



**UNIVERSITY OF GOTHENBURG**  
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Master Degree Project in Innovation and Industrial Management

# **Sourcing Strategies and their Implementation in the Aerospace Industry**

*A case study of an Airbus Group Subsidiary*

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## **Abstract**

By a field study of an Airbus Group subsidiary in combination with a review of extant literature this work examined strategic sourcing in the aerospace industry and the associated implementation challenges and obstacles.

The case study observations were consistent with the literature-based conception that extremely long product cycles, in combination with relatively high non-recurring costs, and a need for strong quality control can be considered as distinctive features of the industry. Those characteristics benefit the application of long-term partnerships and a relative absence of multiple sourcing.

However regarding implementation it became apparent that the case company is susceptible to issues that are related to its origin and hamper this approach. Amongst others those are a historically grown production setup focused on mainly vertical integrated operations with the associated insufficient ERP systems, limited transformation capabilities and capacities that coincide with ramp-up challenges while the impact of backlogs and delivery failure is extreme, and short-term cost pressure.

This problematic context can be considered similar for other incumbent aerospace companies – especially from Europe - which have comparable origins and also face the same industry-wide challenges. Hence also implementation - and not only determination - of sourcing strategies may be considered a main issue in this context

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# 1 Introduction

As the world became more integrated and globalized, the way in which businesses source inputs also underwent significant changes. Under increased competition many companies had and have to focus on their core competencies - in contrast to the past inclination of major companies to vertically integrate. This led to an increase in domestic as well as international outsourcing that increased the relevance of the procurement function and in many companies moved it closer to the core while it was often occupying a mere fringe position before.

As Anderson and Katz (1998) word it *“What companies buy has been increasing in importance, size, and complexity...”*. Gottfredson et al. (2005) go even further and claim that *“It’s no longer ownership of capabilities that matters but rather a company’s ability to control and make the most of critical capabilities.”* A comprehensive, systematic, and long-term approach to this challenge is often referred to as strategic sourcing, while the contrast would be the ad-hoc satisfaction of input needs under an only short-term horizon. This concept of strategic sourcing can have many manifestations: For example outsourcing even core capabilities for scale (Gottfredson et al., 2005) or fostering congruence between the goals of suppliers and buyers as described by Rossetti and Choi (2005) (*“Strategic sourcing integrates the buying firm’s strategic decisions with those of its key suppliers, thus promoting trust and decreasing transaction costs.”*) but also more competition increasing measures as long-term supplier development for the avoidance of supplier dependence respectively monopolies.

During a preceding internship at the aerospace company that became the subject of this study the author was often observing the notion that imitating the “more mature and more developed” automotive industry is desirable but at the same time reservations that applying best practice from other industries will not work were quite present. But why would the aerospace sector be too different from what is the common denominator when it comes to strategic sourcing? On the first look it seems to be another established mature industry.

Yet upon a closer look there are factors that are likely to make a difference: In the aerospace industry product life cycles are extremely long - often more than 30 years - and the technical complexity of the product is unique. In addition reliability and quality requirements are one main (if not the core) issue. (Mundt, 2003)

Some of this is also true for other industries, but usually in every aspect to a less pronounced degree. And while elsewhere one of the features may be as crucial as

in aerospace (e. g. safety as an existential prime issue for the food industry) the absence of the other traits as product complexity or a much higher production volume changes the ramifications or alleviates the challenge. The interest to follow this question in more detail beyond anecdotal evidence and workplace discussions lead to the conception of this thesis.

### **1.1 Project purpose and approach**

Hence the main goal of this degree project was to shed light on sourcing strategy implementation in the aerospace industry by conducting a case study of a subsidiary of the Airbus Group (Premium Aerotec). This was done minding the industry's distinctive features while putting them in relation to approaches derived from general frameworks, cross industry considerations, and exemplary practices usual in other sectors.

So the question included to some degree which strategies are preferable/applicable in an aerospace context to then investigate the challenges associated with their implementation. Due to this approach identifying and outlining the determinants of applicability for the various dimensions of strategic sourcing from literature was necessary. After this step possible strategies could be subsumed under the typical context and restraints of the aerospace sector. Those distinctive properties of the industry had to be carved out as well during the process by using already existing subject literature which was also measured against the insights from the explorative case study of a subsidiary of the Airbus Group.

After this grounding had been provided the observations of practical implementation obstacles and challenges were used as the basis of the analysis. The main sources of information were company documents and complementary inquiries.

### **1.2 Research questions**

Based on the project purpose laid out above and with the case-based approach in mind, three closely linked research questions were defined of which the first has a more general focus whilst the second and third are exclusively related to the case company:

**Question 1:** "Which sourcing strategies are suited for the civil aerospace industry?"

**Question 2:** "What is the current sourcing strategy of the case company?"

**Question 3:** "Which challenges and problems is the case company facing during the implementation of its sourcing strategy?"

Question 1 is broader in the sense that it was primarily answered based on literature, while Question 2 and Question 3 are directly focused on the case company. They aimed at translating the observations made into reinforcement or attenuation of the literature based answer to Question 1. However especially Question 3 was also supposed to identify and explore - especially regarding implementation - aspects that have not been covered before.

### **1.3 Case company profile**

The case company mentioned, Premium Aerotec (abbreviation: "PAG" from the full designation "Premium Aerotec GmbH"), is a German subsidiary of the Airbus Group that produces large aerospace metal and composite parts. This includes fuselage sections for all civilian Airbus craft, the A400M military transporter and the Eurofighter Typhoon fighter jet. The vast majority of orders come from within the Airbus Group, but recently other customers as Boeing and Dassault Aviation have been acquired. With more than 7400 employees and a yearly turnover of around 1.6 billion € in 2013 it represents between 2.7% (by turnover) and 5.2% (by personnel) of the whole Group. While still a wholly owned subsidiary, the company has an independent organizational structure with separate headquarters and engineering facilities since 2009. (Premium Aerotec, 2014 and Airbus Group, 2014)

### **1.4 Civil/military aerospace delimitations**

More than most other industries the civil part of the aerospace industry is subject to political interference in form of subsidies or dependence on demand by (partly) state controlled airlines. Yet in the defense portion of the aerospace industry competition and also sourcing are even more restricted and dominated by political considerations. Technology transfer regulations and offset agreements are usual in international defense contracts where almost all customers are states. E. g. jet fighters will rarely be procured without at least some sourcing from the buyer nation or local final assembly. While there is some timid opening due to increased usage of "off the shelf"-components and an increasing integration of western defense markets, there is still very limited room for a comprehensive sourcing strategy that can for example also use offshoring and was endogenously developed by the deploying company under best costs considerations. Hence this study wants to focus on civil aerospace.

Regarding Premium Aerotec's sourcing volume the importance of military programs is minor (around 10%). Due to the strong ramp-up in the civil programs while

at the same time the “Eurofighter” jet fighter production is going to decrease or come to an end it is likely that in the future the military share will become even less important for Premium Aerotec’s sourcing. Therefore the case company fits the desired focus on civil aerospace quite well.

Accordingly aerospace companies as BAE Systems, Northrop Grumman or Lockheed Martin that are (almost) entirely focused on military contracts by governments would not be in the scope and any transferability considerations have to mind the special circumstances described above. With companies as the Airbus Group and Boeing with a defense and space business share between 25% and 35% it depends on the division in question while e. g. Bombardier’s or Embraer’s business activities have only an at most neglectable military share.



## **2 Theoretical framework and existing empirical studies**

This chapter establishes a theoretical framework and provides an overview about extant empirical studies regarding both strategic sourcing in general as well as an aerospace perspective on the topic.

The starting point is a short review of literature about “standard” sourcing issues. Both theoretical perspectives relying on analytical models as well as empirical cross-industry approaches are covered. The aim is to give an overview regarding sourcing strategies in general and to provide a basis for establishing what their main determinants, exclusion criteria, and contingency dependabilities are. This round-up does not have the aspiration to be exhaustive in every aspect but aims at representing a reasonable cross section covering major aspects.

A similar also selective but in relative terms more extensive review regarding publications explicitly covering aerospace sourcing issues follows. Here the focus lies on a more comprehensive coverage so the review was conducted using a variety of databases (“ABI/INFORM Complete”, “Business Source Complete”, “Econlit”, and the German “wiso Wirtschaftswissenschaften”) as well as Google Scholar with a broad set of keywords.

### **2.1 Strategic sourcing in general**

As already explained in the introduction increased competition due to continuing globalization and decreasing transaction costs increased the importance of the sourcing function. As put by Gottfredson et al. (2005) *“A series of geopolitical, macroeconomic, and technological trends has opened the world’s markets, made business capabilities much more portable, and produced a level of discontinuity that has no precedent in modern economic history. These events include the fall of the Berlin wall, China’s embrace of capitalism, the advent of worldwide tariff reduction agreements, and the spread of cheap, accessible telecommunications infrastructure.”*

A systematic long-term approach to the challenges and opportunities of those trends regarding procurement is often referred to as strategic sourcing, while the contrast would be the ad-hoc satisfaction of input needs under an only short-term horizon.

However a clear definition of the concept may not be as easy as it seems. According to e. g. Chang (2006) the term is often used interchangeably with outsourcing and global sourcing which results from and fits the historic occurrence. Yet that this use could be perceived as problematic becomes apparent when one values

the inherent meaning of the word strategic. Regardless of the interpretation it is associated with high level and long-term planning. Many definitions of global sourcing and business outsourcing include this aspect and in this understanding the synonymous use seems to be fair. Yet per se outsourcing as well as global sourcing can, be it for example due to short-term goals, financial pressure, or management deficits, happen in a unplanned “unstrategic” way that is only focused on ad-hoc needs. Hence in this paper strategic sourcing refers to a planned systematic procurement approach with a long-term horizon that regularly uses and is very often associated with outsourcing and global sourcing, but does not necessarily include those concepts.

