete. We consider a contract complete if observable and verifiable actions are specified for all relevant states of nature.<sup>20</sup> Incompleteness arises w.r.t. elements that are technically not verifiable or are too costly to specify in a contract. Furthermore, the contracts do not cover all eventualities (possible states of nature)—in particular w.r.t. very large, or very small quantities demanded, and thus ordered.

Court cases related to contract violations are very rare, and thus verifiability is rarely an issue. It is not in the interest of the contracting parties to draw the opposing party into costly court rulings.<sup>21</sup> Most interactions are repeated, which allows for various forms of punishment of deviating behaviour from both sides of the market.

More specifically, our case study interviews suggest incompleteness primarily in the following dimensions.

Pre-Development and Development Contracts:

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<sup>20</sup>Interview results on the incompleteness of contracts, and contracts augmented with (partially not verifiable) side agreements: Yes=7, No=2, N/A=9.

<sup>21</sup>Interview results on the use of the courts: Yes=0, No=6, N/A=12. Amongst the latter respondents, two suppliers explicitly stated they would not engage in court procedures on patent infringements, two would not engage in procedures against an OEM, if she disclosed research results to competing suppliers, three stated that they would not engage in procedures against an OEM in general. Several suppliers emphasised the general unimportance of contracts.

- *Supplier's development effort*  
Specification resorts to the end result in terms of the part's functionality
- *Buyer-supplier interaction in the development process*  
Interaction rests largely on informal agreements.
- *Attributes of the part.*  
Often the specification is *functional*, involving performance, rather than *constructive*, involving the complete specification of the part's interfaces with the parts provided by other suppliers.

#### Production Contracts:

- *Quantities procured by the OEM*  
Contractually specified quantities are derived from the OEM's target output quantities over the model's entire life time. The effective quantities supplied are dependent on the final demand for the model, effectuated in the OEM's release orders weeks or days before delivery. The contracts specify the release order procedure. The supplier determines his capacity largely at his own risk. The OEM very rarely grants (minimal) volume guarantees.
- *Part reliability*  
Part reliability is typically exercised within contractual terms in form of maximal failure rates (parts per million) required by the OEM. Damage payments are specified for the case that responsibilities for failed parts are clearly identifiable. Contracts typically remain unclear with respect to failures involving externalities discussed above, in subsection 4.2.
- *Part prices*  
They are always precisely specified for the initial delivery period, e.g. one year. However, framework contracts foresee further delivery periods up to over the model lifetime. In such a contract, prices for ensuing periods are either pre-specified, with stepwise price reduction schedules to account for cost reductions via learning; or prices are renegotiated annually. In either case, price specifications are likely not to be binding. The OEM may enforce price renegotiations under breach of contract—especially in the context of negotiations preceding contractual arrangements for parts for a new car model. See subsection 5.2 below.
- *Framework contract discontinuation*  
While the discontinuation of a framework supply contract appears to be a rare event, the conditions for a discontinuation apparently are almost never completely specified. One of the few provisions from the procurer's point of view is the property right over model specific tools typically also financed by her. While in theory the tool can be transferred between suppliers, the switching cost involved in the transfer is very high, as stated by both OEMs and suppliers. See subsection 4.5 above.

There are other components of the buyer-supplier relationship, that seem to be not specified in contracts at all. For example there was no report on provisions that account for a supplier's potential financial distress. In view of the complementarity between the parts, the OEM's interest in an uninterrupted flow of supply, and the high switching cost involved in changing a supplier, it is in the OEM's short run interest to bail-out a current supplier in distress.<sup>22</sup> Also, the OEM may want to maintain a level of competition between suppliers of similar parts

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<sup>22</sup>Interview results on suppliers' observations of bail-outs of supplier in distress: Yes=6, No=1, N/A=11.

by rescuing his present supplier that preserves her relative market power. However, bail-outs obviously distort incentives at the supplier level.

Alternatively, under dual sourcing, the second supplier may be asked by the OEM to also produce the distressed supplier's share, towards a gain in reputation against the OEM.<sup>23</sup>

## 5.2 Interdependences between Contracts

In many cases, the OEM procures at the same time either similar parts for different car models or parts from different part groups from the same supplier. Formally, the contracts are drafted completely independently of each other. Yet the possibility is open to implicitly or explicitly relate contractual arrangements. Such interdependences are almost always initiated by the OEM. Only one premium OEM explicitly stated that he avoids bundling, while focusing on the optimal contract for each part.<sup>24</sup>

The game involving interdependent supply contracts is played in different variants, dependent on the characteristics of the parts supplied by the supplier. The critical dimensions involved are innovative vs. standard, and high vs. low volume. We observed the following interesting combinations:

- *Supply contracts for innovative and standard products*

Many suppliers provide both innovative components and standard commodities to the same OEM.<sup>25</sup> We found evidence that such a supplier is limited in exploiting monopolistic advantage in the provision of the innovative product. This, he feels, could induce the OEM to withdraw from the supply relationship for more competitive standard—in particular, volume—products.

- *Supply contracts for high and low volume products*

Often the OEMs offer niche variants of a model in small volumes, either because they are profitable themselves, or because there are positive branding spillovers. By our evidence the OEM tends to bundle supply contracts of small volumes for niche products with those for large volume products, in the attempt to extract rents from the provision of the niche product parts—even if the part for the niche variant differs in essential characteristics.<sup>26</sup> The typical supplier apparently gives in, in view of the potential availability of future contracts.

Summarising our interpretation: rents to suppliers—as most likely created from learning cost savings—are apparently volume dependent, and relatively private to the supplier.

