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How to combine global and local sourcing in the pharmaceutical sector? Patterns of an industry

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Chapter 1. Introduction

In modern society, the pharmaceutical sector has become a key pillar of the healthcare industry. As Peter and Hill (1969) describe it, *"man has moved up the therapeutic hierarchy, through magic, voodoo, faith healing, to modern, orthodox medicine and surgery"* (as cited in Singh, 2015, p.13). Looking at practices in its supply chain and in particular on its sourcing is thus highly relevant in a fast changing, globalized environment. However, this globalization started way longer ago than is usually thought of (The Economist, 2013a), even if recent advancements, like the development of containers in the 1950's (The Economist, 2013b), might have increased its pace. Globalization is nowadays omnipresent in our life and in the corporate world. The fact that cross-border world trade increased from 15 percent of global GDP (Gross Domestic Product) in 1990 to 20 percent in 2009 underlines this trend (The Economist, 2009). In this context, looking at how the pharmaceutical industry combines global and local sourcing, through the lens of several case studies, is crucial for a better understanding of the sector's activity and future.

This research is structured as follows: In this chapter, the research question is introduced and its scope is outlined. Next, the research methodology is discussed and the pharmaceutical industry is briefly described. Chapter 2 focuses on the literature review on the topics of global/local sourcing as well as transaction cost economics. In Chapter 3, the pharmaceutical sector is thoroughly analysed to better understand the context of the four cases, which are then presented: Laboratoires Bailleul, Janssen (J&J), Company A (a subsidiary of Company B)[1] and Abbott. Chapter 4 concentrates on the cross-case analysis and its main results. Finally, Chapter 5 concludes this research by summarizing the thesis, outlining its main implications and recommendations for the global/local sourcing mix in the pharmaceutical industry and exploring limits and future work paths. Additionally, a glossary, clarifying certain key terms, is available at the end of the study.

1.1 Research question and scope

In this research, the main goal is to determine how pharmaceutical companies combine the mix of global and local sourcing. This involves the sourcing of raw materials

[1] Interviewee has requested anonymity

and semi-finished goods, but excludes packaging materials and indirect procurement (i.e. office purchases...). On top of this, the decision for the location of production plants is analysed through a global/local lens, local being equivalent to a continental level (e.g. Europe) and global to the rest of the world. All companies analysed have a strong presence in the European market; it is either their original home market, a major contributor to their turnover or the location of their headquarter. Six propositions (see Table 1) are the basis for the undertaken research, and each of these is tested and then approved or refuted.

Proposition 1	The share of global plant locations and sourcing increases with the size of the company, whatever pharmaceutical business these are in (branded or generic)
Proposition 2	Branded and generic sourcing choices differ, with generics favouring global over local sourcing, due to higher price pressure on generic drugs
Proposition 3	A higher level of vertical integration is observed in the branded segment due to the high sensitivity of intellectual property rights of drug patents
Proposition 4	Local sourcing is used for products of high importance, in order to decrease the possibilities of disruptions in their respective supply chain; implying that trust in globally located suppliers is lower than in their local counterparts
Proposition 5	The location of owned plants and the supplier selection are based on strategic and cost-efficiency criteria
Proposition 6	Transaction cost economics is actively used by decision-takers for backward vertical integration in the pharmaceutical supply chain

Table 1: Propositions discussed in the research.

Furthermore, the goal of this research is to improve the understanding on the sourcing mix decision by pharmaceutical companies. Specific objectives are thus:

- To highlight current trends in the industry.
- To identify the reasons for these corporate choices.
- To allow a broad view and understanding of the sourcing practice in the industry.

These points are developed indirectly throughout this investigation.

1.2 Research methodology

In this part, the research methodology is described, along with its design, and is then followed by a discussion of the information sources as well as limitations of the methodology.

1.2.1 Case study methodology

Descriptive case studies are used; these can be defined as *"a case study whose purpose is to describe a phenomenon (...) in its real world context"* (Yin, 2014, p. 238). A case study is an extensive empirical investigation of a current trend in its natural context through data triangulation, based on predefined research questions (Yin, 2014, pp. 16-17). This allows to see the big picture and to keep a *"real-world perspective"*, while deep diving into a particular case (Yin, 2014, p. 4). Moreover, the cases allow to empirically enrich theory and are not simply examples (Yin, 2014, p. 40). Yin (2014, p. 40) calls this *"analytical generalization"* (or external validity (Yin, 2014, p. 48)), in opposition to *"statistical generalization"*, meaning that the aim of case studies is to *"expand and generalize theories (analytic generalizations) and not to extrapolate probabilities (statistical generalizations)"* (Yin, 2014, p. 21).

Yin (2014, pp. 9-14) determines three criteria making the case study methodology particularly relevant: (1) the research question has a "how" form, (2) it deals with current trends and (3) it does not influence behaviour. Each of these three criteria is met in this work, accounting for the use of case studies as a research methodology. Moreover, the relevance of this approach in global sourcing is confirmed by Quintens, Pauwels, and Matthyssens (2006, p. 173), who state that *"this field is still in need for more (...) case-base studies that allow a more in-depth exploration of the phenomenon"*.

1.2.2 Case study design

In order to evaluate the research excellence of the descriptive case studies, three of the widely used concepts discussed by Yin (2014, p. 45) are relevant: construct validity, external validity and reliability. How each of the three tests has been dealt with is summarized in Table 2 and then described below. Note that the internal validity issue is left out here as it does not apply to descriptive case studies (Yin, 2014, p. 46).

Tests	Main actions taken to guarantee the tests
Construct validity	Different information sources and triangulation Draft review by key interviewees
External validity	Theoretical replication
Reliability	Use of a case study protocol (mainly interview guide)

Table 2: Summary of actions taken to guarantee validity and reliability of the cases.

First, in order to improve construct validity, two main actions have been taken throughout this research (Yin, 2014, pp. 46-47): (1) several information points have been used and, when possible, more than one person has been interviewed per case study, in order to triangulate information; (2) each drafted case study has been sent to key interviewees for review and approval.

Then, external validity is confirmed through theoretical replication, implying that different cases are selected with the goal to reach divergent results (Yin, 2014, pp. 45, 57). The rationale and explanation of firm sampling is discussed later.

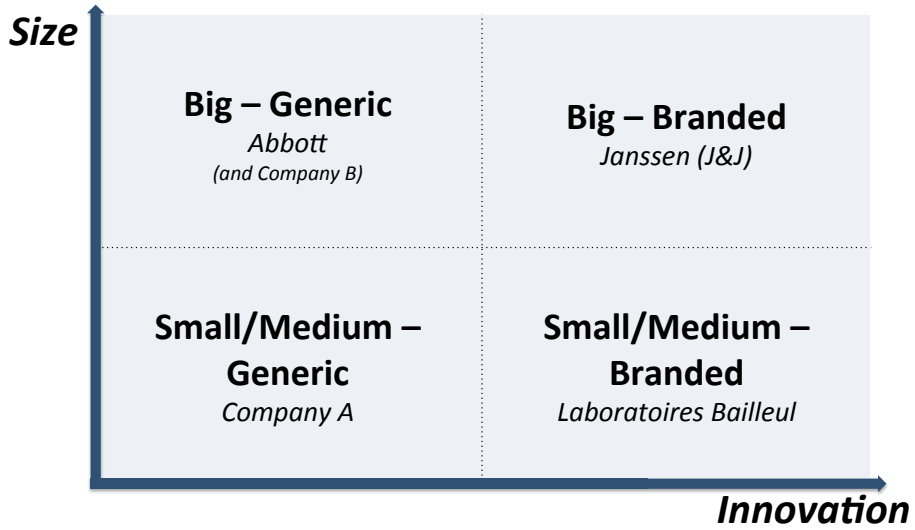
Finally, in order to enhance reliability and gather information in the most effective way, a case study protocol has been used (Yin, 2014, p. 84). A key part of this protocol, the interview guide, can be found in the appendix of this work (see Appendix 1); this questionnaire has been slightly adapted to each case. It results from theoretical bases and empirical findings from previous investigation performed on the pharmaceutical industry, as well as academic readings on the specific researched topic. Regarding the rest of the protocol the key points are now outlined. Companies were selected based on two segmentation criteria (size and innovation levels) and on the availability of sources. Once a suitable company was identified, an employee having the right position, knowledge and responsibility within the selected firm was interviewed. When possible, this discussion took place face-to-face; however, some cases (mainly due to physical distance) had to be done over Skype. Each of these interviews was recorded to insure the correctness of the used information and, later, the interviewees approved their respective case.

1.2.3 Multiple case studies

A holistic multiple-case study design (Yin, 2014, p. 50) is used to analyse the combination of global and local sourcing in the pharmaceutical industry. Each case focuses on a particular company from one of the analysed segments of the industry. The

focus is put on pharmaceutical companies connected to the European market, which delimits the research; each case is then bounded by the specific research topic as defined earlier. For the purpose of this study, local is defined on a continental basis (e.g. Europe) and the rest of the world is considered global. For these case studies to make sense, only companies present on international markets have been selected (for Company A, this is the case through its subsidiary position within Company B).

The considered cases have been selected and differ according to two axes: the size and the innovation level (see Graph A). As stated earlier, this implies that theoretical replication is used, as those different cases are expected to result in different sourcing strategies (for predictable reasons)(Yin, 2014, p. 57). On the axis of size the difference between Big and Small/Medium is based on the income, with a symbolic threshold set at yearly revenues of $1Bn (the annual sales level a drug needs to reach to be considered a blockbuster (Bradley & Weber, 2003, p. 13)). On the innovation axis, sampling is based on the type of drugs commercialized by the company. These can market drugs enjoying intellectual property rights (named branded) or sell off-patent drugs (named generic).



Graph A: Case study sampling.

1.2.4 Information sources

The multiple-case studies are mainly based on qualitative evidence. Indeed, the main sources of information used are documentation (company website and other useful internet pages), as well as interviews with managers from each studied company. The performed interviews have lasted between 45 and 90 minutes and have been recorded in order to secure the correct transcription of the provided information. The interviewees have been selected based on their competencies, responsibilities and

knowledge on the subject of matter. Finally, in order to enrich the findings of the cross-case analysis, discussions with representatives of the consulting industry have been performed. Based on their expertise, they endow the results with a wider view on the issues at hand. This utilization of multiple sources of information allows for triangulation of the data, improving construct validity (Yin, 2014, pp. 118-121). Indeed, Yin (2014, p. 241) defines triangulation as *"the convergence of data collected from different sources, to determine the consistency of a finding"*.

1.2.5 Limitations of the methodology

Yin (2014, p. 57) explains that *"a multiple-case study can require extensive resources and time beyond the means of a single student"*, which is a main limitation to the selected research methodology. Nevertheless, the highest possible level of effort has been put in this research in order to lead to the most valuable results. A potential and time-consuming improvement would include literal replication (i.e. several similar cases each time), improving the external validity of the findings (Yin, 2014, p. 57). This should be considered for further research on the topic.

1.3 Introduction to the pharmaceutical industry

This brief introduction to the pharmaceutical industry highlights key figures, gives a short account of its history, emphasizes key concern areas within the industry, and ends by the description of the blockbuster model.

The pharmaceutical industry has been a main driver in increased world wellbeing over the last century. Indeed, the life expectancy of Europeans has grown by 30 years since the beginning of the 20th century (EFPIA (European Federation of Pharmaceutical Industries and Associations), 2013, p. 2).

Looking back at the history of the pharmaceutical industry, Bradley and Weber (2003, p. 2) show that it was traditionally very stable but fragmented. Indeed, leading companies had been present for a long time, but the major ten firms represented less than 50 percent of total sales by the beginning of the 21st century. Furthermore, price competition had usually been avoided (Bradley & Weber, 2003, p. 2). Various trends lead to waves of mergers and acquisitions (Van Arnum, 2012), Alliances and Joint Ventures, as companies were looking for economies of scale and scope throughout their value chain (Bradley & Weber, 2003, p. 8). However, IBM Business Consulting Services

(2004, p. 3) notes that mergers and acquisitions have lead to *"an infrastructure that is riddled with duplication and complexity"*.

Life sciences in general is nowadays a quite important industry and accounts for approximately $1,200Bn (Mathews & Brimacombe, 2013, May 28). Within this industry, branded pharmaceuticals (ethical drugs) face slow growth (CAGR of 1.2% for the period of 2011-2016) while representing 45% of the market, whereas generics (branded and unbranded) enjoy a higher growth (CAGR of 11% for the period of 2011-2016) but reach only 16% of market share (Mathews & Brimacombe, 2013, May 28). According to EFPIA (European Federation of Pharmaceutical Industries and Associations) (2013, p. 14), *"the world pharmaceutical market was worth an estimated €667,653 million at ex-factory prices in 2012"*.

The design of new drugs is considered a heavy investment. Indeed, in 2012, it consumed on average €1.172Bn and took 12-13 years (EFPIA (European Federation of Pharmaceutical Industries and Associations), 2013, p. 6). It has also to be taken into account that there is only a chance of 0.01% to 0.02% that an initial laboratory substance goes to market (EFPIA (European Federation of Pharmaceutical Industries and Associations), 2013, p. 6).

Heavy investments are not the only concern characterizing the industry; regulation also plays a key role in decision-making. Daemmrich (2009, p. 17) provides a good instance of the importance and impact of the regulatory framework on the pharmaceutical industry. The author argues that regulatory differences largely account for the dominance of the US compared to Europe in the pharmaceutical market; this has lead the *"pharmacy of the world"* to dislocate from the France-Germany-Switzerland hub to the USA. Moreover, strict regulation is implemented for the manufacturing of drugs. Indeed, companies need to comply with the Good Manufacturing Practices (GMP) of the FDA (PhRMA (Pharmaceutical Research and Manufacturing of America), 2012, p. 34).

Until recently, the blockbuster model has been strongly used by top pharmaceutical companies (Bradley & Weber, 2003, pp. 13-14). In this model, firms rely on best-selling drugs that lead to annual sales exceeding $1Bn. This model seemed to be very promising as by 2001, these drugs represented a market share of 45%. However, new blockbusters had to be continuously discovered (Bradley & Weber, 2003, pp. 13-14) as patent rights expire after 20 years and can only benefit of a maximum of an additional 5 years under a supplementary protection certificate (EFPIA (European

Federation of Pharmaceutical Industries and Associations), 2013, p. 6). Also, the industry was undergoing a shift from discovery to acquisition of such drugs (partly due to the increased complexity in R&D (Research & Development))(Bradley & Weber, 2003, pp. 13-14). The scarcity of appropriate markets and available blockbusters are features weakening the relevance of the model (Bradley & Weber, 2003, pp. 13-14). Singh (2005, p. 118) even considers the blockbuster model as doomed to failure and acknowledges a distancing from the model in the industry. Mathews (2012, June 28) adds that: *"globally we will see a third of pharmaceutical sales at threat due to patent expiry"*.

1.4 Managerial, academic and societal utility and implications

This research has a significant impact on and relevance for three main fields: academia, management and society at large.

First, from an academic perspective, the case study methodology followed during this research allows supporting theoretical findings with concrete, real-world examples and confirming some academically predicted implications. This is relevant in the current context as Quintens *et al.* (2006, p. 175) coin the research on global purchasing as *"largely anecdotic and descriptive"*; and as lacking case studies (p. 173). Moreover, additional work on the subject of pharmaceuticals supports the understanding of this complex business setting by researchers. As each industry satisfies certain needs, each has an adapted and, therefore, different supply chain (Singh, 2005, p. 11).

Then, from a managerial point of view, looking at the position of key firms in each outlined segment can help distinguish best practices. This study has thus a broad organizational impact, as well for companies entering new segments as for fully established players willing to improve their efficiency in sourcing. This is of particular pertinence in a context of global market changes, caused by challenges further described in the background information part of Chapter 4.