Gottfredson et al (2005) provide a good access to the topic with a focus on outsourcing: According to them caused by the changes described above (globalization and lowered transaction costs in general) there is a *“decline of the vertically integrated business model”*. Companies have to understand which of their capabilities are *“the core of the core”* where *“they have sufficient scale or differentiated skill.”*, can no longer compete on the basis of owned assets, and have to give up the *“comfortable but simplistic guideline”* that strategic capabilities have always to be kept in-house. If a capability is common enough for external suppliers to do it better due to economies of scale or other advantages then the strategic implications have to be weighted of against the cost benefit. Also to avoid fast obsolescence sourcing strategies have to consider possible future developments in addition of the present context and companies have to be able to anticipate future trends in the economics of sourcing. For this managers *“capable of understanding system economics”* not only knowing *“how to nickel-and-dime the supplier base.”* are necessary.

Principally the underlying elements of strategic sourcing can be analyzed in many dimensions. The two most commonly examined are the number of suppliers used and their geographical distribution in both absolute terms and relative to the buyer. There are also many other aspects: In the case that a company produces multiple products (possibly using multiple inputs) economies of scope become relevant (e. g. Kopel et al., 2013). If asset specificity is relevant, supplier dependence may be a threat for buyers (e. g. Lonsdale, 2001). New tools like e-procurement including online bidding and online auctions also had their impact (e. g. Knudsen, 2003). Furthermore as in all economic research that is usually based on the assumption that agents are rational in reality behavioral aspects should not be neglected even if it is in a business to business context (e. g. Carter et al., 2007). In addition strategic sourcing is not only about a strategic approach to procurement itself but the implications for the overall

strategic positioning of the company (e. g. Tayles et al., 2001 and Kabiraj, 2006). Apart from this literature that focuses on single aspects there are also publications that try to build a general cross-industry framework that covers the issue in a broad way (e. g. Koliouisis, 2006 and Zeng, 2000). Furthermore some sources focus more on providing an applicable toolset for practitioners and have also been developed from that direction by laying down and structuring consulting methods and “best practices” of companies that did exceptionally well in the area (e. g. Rendon, 2005 and Schuh et al., 2009).

However in the scope of this degree project the focus will be on the most frequently discussed dimensions “single vs. multiple sourcing” and “global vs. domestic sourcing”.

### **2.1.1 Single vs. multiple sourcing**

The basic underlying trade-off of this aspect is between efficiency and competition. Sourcing one input from the same supplier for the whole volume instead of distributed production at multiple sources is likely to yield economies of scale, lower transportation costs and reduce complexity. The later can be especially valuable in a “just-in-time” context. Yet this approach can reduce price competition by reducing the number of competitors in the long run. Furthermore multiple sources lower supply chain risk in case of disruptions.

Intuitively single sourcing would be prevalent in especially 2 situations: If fixed costs respectively necessary investments are too high in relation to demand to sustain multiple suppliers or if the share of the buyer in the overall demand is too small to have a significant impact on prices. Already existing high capacities also should shift the trade-off in favor of single sourcing as then prices of all suppliers should be close to marginal costs, yet in the long-term capacity is usually bound to adapt.

An early mainly qualitative view that results in an assessment model similar to the additive rating models for site locations can e. g. be provided by Treleven and Schweickhart (1998) who form five categories of risks and benefits of single and multiple sourcing derived from explorative interviews with high level personnel of large international companies. Of the five areas two are not associated with any benefits: disruption of supply risk and price escalation risk (in the sense of supplier price dominance) and are both most associated by the interviewed with single sourcing. Regarding inventory and schedule aspects the notion that single sourcing is beneficial for a just-in-time approach is common. Technological access is perceived as better secured and broader with multiple sourcing. About the area of quality better

communication and control in a bilateral setup as well as easier error identification and rectification are mentioned in favor of single sourcing. Actually this aspect is the main reason for many of the interviewed managers to move from multiple sourcing to single sourcing.

Another way to shed light on this dimension is shown by Swift (1995). A descriptive study, by means of a survey the author tries to identify whether the selection criteria sets of purchasing managers with a preference for single sourcing differ from those that favor multiple sourcing. The results are that primarily price-sensitive managers have a tendency for multiple sourcing strategies while purchasers that focus (be it out of personal preference or product requirements) on supplier reliability in terms of delivery, reliability of the supplier's products, and technical support quality are more likely to single source.

An example of an analytical approach in a theoretical model would be Burke et al. (2007). They analyze the issue in an extended newsvendor framework which incorporates a firm specific supplier diversification function that represents the benefits of a broader supply base in monetary terms. It also considers prices, costs, capacities, prior reliability, as well as inventory costs. In this model multiple sourcing tends to be favorable unless as hinted at before capacities are large and or the "diversification benefits" (mainly hedging against supply interruption and delay risks) are minuscule.

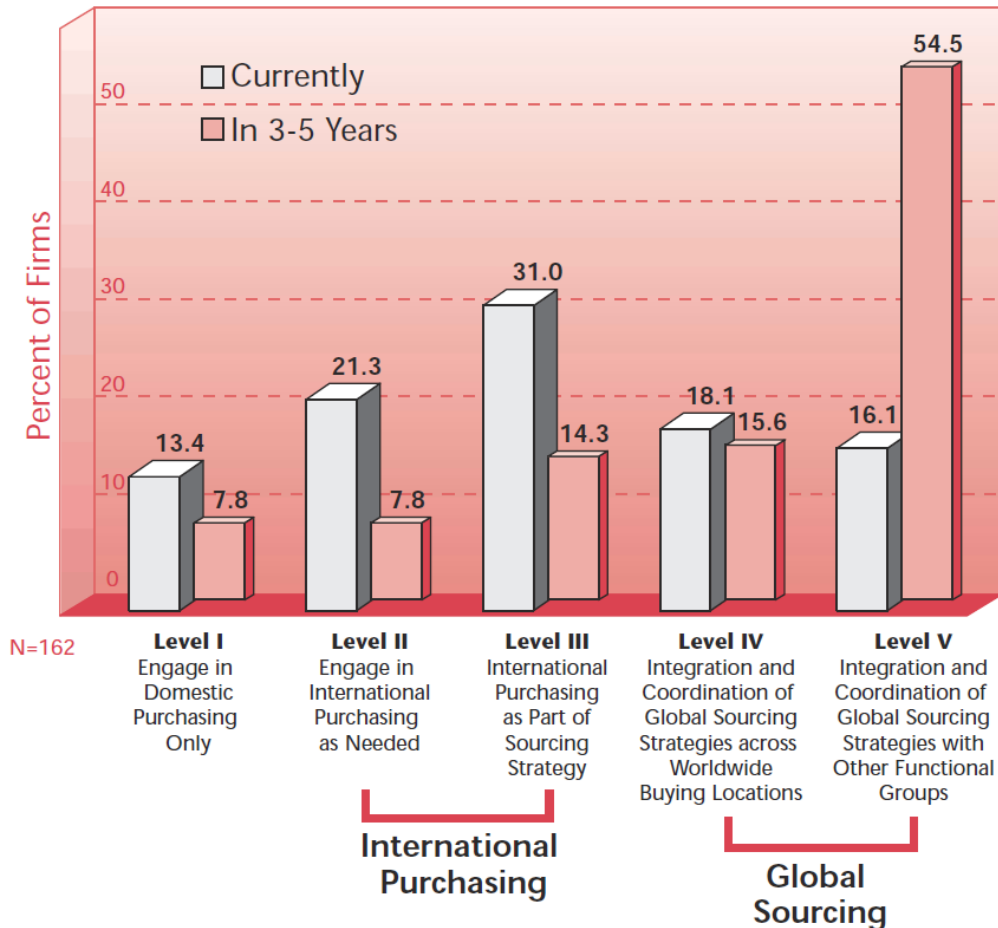
### **2.1.2 Global vs. international and domestic sourcing**

Globalization is not a new phenomenon, yet most would agree that recent decades have seen a remarkable reinforcement of this trend. In line with this viewing sourcing strategy from a global perspective has become more and more common. First the two common terms "international sourcing" and "global sourcing" should be clarified. They are often used as if they were interchangeable. However in the literature concerned with this sourcing dimension they often have different meanings.

Trent et al. (2003) understand "international purchasing" as the mere ad-hoc satisfaction of immediate company needs without integration or coordination while "global sourcing" represents an approach based on a long term supply chain strategy with worldwide purchasing and coordination, as well as supply consolidation. For them those two conditions are part of a larger spectrum that ranges from no international sourcing activity to "global sourcing". The graph below shows the resulting 5 level model of worldwide sourcing and how many companies of a sample (predominantly

from the US) can be attributed to each level at present and likely in the future. The descriptions of the different levels under the x-axis are self-explanatory.

## CURRENT AND EXPECTED WORLDWIDE SOURCING LEVELS



**Figure 1 - “Worldwide sourcing levels” (Trent and Monczka, 2003, p. 29, fig. 1)**

Apart from this definition and taxonomy the driver behind international/global sourcing should also be noted. Besides from cost Bozarth et al. (1998) name offset agreements, currency mechanics, local content requirements/trade-barriers, or access to technology, markets and/or inputs of high quality.

### **2.2 Aerospace-specific sourcing aspects**

While in the preceding chapter the view was general, there is quite some aerospace sourcing literature that is especially relevant for the topic. The overview below covers distinctive industry features (Mundt, 2003 and Chang, 2006), “misapplications” of strategic sourcing in the industry (Rossetti and Choi, 2005), and a sensitivity analysis of a typical aerospace total cost model (Kary, 2006).

### 2.2.1 Distinctive industry features

A good start is a concise description from a practitioner's view that can be found in Mundt (2003), the source already briefly mentioned in the introduction. The author was vice president of EADS's (the successor of Airbus) corporate sourcing at the time of publication and named some in his opinion special features of the aerospace industry: Product life cycles are extremely long which means that timespans of more than 30 years are not uncommon. An extreme example would be the Boeing 737 which is in production for 48 years since 1967. This aspect becomes reinforced by the practice that after an airliner has been used by the first buyer for up to 30 years, another period in less safety regulated markets of comparable length follows. Afterwards the airplane may still be converted for cargo transportation. So in total operation cycles can be beyond 60 years of service which e. g. has ramifications for the supply chain regarding spare parts provision. Apart from this the technical complexity of the product is abnormal – Mundt (2003) mentions the range of 2 to 4 million parts per aircraft while this complexity coincides with *“maximum requirements regarding safety and reliability”*. Furthermore he mentions that the industrial structure is globalized while the supply base is highly specialized and the dependencies between cooperating companies are strong, long term oriented and often single source connections. For the author's company this leads to a shown sourcing strategy that is focused on building competitive advantage by supplier integration and development. This is claimed to be implemented by “four major key strategic elements” that are not that clearly separated: Procurement marketing is supposed to support sales by “integration of the appropriate supply sources in respective areas”, ensure strategic fit and provide long-term supply security. A tool to reach this is e. g. the creation of new supply sources to avoid monopolies. As 2<sup>nd</sup> element the procurement policy is focused on risk sharing and early supplier involvement in production development. The 3<sup>rd</sup> building block is a systematic and group-wide supplier evaluation and development of key suppliers that even includes joint business development for the top performing ones. The last element is quite conventional and usual for a company of this size and is the group wide pooling of common demands. This is done using a lead buyer concept.