Particular forms of contractual interdependences arise when interactions between the same buyer and seller are repeated many times. Repetitions may arise in the following form:

- *Repetition within a vehicle model lifetime*

We frequently observe a sequence of contracts on the same vehicle part, within the economic lifetime of a given model. Two basic contract types have emerged. One extends over one year, and can be (and in most cases is) extended on an annual basis. The second one, a framework contract, extends over half or the entire model lifetime. However, prices are renegotiated every year, with the option left to either party to discontinue the contract without penalties.<sup>27</sup>

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<sup>23</sup>We have found one instance in which a competitor of the bankrupt supplier was asked by the OEM to provide bailout—thus rescuing the competitor—in exchange for favourable supply conditions on another contract.

<sup>24</sup>Interview results on bundling of contracts as common practice: Yes=13, No=1, N/A=4.

<sup>25</sup>As typical example, Bosch provides highly innovative electronic systems as well as spark plugs, amongst many other parts.

<sup>26</sup>A typical example is the body of the convertible roof variant of a standard model

<sup>27</sup>Interview results on short vs. long term contractual structures: Yes=12, No=0, N/A=6.

- *Repetition across several vehicle models*

As indicated before, the typical OEM provides many vehicle models, and staggers launching completely redesigned versions of the individual models across years. Reasons to do so include smoothed capacity exploitation in development and production, as well as a continued flow of news contributing to the company’s marketing. Within that OLG pattern of the models’ economic life times, the typical supplier provides parts for several of the OEM’s models at any given time.

A typical situation arises annually when a new contract is to be signed for a part built into a newly designed model, while some parts are provided under contracts for a model introduced years before into the market. In this situation, some OEMs renegotiate procurement contracts—in particular prices—for parts built into earlier models. The OEM often conditions the award of a new contract to the supplier on an extra price reduction on the old contract. In one exceptional case the supplier would demand price increases on an old contract in order to agree to a new contract.<sup>28</sup>

The OEM’s renegotiation requests can be interpreted positively as the attempt to participate in the supplier’s cost savings due to learning—or negatively, as an abuse of the hold-up situation against the supplier just before a new contract is signed, as in almost all cases that supplier has engaged in upfront investment towards the provision of the new model specific part, that will be compensated only via a markup specified in the new contract. In either case, the redistribution of rent towards the OEM curtails the supplier’s incentive to pursue OEM specific R&D.<sup>29</sup>

## 6 Summary and Conclusion

With our account of a detailed case study we wish to provide exemplary insights into how first tear buyer-supplier relationships are structured. Our chosen example is the automotive industry, because it supplies the most complex mass-marketed product to date.

We observed substantive contract violations, such as the renegotiation of contractually specified supply prices and quantities, or out-of-contract interventions by both buyer and supplier in the supply process. We also identified many possibilities for substantive hold-up from both sides of the market, in view of the substantive switching costs both buyer and supplier are confronted with.

Our central insight is that in the repeated multi-product buyer-supplier interactions, that almost exclusively involve relationship specific investment into idiosyncratic products, the classical preconditions for contract completeness must not be satisfied, namely that actions and their outcomes are specified for all relevant states of nature, and observable and verifiable before the courts. The reason is that these interactions open room for the punishment of deviating behaviour that is not mirrored in the classical spot market contract, but approximated in recent theories of relational contracting.

Our empirical findings hopefully contribute to a wide range of research, e.g. to the discussions on buyer specific investment and hold-up, on vertical integration, on mechanism design, as well as on hierarchies and delegation.

The results of our study also raise new questions that are in need of an answer in theory. We consider interesting in particular the (socially) optimal trade-off between innovation and product reliability, at given R&D outlay and time-to-market, and the difference to the current market outcome.

Another question not discussed here is why automotive OEMs exhibit increasing similarity in the development of their product portfolios, thus apparently ”seeking to increase compe-

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<sup>28</sup>In the industry, this contracting behaviour is called *pay to play*.

<sup>29</sup>Interview results on bundling of consecutive contracts: Yes=10, No=2, N/A=6.



tition” with each other. In addition, car model generations increase in body size and engine power. Which market forces, beyond just per capita income, can explain this?

We also found systematic excess capacity at the OEM level, less so at the supplier level. The reaction of the industry to business cycles, especially the question whether in downturns suppliers accept contracts with negative margins in order to preserve capacity, may be an object worthwhile theoretical research.

The consequences of higher shares of software in the car parts on procurement and pricing by changing the share of fixed relative to variable costs, could be examined. On an even broader scale, we may ask for the OEMs’ role model in the automotive industry in the future, given recent and ongoing changes in innovation activities, technology proliferation, and competition intensity. Which activities remain in their generic competence, which ones will, or should be outsourced?

Our case study interviews focussed on a broad range of phenomena in the supply chain of the automotive industry. From what we have learnt, several aspects may also be worth a more detailed empirical analysis. Among others, this concerns the pursuit of innovative activities by suppliers, initiated by or connected to particular OEMs. How is the supplier’s model-independent pre-development research rewarded—given separate procurement for model development and production? Is there a relationship between part type and contract length? In particular, are more complex parts supplied within longer term contracts? And why does module or system outsourcing not emerge as predominant manufacturing organization, given that it leads to tighter cost control?

We hope that further work will be able to solve some of the open questions and thus further contribute to bringing together economic theory and empirical findings in one of the major industries in the world.

# A Questionnaire

## A.1 Supplier version

### 1. Produkteigenschaften

#### 1.1. Teilebeschreibung

- 1.1.1. Was sind Ihre strategischen Ziele für den betrachteten Produktbereich für die Zukunft? (System- oder Teilelieferant, Know-how Fokussierung)
- 1.1.2. Welche Produkte (Systeme, Module oder Teile) werden von Ihnen außerdem produziert bzw. eingekauft?
- 1.1.3. Ist hierbei Ihre Rolle als System- oder Teilelieferant von Beginn an festgelegt oder entscheidet sich dies im Laufe der Entwicklung? Wann entscheidet sich dies im letztern Fall typischerweise?