Finally, from the point of view of societal utility, by its very own nature, the pharmaceutical business is granted particular collective attention. Indeed, any improvements in sourcing can have long-lasting impacts on price, quality and availability of drugs on the market. Not only does a good supply chain allow more efficient production of drugs, it can also prevent larger issues, like counterfeiting at the semi-finished product level or low quality input. An improvement in the pharmaceutical business can thus have a positive impact on society.

Chapter 2. Literature review

In the following sections, literature on two main topics is reviewed: global and local sourcing and transaction cost economics. Each of the concepts is first defined and then thoroughly discussed.

2.1 Global and local sourcing

This section discusses the sourcing decision, and more precisely how to combine global and local sourcing. The first part focuses on the definition of the various concepts. Next, the main reasons and advantages of global sourcing are considered, before highlighting success factors. Limits of this strategy are then introduced, along with a discussion on reshoring. Thereafter, supplier selection is analysed and finally the last part is devoted to recommendations.

2.1.1 Definition

This subsection first introduces global sourcing and its general evolution, before focusing on the taxonomy and classification of internationalization of sourcing. It then moves on to possible breakdowns of the costs associated to global sourcing and factors influencing sourcing policies. The part concludes with the latest state of the research.

Kotabe and Murray (2004, p. 9) define sourcing as the *"management by multinational companies of the flow of components and finished products in serving foreign and domestic markets"*; and they argue that *"global sourcing strategy generally refers to management of (1) logistics identifying which production units will serve which particular markets and how components will be supplied for production and (2) the interfaces among R&D, manufacturing, and marketing on a global basis"* (Kotabe & Murray, 2004, p. 8). According to Rossetti and Choi (2005, p. 49), global sourcing is one of the initiatives of strategic sourcing. Additionally, Kotabe and Murray (2004, p. 9) demonstrate the complexity of sourcing as they distinguish between in-house sourcing and outsourcing; subdividing the latter option in two: strategic partnerships and arm's length contracts. Further, the authors distinguish between domestic sourcing and offshore sourcing.

Looking at general sourcing developments, Handfield (1994) shows that, in general, suppliers of critical material for pharmaceutical firms in the US are located abroad. Overall, no size differential is linked to the location of the supplier; however,

firms facing higher total costs of materials tend to have international suppliers. Additionally, it appears that a major part of input is sourced locally, even for firms considerably using international sourcing.

More recently, Monczka, Trent, and Petersen (2006, pp. 10-11) explain that offshore sourcing is constantly rising, growing from 21-30 percent of annual expenses in 2000 to 31-40 in 2005, with an expected 41-50 percent to be reached in 2010 (Monczka *et al.*, 2006, p. 13). Based on a survey of US firms, Park (2000, pp. 215, 218-219) discovers that foreign direct investment from and to the US is positively correlated to global sourcing, highlighting the importance of MNEs (Multinational Enterprises) in global sourcing.

The following paragraphs focus on the sourcing taxonomy. Quintens *et al.* (2006) decide to not distinguish between international and global purchasing, as they argue that the globalization process is continuous and not discrete. However, another strand of authors, here represented by Trent and Monczka (2003b), emphasizes the difference between these two concepts in their definition. Indeed, global sourcing is defined as: *"the worldwide integration of engineering, operations, logistics, procurement and even marketing within the upstream portion of a firm's supply chain"* (Trent & Monczka, 2003b, p. 607) whereas international purchasing is defined as *"a commercial purchase transaction between a buyer and supplier located in different countries"* (Trent & Monczka, 2003b, p. 613). The authors argue that the main difference relies on the level of company-wide coordination and integration, which they claim to be higher in the case of global sourcing (Monczka & Trent, 1991, p. 3). Furthermore, Trent and Monczka (2003a, p. 31) emphasize that global sourcing has a strategic role whereas international purchasing is mainly functional.

In order to clearly differentiate between these concepts and to frame global sourcing, Monczka and Trent (1991, pp. 3-5) describe a four-phase process towards the internationalization of sourcing. Whereas the first two phases are termed *"reactive"*, the following two are coined *"proactive"* (Monczka & Trent, 1991, p. 4). In the first phase, firms only purchase nationally. Due to changes in the supply environment, a firm moves to the second phase when it purchases internationally as needed and slowly develops international procurement capabilities. The firm considers international buying as a part of its procurement strategy, once it becomes aware of the potential benefits linked to it. This phase triggers the proactive management of international suppliers and includes

support from top management. However, the company lacks the according coordination (Trent & Monczka, 2003a, p. 29; 2003b, pp. 613-614). In phase four, the global procurement strategy is integrated; the firm benefits the most of its international sources and commits the required resources (Monczka & Trent, 1991, p. 5). Later, the authors decided to further split this initial fourth level into two, level four and five (Trent & Monczka, 2003a, p. 29; 2003b, pp. 613-614). In the new level four, coordination and integration occurs globally across locations, but not across functions, whereas this gap is bridged in level five by additional cross-functional coordination and integration (Trent & Monczka, 2003a, p. 29; 2003b, pp. 613-614). Furthermore, for Trent and Monczka (2003b, pp. 613-614) level two and three represent international purchasing whereas level four and five represent global sourcing.

Other taxonomies of the sourcing internationalization have been developed by:

- Rexha and Miyamoto (2000, pp. 32-33): this consists of four different international sourcing strategies based on the resource capacity and on the knowledge of international supply markets of firms.
- Arnold (1999, pp. 167-168): dividing a firm's sourcing strategy according to two axes, broadness (national-international) and importance (operational-strategic).

Developing various frameworks to describe the internationalization of sourcing is useful but quickly reaches limits in its usability if the costs associated to each strategy cannot be identified. The following paragraphs present thus several possibilities to account for the costs incurred by global sourcing.

In order to build a total cost model, Holweg, Reichhart, and Hong (2011, p. 334) focus on outsourced supplies. The authors identify three main costs in global sourcing:

- Static costs (*"unit cost ex-factory, transportation cost and additional customs clearance, insurance or handling charges that might be incurred on a regular basis"*),
- Dynamic costs (*"increased pipeline and safety (...); inventory obsolescence (...); cost of lost sales and stock-outs (...); expedited shipments"*)
- Hidden costs (*"labour cost inflation (...); currency fluctuations; rise in transportation cost; Overhead for managing the international supply base; the loss of intellectual property to contract manufacturers; the risk of political and economic instability or change"*) (Holweg *et al.*, 2011, pp. 335-336).

Based on case studies, Holweg *et al.* (2011, p. 338) show that the importance of dynamic costs in the global sourcing decision tends to be underrated.

Park (2000, p. 211) offers another possible division of global sourcing costs with two components: direct procurement costs, which are the agreed prices, and transaction costs, which are necessary to reach these agreed prices. This second cost part is interesting as it links the sourcing section to the following chapter on transaction cost economics. Moreover, Park (2000, p. 220) highlights that MNEs tend to reduce transaction costs in their sourcing strategy by sourcing from low risk countries.

Looking at the topic in a broader way, Quintens *et al.* (2006, p. 173) highlight that it is still "young", and that this accounts for the lack of developed research in the field. The main theoretical limits discussed by Quintens *et al.* (2006) include: disagreements on basic concept definitions (p. 170), absence of a journal specialized on the topic of global sourcing (p. 171), lack of case studies (p. 173), focus on description and lack of explanation power (p. 175), poor analysis of global sourcing implications (p. 176) and questionable explanatory power of stage models (pp. 176-177). However, the authors also witness an increase in the amount and quality of empirical papers (Quintens *et al.*, 2006, p. 173). Quintens *et al.* (2006, p. 175) coin the research on global purchasing as *"largely anecdotic and descriptive"*, urging scholars to focus on explanatory research instead.

2.1.2 Reasons, advantages and success factors

This subsection analyses the different reasons and advantages linked to global sourcing, along a brief description of concrete success factors. First, drivers for SMEs' (Small and Medium-sized Enterprises) internationalization are identified. Then, the benefits associated to global sourcing are enumerated, coupled with factors of success. This is followed by a research based on an Australian sample and ends with warnings against blind global sourcing.

Whereas MNEs are per se globally active, it may be interesting to identify the forces driving SMEs to internationalize. Based on the case of Italian industrial SMEs, Tunisini and Bocconcelli (2009, p. 677) reveal that three main factors drive the internationalization of SMEs: growing competition from emerging markets, increasing presence of international players in the home market, and continuous need to broaden their market shares.

From a general point of view, Kotabe and Murray (2004, p. 8) claim that global sourcing combines two important advantages: those linked to location and those linked to the use of internal and external (the suppliers') comparative advantages.

More specific reasons for choosing to source globally include: lower prices, quality (Bozarth, Handfield, & Das, 1998; Monczka *et al.*, 2006), access to technology and/or new markets, regulatory constraints, reduced product and development life cycles, country-specific comparative advantages (Bozarth *et al.*, 1998), supplier existence, cost of labour, company-specific margin and profitability specifications (Monczka *et al.*, 2006). The research of Monczka *et al.* (2006) highlights the importance of cost in the sourcing decision.

As Monczka *et al.* (2006, pp. 14-15) show, some of these goals are effectively reached through global sourcing as the authors state that its benefits include: *"reduced price and total cost of ownership, increased customer performance, and improved quality, flexibility, inventory, delivery accuracy and responsiveness"*. In earlier research, Monczka and Trent (1992, p. 19) guaranteed that the proper level of global integration is coupled with improved results in the fields of cost, technology, quality and responsiveness.

In another study, Trent and Monczka (2003a) highlight key differences between the sourcing patterns of large North American headquartered manufacturers engaged in global sourcing and international purchasing. Global sourcing is linked to some firm characteristics: these firms are bigger (Trent & Monczka, 2003a, pp. 30-32; 2003b, p. 615), believe they benefit more from these strategies, get stronger support from top-management for their sourcing, encounter quicker product and process changes and have a higher probability of facing international competitors (Trent & Monczka, 2003a, pp. 30-32). Moreover, these firms enjoy higher consistency across locations and their communication options are broader (Trent & Monczka, 2003a, pp. 32, 34). Looking at the implications for businesses, Trent and Monczka (2003a, pp. 35-36) note that the sourcing strategy depends on many variables and that global sourcing is complex and not the optimal option for all companies. Finally, decentralization is found to decrease the ease of implementing a global sourcing strategy. Contrary to Trent and Monczka (2003a, p. 36), Arnold (1999, p. 168) argues that decentralization not only represents a risk, but also offers a chance for global sourcing. Indeed, even though the author accounts for the risk implied by the foregone economies of scale, he suggests that decentralization can induce stronger intrapreneurship (Arnold, 1999, p. 168).

Quantifying these advantages, Trent and Monczka (2003b, p. 608) argue that, compared to local sourcing, on average 15 percent material cost saving is reached through international sourcing; this is accompanied by average enhancements of 6 percent in supplier quality, 11 percent in total ownership costs and 3 percent in timely delivery achievement. This helps explain why Trent and Monczka (2003b, p. 615) expect a growth in sourcing efforts as firms face rising pressure from their customers regarding decreases in price/cost and increases in *"responsiveness to customer needs, product delivery and customer service"*.

Additional results are presented by Petersen, Prayer, and Scannell (2000, p. 29), who claim that the effects of a global sourcing strategy are as follows: 5 to 15 percent savings, 5 to 30 percent delivery time accuracy enhancement, 10 to 20 percent defect rate decline and "soft" improvements, like better communication and cooperation (Petersen *et al.*, 2000, p. 36).

In order to achieve these advantages, some of the most important success factors for global sourcing strategies are: information availability, awareness of global suppliers, globally competent suppliers, allocated time for global strategy development (Monczka *et al.*, 2006, p. 16; Trent & Monczka, 2003b, pp. 618-626), employee support, feasibility of aggregation of company demand, supplier site visits (Trent & Monczka, 2003b, pp. 618-626), skilled personnel (Monczka *et al.*, 2006, p. 16; Petersen *et al.*, 2000, pp. 33-35; Trent & Monczka, 2003b, pp. 618-626), availability of structures and processes, business capabilities in global sourcing, backing from top management (Petersen *et al.*, 2000, pp. 33-35), efficient logistics and cross-functional teams (Monczka *et al.*, 2006, p. 16).

Contrary to the majority of the literature on global sourcing, which is mainly built on US samples, Rexha and Miyamoto (2000, pp. 28-29) base their study on top Australian manufacturers. The results show that Australian firms practice more international sourcing and, contrary to previous literature, that this is not due to competitive requirements but to operational necessity (Rexha & Miyamoto, 2000, p. 31). The authors find no correlation between size and international sourcing processes. The main reasons for Australian manufacturers to do international sourcing are *"access to locally unavailable products"*, *"lower price"* and *"access to locally unavailable technologies"*, leaving *"better quality"* on the last spot (Rexha & Miyamoto, 2000, p. 30). Whereas some results from this study differ from previous cases, certain

internationalization reasons, like cost, remain present. Additionally, Rexha and Miyamoto (2000, pp. 30-31) show that close to 85 percent of respondents engage in international sourcing and that this percentage is higher for the part of the sample that is foreign-owned, the same trend applies, with different values, to the intensity of international sourcing.

Nevertheless, global sourcing also has defects. Indeed, regarding outsourced global sourcing, Kotabe and Murray (2004, pp. 11-12) claim that if strategic partnerships are established, the company will benefit from the outsourcing and enjoy greater flexibility. However, if suppliers are treated on an arm's length, the company will suffer a decrease in global competitiveness from outsourcing and thereby become dependent on these suppliers. The following subsection looks at the different limitations of global sourcing.

2.1.3 Limits of global sourcing

Global sourcing supporters like Monczka and Trent (1992, pp. 9-10) recognize that there is no *"one-size fits all"* sourcing strategy. Murray, Kotabe, and Wildt (1995, p. 196) even emphasize that this strategy needs to be continuously adapted to the changing environment, and that it might differ between products from the same company. It is thus relevant in this part to discuss the limits of global sourcing. It looks first at the determinants of the correct ratio of global to local sourcing, then highlights the main limits of global sourcing, and ends with some insights on local sourcing.

Correctly mixing global and local sourcing is crucial; indeed, Jin (2004, p. 1292) shows that the correct blend can minimize the cost/agility ratio. The author highlights main factors to reach this goal by focusing on the US clothes-manufacturing sector; but there might still be key learning points from this analysis for the pharmaceutical industry. In his research, Jin (2004, pp. 1293, 1295-1296) considers cost as the main benefit from global sourcing, and agility as its main limitation; furthermore, agility is subdivided in two components: speed and flexibility. Based on the ideas of Bucklin (1965), Jin (2004, pp. 1296-1297) relates global sourcing to the concept of speculation (early product differentiation - economies of scale) and local sourcing to the opposite concept: postponement (late product differentiation - inventory risk reduction). Jin (2004, pp. 1298-1302) highlights four conditions that will impact the right mix of global and local sourcing: importance of information and manufacturing technology, demand uncertainty, availability of local subcontractor clusters and duration of relationship with

subcontractors; the stronger/longer one of these variables, the more is sourced domestically. Additionally, Jin (2004, p. 1302) highlights that small production volumes lead to local sourcing *"regardless of its demand nature or variability"*.

A look at the strategic limits of global sourcing, through the lens of clusters and the resource-based view of the firm, is performed by Steinle and Schiele (2008) and leads to several conclusions.