Chang (2006) presents a similar general categorization as Mundt (2003). According to her a high-mix, low volume context (many different parts, yet relatively small production scales) is typical and the industry is often considered cyclical. A shift in customer purchase decisions from technology-centric to cost-centric is also mentioned. Furthermore three “sourcing frontiers” grouped by time are presented in the

paper. According to her the 1970s and 1980s were still prevailed by US-focused/domestic sourcing with a rather large number of suppliers and buyer-lead negotiations. The following 1990s & early 2000s are then described as under the influence of strategic sourcing initiatives (that focused on spend and supply base consolidation) and increased - also international - outsourcing. For the late 1990s Chang (2006) asserts a “backfire” due to an “exponential outsourcing misapplication” that stressed the relation between buyers and suppliers. As a reaction the mid-2000s then see the advent of strategies that focus on collaboration to avoid costs instead of just taking them out of the companies’ immediate perimeter by outsourcing. Below is a visualization of this assessment that however seems to have a strong focus on the United States.

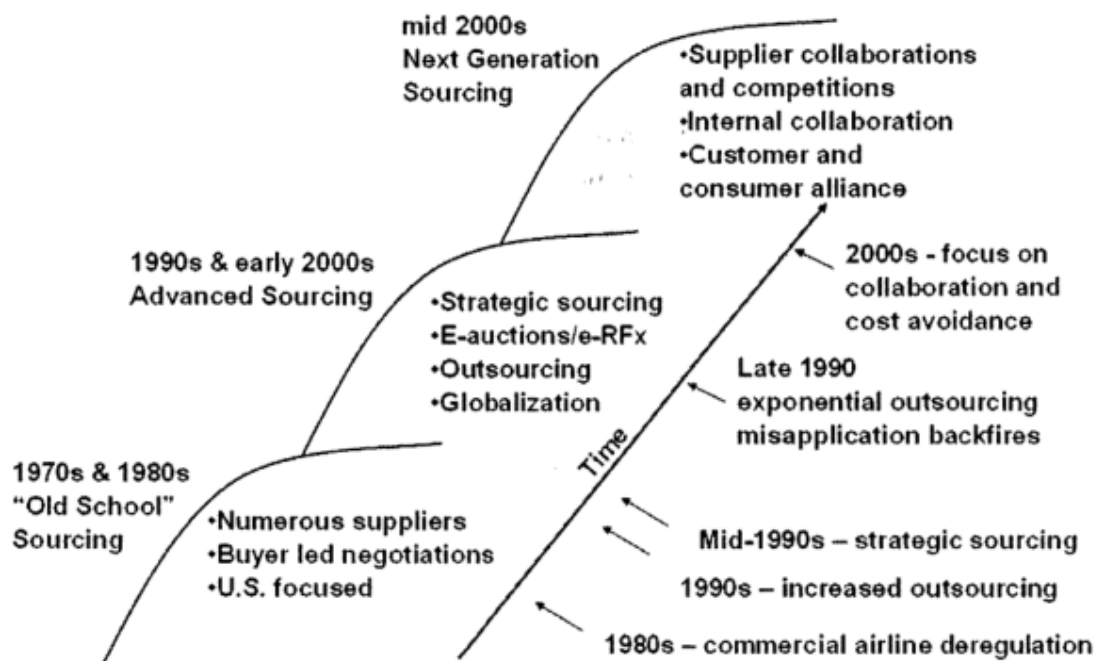


Figure 2 - “Aerospace sourcing frontiers and timeline” (Chang, 2006, p. 16, Figure 3)

### 2.2.2 Strategic sourcing misapplications in aerospace

In a study mainly based on interviews with aerospace managers from the sourcing area Rossetti and Choi (2005) explored common misapplications of strategic sourcing initiatives in the aerospace industry and their ramifications. In their notion the main aspect of strategic sourcing is that it “integrates the buying firm’s strategic decisions with those of its key suppliers, thus promoting trust and decreasing transaction costs”. This can be understood as reducing the typical problems that arise from the inherent incompleteness of contracts by increasing the time horizon in question.

This is related to the description by Chang (2006) above that the potential for cost takeout has been reached, so sourcing has to focus on cost avoidance. Rossetti and Choi (2005) however draw a picture where the per se promising strategic sourcing initiatives did not work out as the efforts were often damaged by short-term considerations on the way. In the worst case for the buyer this happens after critical capabilities have been incorporated into a strategic partnership and the supplier can become a competitor in the same market. While this is unlikely in the aerospace market, it can for example happen in the aftermarket for avionics spare parts – on this level the supply chain can be disintegrated to the disadvantage of the buying firm. This potential threat is aggravated by the background that in aerospace the spare parts market was and to some extent still is the traditional “cash cow” where margins are often higher than with the actual aircraft purchases. According to the authors the main reasons of neglect of long-term implications are flawed cost calculations that do not consider long term ramifications and/or are missing important variables as well as a company focus on improving stock metrics. PPV (purchase price variance) payment schemes for commodity buyers reinforce the problem as they can set wrong incentives and hamper rectification of flawed decision methods if those tend to improve payment related key-performance indicators. Figure 3 and Figure 4 below and on the next page show a quite comprehensive collage of typically affected strategic sourcing initiatives and related concepts, their possible misapplications, and managerial considerations.

**Strategic Sourcing Initiatives: Definitions and Outcomes**

Strategic Sourcing Initiative	Definition	Intended Outcomes
Supply Base Rationalization	Reduction of the total number of suppliers	<ul style="list-style-type: none"> <li>• Decreased resources needed to manage suppliers</li> <li>• More focused relationship building</li> </ul>
Commodity Management	Matching corporate needs for parts of similar processes and materials with the changing capabilities of the supply base.	<ul style="list-style-type: none"> <li>• Increased understanding of supply markets for given commodity</li> <li>• Decreased supplier's internal cost due to improving economies of scale</li> <li>• Closer technical relationship between buyer and supplier</li> </ul>
Spend Consolidation	Increased dollar spent on purchases from one supplier	<ul style="list-style-type: none"> <li>• Increased purchasing leverage</li> <li>• Increased interdependence between buyer and supplier</li> </ul>
Global Sourcing	Finding parts with high labor content that can be produced in low labor manufacturing markets	<ul style="list-style-type: none"> <li>• Decreased cost per part</li> <li>• Increased competition in supply market</li> </ul>
Sole Sourcing Agreements	Purchasing a product or family of products from one supplier	<ul style="list-style-type: none"> <li>• Lower prices from suppliers</li> <li>• Increased interdependence between buyer and supplier</li> </ul>
Long-Term Agreements	An understanding that buyer-supplier relationship will extend over several years or indefinitely	<ul style="list-style-type: none"> <li>• Improved quality, delivery and price due to supplier's buyer-specific investments</li> <li>• Expectation of trust and co-prosperity between buyer and supplier</li> </ul>
JIT Purchasing	Minimization of supply lead time	<ul style="list-style-type: none"> <li>• Reduced level of inventory</li> <li>• Increased supplier responsiveness</li> </ul>

**Figure 3 - “Strategic Sourcing Initiatives: Definitions and Outcomes” (Rossetti and Choi, 2005, p. 4, Table 1)**



### Shedding Light on the Dark Side

Strategic Sourcing Initiative	Misapplication	What Happens	Managerial Considerations
Supply Base Rationalization	The supply base is reduced to the point where supplier competition disappears	Buyers face new more powerful suppliers	Understand the supply market and suppliers' reactions to strategic sourcing initiatives
Commodity Management	Simple metrics like PPV are adopted as sole measures commodity managers performance	Commodity managers neglect the buyer's long term interests for short term results	Incorporate broader metrics that better reflect corporate goals
Spend Consolidation	Spend consolidation creates highly captive suppliers that are soon driven to zero profits	Suppliers enter the aftermarket to remain profitable or leave the industry	Use spend consolidation to increase supplier efficiency and guard against supplier bankruptcy
Global Sourcing	Intellectual property and suppliers' designs are passed to global sources freely	Intellectual property is lost and suppliers no longer share design capabilities	Make use of global sources for new capabilities and respect supplier's talents
Sole Sourcing Agreements	Sole sourcing partners are chosen solely on price	Suppliers' quality/flexibility capabilities and trustworthiness are discounted	Also use soft criteria to choose partners, like the supplier's ability to form a good relationships
Long-Term Agreements	False promises of long term contracts are made to get the lowest price	Trust is destroyed and suppliers are unwilling to engage in future business	Use LTAs to reduce transaction costs and promote co-prosperity based on trust
JIT Purchasing	Suppliers are forced to absorb risks such as holding inventory and cash flow management	Smaller suppliers leave the industry and remaining suppliers mitigate risks by entering the aftermarket or selling intellectual property	Balance risks between partners to improve the entire supply chain's competitiveness

**Figure 4 - "Strategic Sourcing Initiatives: Shedding Light on the Dark Side" (Rossetti and Choi, 2005, p. 12, Table 2)**

### 2.2.3 Total cost model for aerospace sourcing decisions

Kary (2006) features a NPV (net present value) mixed-integer linear total costs model to determine an optimal supplier portfolio for groups of related parts, which can also be used to assess domestic against international sourcing. The model considers non-recurring costs and recurring costs (including non-performance, inventory, transportation, coordination, currency fluctuation and tax costs). An example of the determining supplier specific model inputs is provided by Figure 4 below.