#### 1.2. Wertschöpfung

- 1.2.1. Welchen Wertanteil hat das betrachtete Produkt an einem Fahrzeug? Was sind die durchschnittlichen Einkaufskosten und Verkaufspreise für dieses Produkt? Was ist die typische Umsatzmarge?
- 1.2.2. Welcher Anteil der Wertschöpfung wird vom Systemlieferanten, welcher von dem (den) Teilelieferanten geschaffen?
- 1.2.3. Inwieweit unterscheiden sich Module/Systeme von Einzelteilen in Produktion und Einkauf hinsichtlich Lernkurven-Effekten (Kosteneinsparung über Zeit; x

#### 1.3. Technologie und Innovation

- 1.3.1. Wie komplex ist das betrachtete Produkt? Kann es leicht imitiert werden, weil alle Technologien zur Herstellung des Produkts allgemein bekannt sind? Bestehen Patentrechte auf Systeme, Module oder einzelne Teile?
- 1.3.2. Wie beurteilen Sie die technologische Entwicklung der letzten 5 Jahre im Umfeld Ihres Produktes (insbesondere vor dem Hintergrund einer stärkeren Fokussierung auf Fahrzeugelektronik und Soft- gegenüber Hardware)?
- 1.3.3. Wie spezifisch für ein bestimmtes Fahrzeugmodell oder einen OEM ist das Produkt in der Entwicklung und in der Produktion?
- 1.3.4. Wie komplex sind die Schnittstellen (Entwicklung und Einbau) zum restlichen Fahrzeug (Umfang des Lastenhefts, Interaktion mit anderen Bauteilen/Systemen)?
- 1.3.5. Wie hoch sind die Innovationszyklen im betrachteten Produkt? Wie lange dauert es erfahrungsgemäß, bis eine Innovation auf dem Markt erscheint?
- 1.3.6. Beschleunigt oder bremst die Vergabe von Modulen/Systemen an Systemlieferanten die Zeit zwischen Entwicklung und Markteinführung eines Fahrzeugs im Vergleich zur Eigenentwicklung durch den OEM?

### 2. Kunden

- 2.1.1. Mit welchen Unternehmen unterhalten Sie zu diesem Produkt Lieferbeziehungen?
- 2.1.2. Welche anderen Produkte liefern Sie außerdem an diese Unternehmen? Inwiefern wird die Lieferung verschiedener Produkte (z.B. über Baureihen) oder Projektbündel gemeinsam verhandelt oder bestehen Rahmenverträge?
- 2.1.3. Welche strategischen Implikationen ergeben sich aus Ihrer Sicht aus der Verbreiterung der Produktpalette durch Fahrzeughersteller, z.B. durch die BMW 1er- und X-Serie, den Porsche Cayenne oder die Mercedes A-Klasse bzw. den Maybach? Wie denken Sie wird dies von den Konsumenten beurteilt?
- 2.1.4. Wie beurteilen Sie die Bedeutung der Produkteinführungszeiten? Läßt sich eine Tendenz zu kürzeren Produkteinführungszeiten oder -lebenszyklen feststellen und wie wirkt sich diese aus?
- 2.1.5. Hat sich aus Ihrer Sicht der Wettbewerb zwischen den OEMs erhöht? Was sind Ursachen hierfür (z.B. stagnierende Absatzzahlen, Überkapazitäten, etc.)? Wie hat sich dies gegebenenfalls auf Sie ausgewirkt?

### 3. Anbieter (im gleichen Produktmarkt)

#### 3.1. Marktstruktur

- 3.1.1. Wie groß ist der Markt für das betrachtete Produkt in Deutschland, Europa, weltweit (Umsatz, Stückzahlen)?
- 3.1.2. Wie viele Wettbewerber existieren für das betrachtete Produkt in Deutschland, in Europa, weltweit? In welcher zeitlichen Reihenfolge erfolgte der Markteintritt Ihres Unternehmens und der Ihrer Wettbewerber?
- 3.1.3. Wie verteilen sich die Marktanteile unter den angesprochenen Wettbewerbern?
- 3.1.4. In welchem Umfang hängt die Anzahl der Stufen in der Lieferantenhierarchie ab von der Innovationsfrequenz im betrachteten Markt, der Komplexität des betrachteten Produkts, der Volatilität der Nachfrage nach dem Produkt, dem Wettbewerb im entsprechenden Produktmarkt oder im Fahrzeugmarkt allgemein?

#### 3.2. Anbietereigenschaften

- 3.2.1. Gibt es technologische Unterschiede zwischen den Wettbewerbern?
- 3.2.2. Welche Informationen haben Sie über Technologie und Kostenstrukturen Ihrer Wettbewerber?
- 3.2.3. Was ist Ihre Eigentümerstruktur? Welche Eigentümerstruktur haben Ihre Wettbewerber, Zulieferer und Kunden?
- 3.2.4. Inwieweit hat aus Ihrer Sicht die Entwicklung und Stärkung einer eigenen Zulieferer-Marke, z.B. durch Bosch, Einfluß auf den Wettbewerb unter Zulieferern?

#### 3.3. Globalisierung

- 3.3.1. Welchen Einfluß hat aus Ihrer Sicht die Globalisierung der Industrie (OEM und Zulieferer) auf den Wettbewerb?

- 3.3.2. In welcher Form und weshalb verfolgen Sie heute und in der Zukunft eine Globalisierungsstrategie (Zentrale Produktion (High Tech vs. Low cost) und weltweiter Vertrieb vs. Lokale/OEM-nahe Produktion und Vertrieb)?
- 3.3.3. In wieweit erfolgt eine Produktionsverlagerung gemeinsam mit anderen System- oder Teilelieferanten oder OEMs? Wer führt die Initiative an? In wieweit erfolgt eine (finanzielle) Unterstützung durch andere Unternehmen, insb. den OEM?
- 3.3.4. In welchem Umfang führt eine Globalisierung der Produktion zu einem verstärkten Wettbewerbsdruck auf Seiten der System- oder Teilelieferanten, z.B. über Second Sourcing?