First, from a resource-based view, the authors decide to view suppliers as possible valuable resources. For suppliers to be considered a valuable firm-addressable resource, the traditional VRIN criteria (valuable, rare, imperfectly imitable and imperfectly substitutable) have to be fulfilled (Barney, 1991). Two of these criteria can be linked to clusters: the difficulty to imitate and the rareness, as clusters make bonds more difficult to copy and as New Economic Geography features could predict the concentration of suppliers in several (rare) clusters (Steinle & Schiele, 2008, p. 6).

Second, clusters can have an important impact on the sourcing decision. Indeed, the difficulties to access a supplier in a foreign cluster may be twofold (technical and social), as *"clusters are socio-technical systems that have embedded relationships and a history of mutual adaptation by their actors"* (Steinle & Schiele, 2008, p. 5).

Third, the complexity of becoming a preferred customer rises with the distance to the supplier, limiting global sourcing. This preferred customer status is particularly important when appropriate suppliers are rare and is expressed by *"preferential resource allocation"* (Steinle & Schiele, 2008, p. 11).

Finally, the authors recommend domestic sourcing for specialized supplies, mainly due to strategic and competitive advantage reasons, and for general supplies, mainly due to important process costs; whereas they advise global sourcing for industry-standard supplies, mainly due to their minor impact on customer's purchase decision and potential to reduce costs (Steinle & Schiele, 2008, pp. 7-8, 12). However, this research is only based on the comparison of two companies from a high-tech environment, therefore the reasons for their discrepancies could be multiple and not all taken into account.

The main limits of global sourcing can be divided in two main parts, those related to cost issues and those related to managerial problems. On the cost side, these include: customs duties, currency fluctuations (Handfield, 1994, p. 49), protracted lead times, increased transport and inventory costs (Handfield, 1994, p. 49; Monczka *et al.*, 2006,

pp. 14-15), identification, delivery and quality of suppliers, shortage of qualified employees (Monczka *et al.*, 2006, pp. 14-15). Trent and Monczka (2003b, p. 616) also show that the cycle time for deliveries is typically 5 percent longer with international sourcing. On the managerial side, the main limits include: cultural differences, access to technical support, communication issues, time zone differences, need for similar technologies (Handfield, 1994, p. 49) and/or business units' unwillingness to abandon their independence (Gelderman & Semeijn, 2006, p. 215).

Whereas sourcing from low income countries is often legitimized by lower direct procurement costs, Park (2000, p. 219) finds that it leads to additional transaction costs in collaboration, quality and timely delivery. Additionally, from a pharmaceutical point of view, global sourcing facilitates counterfeiting, which puts lives and profits at risk (IBM Business Consulting Services, 2004, p. 6).

Moreover, Bozarth *et al.* (1998) cast doubt about the impacts of global sourcing by using the earlier mentioned four-phase development model introduced by Monczka and Trent (1991) on 55 US manufacturing companies' relationship to their main suppliers. The research by Bozarth *et al.* (1998) concludes that there is no significant difference in the level of relationship management between firms from phase 2, 3 and 4, leading to weak differences in procurement performance regarding these same groups.

Not only is global sourcing limited, its counterpart, local sourcing, also has advantages. Tunisini, Bocconcelli, and Pagano (2011, pp. 1014, 1019) highlight three areas of superiority of local suppliers of medium sized Italian leading firms from the mechanical industry: *"knowledge and innovation development, flexibility of production and delivery performance, and cost efficiency"*.

However, local sourcing is not perfect either. The threats of sourcing locally without a strategic approach are discussed by Golini and Kalchschmidt (2009, p. 284) who segment companies according to two dimensions, the level of local sourcing and the importance of physical proximity, thereby uncovering three categories: globals (low-low and low-high), patriots (high-high) and idlers (high-low). The authors find no important discrepancy between globals and patriots, apart from the superiority of patriots on throughput time questions (Golini & Kalchschmidt, 2009, p. 288). Nevertheless, the authors highlight that idlers underperform compared to the two other groups. In the context of Italian SMEs, Tunisini and Bocconcelli (2009, p. 677) show that local supplier networks are both a liability and an asset, emphasizing the importance of the

global/local supplier mix on the internationalization process of companies. Finally, Golini and Kalchschmidt (2009, p. 288) add that *"it rather seems that sometimes it is not so important from where companies source but how this is done"*, emphasizing the importance of a strategic approach to sourcing.

2.1.4 Reshoring

The discussion on global and local sourcing has very recently seen a new trend appear, which is coined reshoring, nearshoring (Ellram, Tate, & Petersen, 2013, p. 15) or manufacturing renaissance (Tavassoli, 2013). Indeed, firms like Ford, Apple and Canon are currently partly reshoring from China (Nakayama, Momotake, & Nakayama, 2014, p. 104). A cross-industry study by Tate, Ellram, Schoenherr, and Petersen (2014) even found *"that 40% of these companies perceived a trend toward reshoring to the US in their industries"*. To understand what this implies and how it currently impacts the sourcing mix of companies, the concept is defined and important factors in the location re-examination are described. Furthermore, this part introduces some advantages and limits of the trend, and ends on a note of its potential future.

Reshoring can be defined as *"the relocation of manufacturing facilities from traditional offshore locations to more attractive offshore locations, or even home to the United States"* (Tate *et al.*, 2014, p. 381). The distinction between ownership and location decisions is important in this context, as Gray, Skowronski, Esenduran, and Johnny Rungtusanatham (2013, p. 28) assert that reshoring is only a location decision. Furthermore, these authors define four possible scenarios: *"in-house reshoring"*, *"reshoring for outsourcing"*, *"reshoring for insourcing"* and *"outsourced reshoring"*.

While considering relocation, certain facts and factors have to be constantly taken into account. First, factors impacting regions' appeal as manufacturing location are dynamic, i.e. their importance changes over time. Moreover, the significance of government trade policies and supply chain-related factors (like supply interruption risk) for manufacturing location decisions is increasing. Additionally, in the search for manufacturing locations, firms progressively consider more relevant measures than simple cost savings (i.e. the impact on profits, total costs and customer value creation) (Ellram *et al.*, 2013, pp. 19-20). Finally, Tate *et al.* (2014, p. 387) introduce circumstances favouring a re-examination of the location decision: higher cost increases than global average, local financial instability, important domestic demand satisfied by

offshore plants, valuable intellectual property at risk, lack of respect for human and environmental rights as well as shifts towards automation.

To better explain why the reshoring trend currently seems to be growing, this paragraph highlights some of its main advantages. Reasons accounting for the reshoring phenomenon include: increasing wages in emerging markets (Nakayama *et al.*, 2014, pp. 103-104; Tate *et al.*, 2014; Tavassoli, 2013, pp. 7-14), a shift towards mass-customization and different economies of scale sources, higher transaction costs due to worse business habits/environments in emerging markets, an existing US-made products demand (Tavassoli, 2013, pp. 7-14), low energy costs in the US, a shortage of skilled labour in emerging economies, longer lead-times offshore (Tate *et al.*, 2014, pp. 383-384), a better intellectual property rights protection (Nakayama *et al.*, 2014, pp. 103-104; Tate *et al.*, 2014, p. 387) and lower transport costs (Tate *et al.*, 2014, p. 387), comparably larger country risks in China, a poorer product quality in emerging countries and a decreasing comparative productivity in emerging economies (Nakayama *et al.*, 2014, pp. 103-104). Additionally, Gray *et al.* (2013, p. 30) see global standardization of environmental regulation as going hand in hand with reshoring, as offshoring generally leads to higher pollution levels. Nakayama *et al.* (2014, p. 104) highlights reshoring arguments specific to the US (lower energy prices, political support and improved supply chain performance) and specific to Japan (favourable monetary policies and excellence in value creation through close-knit supply chains).

Nevertheless, the phenomenon also encounters certain limits and its future development can be questioned. First, regarding limits to the objectivity of several studies, Lahidji and Tucker (2014, p. 458) emphasize that part of the literature has lobbying origins and thus only defends certain interests. Then, the importance of the trend may be constrained by new features of emerging markets: growing market size (Gray *et al.*, 2013, p. 31; Tavassoli, 2013, pp. 16-17) and previous investments (Tavassoli, 2013, pp. 16-17). Looking at the decision's origins, Gray *et al.* (2013, pp. 29-30) explain that: *"a reshoring decision is a reversion from a previous offshoring or offshore outsourcing decision"*, implying that the offshoring decision needs to be considered when analysing reshoring. The authors highlight two potential causes for reshoring: an external modification in relative cost components between the two locations and internal appraisal changes for the relative total cost. Gray *et al.* (2013, p. 30) consider the second cause as the most important and argue that the offshoring (and potentially

reshoring) are inappropriate decisions. Finally, Tavassoli (2013, p. 16) maintains that offshoring still supplants reshoring and that the latter should only be done marginally.

2.1.5 Supplier selection

According to Kannan and Tan (2003, p. 473) supplier selection and assessment are the fundamental features in supplier management. The authors even claim that suppliers have to be considered as *"extensions of the buying firms itself"* (Kannan & Tan, 2003, p. 485). It seems thus natural for a discussion on sourcing to focus, at least briefly, on supplier selection and relevant criteria by introducing results from several studies.

Basing their study on European and US firms, Kannan and Tan (2003, pp. 476-478) highlight that the three key selection criteria are: timely delivery, quality promise and technical proficiency; and the four main assessment criteria are: quality, service, timely delivery and speed of adaptation to unforeseen events. The authors emphasize two irrational behaviours. First, the buyer regards information sharing as irrelevant in the assessment of its suppliers, even though it has the strongest impact on the buyer's performance (Kannan & Tan, 2003, p. 484). Second, firms from both regions prioritize "hard" selection and assessment criteria over "soft" ones, although "soft" criteria have the stronger link to performance (Kannan & Tan, 2003, p. 485). Indeed, Jin (2004, p. 1303) notes that a sustainable competitive advantage in sourcing can only be achieved through soft, rather than hard, factors due to lower imitability of soft factors by competitors.

Seemingly, supplier selection criteria (i.e. quality, performance and availability of input and reliability of its delivery) are properly used by firms, but involvement of suppliers (for the development and constant enhancement of output) is weaker (Vonderembse & Tracey, 1999, pp. 34, 36). Both supplier selection criteria and supplier involvement positively impact supplier performance, leading to an improved manufacturing performance (Vonderembse & Tracey, 1999, p. 37). Finally, Vonderembse and Tracey (1999, pp. 37-38) indicate that firms with high manufacturing performances set more emphasis on supplier selection criteria and supplier involvement.

2.1.6 Sourcing recommendations

This subsection analyses various recommendations from authors on how to enhance a sourcing strategy. These proposals are presented in increasing order of

practicality and end with the introduction to a model supporting the decision of sourcing globalization and incorporating global sourcing costs.

According to Loppacher, Luchi, Cagliano, and Spina (2006, p. 45), purchasing is centralized for relevant and standard input and, for this input type, sourcing is global when economies of scale are possible while lead-times and logistics costs are low. It is sourced locally when lead-times are important, input is a service or is personalized and local economic situation is superior. Decentralized purchasing occurs for non-critical input and is sourced globally when global suppliers are present locally or input is not a service and favourably sourced globally. And, it is sourced locally when delivery time is important, input is peculiar to a plant, it is a service or it is favourably sourced locally (Loppacher *et al.*, 2006, p. 45).

Getting closer to corporate decisions, Monczka and Trent (1991, p. 5) describe five sourcing strategies used in phase three and four of their model, by increasing order of global sourcing. A first option is to assign a local buyer with the responsibility to do the international purchasing. Then, linked to increasing complexity, a firm can decide to be assisted by subsidiaries in its international purchasing decisions. A third strategy is the creation of international purchasing offices (IPOs). A further step is to benefit from different international units by allowing them to create, manufacture and source a product; here, the firm enters phase four of the internationalization process. Finally, the global integration and coordination of the sourcing strategy is based on the two previous strategies but additionally allows boosting bargaining power by taking advantage of scale (Monczka & Trent, 1991, pp. 5-7). Furthermore, the authors claim results grow linearly with the first three strategies and exponentially with the fourth and fifth ones.

Finally, Monczka and Trent (1992, pp. 11-17) offer a model to evaluate the required worldwide sourcing for a company. The first step is an analysis of five forces forming the firm (*"competitive forces, customer requirements, worldwide market opportunities, nature of competition and supply base location"*) that help establish the right strategic reaction (Monczka & Trent, 1992, p. 11). Once this strategy is identified, a firm needs to compare its competences (in terms of: *"information systems, coordination mechanisms, personnel capabilities, functional and executive management support and level of integration between functions"*) to the prerequisites of this strategy. This leads to the detection of gaps, which the company then has to bridge. Finally, the firm

continuously supervises the implementation of these enhancements and the relevance of its strategy (Monczka & Trent, 1992, pp. 11-12).

Furthermore, Holweg *et al.* (2011, pp. 339-340) conceive a five-component risk evaluation tool for determining costs of global sourcing, basing it on: lead-time, demand uncertainty, service level priority, cost of expediting and component complexity.

2.1.7 Summary

Whereas global sourcing is highly acclaimed by certain authors, others strongly doubt its absolute superiority. In any case, all authors agree that there is no "one size fits all" strategy to corporate sourcing and it seems that the correct combination of global and local sourcing is a key element to high performance in the value chain. Once the mix of global and local is determined, the company still has to decide whether to perform an activity internally or to outsource it. The following section on transaction cost economics analyses this make-or-buy decision more precisely and help understand companies' choices.

2.2 Transaction cost economics

This section discusses the topic of transaction cost economics (TCE). The chosen unit of analysis in this theory are transactions (Williamson, 1975, p. xi; 1985, p. 41), which are considered the basic unit of activity (Commons, 1959, pp. 55-58). According to Williamson (1985, p. 1), *"A transaction occurs when a good or service is transferred across a technologically separable interface. One stage of activity terminates and another begins"*. In order to emphasize its importance, Williamson (1985, p. 19) even compares transaction costs to physical frictions. TCE is important in determining the right governance structure for a transaction to take place in. Coase's view on TCE is detailed first, followed by Williamson's view. The section ends with an analysis of the successes and limits of the theory.

2.2.1 Coase's view

This part focuses on a view developed by one of the founding fathers of transaction cost economics, Ronald H. Coase. In order to do so, a discussion on the make-or-buy decision is undertaken, which is followed by the comparison of specific governance modes. In the end, the importance attributed to asset specificity is debated.

Operations can be segmented in two, those taking place on the market (according to the price mechanism) and those taking place within the firm (according to the firm

decision makers)(Coase, 1937, p. 388). According to Coase (1937, p. 389), the partial substitution of the price mechanism defines the firm. Furthermore, Coase (1988b, p. 28) notes that contracts are limited and that firm decision-makers thus only partially command production factors. This means that, within firms, decisions outside the reach of the contracts are made according to the price mechanism and not according to administrative choices, i.e. there are internal markets within firms. Whether operations take place within the firm or on the market depends on a comparison of the transaction costs incurred in both cases (Coase, 1937, p. 404; 1988a, p. 38; 1988b, p. 32; 1988c, p. 17). A major advantage of firms is the reduction in transaction costs, as a single contract replaces a group of them (Coase, 1937, p. 391; 1988a, p. 39). Coase (1988a, p. 39) indicates that for a firm to be profitable the alternative transaction costs incurred on the market and the competitors' operating costs need to be higher than its own operating costs. However, Coase (1937, pp. 394-395) emphasizes that firms also have limits. Indeed, coupled with the growth in size of a firm, coordination costs may increase and resource allocation may become suboptimal. Additionally, an increase in the number of within firm transactions may lead to increased supply prices for employees due to a lower attractiveness of positions within larger companies (Coase, 1937, p. 395). Coase (1937, pp. 396-397) concludes that the lower these three negative impacts, the larger the firm. According to Cheung (1983, p. 10), an agent choosing the firm over the markets is not anymore guided by the "invisible hand", but rather by the visible one. The author claims that a decrease in product markets will be a direct effect of the rise in agents choosing to be guided by the visible hand. At the marginal equalization of these two costs, an equilibrium in contract substitution is achieved, leading to the definition of the firm size (Cheung, 1983, pp. 10, 19).