Model Inputs	Domestic Supplier	Low-Cost Supplier, Mexican	Low-Cost Supplier, Asian
Baseline unit purchase price	1000	750	650
Year-over-year price reduction	2.5%	2.5%	2.5%
Lead-time	70	77	98
Coefficient of lead-time variation	0.1	0.1	0.1
Percent cost of regular transportation	1%	2%	4%
Percent premium transportation	10%	12.5%	15%
Premium transportation multiple	5	5	5
Service level	95%	95%	95%
On-going coordination cost	1%	1.5%	2%
Low-cost country tax, tariff and duty rate	0%	10%	25%
Cost of poor quality / delivery	150%	250%	300%

**Figure 5 - Supplier dependent inputs for Kary's total cost sourcing model (Kary, 2006, p. 48, Table 4.2)**

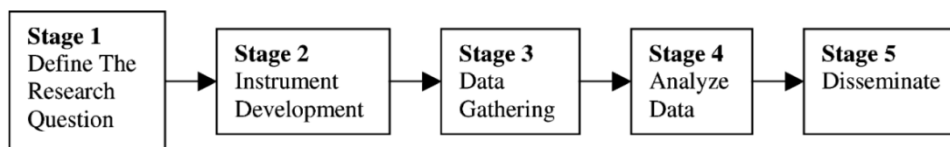
The results of running the model with UTC (United Technologies Cooperation) data as example were that low-cost suppliers have to offer significant discounts to offset all other cost factors. Accordingly the total savings were not as large as anticipated in the sense of a gap between intuitively perceived savings and the actual savings under a total cost view. Furthermore the impact of non-recurring costs (which would e. g. be supplier qualification/development) was higher than usually anticipated by sourcing professionals. More interesting than the somewhat established fact that a total cost view is essential is however that the total cost results were highly sensitive (especially to changes in supply chain dynamics and performance). This means that minor errors in underlying assumptions can easily change the outcome of cost assessments. It has however to be noted that the model was only considering NPVs over a time horizon of 5 years and the results could hence differ with a longer time horizon. This may also explain the high impact of non-recurring costs.

### 3 Case study methodology

The core of this degree project is a qualitative and explorative in-depth case study of an aerospace company. In this chapter the research process, the used sources, the considerations behind the case selection as well as associated implications for generalizability will be laid out.

#### 3.1 Research process and sources

First an initial thesis proposal was created and used to provide focus and an established foundation from the start. For the further development the five stage research process model by Stuart et al. (2002) depicted below and the associated elaborations were used for guidance.



**Figure 5 - “The five stage research process model” (Stuart et al., 2002, p.420, Fig. 1)**

The three research questions were designed driven by the project purpose as already described in Section 1.1 and 1.2.

The mode of a qualitative and explorative in-depth case study was chosen for its suitability to identify and describe key issues in detail which might remain obscured in another design (see Stuart et al., 2002, p.422, Table 1 and Merriam, 1998). This is especially fitting for the Research Question 3 which is also the main one.

Regarding the selection of the data gathering method the main consideration was between an approach relying on a set of interviews or the sole usage of secondary data sources. In the end a combination of both was used. Secondary data was used as a main source but complemented by additional inquires (in person, by e-mail and on the phone) with some of the authors and users of the documents. Also the author was able to participate in various related company meetings. This further amplified the secondary data and helped to ensure its context-adequate interpretation. Using more than one method to gather data can be considered methodological triangulation. Also in a company context internal documents like presentations will usually represent an aggregated and condensed fusion of opinions and views of the various people involved. Compared to only using interviews, relying on already aggregated secondary data allows considering a larger amount of information from a greater number of

original sources under the given resource constraints. The resulting broader scope respectively larger amount of data considered can be seen as a form of data triangulation. Combining this with the methodological triangulation mentioned before should increase validity (see for example Denzin, 2006 or Merriam, 2009)

The secondary data used is from internal documents like internal presentations (sourcing strategy drafts, project team statuses, “supplier snapshots”), database contents (e. g. current and desired procurement scope, spend and technology cluster for suppliers) and materials of a conference held by procurement to brief suppliers about future developments and foster cooperation amongst them. Some public data as mandatory annual reports and analyst reports were also used to a minor extent.

Primary data comes from the conversations with management and attended meetings at the case company. However as said before this was not intended to be the main source of insights, but a complementing one to clarify upon the secondary data used and establishing the context of it. Hence they were no prepared interview questionnaires or alike but a very open approach was used intentionally. This leads to limited comparability and replicability. Yet the level of detail and the tendency of this approach to identify aspects that would not have been covered with a more structured but also rigid method are arguments to justify this trade-off. This way the complementary effect with the secondary data was maximized. The list below provides an overview of the sources made use of.

<p><b>Secondary data</b></p> <p><i>Internal</i></p> <ul style="list-style-type: none"> <li>• Presentations (sourcing strategy drafts, project team statuses, “Procurement Key Facts and Figures”, “Supplier Snapshots”)</li> <li>• Database contents (current and desired development, control mode, past spend, and used technology for each supplier)</li> <li>• Supplier conference materials (held by procurement to brief suppliers about future developments and foster cooperation amongst them.)</li> <li>• “BIC” - a process management software for documentation and compliance enablement</li> </ul> <p><i>External</i></p> <ul style="list-style-type: none"> <li>• Premium Aerotec’s mandatory annual report</li> <li>• Airbus Group Financials</li> </ul>
<p><b>Primary data</b></p> <p>Inquiries about the secondary data, conversations, and participation in meetings with</p> <ul style="list-style-type: none"> <li>• Strategic purchasers</li> <li>• Members of the supplier development department</li> </ul>

**Figure 6 - Used data sources**

### **3.2 Case selection and generalizability**

Since the project purpose included gaining transferable insights at first view a research design including multiple cases could be perceived better. However this would have required a considerable amount of time per case company if the same level of detail and thoroughness were to be sustained. This made a multiple case setup very difficult - if not unfeasible - within the scope of a 30 ECTS degree project.

Again derived from the desire to get transferable insights a purposive sampling approach should lead to typical sampling (see for example Merriam, 2009). However access is also a crucial resource constraint and opportunities to get an in-depth insight into a large aerospace company are far more limited as when the area of interest would for example be small startups (that are more open and more numerous). It would be misleading to convey the impression that Premium Aerotec was chosen for this project out of a set of equally available possibilities. Hence in that sense it was impossible to apply the concept of purposive sampling as intended under the fiction that student researchers have free choice when it comes to sample selection.

Nonetheless the company shows characteristics that would have made it a good candidate in a hypothetical purposive sampling process from a larger set. It is quite suited to serve as a representative example that can be considered to reflect an aerospace company's sourcing context. Being a subsidiary of the Airbus Group it is part of an entity that represents almost half of the wide body-aircraft market and the larger single-aisle segment. Furthermore it shows features that are typical for many aerospace companies: It is a mature company that together with its supplier base had been shaped by its historical growth and state, respectively defense funding and other indirect subsidies. This background is typical for large parts of the industry.

## **4 Case study observations**

The following chapter presents the observations made during the field study at the Premium Aerotec Headquarters in Augsburg, Germany. To facilitate better understanding an overview of the origin of the company, the wider market situation respectively the business context, as well as the organizational structure of Premium Aerotec's procurement function precedes the findings about the company's current sourcing strategy, the motivations behind it and the associated implementation challenges and obstacles.

### **4.1 Company origins**

Premium Aerotec was created from former German EADS/Airbus plants in the wake of the group wide "Power 8" savings program (EADS, 2007). At that time the Airbus predecessor EADS was under financial pressure due to delays and cost increases in the A380 program. Challenging the company further at the same time it became evident that large scale investments for a competing program to Boeing's newly developed Dreamliner/787 wide-body craft were unavoidable to remain competitive.

The then newly created subsidiary was endowed with an independent organizational structure including separate headquarters and engineering facilities. Apart from one captive nearshoring site established in Romania in 2011, its plants are spread over Germany with the largest site including Headquarters in Augsburg and three facilities in Northern Germany that are clustered in proximity of Airbus's Hamburg site. (Premium Aerotec, 2011 and Premium Aerotec, 2014)

The presumed aim for separating the plants from the Airbus Group was to create a carved out tier-one supplier whose divestment was supposed to provide financial relief. However as of today Premium Aerotec is still part of the Airbus Group and in practice remained integrated to some degree in most areas. Tacit but also direct influence by the single shareholder Airbus is not uncommon. HR fluctuation within the Group is usual for higher management as well as regular employees. Whether the carve out was not completed due to a lack of buyers, a too low obtainable price that did not meet the expectations, easing financial pressure on the Airbus Group, or due to a different perception on vertical integration remains unclear. The latter could have developed in light of the struggles and delays that Airbus's competitor Boeing faced with its vertically disintegrated and "truly global" production setup for the Dreamliner/787 program where it almost limited itself to a systems integrator role in terms of development and final assembly (see for example Elahi, 2014).

Recently Premium Aerotec’s integration into the Airbus Group has actually been strengthened as e. g. general (not product specific) procurement was reintegrated into the Group structure entirely.

Interestingly Premium Aerotec has a “French counterpart”: Stelia Aerospace (formerly Aerolia and Sogerma) was created in another carve out attempt from former French Airbus plants at the same time in a quite similar fashion.

#### 4.2 Market situation/business context

Regarding the business context of Premium Aerotec two perspectives should be briefly depicted: The direct competitive situation in the scope of the subsidiary’s products but also the overall development of the civil aerospace market, respectively the final products of the Airbus Group.

##### 4.2.1 Premium Aerotec’s competition environment

If viewed without the Airbus Group context and hence as a tier-1 aerostructure supplier direct competition of PAG would be more than 100 companies around the globe which are competing for orders of a small number of aircraft manufacturers. Historically most of them are located in North America and Europe yet competitive pressure from Asia has been increasing steadily. As mentioned before the vast majority of Premium Aerotec’s orders come from within the Airbus Group, but recently other customers as Boeing and Dassault Aviation have been acquired as well. The map below gives an overview over some competitors that are being perceived explicitly by Premium Aerotec competitors.