#### 4. Anbietersauswahl

- 4.1.1. Wie beurteilen Sie die Auslagerung der Herstellung von ganzen Systemen oder Modulen vom Fahrzeughersteller zu sog. System- oder Modullieferanten und damit die Entwicklung von mehrstufigen Zulieferhierarchien? Worin sehen Sie Vor- und Nachteile einer solchen Entwicklung?
- 4.1.2. Was sind die wichtigsten Schritte in der Lieferantenauswahl durch Ihre Kunden? Findet eine Auktion (Entwicklung und Produktion) zwischen verschiedenen potentiellen Anbietern statt und wenn ja zu welchem Zeitpunkt in der Lieferantenauswahl?
- 4.1.3. Wie viele (potentielle) Anbieter stehen dem OEM zu folgenden Zeitpunkten in der Lieferantenauswahl zur Verfügung: Konzeptphase (vor Entwicklung, Entwicklungswettbewerb), während Entwicklung (Parallel Engineering), bei Ausschreibung der Produktion, während der Produktion (Second oder Dual Sourcing) (Wie verteilen sich Aufgaben und Volumina bei mehreren Anbietern gleichzeitig)
- 4.1.4. Baut der OEM alternative Lieferanten (wenn nicht schon bei einer einzigen Modellreihe) über verschiedene Modellreihen auf?
- 4.1.5. In wieweit gibt es Vorteile aus wiederholter Zusammenarbeit über verschiedene Projekte hinweg zwischen OEM und Lieferanten? Wie werden diese bei der Vergabe neuer Projekte berücksichtigt?
- 4.1.6. In welcher Reihenfolge werden Verhandlungen geführt (und ggf. Verträge geschlossen)? Zuerst zwischen OEM und den Systemlieferanten oder zuerst zwischen Systemlieferanten und indirekten Teilelieferanten). Welche Verträge werden zuletzt geschlossen? Wer hat Ausstiegsmöglichkeiten, wann und zu welchen Kosten? Wer bestimmt die Reihenfolge der Verhandlungen?
- 4.1.7. In welchem Umfang hat der OEM Einfluß auf die Wahl der indirekten Teilelieferanten durch die Systemlieferanten?

#### 5. Entwicklung

##### 5.1. Modellunspezifische Entwicklungen

- 5.1.1. Können Sie eine Verschiebung der Entwicklungsleistung vom OEM zu System- oder Teilelieferanten feststellen? Wie beurteilen Sie eine solche Entwicklung, wo sehen Sie Vor- und Nachteile?
- 5.1.2. In wieweit schließen sich Lieferanten untereinander oder mit OEMs bzw. Systemlieferanten für über fahrzeugmodell-spezifische Entwicklungsleistungen hinausgehende Forschung zusammen?
- 5.1.3. Was sind die wichtigsten Vor- und Nachteile solcher Kooperationen?
- 5.1.4. Wie wirkt sich dies auf die Lieferantenauswahl und damit ggf. auf Preise aus?
- 5.2. Modellspezifische Entwicklungen (Adaptionsentwicklungen)
  - 5.2.1. Wie viel Entwicklungsaufwand (Zeit, Mann-Tage, EUR) entsteht durch eine modellspezifische Anpassung (Entwicklung einer bereits prinzipiell bestehenden Technik in ein neues Fahrzeugmodell)?
  - 5.2.2. Welcher Anteil am Entwicklungsaufwand wird vom Teilelieferanten, Systemlieferanten und dem OEM jeweils übernommen (Wer entwickelt und wer trägt die anfallenden Kosten)?
  - 5.2.3. Wer erhält typischerweise Patente an Entwicklungsleistungen?
  - 5.2.4. Wie werden die Aktivitäten der Beteiligten untereinander koordiniert? Wer überwacht die Aktivitäten und definiert Schnittstellen? Wer ist für den Erfolg verantwortlich?
  - 5.2.5. Wie findet bei Entwicklungen durch System- oder (direkten oder indirekten) Teilelieferanten eine Koordination mit Entwicklern anderer Bauteile statt?
  - 5.2.6. In wieweit lassen sich Entwicklungserkenntnisse übertragen und so eine Trennung von Entwicklung und Produktion erreichen? Welchen Anteil am gesamten Entwicklungsaufwand (in Zeit, EUR) müsste bei einer Nach-Entwicklung neu aufgebracht werden wenn Der Erstentwickler den Nachentwickler mit allen vorhandenen Informationen unterstützt, nur eine Übergabe von Zeichnungen und Prototypen erfolgt?
  - 5.2.7. In wieweit kooperieren Sie auch mit direkten Wettbewerbern bei der Entwicklung von Bauteilen, z.B. um Gleichteileeffekte bei verschiedenen Fahrzeugen über Baureihen oder sogar Marken hinweg zu nutzen?
  - 5.2.8. Gibt es neben einer Entwicklung durch OEM oder Lieferanten auch eine Entwicklung durch spezielle Entwicklungsfirmen? Wenn ja, wer nutzt solche Firmen vor allem (OEM, Systemlieferant oder Teilelieferanten)? Was sind die Gründe für eine solche Auslagerung von Entwicklungsleistung? Welcher Anteil an Entwicklungsleistungen wird dabei ausgelagert? Wie verteilen sich dabei die Risiken, z.B. falls sich eine Entwicklung als fehlerhaft herausstellt?