Looking at operations taking place on the market, Coase (1937, p. 390) argues that *"the most obvious cost of "organising" production through the price mechanism is that of discovering what the relevant prices are"*. Cheung (1983, pp. 6-9) develops four main reasons for these costly price discoveries in the absence of firms:

- The higher amount of transactions (Cheung, 1983, p. 6). Indeed Coase (1937, p. 391) states that with a firm: *"for this series of contracts is substituted one"*.
- The information cost linked to product knowledge. Cheung (1983, p. 7) explains that price agreements are cheaper with specialists, as they value input more correctly than consumers.

- Measurement costs, Cheung (1983, p. 7) argues that costs are higher when activities are high in frequency or involve difficult beforehand stipulation or variation; in these cases measuring proxies tends to be cheaper.
- Cost of contribution evaluation, regarding which Cheung (1983, p. 8) claims that in joint efforts each party will tend to overstate his merit.

Finally, Cheung (1983, pp. 9-10) asserts that price designation costs and monitoring agency costs move in opposite directions.

After looking at the make-or-buy decision in general, it is interesting to compare long-term contracts and vertical integration (Coase, 1988b, p. 30). One advantage linked to vertical integration is that it does not end with the death of the other party, as is the case in contracting. Contrary to prior belief (Coase, 1937, p. 392), Coase (1988a, p. 42) argues that long-term contracts and vertical integration tend to be substitutes, rather than the first leading to the second.

Coase (1988c, pp. 3-4) developed his ideas on transaction costs in 1932, but only published them in 1937 in his main article: *"the nature of the firm"* (Coase, 1937; 1988c, pp. 3-4). Coase (1988c, p. 12), quoting a letter from 1932 (March 24), introduces the concept of asset-specificity. Coase (1988a, p. 42) explains that as a supplier makes a relation-specific investment, leading to appropriable quasi-rents, the buyer has an incentive to behave opportunistically and to use its bargaining power to reduce prices until no returns on investment are earned by the supplier. Therefore, the supplier is reluctant to make this initial investment and the buyer misses the opportunity to get a better service/product. It is important to note that issues linked to asset specificity can happen both to suppliers and buyers. Firms must thus decide whether to apply long-term contracts or vertical integration based on a comparison of their relative costs; knowing that higher quasi rents and asset specificity (as they are positively correlated to capital costs (Coase, 1988c, p. 13)) increase costs of contracts more than costs of vertical integration (Coase, 1988a, p. 43), which would remove these risks (Coase, 1988c, p. 13). Yet, in opposition to other authors (Williamson, 1988, p. 70), Coase (1988a, pp. 43-44) rejects the importance of asset-specificity in business, as particular contract mechanisms and expected future business strongly limit the attractiveness of opportunistic behaviour.

2.2.2 Williamson's view

This subsection first contextualizes the view of Williamson and analyses behavioural assumptions as well as variables impacting transactions. Further, the goal of TCE is stated along with the analysis of hierarchies, one of the two extreme governance structures. The case of non-respected contracts is discussed in the conclusion, followed by a short summary of key TCE points.

Regarding new institutional economics, Williamson (1998, p. 75) differentiates between the environment and the governance type; with transaction cost economics being part of the latter. The initial goal of Williamson (1975, pp. 8-9, 253-254) was, through the organizational failures framework, to discover human and environmental components accounting for the costs of creation, completion and enforcement of contingent claims contracts. *"Transaction costs are economized by assigning transactions [...] to governance structures [...] in a discriminating way"* (Williamson, 1985, p. 18). According to Shelanski and Klein (1995, p. 341), the make-or-buy/vertical integration decision is the central issue in transaction cost economics. However, Williamson (1975, p. 84) claims that the theory is also useful for the organizational form chosen within the firm (in case of vertical integration), which is important (Williamson, 1985, p. 274). Williamson (1998, p. 76) summarizes a main point in transaction cost economics: *"Parties that are joined in a condition of bilateral dependency (by reason of asset specificity) and are confronted with contractual incompleteness (by reason of bounds on rationality) must confront strains (by reason of opportunism) when faced with the need to adapt cooperatively"*.

Regarding the traits of the parties, Williamson (1988, p. 68) considers two major behavioural assumptions characterizing transaction cost economics: bounded rationality and opportunism.

Bounded rationality implies that no contract can be complete (Williamson, 1988, p. 68), which occurs because *"human behaviour is intendedly rational, but only limitedly so"* (Simon, 1957, p. xxiv). Indeed, Simon (1955, p. 101) explains that *"actual human rationality-striving can at best be an extremely crude and simplified approximation to the kind of global rationality that is implied, for example, by game-theoretical models"*. The two components of bounded rationality are *"neurophysiological limits"* and *"language limits"* (Williamson, 1975, pp. 21-22). Furthermore, the factors that can lead to bounded

rationality include: uncertainty and risk, complexity and incomplete data about possible choices (Simon, 1972, pp. 163-164).

Opportunism is defined as *"a lack of candor or honesty in transactions, to include self-interest seeking with guile"* (Williamson, 1975, p. 9). The definition was later clarified as *"the incomplete or distorted disclosure of information, especially to calculated efforts to mislead, distort, disguise, obfuscate, or otherwise confuse"* (Williamson, 1985, p. 47). The meaning is thus that contracting parties do whatever is necessary to be better off. However, Williamson (1985, p. 64) states that opportunism is not the rule among agents and that those who are opportunistic only display this feature occasionally.

Finally, Williamson (1988, p. 69) summarizes the impact of the two assumptions as follows: contracts are incomplete and contracting parties are deceitful. It is noteworthy that when one of the two features, either bounded rationality or opportunism, is absent, contractual problems disappear (Williamson, 1985, pp. 30-32; 66-67).

Looking at the transactions, there are three main variables that impact transactions: asset specificity, frequency and uncertainty (Williamson, 1985, pp. 52-61). However, Williamson (1985, pp. 30, 56; 1988, p. 70) claims that the single most important factor is asset specificity.

Williamson (1988, p. 70) defines asset specificity as: *"the degree to which an asset can be redeployed to alternative uses and by alternative users without sacrifice of productive value"* and relates it to the sunk cost notion. Asset specificity holds that an investment choice has to be made, which is either transaction specific or general. The first option is cost reducing but its value in a second-best use is strongly diminished, making it a risky option (Williamson, 1985, p. 54). Williamson (1985, pp. 55-56) presents four asset specificity categories: dedicated assets, physical asset specificity, site specificity and human asset specificity. Further, Williamson (1988, p. 73) argues that hierarchies become more advantageous with increasing asset specificity.

Regarding uncertainty, Williamson (1985, pp. 56-57) asserts that different governance modes fit better different levels of uncertainty and the implied turmoil.

Frequency is important in so far as Williamson (1985, p. 60) explains that the implementation of beneficial but costly particular governance structures increases with the transaction frequency.

According to Williamson (1988, p. 73), the final goal of transaction cost economics is to find the governance structure (firm, hybrid or market) that minimizes transaction costs for a specific transaction. A comparative cost/benefit analysis of market and hierarchy modes decides how transactions are performed, but the right mode can evolve over time (Williamson, 1975, pp. 8,10). This comparison is done by the *"examination of comparative costs of planning, adapting, and monitoring task completion under alternative governance structure"* (Williamson, 1985, p. 2). This implies that *"Efficiency purposes are served by matching governance structures to the attributes of transactions in a discriminating way"* (Williamson, 1985, p. 68). Furthermore, Williamson (1975, p. 253) considers markets and hierarchies as *"alternative contracting modes"*. Williamson (1985, p. 42) also accounts for mixed modes of governance between the two extremes that are market and hierarchy. These structures are called hybrids and include for instance joint ventures and franchising (Williamson, 1985, p. 83). According to Shelanski and Klein (1995, p. 344), hybrid modes include: *"long-term contracts, complex contracts with reciprocity agreements, agreements to provide offsetting specific investments [and] equity linkages"*. Furthermore, Williamson (1985, pp. 161-162) states that different governance modes are associated with different incentive characteristics.

As looking at one of the two extremes automatically defines the opposite one, the following discussion focuses on hierarchy/internal organization. Williamson (1975, p. xv) characterizes a hierarchy by the relation of subordination between an employee and an employer. The main changes incurred by vertical integration are changes in ownership, incentives and governance structures (Williamson, 1985, p. 393). According to Williamson (1975, p. 10), an advantage of hierarchies is that they are less subject to opportunism and can thus more easily focus on long-term perspectives. They are also able to better tackle information impactedness issues (Williamson, 1975, p. 33). Moreover its features of flexible and subsequent decision-making give better protection against problems brought about by bounded rationality (Williamson, 1975, p. 40). Finally, hierarchies also reduce uncertainty, small numbers issues and calculative trade atmospheres (Williamson, 1975, pp. 257-258). The reason hierarchy leads to advantages is due to the fact that it changes the stakeholders' incentives (Williamson, 1975, p. 124). However, Williamson (1985, p. 138) claims that integration incurs *"unavoidable side effects"*. Indeed, the author argues that the size of firms has an upper bound, which is mainly due to intensified complexity, diminishing returns to expansion, abuses of

authority by top management, lack of cooperation among employees (Williamson, 1975, pp. 125-129). A big firm does thus not outperform a group of small ones because *"internal organization is unable to replicate the high-powered incentives of markets and is subject to bureaucratic disabilities"* (Williamson, 1985, p. 403). Additional findings show that vertical integration and product complexity are positively correlated (Sharon & Eppinger, 2001, p. 202) and that lower market production costs relate to scope and scale economies (Grover & Malhotra, 2003, p. 461).

When contracts are not respected, Williamson (1985, pp. xii, 29) claims that private ordering is to be preferred over court ordering; and the author strongly challenges the efficacy of the latter (Williamson, 1985, p. 29). This is due to the fact that *"outsiders often have little appreciation either for the costs of transactions or the range of informal sanctions that businessmen have access to"* (Williamson, 1975, p. 107). Williamson (1985, p. 166) states that the importance of court ordering is often overemphasized. However, Williamson (1988, p. 81) also recognizes the utility of courts as a last resort.

In conclusion, Grover and Malhotra (2003, pp. 460-461) summarize transaction cost economics in three statements: *"bounded rationality and opportunism give rise to transaction costs"*, *"transaction costs are higher under conditions of high asset specificity and high uncertainty"* and *"the most efficient governance mechanism (markets or hierarchy) needs to be chosen to organize economic activity. In general, lower transaction costs favor markets, while higher transaction costs favor hierarchies"*.

2.2.3 Success and limits of TCE

After having reviewed the different views on transaction cost economics, it is interesting to question its success as well as its limits, in particular with a focus on the view of Williamson. In the first paragraphs, key achievements of the theory are introduced. The following paragraphs then focus on the practical limits of the theory.

From a broader perspective, Shelanski and Klein (1995, p. 338) claim that the level of integration is positively correlated with uncertainty, asset specificity, frequency and complexity. The authors (p. 342) thus suggest that transaction cost economics arguments are generally relevant determinants for vertical integration. Moreover, Shelanski and Klein (1995, p. 343) point out that *"site specificity, dedicated assets, and the need for specifically tailored products or production facilities have been shown to increase integration in a variety of industries"*. Additionally, Shelanski and Klein (1995, p.

349) emphasize that many non-legally enforceable linkages respect transaction cost economics predictions (if necessary through private ordering) and are mainly respected due to reputational concerns and reciprocal provisions. However, Williamson (1998, p. 77) admits that the effectiveness of reputation in contracting is dependent on societal features, varying across populations. Based on findings from transaction cost economics studies in manufacturing, Grover and Malhotra (2003, pp. 463-465) conclude that, unlike for uncertainty, theoretical predictions are backed for asset specificity (p. 465).

A more specific success case is analysed by Hennart (2010) who focalizes on the relation between TCE and multinational enterprises (MNEs). The author concludes that the theory successfully explains occasions and causes for MNEs as governance structure (p. 262). Hennart (2010, p. 260) emphasizes two general conditions for the selection of MNEs in the internalization of *"non-pecuniary externalities"*: hierarchy is more profitable than markets and leads to positive profits. According to Hennart (2010, p. 261), three main requirements have to be satisfied for the MNE to be the selected governance structure for global value chains: efficient information exchange is vital and hard to organize; transaction-specific investments are necessary for value maximization; and, free riding is made possible *"because the separate impact of their [i.e. the participants in the value chain] output on the reputation of the product is difficult to assess"* (Hennart, 2010, p. 261).

Finally, a successful connection to the previous section on sourcing can also be made. Indeed, McIvor (2013, p. 24) supports the value of transaction cost economics at the operational and strategic level for the sourcing practice, in particular for the manufacturing location decision. In fact, McIvor (2013, p. 24) even claims that *"employing TCE as a theoretical lens to explain the sourcing of manufacturing processes can help to address a number of important questions"*.

The following paragraphs discuss various limits and criticisms that have been raised to the value of TCE. These have varying degrees of severity for the future of the theory, the final argument going as far as to predict the absence of future for TCE.

A first objection to the classical view is based on its terminology and its content. Demsetz (1988, p. 144) argues there is a need to distinguish between transaction costs and management costs and he defines those as *"the costs of organizing resources, respectively, across markets and within firms"*. Based on this terminology, Demsetz (1988, p. 145) argues that the only relevant comparison is on the sum of transaction and

management costs between market and vertically integrated production. Moreover, Demsetz (1988, pp. 146-147) claims that transaction is merely one of the parts of total costs and only one of the determinants of vertical integration. Furthermore, the author argues that increasing transaction costs lead to more and smaller firms and not to the switch from vertical integration to market coordination.

Coase (1988a, pp. 43-44) is not the only author rejecting the importance of asset specificity, Demsetz (1988, p. 147) also challenges Williamson's view. The author maintains that asset specificity is the only determinant used by Williamson and the author considers this relationship to be weak. Indeed, Demsetz (1988, p. 150) emphasizes that both, vertical integration and contracting, are efficient ways to deal with asset specificity issues. In his view, Demsetz (1988, p. 150) asserts that *"it is simpler and less misleading to state that asset specificity increases the loss attendant on failure of agreement than that it increases the cost of transacting"*. Furthermore, Demsetz (1988, pp. 153-154) affirms that asset specificity may actually lead to vertical disintegration as it *"may reduce the non-opportunistic costs of maintaining vertically separated organizations"* (p. 153).

A further criticism also includes one of the behavioural assumptions underlying the theory. Hill (1990, p. 501) criticizes the importance given to transaction cost economics, in particular arguments linked to asset specificity and opportunistic behaviour, as a cause for vertical integration. According to Hill (1990, p. 501), cooperative parties will find each other through the selection processes and collaborate together; with reputation being an important factor (Hill, 1990, p. 505). Further, Hill (1990, pp. 509-511) argues that the amount of opportunistic actors should continually decrease as it is unprofitable in the long term; however, this effect will be limited by non-discerned opportunism, outweighing opportunistic returns, inefficient markets and the cost of reputation establishment.

Schneider, Bremen, Schönsleben, and Alard (2013) offer a limit to the usefulness of the theory for sourcing issues by empirically testing the implication of transaction cost economics on global sourcing in the analysis of trade between Swiss firms and their international suppliers. Schneider *et al.* (2013, p. 244) discuss the existence of benefits from conforming governance structure to theoretical recommendations. Schneider *et al.* (2013, p. 250) found that firms aligning their governance structure to recommendations from transaction cost economics perform slightly lower than those over-incorporating.