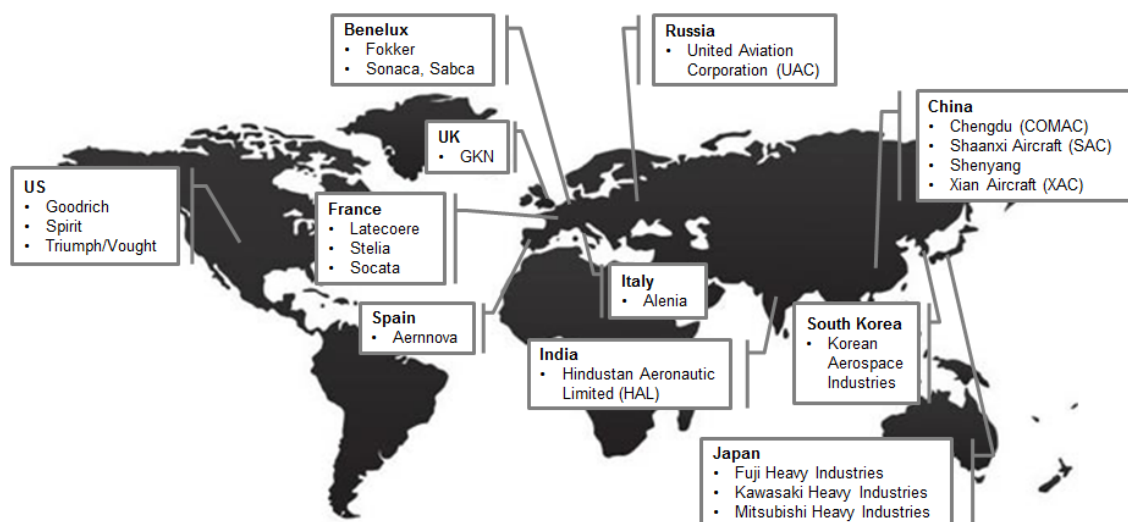


Figure 7 - Premium Aerotec’s global competition (source: internal presentation)

#### 4.2.2 Civil aerospace market situation

Recently the civil aerospace industry faces a strong increase in demand. All major manufacturers are facing severe backlogs due to capacity constraints. The figure below shows this development exemplary for the civil business of the Airbus group.

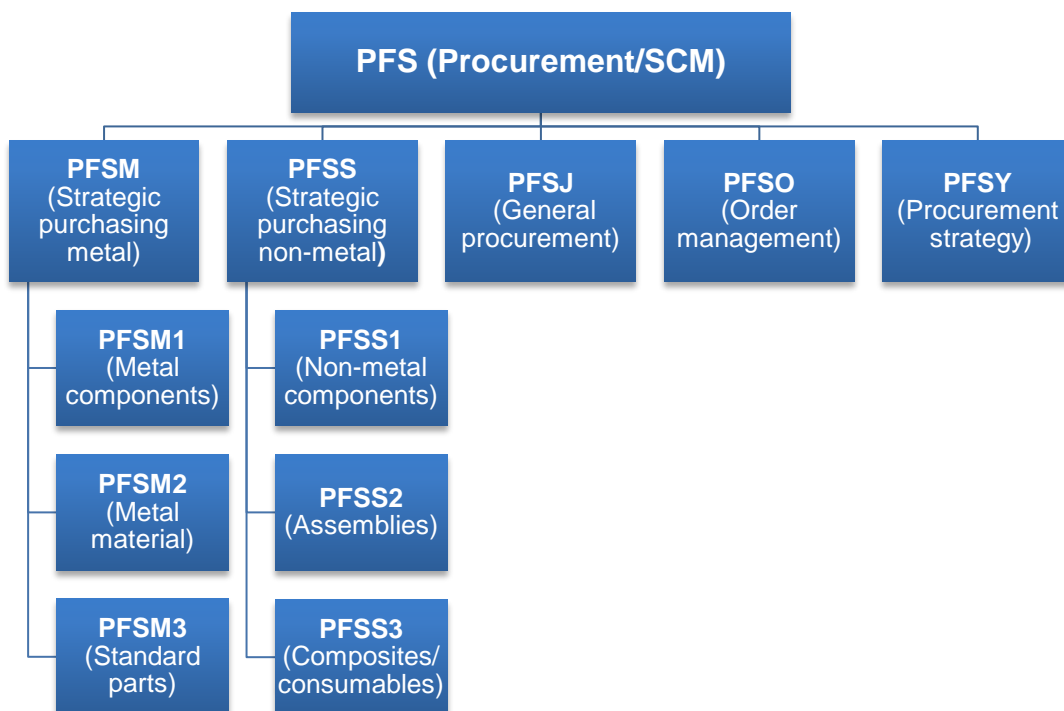
	A300/A310	Single aisle	A330/A340/A350	A380	Total
Total orders	816	11582	2658	317	15373
Total deliveries	816	6494	1553	156	9019

**Figure 8 - Airbus orders and deliveries (Airbus Group, 2015)**

Quite remarkable for a company already existing for 45 years almost the amount of Airbus crafts ever built is currently in the order books. The group faces its accumulated lifetime demand in the present. While this may look solely positive at first glance it puts strains on cost-efficient capacity and bears the danger that a delayed demand satisfaction may attract entries of competitors into the wide-body aircraft market that has been a duopoly since the merger of McDonnell Douglas and Boeing in 1997.

#### 4.3 Organizational structure of Premium Aerotec's procurement

The figure below shows the structure of the case company's procurement function.



**Figure 9 - Premium Aerotec's Procurement Organization**



Within the strategic purchasing function at PAG responsibilities are divided by a scheme that follows two dimensions: material (metal or non-metal) and level of complexity/product proximity. General procurement is done within the group wide procurement division and the PAG PFSJ department has mainly an interface function. Material procurement is also supported group wide by a mechanism of aggregated price negotiations/consolidated bidding with later distribution of options (“Airbus Conbid”). For product specific procurement Premium Aerotec is supposed to act mainly independent from Airbus as long as the procured parts are not also used by another Airbus Group member. Suppliers are being assigned to responsible strategic purchasers, for projects as “Transfer of Works” (between in-house and suppliers or from one supplier to another) temporary cross function teams are formed in which the strategic buyers have a coordinating lead role. In light of the PPV incentive problems described by Rossetti and Choi (2005) inquiry revealed that strategic purchasers have no such variable payment components.

#### **4.4 Premium Aerotec’s current sourcing strategy**

The materials used (see subsection 3.1) were mainly acquired within the PAG strategic procurement department that covers metal components (PFSM) and especially detail parts (see Figure 9 above). Detail parts are individual components excluding sub-assemblies and whole structures. The PFSM department represents the largest share of sourced inputs within the company (without general procurement > 70 %).

##### **4.4.1 QFS-A and QSF-B outsourcing control**

At Premium Aerotec there are two major distinctions when it comes to handling outsourcing depending on the grade of supplier independence/control: Outsourced parts are either being procured in “QSF-A” or “QFS-B” mode. The terms originate from a legacy industrial standard for quality accreditation by the BDLI (translated: Federal Association of the German Aerospace Industry).

QSF-A applies in case of an “extended workbench approach” where Premium Aerotec uses the other manufacturer only for some (or only one) process step, but still procures raw material for the product and manages the precutting of it as well as logistics and JIT issues. Some production steps may be conducted in-house on the part before the outsourced manufacturing steps. This control mode is especially common when machining of parts is the outsourced process. This, especially to the

witnessed extent, somewhat uncommon setup grew out of the historically deep range of manufacturing and quality responsibility considerations.

QSF-B outsourcing on the other hand represents the “usual outsourcing” setup: The supplier produces the part more independently and manages the whole manufacturing process alignment including raw material procurement and in-time availability. For the raw material the supplier may however still use options out of the Airbus consolidated bidding system through an enablement clause.

Before the company formation the Airbus plants that today constitute Premium Aerotec had a traditionally very high depth of manufacturing and the relatively low volume that was outsourced was handled over QFS-A and mainly used as a capacity relief tool for increased flexibility.

However such a system can be quite challenging from a coordination perspective. Basically everything that would have to be steered if the part were to be manufactured in-house has to be minded. Yet this has to be done under the aggravated context of additional interfaces between companies, so the actual resulting overhead is most likely even higher compared to in-house production. This is especially unsuitable for international sourcing where transaction costs tend to be higher already. Also the average size of QSF-A suppliers is rather small which leads to a large number of them to be managed.

Starting around 2012 there is currently a strong effort at Premium Aerotec to reduce this grown complexity which proved to be difficult when the production system was to be enhanced under “lean” and “just in time” aspects. A “QFS-A to B” transformation and consolidation initiative has been started. In the desired outcome the large bundle of QSF-A suppliers that had to be managed extensively in the past will be reduced to interface-based control of few larger and more capable QFS-B “lead-suppliers” that are considered strategic partners. Additionally some of those QSF-B suppliers are then supposed to take a “lead role” and manage some of the previous “QSF-As” in a sub-tier structure. Hopefully this would also lead to a reasonable grouping by technology and/or process order.

In this new configuration only essential (“enabling”) QSF-A suppliers that cannot be phased out due to special capabilities (“technology-driven”), but cannot be put under a lead supplier, would still be addressed though QSF-A while “capacity-driven” QSF-A is absent. Figure 10 on the next page shows a simplification of the past setup where Premium Aerotec is engaged in direct control of many, often small QSF-A suppliers. While Figure 11 shows the desired outcome after transformation where some QSF-B

suppliers do also manage prior “QSF-As” and direct purchasing from “QSF-As” is limited to cases where it is unavoidable due to technological considerations.