## 6. Produktion

### 6.1. Produktionsentscheidungen

- 6.1.1. Auf welcher Ebene der Zulieferhierarchie werden welche Entscheidungen getroffen? (z.B. bezüglich Kapazitäten, Produktionsmengen und Losgrößen)

- 6.1.2. Nutzt der Lieferant auch Produktionsmittel (Maschinen, Werkzeuge oder auch Patente) des OEM bei der Produktion?
- 6.1.3. Rechnen die OEM mit (oder unternehmen die OEM etwas gegen) drohende Insolvenzen der Systemlieferanten oder (direkten und indirekten) Teilelieferanten? Wie hoch ist das jeweils zu erwartende Risiko?
- 6.2. Vertragsabweichungen und -strafen
  - 6.2.1. Wie wollen Lieferanten und OEMs in Zukunft Qualitätssicherung betreiben, um kostspielige Rückrufaktionen zu vermeiden, insb. vor dem Hintergrund einer Verschiebung der Entwicklungsleistung vom OEM zu den System- oder Teilelieferanten?
  - 6.2.2. Wie und von wem werden Abweichungen von zuvor in Verträgen spezifizierten Kosten, Mengen oder Qualitäten festgestellt? Wie sind entsprechende Strafen vertraglich ausgestaltet? Gibt es außervertragliche Absprachen in dieser Hinsicht?
  - 6.2.3. Ist es möglich, Fehler im fertigen Produkt System- oder Teilelieferanten zuzuweisen und gegebenenfalls entstehende Zusatzkosten verursachungsgerecht aufzuteilen? Ist es möglich, Fehler des Systemlieferanten im Zusammenbau (im Gegensatz zu den Fehlern der verbauten Einzelteile) des Systems/Moduls zu erkennen?
  - 6.2.4. Wie häufig sind im Nachhinein zu Tage tretende Missverständnisse in Bezug auf Inhalt und Interpretation von Verträgen?

## 7. Vertragsgestaltung

### 7.1. Vertragsinhalte

- 7.1.1. Was wird in den Verträgen typischerweise wann spezifiziert? Werden Mengen bereits beim ersten Angebot festgelegt (insbesondere vor der letzten Möglichkeit der Parteien, aus dem Vertrag ohne Vertragsstrafen auszusteigen)?
- 7.1.2. Wie lange ist die typische Vertragsdauer und wer legt sie fest?
- 7.1.3. Gibt es selbst noch während der Vertragslaufzeit Nachverhandlungen? Unter welchen Bedingungen finden Nachverhandlungen statt und wer veranlasst diese?
- 7.1.4. In wieweit wird die Weitergabe von F&E Ergebnissen der Zulieferer an Konkurrenten des OEM vertraglich eingeschränkt?
- 7.1.5. Welche Absprachen werden neben den vertraglichen Regelungen zwischen OEM und Systemlieferanten bzw. zwischen System- und indirekten Teilelieferanten typischerweise noch getroffen (nicht justitiable Absprachen)?

### 7.2. Anreizstrukturen und Kostenteilung

- 7.2.1. In welcher Form und Höhe sind Lieferverträge Performance-abhängig (Zielerfüllung hinsichtlich Qualität und Menge)? Gibt es Unterschiede zwischen den verschiedenen Lieferantenebenen?

- 7.2.2. In wieweit werden die Kosten für Investitionen des Lieferanten vom OEM (bzw. bei indirekten Teilelieferanten vom Systemlieferanten) übernommen, z.B. für Entwicklungen oder für Maschinen und Werkzeuge?
- 7.2.3. Wie erfolgt in diesem Fall eine Übernahme der Kosten (direkte Bezahlung, Umschlag auf eine festgelegte Produktionsmenge, etc.)?
- 7.2.4. Wie wirkt sich eine Kostenübernahme auf die Eigentumsrechte, z.B. an Patenten oder Maschinen und Werkzeugen, aus?

## 8. Informationen

- 8.1.1. Welche Informationen hat ein Geschäftspartner (besonders der OEM) über die Produktionskosten der anderen Partner (System- und Teilelieferanten)? In wieweit geben Unterschiede zwischen alten und neuen Produktmodellen oder Baureihen Anhaltspunkte hierfür?
- 8.1.2. Hat der Systemlieferant bessere Informationen über die Kostenstruktur der indirekten Teilelieferanten als der OEM?
- 8.1.3. Kann der OEM Informationen oder Vermutungen über die Kosten des Systemlieferanten aus den Verhandlungen mit dem indirekten Teilelieferanten ableiten (falls solche stattfinden)?
- 8.1.4. Wie flexibel sind Ihre eigenen Informations- und Kostenrechnungssysteme, um verschiedene Vertragskonstellationen abzubilden?
- 8.1.5. Sind die Verträge zwischen System- und indirekten Teilelieferanten dem OEM bekannt? Wenn ja, welche Elemente (z.B. Preis, Menge, Qualität, Zusammenarbeit in der Forschung)? Kann der OEM Verträge, die er selbst schließt, daran knüpfen?
- 8.1.6. Sind die Verträge zwischen dem OEM und Systemlieferanten dem indirekten Teilelieferanten bekannt? Kann es z.B. sein, dass der OEM direkt mit dem Teilelieferanten verhandelt und Daten aus dem Vertrag mit dem Systemlieferanten weitergibt?

## A.2 OEM version

### 1. Produkteigenschaften

#### 1.1. Teilebeschreibung

- 1.1.1. Was sind Ihre strategischen Ziele im Einkauf für die Zukunft? (z.B. verstärktes Outsourcing, Know-how Fokussierung, mehr oder weniger Zusammenarbeit mit Systemlieferanten)
- 1.1.2. Welche Produkte (Systeme, Module oder Teile) bzw. Produktgruppen werden von Ihnen von welchen Lieferanten eingekauft? Wie ist Ihre Einkaufsorganisation aufgebaut? (Weitere Details vgl. Kap. 3)
- 1.1.3. Ist hierbei der Einkauf von einem System- oder Teilelieferanten von Beginn an festgelegt oder entscheidet sich dies im Laufe der Entwicklung? Wann entscheidet sich dies im letztern Fall typischerweise?