Moreover, the authors indicate that transaction types have stronger impact on firm performance than governance structures and that additional performance variables need to be taken into consideration for the theory to have managerial relevance (Schneider *et al.*, 2013, p. 250). Variables suggested by the authors include: *"risk preferences, trust propensity, sourcing strategy, or market environment"* (Schneider *et al.*, 2013, p. 252). Additionally, Schneider *et al.* (2013, p. 251) observe a decreasing integration moving from Western Europe to Eastern Asia, the former being over-integrated and the latter somewhat under-integrated with respect to their transactions. This seems odd as spatial proximity to suppliers should diminish complexity via improved trust; however the authors account for this phenomenon by the importance of bounded rationality and opportunistic behaviour (Schneider *et al.*, 2013, p. 251).

Demsetz (1988) offers a constructive argument that could enable some theoretical extensions. Next to transaction cost issues that cover reasons for existence and degree of integration of firms, Demsetz (1988, p. 151) highlights the importance of internal firm structure determinants that are moral hazard, shirking and opportunism. These three incentive compatibility issues are partly caused by transaction costs (when roughly defined), but organizations' response to these challenges is hardly accounted for by these costs. The three determinants can thus be useful in the theory of the firm (Demsetz, 1988, p. 152).

One of the most extreme objections is defended by Ghoshal and Moran (1996) who reject the strand of the theory developed by Williamson mainly due to its foundation on market-failure, i.e. opportunism (Ghoshal & Moran, 1996, pp. 17, 23-25, 30-31). According to Ghoshal and Moran (1996, pp. 27, 31), TCE justifies the existence of firms based on their power to control opportunism and the theory primarily encourages rational over social controls; linked to opportunism, this leads to a self-sustaining mechanism where rational controls will be used more intensively until the benefits of vertical integration are nullified. This focus *"on rational control will lead firms to domains in which they would be uncompetitive in comparison with and, therefore, would ultimately succumb to markets"* (Ghoshal & Moran, 1996, p. 28). Ghoshal and Moran (1996, p. 39) coin the theory as *"bad for practice"*, as they argue that it ultimately leads to increased opportunism. Finally, in the perspective of Ghoshal and Moran (1996, p. 42), there is no future in this strand of the theory and the authors recommend a new start, for a better theory.

2.2.4 Summary

In conclusion, transaction cost economics offers a way to analyse a company's make-or-buy decision, by focusing on asset specificity. TCE remains rather theoretical, which could be a limitation of its operationalization, but several authors' try to fix this drawback. For others the theory is even doomed to fail. Its application to case studies at a later stage of this research helps determine the predictive power of transaction cost economics in the case of pharmaceutical sourcing.

Chapter 3. Case studies

The following chapter unfolds as follows. First, thorough background information on the pharmaceutical industry is introduced, in order to understand the context of the cases. Then each single case study is presented and discussed; for each of them a strong focus is put on how they deal with sourcing. This information is then used in the following chapter, where a cross-case analysis is performed to reach generalizable conclusions.

3.1 A supply chain perspective of the pharmaceutical industry

This first section thoroughly introduces the pharmaceutical industry, which helps to better contextualize the case studies that follow. First, the focus is put on the pharmaceutical supply chain, which is supported by an example of the US model. The following part then describes the main challenges faced nowadays by pharmaceutical companies. Next, some possible scenarios for the pharmaceutical industry's future and possibilities for companies to thrive in these changing environments are presented. Finally, the conclusion of this part summarizes the main ideas and links them to the need to more specifically look into sourcing policies.

3.1.1 Description of the pharmaceutical supply chain

This subsection starts with a short introduction to the R&D process in pharmaceuticals and then highlights the reasons for a focus on the pharmaceutical supply chain, based on the example of the US model. The aim of this description is to better understand the particular context of the industry.

The steps of the R&D process in the pharmaceutical industry can be summarized, in order of happening, as: drug discovery, preclinical testing, clinical trials (phase 1, 2 and 3), FDA review, manufacturing (and the need to abide by the Good Manufacturing Practices (GMP) of the FDA), post-approval research and monitoring (PhRMA (Pharmaceutical Research and Manufacturing of America), 2012, pp. 30-36). Pisano (1994, p. 89) further breaks down the clinical trial in three phases: (1) determination of safety in human; (2) dosage variation and impact on efficacy; (3) large-scale human trial of overall drug effect.

The supply chain is of particular interest in the pharmaceutical industry as *"manufacturing and distribution typically account for about 40 percent of the headcount*

and 60 percent of the capital employed in a large pharmaceutical firm" (IBM Business Consulting Services, 2004, p. 1); and McKinsey & Company (2013, p. 11) considers that a quarter of total costs are accounted for by the supply chain. Moreover, McKinsey & Company (2013, pp. 2, 6) estimates the average manufacturing lead-time (from plant to distribution centre) in the sector to be 75 days and inventories equivalent of 258 days, which is unbearably high compared to equivalent numbers in fast moving consumer goods. The topic is thus worth further analysis.

A first division in two parts of the supply chain in the industry is offered by Singh (2005, pp. 31-32). There is the trial supply chain that supplies the trial phase and the pharmaceutical supply chain that supplies the customers. According to the author, the first needs to be responsive/agile, whereas the second focuses on increased availability of the products. This latter focus is due to the huge opportunity cost of lost sales (compared to the cost of raw materials), leading to the implementation of a constant high stock policy for raw materials (Singh, 2005, p. 65).

The pharmaceutical (prescription drug) supply chain is best described by a concrete example; this part is based on the US model, as it is the largest national market worldwide (EFPIA (European Federation of Pharmaceutical Industries and Associations), 2013, p. 14; The Kaiser Family Foundation, 2005, p. 5). Indeed, EFPIA (European Federation of Pharmaceutical Industries and Associations) (2013, p. 14) notes that the main market for pharmaceuticals is North America (41 percent), whereas Europe only represents 26.7 percent. According to The Kaiser Family Foundation (2005, p. 1), the US pharmaceutical (prescription drug) supply chain consists of three main actors: Pharmaceutical Manufacturers, Wholesale Distributors, and Pharmacies. Each of these stakeholders is briefly described hereafter.

Pharmaceutical Manufacturers

This category can be further divided in two product categories: Brand-name drug manufacturers and generic drug manufacturers (some companies produce both types of drugs). Whereas the first category invests in the research and development of new drug therapies, the second one only focuses on the manufacturing of off-patent products.

Sousa, Liu, Papageorgiou, and Shah (2011, p. 2396) distinguish five main players in manufacturing: branded-products multinationals, biotech companies, national players, CMOs (Contract Manufacturing Organizations) and international generics companies.

Additionally, The Kaiser Family Foundation (2005, p. 17) claims that drug prices are mostly influenced by manufacturers. This is not only the case in the US, as manufacturers in Europe get on average 65.2 percent of the drug's retail price (EFPIA (European Federation of Pharmaceutical Industries and Associations), 2013, p. 14).

The pharmaceutical manufacturing industry has been subject to an important number of mergers and acquisitions in recent years, leading to a consolidated industry (UPS, 2005a, p. 1). Indeed, The Kaiser Family Foundation (2005, p. 5) points out that in 2004, 60 percent of US sales were captured by the top ten pharmaceutical companies (by US sales). Nevertheless, the goal for this consolidation trend has shifted from scale, to the development of more consistent drug portfolios and the purchase of smaller, more innovative entities (The Economist, 2014).

Manufacturing is often divided in two main stages: primary and secondary manufacturing (Shah, 2004, pp. 931-932; Sousa *et al.*, 2011, p. 2399). The active ingredient (API) is produced at the primary site; these sites incur long cycle times and demand variations (Sousa *et al.*, 2011, p. 2399). Their output is then transported to the secondary site where it is added to the excipient and where the drug is packaged (Shah, 2004, pp. 931-932). Secondary manufacturing locations often outnumber primary sites and serve local markets due to important conveyance costs (Sousa *et al.*, 2011, p. 2399)

The largest share of manufacturer's sales goes to Wholesale Distributors (The Kaiser Family Foundation, 2005, pp. 1-4).

Wholesale Distributors

Wholesale distributors are the link between the Pharmaceutical Manufacturers and the "retailers" (pharmacies, hospitals...). This sector has also been consolidated over the last decades, as The Kaiser Family Foundation (2005, p. 8) notes that in 2004 McKesson, Cardinal Health and AmerisourceBergen represented 88 percent of the US market; whereas they reached 95 percent in 2013 (Schuetze & Siebelt, 2013).

Pharmacies

Pharmacies mostly purchase drugs from Wholesale Distributors and represent the final intermediary to patients; this segment has also undergone consolidation (The Kaiser Family Foundation, 2005, p. 9). The Kaiser Family Foundation (2005, p. 9) acknowledges the existence of different types of pharmacies in the US market:

"independent pharmacies, chain drug stores, pharmacies in supermarkets and other large retail establishments, and mail-order pharmacies".

3.1.2 Industrial challenges

The pharmaceutical industry is currently facing tremendous challenges, which can account for the relevance of research during this period of rapid change. The main challenges and forces leading to price decreases are described in this subsection. The general trend is for healthcare costs to grow quicker than GDP (Mathews & Brimacombe, 2013, May 28).

First, the incredible growth in US managed care organization (MCO) memberships from 1980 (5%) to 2001 (90%) (Bradley & Weber, 2003, p. 2) gives the MCOs strong bargaining power to pressure prices down (Bradley & Weber, 2003, p. 2; Singh, 2005, pp. 120-121). However, Bradley and Weber (2003, p. 2) note that US drug prices remained the highest worldwide.

Second, generics entered in the market (Accenture, 2012, p. 3; IBM Business Consulting Services, 2004, p. 1; United Nations Conference on Trade and Development, 2014, p. 13; UPS, 2005a, p. 1; Van Arnum, 2012) and quickly gained market shares thanks to the managed care organizations. The price of generics can go as low as 10% of the price of the branded products they compete with (Bradley & Weber, 2003, p. 3). In 2011, generics reached an 80% market share in the US (PhRMA (Pharmaceutical Research and Manufacturing of America), 2012). Further, Bradley and Weber (2003, p. 3) observe how a favourable change in regulation facilitated the entry of generics: the introduction of the Waxman-Hatch Act in 1984, which lead to a quicker authorization mechanism of pharmaceuticals. However, the generics' entry was mainly enabled through the so-called "patent cliff" (United Nations Conference on Trade and Development, 2014, p. 13). The "patent cliff" is the expected sales decrease due to the patent expiry of big pharmaceutical companies' blockbuster drugs, going along with a decreasing number of new blockbuster introductions (The Economist, 2011). The Economist (2011) estimates that top-selling drugs accounting for $170 billion of annual sales have patents expiring in the period of 2011 to 2015.

Third, the industry has been under strong political and social pressure due to high price levels (Accenture, 2012, p. 3; Bradley & Weber, 2003, pp. 3-5; McKinsey & Company, 2011; Shah, 2004, p. 930).

Fourth, costs linked to R&D have been growing (UPS, 2005a, p. 1) due to increased approval periods and development complexity; the productivity of R&D is thus on the wane (Bradley & Weber, 2003, pp. 6, 12; Shah, 2004, p. 930; Sousa *et al.*, 2011, p. 2396; Van Arnum, 2012). Daemmrich (2009, p. 6) summarizes different sources and shows how R&D productivity within pharmaceuticals declined from the 1960s to the beginning of the 21st century. Indeed, the total number of New Chemical Entities (NCEs) went down from 692 (in 1961-1970) to 180 (in 1991-2000). Recently, the FDA listed 27 NCEs approved by the CDER (Center for Drug Evaluation and Research) in 2013 (U.S. Food and Drug Administration, 2014b).

Fifth, the growing outsourcing trend lead external biotechnology firms to discover the drugs and Contract Research Organizations (CROs) to cover the highly expensive clinical trials for the pharmaceutical companies (Bradley & Weber, 2003, pp. 11-12).

Finally, sixth, emerging markets represent a higher business complexity (Accenture, 2012, p. 3) and these markets' spending on pharmaceuticals are expected to double from 2012 to 2016 (IMS Institute for Healthcare Informatics, 2012, p. 3). Indeed, Mathews and Brimacombe (2013, May 28) emphasize that emerging markets lead to shifts in the pharmaceutical industry as BRIC countries are expected to be amongst the top 10 pharmaceutical markets by 2015.

Some of these trends have lead to an increase in mergers and acquisitions and to the outsourcing of R&D and non-core business activities (United Nations Conference on Trade and Development, 2014, pp. 13-14). Singh (2005, pp. 123-124) adds that the outsourcing is becoming the rule rather than the exception (rise of Contract Research Organizations (CROs) but also of Contract Manufacturing Organizations (CMOs)).

3.1.3 Outlook for the pharmaceutical industry

Various authors and institutions try to predict the future of pharmaceutical companies, how they will be structured and what reasons are behind these changes. This subsection does not focus on the previously described challenges faced by the industry; however, the reader should bear in mind that these challenges have an influence on the outlook of the pharmaceutical industry. Instead, some scenarios and predicted changes by several authors are introduced to allow the reader to understand the importance of sourcing for a prosperous future.

From a global perspective, United Nations Conference on Trade and Development (2014, p. xvii) shows that even though the USA is still the largest market for pharmaceutical foreign direct investment (FDI), FDI is shifting towards developing countries. Indeed, there has been a rise from 4 to 18 percent (from 2006 to 2013) in the share of cross-border mergers and acquisitions targeting non-developed countries in the pharmaceutical industry.

PricewaterhouseCoopers (2011, p. 4) identifies seven forces that shape pharma's future supply chains: quicker drug approval, raise of vaccines and biological drugs, enhanced value of effectiveness, intensification of home therapy, multiplication of developing market specific products, as well as *"greater public scrutiny"* and increased *"environmental pressures"*.

In a first scenario offered by PricewaterhouseCoopers (2007), the authors (2007, pp. 2-3) present diverse trends shaping the future of the pharmaceutical industry. These changes are summarized as economic, demographic and epidemiological. They mainly comprise the aging of the population, the growth of developing countries and the impact of global warming on the presence of illnesses in new regions. According to PricewaterhouseCoopers (2007, pp. 3-5), those changes can be considered as opportunities for pharmaceutical companies. However, pharmaceutical firms will be unable to monetize those changes due to a lack of product innovation. The increasing healthcare burden might also negatively impact governments' attitudes towards companies (PricewaterhouseCoopers, 2007, p. 27). Finally, the report predicts changes in the production pattern of drugs. Indeed, according to PricewaterhouseCoopers (2007, p. 37), there will be an increasing shift to contract manufacturers due to current in-house overcapacity, with instances of less than 50 percent plant utilization rate in the industry; these CMOs will have to be treated as strategic partners.

UPS (2005b, p. 2) presents another scenario and identifies areas within pharmaceutical supply chains that are prone to allow firm differentiation; those include production and procurement. Regarding production, UPS (2005b, p. 3) describes pharmaceutical firms as inflexible, slow to adapt and characterized by over-/under-capacity; PricewaterhouseCoopers (2011, p. 3) adds lack of cost-effectiveness to this list. Three solutions UPS (2005b, pp. 3-4) predicts are: *"rationalized global production networks; changeover competence and smaller batch production; compliance management"*. Regarding procurement, UPS (2005b, pp. 9-10) states that: *"a dollar saved*

in operating expense may have the same effect on profit as a $10 gain in sales". UPS (2005b, pp. 9-10) foresees that strategic sourcing and supplier management represent great future benefit sources.