Figure 10 - Current/past supplier configuration with direct QSF-A management

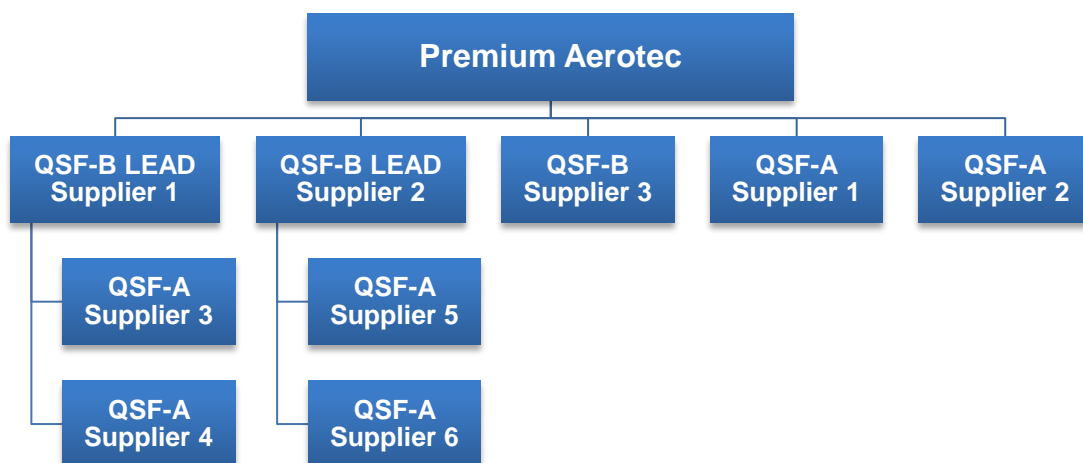


Figure 11 - Desired tier configuration with coordinating QSF-B lead-suppliers

#### 4.4.2 QSF-B as enablement for “best cost country” sourcing

Complexity reduction per se (and the associated direct cost savings) is however not the sole motivation behind the consolidation and QSF-A to QSF-B transformation efforts. In the QSF-A setup outsourcing production to offshore locations is more difficult as the cost of the inherent tight control is especially prone to increased coordination costs. As in comparisons the QFS-B setup reduces the amount of necessary interaction it promises more flexibility and options regarding international/global sourcing. Ideally for example a QSF B lead supplier in India or another country with lower factor costs for

some parts (often called BCC/"best cost country" or LCC/"low cost country") could manage a set of other Indian suppliers clustered around the lead in an extended workbench mode, while Premium Aerotec would still have to address only one international interface and elevated transportation costs and lead-times would also only be incurred once.

#### **4.4.3 "Future Supply Chain" – in-house to QSF-B shift**

Not only parts currently sourced in QFS-A are planned to be transferred to QSF-B suppliers. Parts produced in-house so far are also in the scope and here one of the two underlying reasons is also to tap best cost sources (mainly in countries with lower labor costs).

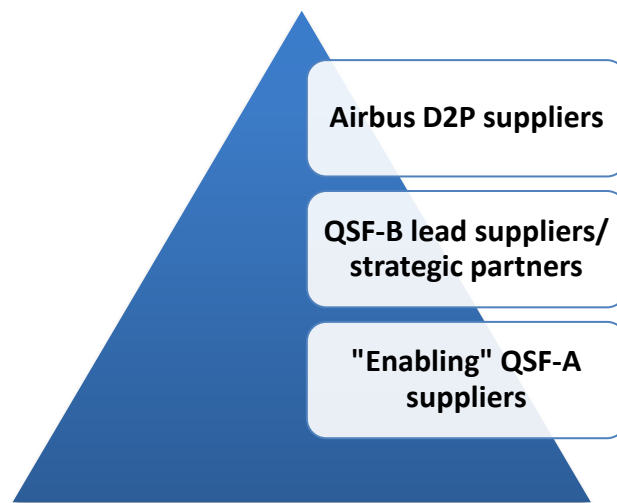
Yet the other reason is different compared to transfers from QSF-A to QSF-B and is an additional internal capacity relief for key areas. As described in Section 4.2 the rise in demand, the resulting backlogs and the resulting production ramp under way are quite demanding. For example in the two most important programs A320 and A350 Premium Aerotec's sourcing volume will increase considerably from 2014 to 2018. In the detail part area it is likely to more than double.

Changing some relatively easier to transfer respectively replicate - work packages from make to buy is intended to preserve in-house capacity for work that is more difficult to scale up externally or not outsourceable at all be it due to capability or strategic considerations. Also scaling up the whole supply chain with the current distribution of work would be more capital intensive than this approach. Increased outsourcing while increasing capacity over the whole supply chain should mitigate the internal investment/capital requirements of the ramp-out. At the same time it should also reduce/share risk.

#### **4.4.4 Airbus D2P integration/supplier pyramid**

The sourcing mechanisms described cover all parts that, within the Airbus Group, are only used by Premium Aerotec. Suppliers that deliver to more than one Airbus business unit can however be out of this category. They can become a part of the recently initialized airbus D2P initiative ("Detail Parts Partnership"). This program entails common sourcing, risk and capacity management under a lead buyer concept for selected high performing suppliers that deliver to more than one Airbus business unit. Selection criteria are mainly strategic fit and operational performance.

Together with the D2P program Premium Aerotec's sourcing should lead to a post-consolidation configuration that is internally communicated as "supplier pyramid" and can be seen below. It consists of selected well performing group-wide suppliers at the very top, followed by Premium Aerotec's strategic QFS-B key suppliers in the middle. At the bottom QFS-A suppliers remain, that can't be put under a lead QFS-B supplier or be developed into a QSF-B themselves but have to be kept in this control mode due to their "enabling" capabilities.



**Figure 12 - PAG's desired "supplier pyramid"**

#### **4.4.5 Implementation issues**

The implementation of the above described strategy elements has been delayed and slowed down considerably. One of the aggravations was probably simply the peak-wise character of the QSF-A to B and FSC transformation. The historically grown strong vertical integration and domestic QSF-A sourcing have been standard for long before the formation of an at least to some degree independent company out of the former group plants. A common interpretation is that a high level of organizational rigidity developed when it was possible "to hide problems in the group" out of which a "sourcing strategy backlog" developed. Hence the "sudden" changes that came with a relatively short time-span after the Power 8 savings program led to a transformation workload that could not be performed on a smoothed level over the long timespan during which it became necessary.

Accordingly qualified personnel/members for the project teams that transfer work packages are rare and there is a strain through all functions. However there are also other issues as insufficient information systems and information flow frictions

(especially enterprise resource management, but not product lifecycle management). The IT landscape is not only vastly outdated and impaired by its past development with a focus on in-house manufacturing. It is also fragmented on plant levels, while there is another layer of fragmentation between the Northern and Southern plants. While the information system issues seem to be identified and addressed in the sense that migration is underway it has been delayed for several years and seems to be extraordinarily difficult. Hence implementation is often hampered by manual and slow processes to get sight on necessary data. The sourcing related operations visibility is rather poor. E. g. awareness about costs and capacity needs is often only heuristic. In the actual transfer of work projects scoping (proper allocation of parts to packages) was often an issue. At times information about technical properties was not available enough which then necessitated later adaptations of the work packages when it turned out that some of the parts transferred were actually beyond the chosen supplier's capabilities. Furthermore some scopes were overlapping which then caused further issues as the need for "compensation packages" (to fulfill the volume promised to the supplier in question). While a structured, steady and intense synchronization between the teams would have mitigated those issues, most likely they would have never occurred in a company environment with adequate information systems.

Similar to the information system issues many processes have been uncodified for long and grew implicitly - again this issue seems to be identified and addressed by measures as the introduction of a business process management software, that however still have to fully yield.

#### **4.4.6 Quality of savings assessments**

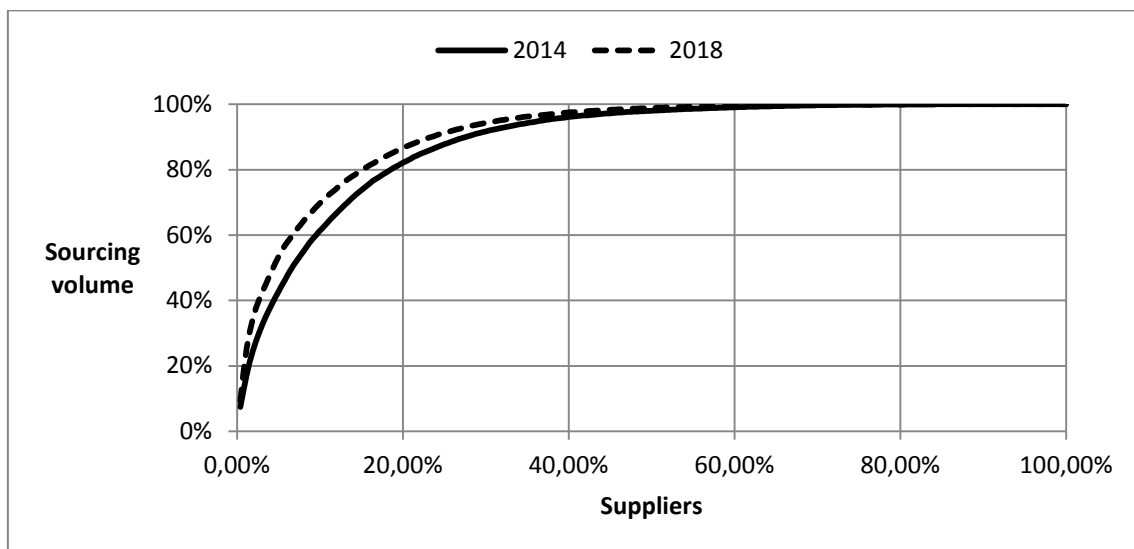
The quality of the business cases for the company's sourcing decisions was not initially planned to be considered. However it became of some interest in light of the assertions by Kary (2006) about high total cost sensitivity in combination with Rossetti's and Choi's (2005) remark that important factors were indeed often being ignored in many past aerospace sourcing decisions.

According to strategic buyers the business cases are "rather slim" and do indeed not contain a sensitivity analysis - neither regarding the made internal assumptions nor regarding external influences as macroeconomic changes. Instead the height of the internal rate of interest to be considered acceptable is used as some kind of safety margin.

#### 4.4.7 Single vs. multiple sourcing usage

Whether Premium Aerotec tends to employ single sourcing or multiple sourcing depends on whether individual parts or categories of similar parts are the level to be considered.

On the level of part categories or (at least to some degree) interchangeable capacities there are often multiple suppliers in use for similar, related inputs that require the same capabilities and skills. The supplier consolidation efforts described under 4.4.1 to 4.4.4, that should lead to fewer QSF-A sources and emphasis of QSF-B suppliers as strategic partners, is however likely to reduce this as the future supplier landscape will feature fewer suppliers for a bigger volume that hence will on average be bigger. An indicator for this is plotting the accumulated percentages of the sourcing volume (largest suppliers first) against the percentage of total sources/suppliers. Estimations for all commodities and programs for 2018 as well as data for the present (2014) were available. As can be seen in the graph below there is a clear difference which should – according to strategy – increase further with time.