#### 1.2. Wertschöpfung

- 1.2.1. Welchen Wertanteil am Fahrzeug haben die eingekauften Produkte? Was ist der durchschnittliche Materialkostenanteil, Ihre Wertschöpfung und die Marge je Fahrzeug?
- 1.2.2. Welcher Anteil der Wertschöpfung wird vom Systemlieferanten, welcher von dem (den) Teilelieferanten geschaffen?
- 1.2.3. Erfahren Sie für Module/Systeme höhere oder niedrigere Economies of Scale relativ zu Einzelbauteilen? In welcher Größenordnung bewegen sich diese (Verdopplung der Einkaufsmenge führt zu x Prozent Einsparungen)? In wieweit beziehen diese sich auf die Produktion (Lernkurveneffekte) oder auf Einkaufserfolge (Einkaufs-Economies of Scale)?

#### 1.3. Technologie und Innovation

- 1.3.1. Wie komplex sind die betrachteten, von Ihnen eingekauften Produkte (System, Modul oder Teil)? Sind alle Technologien zur Herstellung dieser Produkte allgemein bekannt? Bestehen Patentrechte auf Systeme, Module oder einzelne Teile?
- 1.3.2. Wie beurteilen Sie die technologische Entwicklung der letzten 5 Jahre im Umfeld der von Ihnen eingekauften Produkte (insbesondere vor dem Hintergrund einer stärkeren Fokussierung auf Fahrzeugelektronik und Soft- gegenüber Hardware)?
- 1.3.3. Wie spezifisch für ein bestimmtes Fahrzeugmodell oder einen OEM sind die Produkte, in der Entwicklung und in der Produktion?
- 1.3.4. Wie komplex sind die Schnittstellen (Entwicklung und Einbau) zum restlichen Fahrzeug (Umfang des Lastenhefts, Interaktion mit anderen Bauteilen/Systemen)?
- 1.3.5. Wie lang sind die Innovationszyklen in den von Ihnen eingekauften Produkten? Wie lange dauert es erfahrungsgemäß, bis eine Innovation auf dem Markt erscheint?



- 1.3.6. Beschleunigt oder bremst die Vergabe von Modulen/Systemen an Systemlieferanten die Zeit zwischen Entwicklung und Markteinführung eines Fahrzeugs im Vergleich zur Eigenentwicklung (durch den OEM)?

## 2. Kunden

- 2.1.1. Welche anderen Unternehmen (OEM) werden vom selben Lieferanten mit dem betrachteten oder einem vergleichbaren Produkt beliefert? Welche OEM kaufen bei anderen Lieferanten ein oder stellen das betrachtete Produkt selbst her?
- 2.1.2. Welche anderen Produkte beziehen Sie noch vom selben Lieferanten? In wiefern wird die Lieferung verschiedener Produkte (z.B. über Baureihen) oder Projektbündel gemeinsam verhandelt oder bestehen Rahmenverträge?
- 2.1.3. Welche strategischen Implikationen ergeben sich aus Ihrer Sicht aus der Verbreiterung der Produktpalette durch Fahrzeughersteller, z.B. durch die BMW 1er- und X-Serie, den Porsche Cayenne oder die Mercedes A-Klasse bzw. den Maybach? Wie denken Sie wird dies von den Konsumenten beurteilt?
- 2.1.4. Wie beurteilen Sie die Bedeutung der Produkteinführungszeiten? Läßt sich eine Tendenz zu kürzeren Produkteinführungszeiten oder -lebenszyklen feststellen und wie wirkt sich diese aus?
- 2.1.5. Hat sich aus Ihrer Sicht der Wettbewerb zwischen den OEMs erhöht? Was sind Ursachen hierfür (z.B. stagnierende Absatzzahlen, Überkapazitäten, etc.)? Wie hat sich dies gegebenenfalls auf Sie ausgewirkt?

## 3. Anbieter (im gleichen Produktmarkt)

### 3.1. Marktstruktur

- 3.1.1. Wie groß ist der Markt für die von Ihnen eingekauften Produkte in Deutschland, Europa, weltweit: Wie viel Umsatz wird mit diesen Produkten p.a. erzielt? Wie viel Stück werden umgesetzt?
- 3.1.2. Wie viele potentielle Lieferanten stehen Ihnen für die von Ihnen eingekauften Produkte zur Verfügung? Mit welchen unterhalten Sie Lieferbeziehungen?
- 3.1.3. Wie verteilen sich die Marktanteile unter den angesprochenen Wettbewerbern?
- 3.1.4. In welchem Umfang hängt die Anzahl der Stufen in der Lieferantenhierarchie ab von der Innovationsfrequenz im betrachteten Markt, der Komplexität des betrachteten Produkts, der Volatilität der Nachfrage nach dem Produkt, dem Wettbewerb im entsprechenden Produktmarkt oder im Fahrzeugmarkt allgemein?

### 3.2. Anbieterereigenschaften

- 3.2.1. Gibt es technologische Unterschiede zwischen den verschiedenen System - oder Teilelieferanten im Markt der von Ihnen eingekauften Produkte?
- 3.2.2. Welche Informationen haben Sie über Technologie und Kostenstrukturen der Lieferanten?

- 3.2.3. Was ist die typische Eigentümerstruktur eines System- und eines Teilelieferanten: Welche Eigentümer und Gesellschaftsform existiert, in wieweit sind Tochterunternehmen und Beteiligungen vorhanden?
  - 3.2.4. In wieweit hat aus Ihrer Sicht die Entwicklung und Stärkung einer eigenen Zulieferer-Marke, z.B. durch Bosch, Einfluß auf den Wettbewerb unter Zulieferern? Wie beurteilen Sie als OEM den Aufbau einer Zulieferer-Marke?
- 3.3. Globalisierung
- 3.3.1. Welchen Einfluss hat aus Ihrer Sicht die Globalisierung der Industrie (sowohl der OEM als auch der Zulieferer) auf den Wettbewerb?
  - 3.3.2. In welcher Form und weshalb verfolgen Sie heute und in der Zukunft eine Globalisierungsstrategie (Zentrale Produktion (High Tech vs. Low cost) und weltweiter Vertrieb vs. lokale Produktion und Vertrieb)?
  - 3.3.3. In wieweit erfolgt eine Produktionsverlagerung gemeinsam mit System- oder Teilelieferanten oder OEMs? Wer führt die Initiative an? In wieweit unterstützen Sie Ihre Lieferanten, z.B. finanziell? In wieweit unterstützen Lieferanten ihre Unterlieferanten bei einer Produktionsverlagerung?
  - 3.3.4. In welchem Umfang führt eine Globalisierung der Produktion zu einem verstärkten Wettbewerbsdruck auf Seiten der System- oder Teilelieferanten, z.B. über Second Sourcing?