IBM Business Consulting Services (2004, p. 8) discusses three supply chain models for the pharmaceutical industry's future, these are: the *"volume manufacturer"*, who will focus on off-patent drugs and cost reductions through economies of scale; the *"High-tech manufacturer"*, who relies on strong and interactive R&D capabilities and focuses on patented drugs; and the *"network integrator"*, who outsources production and actively manages its network (IBM Business Consulting Services, 2004, p. 8).

Finally, Singh (2005, p. 147) concludes that strategies as well as operating models are out of date in the pharmaceutical industry and need to evolve. McKinsey & Company (2011) adds that *"A bolder, more radical approach to Big Pharma's operating model must become a realistic planning scenario"*. Before changes occur, it is thus interesting to see how firms currently cope with their sourcing strategies and what key learning can be taken out of it.

3.1.4 Summary

McKinsey & Company (2013, p. 11) estimates that supply chains account for a quarter of total costs in the pharmaceutical sector and are thus an interesting point to start the necessary changes to cope with shifts in the industry as well as to improve patient well-being. Three main advantages to take out of these changes are: reduced costs, improved safety and increased market access (McKinsey & Company, 2013, pp. 2-4). The authors suggest that these goals can be achieved through internal and external changes in the supply chain (McKinsey & Company, 2013, pp. 5-10), therefore it is useful to have a look at the pharmaceutical supply chain. Additionally, Accenture (2012, p. 4) claims that procurement is currently an underrated value creator for the industry. The authors assert that procurement accounts for 50% of total costs and that pharmaceutical companies usually underperform on indirect spending (for instance, R&D), but are top players in production and raw materials cost management (direct spending), compared to other industries (Accenture, 2012, p. 4). This apparent high performance in direct spending can be useful to define best practices in the industry and in particular identify how pharmaceutical companies combine global and local sourcing.

After having thoroughly described the pharmaceutical sector, the next step is to analyse case studies from the industry to learn how global and local sourcing are combined.

3.2 Case study 1. Laboratoires Bailleul

This first case study focuses on Laboratoires Bailleul, which are considered as being part of the Small/Medium-Branded category for the purpose of this research. The company is first introduced in order to understand its structure and activity. Research and development is then briefly discussed, followed by a thorough analysis of the company's global/local sourcing mix. The discussion ends with a look at transaction cost economics and a summary of Laboratoires Bailleul's strategy.

3.2.1 Company introduction

Laboratoires Bailleul is a medium-sized family-owned pharmaceutical company established in France in 1949 and headquartered in Switzerland (Geneva). The company is specialized in dermatology, along four main medical areas: alopecia, mycosis, acne and rosacea. Additionally, there is a complementary area, mainly developed in France, for family medication (i.e. coughs and circulatory problems). Its two main brands are: Biorga Dermatologie and Therica Médication Familiale. Four key aspects of the patient are tackled: prevention, treatment, care and anti-recurrence (Laboratoires Bailleul International, 2014). Laboratoires Bailleul mainly offers branded drugs, but also offers several generics as well as cosmetics (D. Negri, personal communication, July 22, 2014). All facts discussed in this case study strictly relate to the branded drugs part of their portfolio.

Laboratoires Bailleul is described from a more quantitative perspective in the following paragraph. First, as the company is privately-held and thus not listed on any stock market, its balance-sheets are not publicly available; its turnover of €30.5Mn is thus a rough estimate at best (Les Echos, n.a.; Société, 2015; Verif, n.a.). The company employs close to one hundred people (B. Barthélémi, personal communication, June 30, 2014). From a market perspective, the firm offers a portfolio of approximately 40 drugs (Pharmaxie, n.a.); of which 4-5 are considered best selling products (D. Negri, personal communication, July 22, 2014). With a two-digit annual growth rate, the company is developing quickly in Belgium; however, France still accounts for approximately 60 percent of the company's total business and offers the largest product portfolio. The

strategy of senior management is to keep growing in France, whilst spreading its revenues over several markets, in order to diversify and decrease risks (B. Barthélémi, personal communication, June 30, 2014).

From an international perspective, Laboratoires Bailleul has seven subsidiaries, located in: Belgium, France, Italy, Portugal, Spain, Switzerland and Turkey. Overall, with exports, the company is present in 45 countries in Europe, Asia, Africa and the Americas (Laboratoires Bailleul International, 2014). Export activities cover the partnering with local players who manage the product portfolio until the market share is high enough for the installation of a subsidiary in the country (B. Barthélémi, personal communication, June 30, 2014). In 1979, Laboratoires Bailleul officially started its international business (Laboratoires Bailleul International, 2014). However, internationalization on a larger scale started only with the recruitment of the first external managing director, four to five years ago (B. Barthélémi, personal communication, June 30, 2014).

3.2.2 Case study

The following sections, whilst focusing on branded drugs, discuss consecutively research and development, the global and local sourcing mix and supplier management at Laboratoires Bailleul. Finally, the impact and importance of TCE for the company is looked at. It is important to notice that supply and logistics functions for the subsidiaries and export clients are centralized at the headquarters, in Geneva. Moreover, sourcing costs (i.e. raw materials, packaging materials and production of the drug) represent between 35 and 40 percent of turnover (D. Negri, personal communication, July 22, 2014).

Research and development

Research and development is totally outsourced; indeed, Laboratoires Bailleul aims at creating partnerships with specialized companies lacking commercial capabilities (B. Barthélémi, personal communication, June 30, 2014). More specifically, the company uses two main strategies: the use of historical products, which are improved with the help of external developers and then turned into generics, as well as the purchase of new drug formulas (D. Negri, personal communication, July 22, 2014). This outsourcing decision allows the company to be more flexible, to focus on its core business and to avoid amortization issues. In return, the company accepts a certain loss

of control. Research and development is outsourced, but is still mainly done locally (D. Negri, personal communication, July 22, 2014).

Sourcing and supplier management

Whilst analysing the global and local sourcing combination of raw materials, semi-finished products and the location of production sites of Laboratoires Bailleul, it is relevant to understand what the company associates with these two options. In the mind of the company, global sourcing is linked to: lower costs, long lead-times, and weaker safety/quality; whereas local sourcing is linked to: better quality, higher frequency of transactions/repetitiveness and easier to manage logistics (D. Negri, personal communication, July 22, 2014).

Production is a key element of the value chain of a drug and Laboratoires Bailleul's decisions are described in this section. Historically, Laboratoires Bailleul owned a manufacturing site. However, this turned out not to be profitable (B. Barthélémi, personal communication, June 30, 2014). As a consequence, all production was outsourced to Contract Manufacturing Organizations (CMOs), who own the production equipment. Production is done 100 percent locally, with the majority of Contract Manufacturing Organizations located in France. CMOs have been selected mainly based on historical reasons. Other reasons accounting for this local choice include: closeness to the main market, CMOs' application of the GMP (Good-manufacturing-practice)/GDP (good-distribution-practice) norms, desired quality at the required price and reasonable lead-times. The company does not contemplate relocating current CMOs globally, due to logistics, safety and quality concerns. However, as there is a desire to continue the international expansion, the company will consider new CMOs from these markets to have a local presence (D. Negri, personal communication, July 22, 2014).

The sourcing of raw materials is another main topic in this research, and Laboratoires Bailleul is mainly doing it on a global basis (90 percent global sourcing), with the majority of inputs originating from China and India. Actually, raw materials are not sourced directly from the producer, but from local distributors (located in Europe), who source them globally. Laboratoires Bailleul has approximately 15 such suppliers, which are also responsible for the sourcing of other pharmaceutical companies. More specifically, there is a difference between the sourcing of active ingredients and excipients. On the one hand, the Contract Manufacturing Organization is directly

responsible for the supply of the excipients it uses in the production of drugs. Indeed, CMOs can reach lower prices through superior excipient quantities, as they do not only produce for Laboratoires Bailleul. On the other hand, Laboratoires Bailleul is responsible for the supply of active ingredients, which are key to the drug, and packaging material (D. Negri, personal communication, July 22, 2014).

Whereas the previous paragraphs allow for a detailed view on two precise topics, a more general view is discussed now. Regarding the five-step model of global sourcing developed by Monczka and Trent (1991, pp. 4-5) and Trent and Monczka (2003a, p. 29; 2003b, pp. 613-614), the firm considers itself at the second level: engage in international purchasing as needed. This is due to the fact that the company has a relatively low maturity level on the issue of active global sourcing as the sourcing approach is relatively new to the company. Indeed, the current structure of the procurement department and the sourcing approach have only been put into place two years ago; before, there was no organized sourcing and supply securing approach and also no procurement strategy in place. Currently, Laboratoires Bailleul is still lacking an ABC categorization of its supplies and a formal procurement strategy. The company is in a reactive approach and is implementing a supply securing policy, due to experienced trouble with raw materials sourcing on long distances and local CMOs' experiencing difficulties. In the medium term, the goal of the firm is to actively manage its purchasing portfolio with an ABC categorization, to analyse which products are the most sensitive and how to differentiate the sourcing of critical components compared to non-critical ones. Yet, this is a time-consuming process, as changing the CMO or the raw material of a drug is a lengthy and difficult process in the pharmaceutical business. This makes the initial choice of suppliers extremely important and explains why supplier changes occur only in extreme cases (D. Negri, personal communication, July 22, 2014).

From a supplier management point of view, selection criteria (for CMOs, suppliers and external R&D parties) are currently very crude and only include quality, the most important factor, and total costs. A future goal is to add two criteria to this list: lead-times and flexibility. Moreover, supplier assessment is currently being established, but not yet in place. Assessment criteria will be checked every two months and will include: quality and timeliness of delivery. When looking for new suppliers, the company mainly uses typical research engines (the internet) and its network (D. Negri, personal communication, July 22, 2014).

As a rule of thumb, at present, suppliers generally meet quality requirements but delivery requirements are only met in 60 percent of the cases; when delays occurs, these are of a few weeks (D. Negri, personal communication, July 22, 2014).

In order to reduce these risks, the company mainly tries to create redundancy to avoid having a single source of supply. This is done in order to have a backup plan in case there is a difficulty and to absorb consumption peaks. The first step is thus to register new CMOs and new raw material suppliers, which the company is currently at the very beginning of, and it estimates that five more years are needed before significant results can be achieved (D. Negri, personal communication, July 22, 2014).

Transaction cost economics

The final step in this case study is to look at the importance of transaction cost economics for Laboratoires Bailleul.

There is currently no trend towards internalization of any of the outsourced activities and the coordination cost differences between markets and hierarchy are not significant to decision-makers (D. Negri, personal communication, July 22, 2014).

In general, Laboratoires Bailleul deems the risk of transactions relatively weak. However, the risk is considered critical on several issues: the risk of a sole supplier artificially increasing their prices and the quality risk of raw materials sourced from China. The latter point is subdivided in: the ease with which these suppliers can lose their authorizations, making them unable to supply the company; and the hazardous viability of suppliers due to financial distress. The company considers that these three main risks apply to a fifth of their portfolio, with 20 percent of products causing 80 percent of the trouble (Pareto law). And there is no correlation between the turnover of a product and its propensity to encounter any of the mentioned issues (D. Negri, personal communication, July 22, 2014).

Transaction cost economics can help understand the outsourcing choice of production. Indeed, as CMOs are not only producing for Laboratoires Bailleul, but also other pharmaceutical companies, it seems that the assets involved are not specific to the transaction, and theory shows that low asset specificity is best dealt with markets. Apparently, high frequency and medium uncertainty are not sufficient, in the wake of low asset specificity, to lead to the vertical integration of Laboratoires Bailleul with the production stage. This confirms the assumption that asset specificity is the most important variable that impacts transactions (Williamson, 1985, pp. 30, 56; 1988, p. 70).

3.2.3 Summary

As a conclusion to this case study, Laboratoires Bailleul's strategy to combine global and local sourcing for raw materials, R&D and production sites is summarized. Currently, Laboratoires Bailleul applies a constrained strategy, in which the company adapts to the market. Global sourcing is used for raw materials because there is no alternative choice and local sourcing occurs because of historical and facility reasons. In the future, the firm aims at setting up a good supplier management system in order to improve its profitability (D. Negri, personal communication, July 22, 2014).

3.3 Case Study 2. Janssen (J&J)

This case study focuses on Janssen, considered part of the Big-Branded category for the purpose of this research. First, the company is introduced in order to understand its structure and activity; research and development is discussed next, followed by an analysis of the company's global/local sourcing mix. The case study ends with a look at transaction cost economics, a perspective on future strategy and a summary of Janssen's current strategy.

3.3.1 Company introduction

Headquartered in New Brunswick (US), Johnson & Johnson (J&J) is a family of 275 companies with total sales of $71.3Bn. The company was founded in 1886 and currently employs 128,700 people (Johnson & Johnson, 2014; Johnson & Johnson Services, 2015). Johnson & Johnson is constituted of three business segments: Consumer, Medical Devices & Diagnostics and Pharmaceuticals; which are based on a system with decentralized management (Johnson & Johnson, 2014; Johnson & Johnson Services, 2015). Janssen Pharmaceutical Companies represents the pharmaceutical business segment and accounted for 39 percent of total sales of J&J in 2013. Sales of Janssen are approximately equally distributed between the US and the rest of the world. Janssen is the seventh largest pharmaceutical company in the world and the main treated therapeutic areas include: immunology, neuroscience, oncology and infectious diseases. Its main blockbuster drugs (sales superior to $1Bn) are, in order of importance: Remicade, Prezista, Zytiga, Velcade, Stelara, Procrit/Eprex, Risperdal/Const, and Invega/Sustenna/Xeplion (Johnson & Johnson, 2014). *"Our strategy is to be the leader in these disease stronghold areas that we have outlined"* (L. Livingston, personal communication, May 28, 2014). Off-patent drugs often become OTC (over-the-counter)

and are then moved to the consumer business segment (J. Van den Heuvel, personal communication, August 4, 2014). The company focuses only on branded drugs and produces no generics, as *"we focus on the new stuff, there is so much of an unmet need in the world today in terms of pharmaceuticals or procedures, it's just scary"* (R. Sheppard, personal communication, May 28, 2014).

Janssen produces globally around 6,000 SKUs (stock keeping units). Europe-wide, the company produces 250 million packs per year and has 500 to 600 different formulations (J. Van den Heuvel, personal communication, August 4, 2014).

3.3.2 Case study

The following sections, whilst focusing on branded drugs, discuss consecutively research and development, the global and local sourcing mix, supplier management and TCE relevance for Janssen.

Research and development

Research comprises many steps. On the one hand, Janssen owns approximately 3-4 large centres worldwide for the discovery and in-house testing part. On the other hand, clinical trials are spread globally in order to reach a representative sample needed for the global introduction of new drugs (J. Van den Heuvel, personal communication, August 4, 2014). Development is often done in the same place as research (3-4 main locations). Once the galenic form (liquid, cream, injectable) is decided, the pharmaceutical product is developed and is then transferred to production for validation and up scaling (J. Van den Heuvel, personal communication, August 4, 2014).

Combined with decreasing in-house discoveries, the number of in licensed products has been on the rise, which represents an outsourcing of R&D. However, *"our first choice is never to have development outsourced"* (J. Van den Heuvel, personal communication, August 4, 2014). Indeed, in licensing often limits the company's choices, for instance regarding galenic form. The development and even the production up scaling and validation are often already done, meaning that the company has to accept these choices. Janssen offers these smaller companies its experience with the up scaling, development capabilities (when needed) and sales channels. Problems with in licensed products often include stability and reliability because these small companies tend to be good in research but not as much in operations. This in licensing is considered to have

no strategic advantage and is mainly done by the company out of necessity to get new drugs (J. Van den Heuvel, personal communication, August 4, 2014).