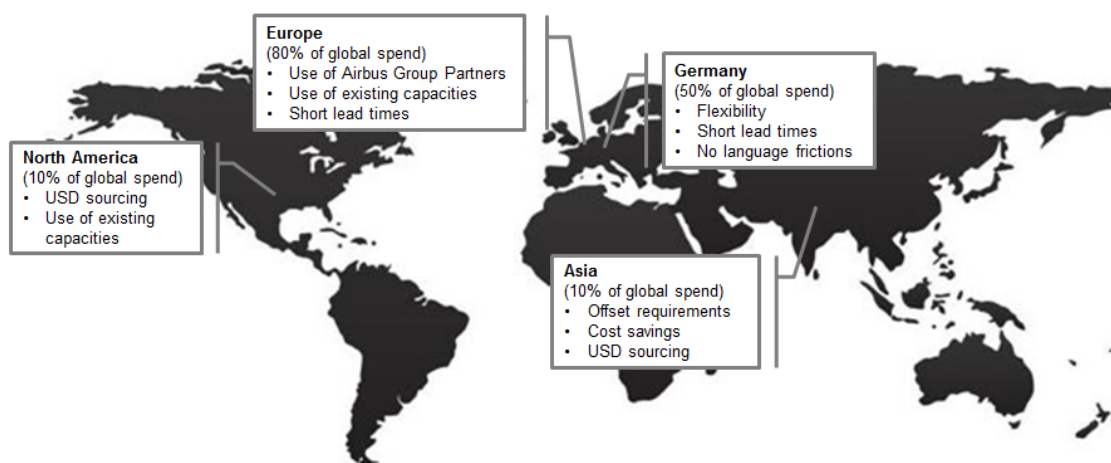
**Figure 13 - Sourcing volume distribution against suppliers**

However when viewed by individual parts multiple sourcing is definitely the exception. It is rare that the same part comes from multiple suppliers. Fitting to this observation is that there exists an internal guideline that strategic purchasers should mind allocating “mirror parts” (parts with different S/N but none or only very minor actual differences) to the same supplier. Long term strategy aims however at changing this. After consolidation and stabilization of the supply base a “hybrid” approach is planned where demand should be split between multiple suppliers based on variance. If possible stable repetitive demand (for which long lead times are less problematic)

should be sourced in “best cost countries”. In addition local suppliers would be used as 2<sup>nd</sup> source to secure flexibility.

#### 4.4.8 Global/domestic sourcing extent

Currently only about 20 percent of Premium Aerotec’s global procurement spend (without general procurement) is outside Western Europe, while more than 50% of it is domestic (in Germany). According to company strategy this shall change in the future. The map below gives an overview about current shares and motivations for global sourcing in regard to different regions (actual countries in Asia obscured).



**Figure 14 – Premium Aerotec’s global sourcing strategy**

Based on the predicted sourcing volumes domestic sourcing (in Germany) will decrease in relative terms to around 30% of the total procurement spend (without general procurement) down from currently about 50%. However in absolute terms this will still be an increase by approx. 25% due to the strong business growth/production ramp-up.

Europe and North America stand in their history of path dependent growth, respectively already existing capacities. Asia is not only relevant for anticipated cost savings, but also due to offset agreements. In airliner sales marketing relies on pitching some local production value especially in interaction with mainly state owned airlines. Furthermore sourcing in countries outside Europe reduces currency exchange rate risk. Airbus has an especially high exposure in that area as most deals are paid in USD while the majority of manufacturing takes place in the Eurozone. Richter (n. d.) - an article by Airbus Executive Vice President for Procurement specifically mentions exchange rate risks as “one of the biggest challenges for EADS”.



## **5 Synthesis and analysis**

This chapter analyses the empirical findings presented in Chapter 4 and integrates them with the theoretical framework and existing empirical studies that have been elaborated in Chapter 2.

### **5.1 Industry characteristics**

Not to surprisingly the industry characteristics described by Mundt (2003) and Chang (2006) under 2.2.1 are consistent with the case study observations in most aspects like product life cycle length, quality requirements, technical complexity and “low volume, high mix” context.

Chang’s description of sourcing frontiers by time is however not exactly fitting for Premium Aerotec. It would be fitting to some degree with an assumed delay of 5 to 10 years, but even then some assertions as the “outsourcing backlash” cannot be attributed. This could be due to the organizational rigidity and long preserved high depth of vertical manufacturing. Above the company level it could however also result from the US focus of Chang’s assessment, respectively a difference between European and American aerospace. When the European large airliner manufacturing capabilities (or “just Airbus” as it represents almost all of it) came into existence and were further developed government support by subsidies and loans was essential. Hence the political influence on the production structure was fairly large. For example Aircrafts were divided by sections between country and this organization is still persistent to some degree. Airbus main competitor Boeing and other US aerospace companies also received direct and indirect (through to the extremely large US defense budget) subsidies (see for example BBC News, 2013) but those were less burdened with political sourcing expectations as they mainly concern final assembly. This could have led to a (relative to the European industry) higher flexibility and faster adaptation of new sourcing trends. In this case however ‘being slower’ and less flexible may however not have been to the disadvantage of the European industry if one considers the recent struggles Boeing faced with an extremely outsourced setup.

### **5.2 Single vs. multiple sourcing**

Confirming Mundt’s (2003) assertion that product life cycle length, quality requirements, and technical complexity foster single sourcing tendencies, single sourcing on the level of individual parts (which is for example very common in the automotive industry) does virtually not occur at Premium Aerotec (see 4.4.8).

In line with that a concrete explanation for this could be the challenging complexity management due to the very high part number per plane while volumes per part are too small to allow for multiple sourcing (cf. 2.2.1).

This is not only due to small volumes but a combination of small volumes and high non-recurring cost per production setup. The major issue of quality assurance due to safety requirements spurred strong certification systems by third parties. For Premium Aerotec this means that most of its product portfolio requires certifications by national and international aviation controlling authorities as e. g. the EASA (European Aviation Safety Agency). Put simplified as keeper of those Premium Aerotec remains “component responsible” regardless whether parts were produced in-house or outsourced. Potentially every unidentified quality issue poses a threat to the certifications, which are main intangible assets of the company. Many non-recurring costs are associated to mitigation of this and the aimed at sub-tier structure presented in subsection 4.4.1 represents this in the old as well as in the future configuration. In the past approach keeping suppliers in the tight QSF-A control model also ensured good control regarding quality issues. In the future approach consolidation and focus on few QFS-B suppliers helps to reduce to development/certification costs.

Yet there is another contrary force to this trend: 2<sup>nd</sup> “best cost country” sources are planned for easy to handle (stable and repetitive) demand and this considerations could be fostered by the production ramp-up. While it is not big enough to totally change the “low volume, high mix” context it can bring the aerospace industry closer to volumes where double sourcing is more feasible, as the impact of double non-recurring costs is relatively lower. This trend will probably further gain in strength and a tendency towards fewer different aircraft models in operation further helps this. Many airlines are consolidating their fleet regarding technical variance and the producers are going in the same direction. Regarding Airbus e. g. the 2 engine planes A320 and A350 with their technically all very similar variants can cover almost all customer needs and the development of new 3 or 4 engine planes is unlikely.

In summary Premium Aerotec’s supply base consolidation efforts for complexity reduction in the shape of QSF-A to QSF-B transformation is fostering single sourcing on the level of part categories/comparable capabilities while in a longer time horizon the production ramp-up and ongoing product portfolio consolidation give room for establishing dual-sourcing on the level of individual parts. This might seem contradictory but makes sense if one considers that the supply base consolidation is not driven by a desire to single source but shall create a “clean slate” free of the

limitations of the historically grown outsourcing environment that developed “step-by-step” without long-term guidance creating unsystematic complexity.

### **5.3 Global vs. international and domestic sourcing**

In regard to the model of global sourcing levels (see 2.1.2) as described by Trent and Monzcka (2003) it could be said that Airbus as a group is on “Level V” when it comes to general sourcing. The D2P program (see 4.4.4) represents an effort to move to “Level IV” or even also to Level V in other areas as well (in this case for detail parts). For the scope that only Premium Aerotec buys (parts not used by other group members) the current efforts seem however only to correspond with a transition from “Level II” to “Level III”. Premium Aerotec moved beyond “engaging in international purchasing as needed” to a point where international purchasing is part of the sourcing strategy. While this could be considered a shortcoming the Airbus Group context has to be minded. The now reached stage may actually be an appropriate level for a company, for which resorting to a Group structure is possible for part families where it is necessary.

Apart from the captive sourcing effort in terms of the recently established plant in Romania the share of international sourcing seems to be rather low at Premium Aerotec (see 4.4.9). Yet there are company specific motivations as USD sourcing and offsets agreements for specific countries that should actually lead to more extend international sourcing. The nature of the international sourcing impairing QSF-A setup (see 4.4.1, 4.4.2) is probably the main cause. As explained it is not only to the disadvantage of international sourcing due to required high number of interactions and the hence high sensitivity to higher (international) transaction cost, but was also often driven by a need for capacity flexibility - a context in which short lead times are also important. Hence if the further QSF-B transition, which will also reduce outsourcing for flexibility reasons, does not delay further international sourcing should as predicted increase considerably in the future (see 4.4.9).

### **5.4 Quality of savings assessments**

Since as described under 4.4.7 business cases at Premium Aerotec seem to lack a sensitivity analysis that shows the impact of deviations in assumptions and estimations it is exposed to the risks described by Kary (2006). Business cases may create a deceiving picture for sourcing decisions as the impact of the various factors remains obscured. Using an elevated internal rate of interest to be considered

acceptable cannot be seen as equivalent to a proper sensitivity assessment. This apparently usual approach does indeed create some kind of safety margin. However this margin can again be deceiving as it can vanish fast under the high sensitivities shown in the calculations of Kary (2006). However it has again to be noted that in this model the net present values were calculated for 5 years and a sensitivity analysis of the sensitivity analysis in respect to the time horizon would have enriched it. In contrast to the assumed 5 years Premium Aerotec contracts are often made for whole product lifespans. As explained before those can be longer than 30 years. For example in the case of the A350 XWB typical contracts would already cover almost 5 years of production, despite the program just reached first delivery status. Concrete this means that non-recurring costs may be a far less relevant cost driver in this context.