#### 4. Anbietersauswahl

- 4.1.1. Wie beurteilen Sie die Auslagerung der Herstellung von ganzen Systemen oder Modulen zu sog. System- oder Modullieferanten und damit die Entwicklung von mehrstufigen Zulieferhierarchien? Worin sehen Sie Vor- und Nachteile einer solchen Entwicklung?
- 4.1.2. Was sind die wichtigsten Schritte in der Lieferantenauswahl? Findet eine Auktion (Entwicklung und Produktion) zwischen verschiedenen potentiellen Anbietern statt und wenn ja zu welchem Zeitpunkt in der Lieferantenauswahl?
- 4.1.3. Wie viele potentielle Geschäftspartner im Systemlieferanten- und (direkten oder indirekten) Teilelieferantenlevel stehen Ihnen typischerweise während der folgenden Phasen zur Verfügung? Konzeptphase (vor Entwicklung, Entwicklungswettbewerb), während Entwicklung (Parallel Engineering), bei Ausschreibung der Produktion, während der Produktion (Second oder Dual Sourcing) (Wie verteilen sich Aufgaben und Volumina bei mehreren Anbietern gleichzeitig)
- 4.1.4. Bauen Sie alternative Lieferanten (wenn nicht schon bei einer einzigen Modellreihe) über verschiedene Modellreihen auf?
- 4.1.5. In wieweit gibt es Vorteile aus wiederholter Zusammenarbeit mit einem bestimmten Lieferanten über verschiedene Projekte hinweg? Wie werden diese bei der Vergabe neuer Projekte berücksichtigt?

- 4.1.6. In welcher Reihenfolge werden Verhandlungen geführt (und ggf. Verträge geschlossen)? Zuerst zwischen Ihnen und den Systemlieferanten oder zuerst zwischen Systemlieferanten und indirekten Teilelieferanten?. Welche Verträge werden zuletzt geschlossen? Wer hat Ausstiegsmöglichkeiten, wann und zu welchen Kosten? Wer bestimmt die Reihenfolge der Verhandlungen?
- 4.1.7. In welchem Umfang haben Sie Einfluß auf die Wahl der indirekten Teilelieferanten durch einen Systemlieferanten (sog. Directed Business)?

## 5. Entwicklung

### 5.1. Modellunspezifische Entwicklungen

- 5.1.1. Können Sie eine Verschiebung der Entwicklungsleistung (vom OEM) zu System- oder Teilelieferanten feststellen? Wie beurteilen Sie eine solche Entwicklung, wo sehen Sie Vor- und Nachteile?
- 5.1.2. In wieweit schließen sich Lieferanten untereinander oder mit Systemlieferanten oder Ihnen als OEM für über fahrzeugmodellspezifische Entwicklungsleistungen hinausgehende Forschung zusammen?
- 5.1.3. Was sind die wichtigsten Vor- und Nachteile solcher Kooperationen?
- 5.1.4. Wie wirkt sich dies auf die Lieferantenauswahl und damit ggf. auf Preise aus?

### 5.2. Modellspezifische Entwicklungen (Adaptionsentwicklungen)

- 5.2.1. Wie viel Entwicklungsaufwand (Zeit, Mann-Tage, EUR) fällt für ein neues Fahrzeugmodell insgesamt an? Wie teilt sich dieser Aufwand zwischen Grundlagen- und Adaptionsentwicklungen auf? Wie verhält sich dies für einzelne exemplarische (eingekaufte) Teile?
- 5.2.2. Welcher Anteil am Entwicklungsaufwand wird vom Teilelieferanten, Systemlieferanten und Ihnen als OEM jeweils übernommen (Wer entwickelt und wer trägt die anfallenden Kosten)?
- 5.2.3. Wer erhält typischerweise Patente an Entwicklungsleistungen?
- 5.2.4. Wie werden die Aktivitäten der Beteiligten untereinander koordiniert? Wer überwacht die Aktivitäten und definiert Schnittstellen? Wer ist für den Erfolg verantwortlich?
- 5.2.5. Wie findet bei Entwicklungen durch System- oder (direkten oder indirekten) Teilelieferanten eine Koordination mit Entwicklern anderer Bauteile statt?
- 5.2.6. In wieweit lassen sich Entwicklungserkenntnisse übertragen und so eine Trennung von Entwicklung und Produktion erreichen? Welchen Anteil am gesamten Entwicklungsaufwand (in Zeit, EUR) müsste bei einer Nach-Entwicklung neu aufgebracht werden wenn Der Erstentwickler den Nachentwickler mit allen vorhandenen Informationen unterstützt, Nur eine Übergabe von Zeichnungen und Prototypen erfolgt
- 5.2.7. In wieweit kooperieren Sie auch mit Wettbewerbern oder Lieferanten von Wettbewerbern bei der Entwicklung von Bauteilen, z.B. um Gleichteileeffekte

bei verschiedenen Fahrzeugen über Baureihen oder sogar Marken hinweg zu nutzen?

- 5.2.8. Gibt es neben einer Entwicklung durch OEM oder Lieferanten auch eine Entwicklung durch spezielle Entwicklungsfirmen? Wenn ja, wer nutzt solche Firmen vor Allem (OEM, Systemlieferant oder Teilelieferanten)? Was sind die Gründe für eine solche Auslagerung von Entwicklungsleistung? Welcher Anteil an Entwicklungsleistungen wird dabei ausgelagert? Wie verteilen sich dabei die Risiken, z.B. falls sich eine Entwicklung als fehlerhaft herausstellt?