The company has recently undergone changes on its research and development activity; it has set up regional centres for innovation to look at the development of new drugs and components by small development companies (R. Sheppard, personal communication, May 28, 2014). These centres provide Janssen with the opportunity to be present at the moment a molecule is found. This enables guidance and partnerships, which is beneficial for later phases of the drug development (J. Van den Heuvel, personal communication, August 4, 2014).

Sourcing and supplier management

Production decisions are key in the structure of Janssen's supply chain and impact its way of doing business. The internal-external breakdown in volume approximates 60-40, meaning that 40 percent of volume is produced by CMOs. A main reason for this importance of outsourced production is linked to the in licensing of products. As explained earlier, this is not on a voluntary basis but rather a constraint. Outsourcing, which would then be considered voluntary, is estimated to account for half of the current outsourcing practice (J. Van den Heuvel, personal communication, August 4, 2014).

The location of company owned production sites often has one or more of the following reasons: historical, financial, regulatory, closeness to market, partnerships, and availability of very specific supplies. For pharmaceuticals, the most important production sites in the US are mainly on the Island of Puerto Rico, but there are also several plants in the New Jersey area and some plants in California, near San Francisco. In Europe, there are three major sites in Italy, Switzerland and Belgium. In Asia, there is a big plant in China, a small plant in South Korea and a partner in Japan (J. Van den Heuvel, personal communication, August 4, 2014).

The trend is no longer to build plants but rather to balance insourcing and outsourcing. The company has thus a lot of CMOs and the two main criteria to choose them are reliability and quality. This is due to the fact that it takes quite a lot of time to move pharmaceutical production. It takes 2 years to build a plant that produces in a sterile way, also a technology transfer (of the production process) from one plant to another takes approximately 3 years for a sterile product. With the transfer come sterility testing, validation, prove that the environment works, stability of batches for 3

or 6 months, authority approval, which in total takes 3 years for sterile production. For solids it is around 1.5 to 2 years. So flexibility is quite low and the decision to outsource is not done lightly. Moreover, the company also starts losing the knowledge if no similar processes are run internally (J. Van den Heuvel, personal communication, August 4, 2014).

There is currently no reshoring trend of Janssen's production sites, and this should not happen in a foreseeable future (R. Sheppard, personal communication, May 28, 2014).

Regarding raw materials sourcing, there is a big difference in the sourcing decision between active pharmaceutical ingredients and excipients (J. Van den Heuvel, personal communication, August 4, 2014).

For strategic reasons, Janssen tends to produce active pharmaceutical ingredients internally. Indeed, a shortage on API can kill a product. The main plant is located in Belgium (Geel) and there are some smaller subsidiaries all over the world. It is important to remember that chemical capacity is quite expensive and takes a long time to build. For the production of pharmaceuticals and important APIs, the company tries to have an active backup. However, keeping a plant ready is very expensive and is thus only done for essential products. Instead, Janssen often uses idle capacity to absorb shocks (J. Van den Heuvel, personal communication, August 4, 2014).

In the past, Janssen has been confronted with API capacity issues and reacted through several steps. First, capacity eating, low margin production was sold-off (for instance: veterinary activity to Eli Lilly). Then, some off-patent drugs, which were moved to the consumer segment of J&J, are not produced in-house anymore. This is due to the fact that Janssen faced a shortage in chemical capacity and that these products have low margins. Finally, the intermediate chemical products, which are used in the 6 to 18 production steps of an API, can also be bought all over the world. Janssen thus started to purchase them from China or India. The two main drivers for this decision are that Janssen found companies that were suitable in quality and reliability to be suppliers and because there were predicted capacity constraints for important future products (J. Van den Heuvel, personal communication, August 4, 2014).

The rule for API is that Janssen produces them internally. However, it is possible that for old products, which are off patent, and for some intermediates, the company outsources production. Additionally, Janssen often does not have the choice for in

licensed products because the company that gives the license also produces the API (J. Van den Heuvel, personal communication, August 4, 2014).

Excipients are purchased externally, with supplier choices limited by quality restrictions. They usually have lead times of a couple of weeks to a couple of months. Janssen prefers to have global partners that supply excipients locally. This local aspect gives more flexibility, a shorter reaction time and the development of a better relationship. However, Janssen has hundreds of suppliers and there are all possible scenarios. Indeed, excipients are sometimes bought on a global basis (for instance, purchased in China and shipped to Europe) when quality and reliability issues are satisfied (J. Van den Heuvel, personal communication, August 4, 2014).

The following paragraphs look at supplier management from a broader view. Regarding the five-step model of global sourcing developed by Monczka and Trent (1991, pp. 4-5) and Trent and Monczka (2003a, p. 29; 2003b, pp. 613-614), Janssen is present on all the five possible levels, depending on the supplier. For strategic partners, level 5 is practiced; and the level decreases with the importance of the supplier. The company can thus be considered on level 5: Integration and coordination of global sourcing strategies with other functional groups (J. Van den Heuvel, personal communication, August 4, 2014).

For supplier selection, Janssen is similar to other big companies; it runs RFPs (request for proposals) and RFIs (request for information), it belongs to a lot of trade organizations and uses connections in other companies (L. Livingston, personal communication, May 28, 2014).

The most important criteria in supplier selection are quality and reliability. Reliability has two components: an attractive lead-time and adherence to the promise. Moreover, process technology is crucial for the selection of a supplier. Indeed, the company prefers suppliers to have five or ten years experience, so that the child sickness is out. However, for later supplier assessments it is not important because the technology is already present. Finally, cost comes only after these two main criteria (J. Van den Heuvel, personal communication, August 4, 2014).

Supplier assessment is based on formal quality audits formal business reviews and daily/weekly/yearly contacts with suppliers (R. Sheppard, personal communication, May 28, 2014).

In the future, supplier selection should be done coherently on an enterprise (J&J) level. This is due to the importance of purchasing controls in FDA inspections, as the supplier ultimately has an impact on the quality of the product and the potential risk for the patient (R. Sheppard, personal communication, May 28, 2014).

Transaction cost economics

These final paragraphs take a more transaction cost economics specific view on the organization of the company. For Janssen, using an external partner instead of vertical integration has no significant impact on logistic costs; however this might be different for quality or technology management. Indeed, if CMOs are not able to run their plant in a decent way, but Janssen has to work with them because they have the license or they are the only ones with the technology, the company has to staff its employees in plants, which can be expensive. An additional cost linked to outsourcing occurs in the case Janssen supplies API to CMOs and these have poor batch reliability (J. Van den Heuvel, personal communication, August 4, 2014).

As discussed earlier, a technology transfer (of the production process) from one plant to another takes approximately 3 years for sterile products. This can be assimilated to asset specificity, as the choice of a supplier is binding for the long term and a change is very costly for Janssen (J. Van den Heuvel, personal communication, August 4, 2014). In line with transaction cost economics, production of vital elements, with asset specificity, is kept internal. Nevertheless, some elements are outsourced, even when assets are specific. It is important to remember that this is not always done on a voluntary basis due to in licensing. Finally, less crucial elements are outsourced.

Regarding transaction risks, Janssen works out very detailed contracts to avoid any hold-up situation. However, it seems that hard bargaining is not commonplace in the pharmaceutical business. There are several reasons to this. First, a lot of suppliers like to work with Janssen because the company constantly offers opportunities, meaning that suppliers are generally not increasing prices unreasonably because the future opportunities are comparatively more interesting. Secondly, as Janssen aims for good reliability and good quality, while knowing that switching is complicated, it does not squeeze its suppliers down to the last cent. In summary, *"they don't try to screw me, I'm their best friend, I am paying their invoices"* (J. Van den Heuvel, personal communication, August 4, 2014).

Tougher negotiation can occur on some commodities, like solids; this is then either kept in-house or external suppliers are given a fair price, in order to avoid bad reliability, bad lead-times and bad quality (J. Van den Heuvel, personal communication, August 4, 2014).

A strategy for Janssen's, and the industry's, future is discussed in this last paragraph. Research and in licensing are expected to cost increasingly more in the future. From an accounting point of view, a production infrastructure represents fixed money. In the future the pharmaceutical industry could thus bring down plants in favour of outsourcing to liberate more cash flow for the funding of research, take-overs, mergers, or in licensing. Indeed, Janssen is in the first place a company that finds, develops and markets new pharmaceutical products. Pharmaceutical production is not its core activity but its operations still outperform that of small companies from which products are in licensed. This explains why some production still needs to be done internally and sets a limit to the outsourcing trend. Thus, companies sell their plants to CMOs, which are guaranteed to produce the company's product for the following five years. These CMOs are running the plant in a more stringent and cost efficient way than the original company. This outsourcing trend is expected to grow in the future, not endlessly though (J. Van den Heuvel, personal communication, August 4, 2014).

3.3.3 Summary

As a conclusion to this case study, Janssen's strategy to combine global and local sourcing for raw materials, R&D and production sites is summarized. Janssen currently keeps production of key elements in-house but increasingly turns towards outsourcing. However, this is not always done on a voluntary basis. API production sites are limited and thus supply the company globally. Regarding other supplies, the company tries to get global suppliers that have local capabilities. When this is not possible, the company also sources from smaller suppliers locally. The total balance tends towards a global supply pattern.

3.4 Case study 3. Company A (a subsidiary of Company B)

Company B (a European multinational operating in Pharmaceuticals) is analysed by focusing on one of its subsidiaries, Company A (one of the leading generic companies in Belgium). This case study is considered to mainly represent the Small/Medium-Generic segment and partly the Big-Generic category through its dual nature

("small/medium" subsidiaries combined in a "large" overall company). In the first part, the company is introduced with the aim to grasp its structure and activity field. Then, a thorough analysis of the sourcing decisions is offered and transaction cost economics is briefly discussed. Finally, the firm's strategy is summarized (Interviewee has requested anonymity).

3.4.1 Company introduction

Company A was established in the second part of the 20th century and is a market leader in generics in Belgium. The company commercializes 151 different molecules in various dosage forms and has a total of 670 SKUs. During its expansion, Company B acquired Company A, limiting the responsibility of Company A to the Belgian and Luxembourgish markets. In 2011, Company A contributed over €140 million to Company B's total turnover of €2Bn (in 2013). Looking at the group level, Company B was founded at the end of the 19th century and is headquartered in Germany. The company mainly focuses on generic products, which represent 61 percent of its sales, and are the segment this case study considers. Within generics, Company B focuses on *"stomach medicines, antihypertensive agents and anti-inflammatory agents"*. Company B offers more than 900 drugs and 16,000 SKUs. Moreover, the company has close to 10,000 employees and is present in more than 30 countries with over 50 subsidiaries. Access to these markets has primarily taken place through an active acquisition strategy (Supply Chain Director, personal communication, November 26, 2014).

3.4.2 Case study

The following sections successively discuss R&D, the sourcing mix, supplier management and TCE. Each point is mainly examined with the subsidiary perspective, and enriched with a view on the group level when useful. Before starting, it is interesting to note that the sourcing/procurement costs of Company A represent about 33 percent of turnover (Supply Chain Director, personal communication, November 26, 2014).

Research and development

As Company B (and thus Company A) focuses on generics, no research is performed within the company. However, the development of new generics to reach bioequivalence and other requirements (marketing authorization/new pharmaceutical dossier) is done internally on a group level by Company B, or in licensed at a partner company (Supply Chain Director, personal communication, November 26, 2014).

Sourcing and supplier management

When looking at the global/local sourcing mix for raw materials, semi-finished goods and the location of production plants, it is important to understand what the firm associates to each option. For Company A, local sourcing includes the following advantages: personally knowing the people and day-to-day contact in their own language, leading to few misunderstandings, as well as knowing the local market requirements. Global sourcing is related to: lower prices and consolidated volumes at the group level leading to increased negotiation power; but also to less day-to-day contact and a more complex sourcing set up (Supply Chain Director, personal communication, November 26, 2014).

Production is a key step within Company A's, as well as Company B's, value chain; their main decisions are outlined hereafter. For Company A, 80 percent of drugs are currently being produced in Belgium by a CMO. However, the company sources from approximately 100 suppliers, of which 5 are located in Belgium, an additional 5 in the EU and the rest in Serbia (own production facilities) and in Asia (mainly Vietnam, China and India). Whereas 80 percent of volumes (in number of units sold in Belgium) are coming from the 5 Belgian suppliers, this ratio is totally different in value because CMOs produce the cheaper products. Indeed, the products with higher group volumes are produced internationally in Company B owned production sites. Looking at Company B as a whole, the company has a total of 11 wholly owned production sites, which can be ranked according to their respective volumes of production: Serbia, Russia, Bosnia-Herzegovina and Montenegro (63 percent); Vietnam (21 percent); Germany and the UK (16 percent). All of these plants meet the requirements to export to Europe. Despite these plants, the majority of drug production of Company B occurs through CMOs. The trend within the group is thus to produce nationally through CMOs for low margin products and mainly internally for high margin products. In the near future, no reshoring trend to national markets is expected as the company as a whole is focusing on offshoring (to use the cheaper production markets, mainly located in Asia), due to the continuous price drops in the market (Supply Chain Director, personal communication, November 26, 2014).

This research also analyses the sourcing of raw materials, which Company A and Company B tend to perform on a global basis. For Company A, 90 percent of the raw materials for pharmaceuticals come from India and China; their quality is checked in

detail to ensure the product is good before the production starts. In the future, Company A does not plan to have any active pharmaceutical ingredient production because of its specificity (a plant being in general specialized or able to produce 5 to 10 APIs) and the large portfolio of APIs needed by Company A (150 molecules, and continuously increasing), which would imply too many dedicated plants. Implying that, as some API consumption is relatively low, working with a CMO is more economical. The same applies to Company B; the company outsources the production of active pharmaceutical ingredients and excipients, with APIs being sourced primarily in Asia, which is the worldwide largest source of API manufactories. For some critical components, redundancy of supply is reached through the registration of several sources (i.e. different CMOs) as well as plants of the same supplier (Supply Chain Director, personal communication, November 26, 2014).

The two previous sections give a detailed view on two specific topics; this outlook is generalized in the following lines. Regarding the five-step model of global sourcing developed by Monczka and Trent (1991, pp. 4-5) and Trent and Monczka (2003a, p. 29; 2003b, pp. 613-614), Company A can be considered as moving towards level 4: integration and coordination of global sourcing strategies across worldwide locations.

The general sourcing strategy of Company A is not linked to the Pareto principle of 20/80 on units, but rather on the variability of demand. Indeed, higher variability implies more local sourcing because of a need for quicker reaction and easier demand shifts. Global sourcing would be too slow, as suppliers have a total throughput time of 8 to 9 months (their lead time in general is 6 months before shipping and then one month shipping and an additional month of European Community Release analysis, for products coming out of the EU). Therefore, ABC categorization can be applied, not in the general way of speaking, but rather based on variability, taking into account risk, on top of units (Supply Chain Director, personal communication, November 26, 2014).

From a supplier management point of view, Company A's supplier selection criteria include mainly quality of the product, supply accuracy as well as a cost factor. Additionally, suppliers need to be reliable and trustworthy. Indeed, predictability of lead-time is considered more important than the lead times itself (Supply Chain Director, personal communication, November 26, 2014).

Regarding the assessment criteria, Company A has put in place several KPIs (Key Performance Indicators), with quality and trustworthiness constantly present. Selection is done thoroughly as changing suppliers is a high investment, mostly in time and opportunity cost. Moreover, this switch leads to a strong breach in trust within pharmaceuticals, and Company A thus tries to keep relationships as long as possible (Supply Chain Director, personal communication, November 26, 2014).

With respect to these suppliers, the goal of Company A is to increase the strength of supplier partnerships, leading to a reduction from currently 100 suppliers to 20-30 specialized partners. Sourcing will be more segmented and will focus on strategic partnering with key suppliers, to find a win-win situation on all products. Products are segmented in special forms and types: tablets, capsules, micro tablets, prolonged release tablets, liquid form, cream, sprays, IV products, sterile products… (Supply Chain Director, personal communication, November 26, 2014).