On the other hand the implications issues described under 4.4.6 are not only problematic per se. The underlying reasons as insufficient ERP systems that lead to a poor operations visibility and the limited transformation capabilities (in relation to the ongoing efforts) are likely to elevate the risk of flawed estimations of variables influencing total cost. Furthermore the caused delays also have an impact on total costs. The actual impact of total cost sensitivity in combination with bad prerequisites for accurate estimations on the current Premium Aerotec transformation is not clear. Yet there are reasons to believe that significant risks may be hidden in this blind spot.

## **5.5 Dangers of strategic sourcing misapplications**

The other strategic sourcing misapplications described by Rossetti and Choi (2005) are quite many, yet most of them have one common feature: They tend to result from pitching short-term goals against the actually wanted long-term outcomes at some point. According to its internal presentations Premium Aerotec has a clear plan to develop a sound long-term strategy and commit to long-term development. Positive is also that the company is likely to be somewhat more independent from short-term pressure resulting from stock metrics as its only shareholder is the Airbus Group and it is hence at least not directly listed. Purchasing price variance payment schemes are also not common for strategic buyers. Hence two main reasons for short term optimization described by the study are not present. However in the short-term the company is driven by a strong focus on rate readiness and cost savings to ensure deliveries and profitability. This is understandable as delivery performance is of essential importance for the existence of the company in its current shape, yet this focus still is a bad context to avoid the errors described by Rossetti and Choi (2006).

## 6 Conclusions

By a field study of an Airbus Group subsidiary in combination with a review of extant literature this work examined strategic sourcing in the aerospace industry and the associated implementation challenges and obstacles. This was done in light of conclusions regarding strategy applicability drawn from general theoretical frameworks and existing studies.

The case study observations were consistent with the literature-based conception that extremely long product cycles, in combination with relatively high non-recurring costs, and a need for strong quality control can be considered as distinctive features of the industry. Those characteristics benefit the application of long-term partnerships and a relative absence of multiple sourcing.

However regarding implementation it became apparent that the case company is susceptible to issues that are related to its origin and hamper this approach. Amongst others those are a historically grown production setup focused on mainly vertical integrated operations with the associated insufficient ERP systems, limited transformation capabilities and capacities that coincide with ramp-up challenges while the impact of backlogs and delivery failure is extreme, and short-term cost pressure.

This problematic context can be considered similar for other incumbent aerospace companies - especially if from Europe - which have comparable origins, hence similarly grown structures, and do also face the same industry-wide challenges. Hence also implementation - and not only determination - of sourcing strategies may be considered a main issue in this context.

The most surprising insight was that the case company is struggling with unexpected implementation issues as for example fragmented, outdated, and difficult to change information systems that would be perceived as anachronistic in other high-tech industries. This is likely related to the relative past rigidity of the industry and the long history of most of its companies.

Considering managerial recommendations the main observation was regarding total cost assessments of sourcing decisions. By now it is accepted that a total cost view is essential. At the case company however there seems to be only limited awareness that the impact of deviations from the underlying assumptions can be strong and against intuition, while the company has suboptimal prerequisites to avoid estimation errors. Establishing sensitivity analyses as standard component for all underlying business cases unless there is an especially low degree of uncertainty should be considered.

Regarding this matter an interesting field for further research would be to quantify the impact of the issues raised by Rossetti and Choi (2005) and Kary (2006) by analyzing real sourcing decisions ex post. This would allow comparing the sensitivity predictions of models like Kary's and the impact of the described strategic sourcing misapplications with the actual deviations. Business case calculations (ex-ante and ex-post) should be available at most companies, yet getting access could prove to be challenging.

## References

- Airbus Group (2014): "Financial Statements 2013", <http://www.airbus-group.com/dms/airbusgroup/int/en/investor-relations/documents/2014/Closings/Airbus-Group-Financial-Statements-2013/Airbus%20Group%20Financial%20Statements%202013%20%28short%20notes%29.pdf> [2015-05-29].
- Airbus Group (2015): "Orders & deliveries", <http://www.airbus.com/company/market/orders-deliveries/> [2015-04-08].
- Anderson, M, Katz, P (1998): "Strategic Sourcing", *The International Journal of Logistics Management*, 9 (1), pp. 1-13.
- BBC News (2013) "Boeing subsidies illegal, says World Trade Organization", <http://www.bbc.com/news/business-12925024> [2015-06-03].
- Bozarth, C., Handfield, R., Das, A. (1998): "Stages of global sourcing strategy evolution: an exploratory study", *Journal of Operations Management*, 16, pp. 241-255.
- Burke, G., Carrillo, J., Vakharia, A. (2007): "Single versus multiple supplier sourcing strategies", *European Journal of Operational Research*, 182, pp. 95-112.
- Carter, C., Kaufmann, L., Michel, A. (2007): "Behavioral supply management: a taxonomy of judgement and decision-making biases", *International Journal of Physical Distribution & Logistics Management*, 37 (8), pp. 631-669.
- Chang (2006): "Getting ahead in sourcing through benchmarking and system dynamic analysis - an aerospace industry perspective", Massachusetts Institute of Technology, <http://hdl.handle.net/1721.1/44613> [2015-03-30].
- Denzin, N. (2006): "Sociological Methods: A Sourcebook", Piscataway, Aldine Transaction, 5<sup>th</sup> edition.
- EADS (2007): "Power8 prepares way for "New Airbus", 2007-02-28 Press Release, <http://www.airbus.com/presscentre/pressreleases/press-release-detail/detail/power8-prepares-way-for-new-airbus/> [2015-04-27].
- Elahi, E., Sheikhzadeh, M., Lamba, N. (2014): "An Integrated Outsourcing Framework: Analyzing Boeing's Outsourcing Program for Dreamliner (B787)", *Knowledge and Process Management*, 21 (1), pp. 13-28.
- Gottfredson, M, Puryear, R, Phillips, S (2005): "Strategic Sourcing: From Periphery to the Core", *Harvard Business Review*, 83 (2), pp. 132-139.
- Kabiraj, T. (2013): "Outsourcing: Some Strategic Aspects", Indian Statistical Institute, <http://www.isical.ac.in/~eru/erudp/2013-05.pdf> [2015-03-30].
- Kary, J. (2006): "Advanced aerospace procurement models with sensitivity analysis and optimized demand allocation", Massachusetts Institute of Technology, <http://hdl.handle.net/1721.1/37126> [2015-03-30].
- Knudsen, D. (2003): "Aligning corporate strategy, procurement strategy, and e-procurement tools", *International Journal of Physical Distribution & Logistics Management*, 33 (8), pp. 720-734.

- Koliousis, G. (2006): "Analysis of Sourcing & Procurement Practices: A Cross Industry Framework", Massachusetts Institute of Technology, <http://hdl.handle.net/1721.1/36143> [2015-03-30].
- Kopel, M., Löffler, C., Pfeiffer, T. (2013): 'Sourcing Strategies of a Multi-Input-Multi-Product Firm', Social Science Research Network, <http://ssrn.com/abstract=2363831> [2015-03-31].
- Lonsdale, C. (2001): "Locked-In to Supplier Dominance: On the Dangers of Asset Specificity for the Outsourcing Decision", *The Journal of Supply Chain Management*, Spring, pp. 22-27.
- Merriam, S. (2009): "Qualitative Research: A Guide to Design and Implementation", San Francisco, Jody-Bass.
- Mundt, H. (2003): "Long-Term Cooperation in the European Aerospace Industry". In Sachsenmeier, P., Schottenloher, M. (2003): "Challenges Between Competition and Collaboration", Springer Berlin Heidelberg, pp. 59-62.
- Premium Aerotec (2011): Company Profile, [http://www.premium-aerotec.com/Binaries/Binary4668/Backgrounder\\_e\\_June2011.pdf](http://www.premium-aerotec.com/Binaries/Binary4668/Backgrounder_e_June2011.pdf) [2015-01-12].
- Premium Aerotec (2014): "Jahresabschluss zum Geschäftsjahr vom 01.01.2013 bis zum 31.12.2013", Bundesanzeiger 18.07.2014.
- Rendon, G. (2005): "Commodity Sourcing Strategies: Processes, Best Practices, and Defense Initiatives", *Journal of Contract Management*, Summer, pp. 7-20.
- Richter, K. (n. d.): "Absicherung von Währungsrisiken", *Beschaffung aktuell*, [http://www.beschaffung-aktuell.de/home/-/article/16537505/27470523/Absicherung+von+W%c3%a4hrungsrisiken/art\\_co\\_INSTANCE\\_0000/](http://www.beschaffung-aktuell.de/home/-/article/16537505/27470523/Absicherung+von+W%c3%a4hrungsrisiken/art_co_INSTANCE_0000/) [2015-06-02].
- Rossetti, C., Choi, T. (2005): "On the Dark Side of Strategic Sourcing: Experiences from the Aerospace Industry", *Academy of Management Executive*, 19 (1), pp. 1-15.
- Schuh, C. (2009): "The purchasing chessboard", Springer Berlin Heidelberg.
- Stuart, I., McCutcheon, D., Handfield, R., McLachlin, R., Samson, D. (2002): "Effective case research in operations management: a process perspective", *Journal of Operations Management*, 20, pp. 419-433.
- Swift, C. (1995): "Preferences for Single Sourcing and Supplier Selection Criteria", *Journal of Business Research*, 32, pp. 105-111.
- Talluri, S., Narasimhan, R. (2004): "A methodology for strategic sourcing", *European Journal of Operational Research*, 154, pp. 236-250.
- Tayles, M., Drury, C. (2001): "Moving from Make/Buy to Strategic Sourcing: The Outsource Decision Process", *Long Range Planning*, 34, pp. 605-622.
- Treleven, M., Schweikhart, S. (1988): "A risk/benefit analysis of sourcing strategies: single vs. multiple sourcing", *Journal of Operations Management*, 7(4), pp. 93-114.
- Trent, R., Monczka, R. (2003): "International Purchasing and Global Sourcing - What are the Differences", *The Journal of Supply Chain Management*, Fall, pp. 26-37.
- Zeng, A. (2000): "A synthetic study of sourcing strategies", *Industrial Management & Data Systems*, 100 (5), pp. 219-226.