## 6. Produktion

### 6.1. Produktionsentscheidungen

- 6.1.1. Auf welcher Ebene (OEM, Systemlieferant, Teilelieferant) werden welche Entscheidungen getroffen? (z.B. bezüglich Kapazitäten, Produktionsmengen und Losgrößen)
- 6.1.2. Nutzen Lieferanten auch Ihre Produktionsmittel (Maschinen, Werkzeuge oder auch Patente) oder die von Systemlieferanten?
- 6.1.3. Rechnen Sie mit (oder unternehmen Sie etwas gegen) drohende Insolvenzen der Systemlieferanten oder (direkten und indirekten) Teilelieferanten? Wie hoch ist das jeweils zu erwartende Risiko?

### 6.2. Vertragsabweichungen und -strafen

- 6.2.1. Wie wollen Sie und Ihre Lieferanten in Zukunft Qualitätssicherung betreiben, um kostspielige Rückrufaktionen zu vermeiden, insb. vor dem Hintergrund einer Verschiebung der Entwicklungsleistung vom OEM zu den System- oder Teilelieferanten?
- 6.2.2. Wie und von wem werden Abweichungen von zuvor in Verträgen spezifizierten Kosten, Mengen oder Qualitäten festgestellt? Wie sind entsprechende Strafen vertraglich ausgestaltet? Gibt es außervertragliche Absprachen in dieser Hinsicht?
- 6.2.3. Ist es möglich, Fehler im fertigen Produkt System- oder Teilelieferanten zuzuweisen und gegebenenfalls entstehende Zusatzkosten verursachungsgerecht aufzuteilen? Ist es möglich, Fehler des Systemlieferanten im Zusammenbau (im Gegensatz zu den Fehlern der verbauten Einzelteile) des Systems/Moduls zu erkennen?
- 6.2.4. Wie häufig sind im Nachhinein zu Tage tretende Missverständnisse in Bezug auf Inhalt und Interpretation von Verträgen?

## 7. Vertragsgestaltung

### 7.1. Vertragsinhalte

- 7.1.1. Was wird in den Verträgen typischerweise wann spezifiziert? Werden Mengen bereits beim ersten Angebot festgelegt (insbesondere vor der letzten Möglichkeit der Parteien, aus dem Vertrag ohne Vertragsstrafen auszusteigen)?

- 7.1.2. Wie lange ist die typische Vertragsdauer und wer legt sie fest?
  - 7.1.3. Gibt es selbst noch während der Vertragslaufzeit Nachverhandlungen? Unter welchen Bedingungen finden Nachverhandlungen statt und wer veranlasst diese?
  - 7.1.4. In wieweit wird die Weitergabe von F& E Ergebnissen der System- oder Teilelieferanten an andere OEM vertraglich eingeschränkt?
  - 7.1.5. Welche Absprachen werden neben den vertraglichen Regelungen zwischen Ihnen und Systemlieferanten bzw. zwischen System- und indirekten Teilelieferanten typischerweise noch getroffen (nicht justitiable Absprachen)?
- 7.2. Anreizstrukturen und Kostenteilung
- 7.2.1. Hängen die Gewinne der Firmen, die direkt an Sie liefern, stärker von ihrer Performance (Zielerfüllung hinsichtlich Qualität und Menge) ab? Beinhaltend z.B. die Verträge zwischen Ihnen und Systemlieferanten einen höheren pauschalen Anteil und die Verträge zwischen System- und indirekten Teilelieferanten einen höheren produktionsmengenabhängigen Anteil?
  - 7.2.2. In wieweit werden die Kosten für Investitionen der Systemlieferanten oder Teilelieferanten von Ihnen übernommen, z.B. für Entwicklungen oder für Maschinen und Werkzeuge? Übernehmen Systemlieferanten solche Kosten bei den Teilelieferanten?
  - 7.2.3. Wie erfolgt in diesem Fall eine Übernahme der Kosten (direkte Bezahlung, Umschlag auf eine festgelegte Produktionsmenge, etc.)?
  - 7.2.4. Wie wirkt sich eine Kostenübernahme auf die Eigentumsrechte, z.B. an Patenten oder Maschinen und Werkzeugen, aus?

## 8. Informationen

- 8.1.1. Welche Informationen haben Sie über die Produktionskosten und Gewinne Ihrer Geschäftspartner (System- und indirekten Teilelieferanten)? In wieweit geben Unterschiede zwischen alten und neuen Produktmodellen oder Baureihen Anhaltspunkte hierfür?
- 8.1.2. Hat der Systemlieferant bessere Informationen über die Kostenstruktur der indirekten Teilelieferanten als Sie?
- 8.1.3. Können Sie Informationen/Vermutungen über die Kosten des Systemlieferanten aus den Verhandlungen mit dem indirekten Teilelieferanten ableiten (falls solche stattfinden)?
- 8.1.4. Werden von System- oder Teilelieferanten Preismenüs (z.B. verschiedene Möglichkeiten der Kompensation von Entwicklungskosten) angeboten? Wie transparent sind diese Kalkulationen?
- 8.1.5. Sind Ihnen die Verträge zwischen System- und indirekten Teilelieferanten bekannt? Wenn ja, welche Elemente (z.B. Preis, Menge, Qualität, Zusammenarbeit in der Forschung)? Können Sie Verträge, die Sie selbst schließen, daran knüpfen?

8.1.6. Sind die Verträge zwischen Ihnen und dem Systemlieferanten den indirekten Teilelieferanten bekannt? Kann es z.B. sein, dass Sie direkt mit dem Teilelieferanten verhandeln und Daten aus dem Vertrag mit dem Systemlieferanten weitergeben?