On the subsidiary level, Company A's decision to combine global and local sourcing, starts with an analysis at the firm level, which is followed by interactions with Company B. This communication helps decide what can and what should be harmonized. A certain intragroup trade-off needs to be reached between local needs of Company A and global plans of Company B to reach the highest possible efficiency. Indeed, Company B recommends global suppliers in order to bundle all the quantities from the group. However, sourcing out of the EU implies quality checks, which increase total cost (Supply Chain Director, personal communication, November 26, 2014).

Moreover, there is currently a major shift, towards global, going on regarding the mix of global and local sourcing within Company B. For Company A, which is a rather young company within Company B, there is increasing harmonization to reach better volumes, leading to better prices. The company is thus harmonizing and going towards more global sourcing; while more than 80 percent is actually still produced in Belgium. However, if required by the market, Company A still has the possibility to do things locally, but it tries to harmonize within the group and to think globally for cost-efficiency reasons (Supply Chain Director, personal communication, November 26, 2014).

Looking at the group level, the trend within Company B is offshoring, increasingly going to Asia; the group recently opened an Asian sourcing site. This growing offshore strategy to Asia is due to the continuous decrease of prices of generics and the difficulty to focus with a large portfolio of molecules (150 molecules for Company A). Due to the

amount of many molecules, API production is always outsourced. The involved risk of market shifts is usually shared with suppliers by the use of contract clauses linking for instance market and procurement prices. Finally, the move towards a global sourcing within Company B implies global demand planning, i.e. less independence for Company A, with coordination being done at a high level in order to keep transaction costs low (Supply Chain Director, personal communication, November 26, 2014).

Transaction cost economics

In these final lines, the importance of transaction cost economics for Company A is reviewed. TCE is not perceived as being of high importance for the company. Regarding modes of governance, suppliers are not internalized; however, the most critical ones benefit from good partnerships (i.e. extracts of Company A's SAP system, better information...). While, Company B has been integrating firms through acquisitions, this expansion is more market access than backward integration driven. The latter is not a priority for Company B, which is perceived as a sales and marketing company and not as a production company (Supply Chain Director, personal communication, November 26, 2014).

3.4.3 Summary

Strategically, Company A considers the mix of global and local sourcing based on the variability of its products and its risk management, with a decision that is mainly driven by the market situation. Whereas production currently mainly occurs on a local level for Company A, changes towards global production are expected with the group harmonization. Moreover, raw materials are primarily sourced and negotiated on a global basis (Supply Chain Director, personal communication, November 26, 2014).

3.5 Case Study 4. Abbott

This case study focuses on Abbott, which is considered being part of the Big-Generic category in this research. First, the company is introduced in order to understand its structure and activity. Next, research and development is briefly discussed, followed by a thorough analysis of the company's global/local sourcing mix. Finally, the discussion ends with an analysis of TCE and a summary of Abbott's sourcing strategy.

3.5.1 Company introduction

Abbott is a global healthcare company, with headquarters in Illinois (US) and established in 1888 (Abbott, 2015). In 2013, the company had net sales of $21.8 Billion and is currently present in four market segments: Nutrition, Diagnostics, Medical Devices and Established Pharmaceuticals (Abbott, 2014). This case study focuses only on the Established Pharmaceuticals Division (EPD), which has headquarters in Basel (Switzerland)(Abbott, n.a.-a); therefore Abbott is to be assimilated to EPD in the rest of this text. The Established Pharmaceuticals Division was created in 2010 as the combination of Legacy Abbott Pharma Assets, Piramal Healthcare Solutions, Solvay Pharmaceuticals and smaller, local asset deals (Abbott Laboratories, 2014). Within EPD, the core therapeutic areas are: Gastroenterology, Women's Health, Cardiovascular, Pain/Central Nervous System, Respiratory, Influenza Vaccine (Abbott, 2015). In 2014, EPD generated $5 Billion in sales, of which 40 percent come from developed markets and 60 percent from emerging markets; thereby producing 23 percent of the company's total turnover (Abbott, n.a.-b). While EPD was recently still present in developed and developing markets, on February 27, 2015, Mylan acquired the pharmaceutical business of Abbott in developed markets (outside US)(News-Medical.Net, 2015). Implying that Abbott is now only present in developing markets, i.e. Central (Mexico) and South America, Africa, Middle East and Asia-Pacific (excluding Australia, New Zealand and Japan)(U. Suerig, personal communication, March 3, 2015). This case is of particular interest as Abbott's EPD headquarters are located in Europe, but its markets are dispersed globally in emerging markets.

3.5.2 Case study

The following sections, whilst focusing on generic drugs, discuss consecutively research and development, the global and local sourcing mix, supplier management and TCE relevance at Abbott. Before looking at these topics in detail, it is interesting to note that sourcing costs (including internal plants) represent 40 percent of the general cost of goods sold (U. Suerig, personal communication, March 3, 2015).

Research and development

As Abbott is present in the generics business, it does not practice research. Development is mainly done in Europe; but there are also centres in Russia, India, Latin America and South-East Asia (U. Suerig, personal communication, March 3, 2015).

Sourcing and supplier management

Production is a key part of Abbott's value chain and is currently divided between 27 internal plants and approximately 250 CMOs. However, in volumes, about 55-60% of drugs are sourced externally. This internal-external decision is taken as follows: production is kept internal if Abbott has a technology advantage; if this is not the case, cost is the driver. If, due to volumes and capabilities, internal manufacturing is cheaper than the standard market, it is kept internal; otherwise, Abbott first tries to improve its production. Finally, assuming that these improvements are not cost efficient, production is externalized (U. Suerig, personal communication, March 3, 2015).

The company practices two main types of production: international supply and local for local. In the first case, Abbott has international supply centres, which are located mainly in Europe and serve all markets; these account for 70 percent of the business. The remaining 30 percent form the second case, local for local, in which a drug is manufactured in the emerging market where it is also sold (U. Suerig, personal communication, March 3, 2015).

Focusing on the first case (international supply), 85 percent of finished internationally traded goods are coming from developed markets (with a share of approximately 80 percent from Europe and 20 percent from the US) and 15 percent from emerging markets. This strong presence in Europe is due to Abbott's acquisition strategy, with many acquisitions having taken place in developed markets. Currently, the company is not building new plants and the location of its facilities is due to historical reasons (U. Suerig, personal communication, March 3, 2015).

Regarding reshoring, Abbott is on the opposite trend (offshoring), as it is increasingly forced, due to local legislation, to do national manufacturing. This increases costs and harms business, as it implies more suppliers and lower volumes, but it is necessary, for legislative reasons, to go towards developing markets. Once offshore, Abbott often sources mainly locally in those countries (U. Suerig, personal communication, March 3, 2015).

The sourcing of raw materials is another main topic in this research, and is practiced globally by Abbott, while currently shifting towards local sources. The company has around 1,000 APIs that are mostly sourced externally, with 99 percent of APIs being outsourced, accounting for 60-70 percent of the sales volume. This is explained by the fact that when Abbott has a technology advantage, API production is

kept in-house. Regardless of this, APIs are mainly sourced globally from China, Switzerland and Puerto Rico (US). For API sourcing, the company either tells CMOs which source to select, or Abbott buys the API and delivers it to the CMO (U. Suerig, personal communication, March 3, 2015).

Regarding excipients, production is completely outsourced and sourcing mainly occurs on a global basis. Abbott gives guidelines about the specifications of the excipients, but the CMOs are free to determine the suppliers (U. Suerig, personal communication, March 3, 2015).

Whereas the previous paragraphs allow for a detailed view on two specific topics, a more general view is discussed next. Regarding the five-step model of global sourcing developed by Monczka and Trent (1991, pp. 4-5) and Trent and Monczka (2003a, p. 29; 2003b, pp. 613-614), the firm can be considered on level four, integration of and coordination of global sourcing across worldwide locations. Indeed, the company aligns on a global level and is segmenting its sourcing in three levels: global, regional and local. Moreover, Abbott aligns on regional communication, with differentiations done between the regions and the local markets. In the future, the organization will emphasize its presence on the local markets, in order to be closer to the customers. Indeed, Abbott is currently looking for a model to have the right balance between global, regional and local sourcing (U. Suerig, personal communication, March 3, 2015).

For all types of suppliers (excipient, API, finished drug), Abbott has an internal threshold, which is around 25 percent. Meaning that Abbott limits its activity to making 25 percent of the revenue of a supplier, because of obligations and risks from Abbott's side (U. Suerig, personal communication, March 3, 2015).

Regarding redundancy of supply for critical items, Abbott aims at having a second source for external suppliers. Internally, redundancy is not practiced as the company has measures in place to avoid risks (U. Suerig, personal communication, March 3, 2015).

The three most important criteria for supplier selection are: quality, financial background and compliance to regulations. Abbott performs many upfront checks before accepting a new supplier. Then, supplier assessment is done by monthly management review of suppliers and is mainly based on: quality, on time delivery and in-full delivery. Moreover, flexibility and acceptable costs are expected (U. Suerig, personal communication, March 3, 2015).

Transaction cost economics

In this final paragraph, the importance of transaction cost economics for Abbott is reviewed. TCE is not perceived as being of high importance for the company. Indeed, even if assets are specific, suppliers that try to squeeze prices directly regret this, because Abbott quickly develops new sources, as there is always another supplier with the technology. Abbott is thus investing in long-term partnerships. Looking at governance structures, there is currently no trend towards vertical integration with API production, however this should happen in the medium term future (U. Suerig, personal communication, March 3, 2015).

Regarding coordination costs, these are high due to the global, regional and local view; however, the company does not measure them (U. Suerig, personal communication, March 3, 2015).

3.5.3 Summary

In conclusion, Abbott's strategy can be summarized as *"we try to live the stretch"* (U. Suerig, personal communication, March 3, 2015). The company is going into local emerging markets and its sourcing thus also needs to be more local. However, this local move adds complexity and implies additional internal investments in quality and governance to control suppliers. Abbott thus cannot keep its global European based footprint as-is without sustainable changes because it is not competitive from a cost perspective. In today's dynamic environment, Abbott is still assessing where to go and what to do with all its European plants (U. Suerig, personal communication, March 3, 2015).

Chapter 4. Cross case analysis

This chapter compares the outlined case studies, faces findings with theory, describes the wider view of consultants and gives some recommendations for the industry, resulting in deductions that *"will be at a conceptual level higher than that of the specific case"* (Yin, 2014, p. 41). All this is done by summarizing major findings in Table 3 and then considering the implication of these on the propositions outlined at the beginning of this thesis. Finally, this analysis is enriched and broadened by the perspective of consulting representatives.

4.1 Cross case analysis

The first step of the cross-case analysis consists of summarizing the main points from each case in Table 3. These findings are then confronted to the initial six propositions. The subsection ends with a summary of the results.

	Laboratoires Bailleul	Janssen (J&J)	Company A *(Company B in italic)*	Abbott
Category	Small/Medium Branded	Big Branded	Small/Medium Generic	Big Generic
Turnover	€30.5Mio	$27.8Bn ($71.3Bn for J&J)	- €140 Mio - *€2Bn*	$21.8 Bn
Sourcing costs	35-40% of turnover	n.a.	±33% of turnover	40% of COGS
Sourcing				
Production	- Outsourced locally - CMOs chosen for historical reasons, closeness to main market, GMP/GDP application, desired quality, price & lead-times - No relocation planned for current plants	- 60% internal & 40% by CMOs (half "voluntary") - Global & local production in Europe, USA & Asia - Company owned production sites location reasons: historical, financial, regulatory, closeness to market, partnerships & availability of specific supplies - Not building plants but balancing in-/outsourcing - No relocation planned for plants	- International internal production of high margin products on a group basis - 80% of units sold from national CMOs (different ratio in value) - 100 suppliers (10 in EU, rest in Serbia & Asia) *- 11 owned plants (production: 63% in Serbia, Russia, Bosnia-Herzegovina & Montenegro; 21% in Vietnam; 16% in EU)* *- Locally outsourced low margin drug production* *- International in-house*	- 27 internal plants & ±250 CMOs - 55-60% of drugs outsourced (by volume) - 70% global production (85% from developed markets (mainly Europe)) & 30% national production - Location due to historical reasons - Offshoring trend to

			production for high margin *- Offshoring trend*	produce locally (legislative motive)
Sourcing of raw materials	- Global (90% from China & India) - Through local distributors - 15 suppliers	n.a.	- Globally outsourced (90% from India & China) *- Globally outsourced (from Asia)* *- Redundancy for some critical components*	n.a.
Sourcing of API	- Outsourced production (global) - Supply (to CMO) responsibility of Laboratoires Bailleul (but not production)	- Internal production - Global plant in Belgium, smaller global subsidiaries - Active backup for essential products & use of idle capacity - Globally outsourced for old products, some intermediates & in licensed products	n.a.	- 1,000 APIs - 60-70% sales volume outsourced - Sourced globally from: China, Switzerland & Puerto Rico (US)
Sourcing of excipients	- Outsourced production (global) - Responsibility of the CMO (lower prices)	- Outsourced production - Preference for global partners supplying locally - Hundreds of suppliers & all possible scenarios	n.a.	- Globally outsourced production - Responsibility of the CMO

Supplier management				
Supplier selection	Quality & total costs	Quality, reliability (i.e. attractive lead-time & promise adherence), process technology & costs	- Quality, cost, reliability & trustworthiness - *Global suppliers recommended to bundle quantities*	Quality, financial background & compliance to regulations
Supplier assessment	Non existent	Formal quality audits, formal business reviews & regular supplier contacts	KPIs (among others: quality & trustworthiness)	- Quality, on time delivery & full delivery - Monthly management review of suppliers
Changes in suppliers	Only in extreme cases	Only in extreme cases	Only in extreme cases	Only in extreme cases
Transaction cost economics				
Vertical integration	No vertical integration	- Internal production of vital elements, with high asset specificity - Outsourcing of vital elements, with high asset specificity (due to in licensing) - Outsourcing of less crucial	*- Low importance of backward integration* *- Critical suppliers treated with good partnerships*	Currently no, but potential future integration of API suppliers

		elements		
Transactional risks	- Generally weak - Critical for 20% of the portfolio: price of sole suppliers & quality of Chinese suppliers	- Weak - Detailed contracts to avoid hold-up situation - Future opportunities prevent hard bargaining	- Weak - TCE not perceived as important	- Weak - TCE not perceived as important
Future				
Outlook	- Market expansion - Implementation of ABC categorization - Redundancy of supply source planned - Adding flexibility & lead-time measures to selection criteria - Establishment of assessment criteria (quality & timeliness of delivery)	- Coherent supplier selection on an enterprise (J&J) level - Increase in production outsourcing trend	- No internal API production planned - Reduction to 20-30 specialized partners (core suppliers) - Increasing global sourcing & harmonization of Company A with Company B, which implies global demand planning, i.e. less independence for Company A - *Increasing sourcing harmonization*	- Change of European footprint needed - Move towards more local sourcing in developing markets

Table 3: Main findings of case studies.

The six propositions introduced in the beginning of this thesis are first outlined, followed by implications from the cross-case analysis to see if these statements are confirmed or refuted in a real-life setting. Those findings are then summarized in Table 4 at the end of this subsection.

4.1.1 Proposition 1

The share of global plant locations and sourcing increases with the size of the company, whatever pharmaceutical business these are in (branded or generic)

Regarding drug production, this proposition is confirmed, as a larger share of production is globalized for the big segment compared to the small/medium segment. Indeed, the trend appears clearly when ranking the companies according to their size. Within the smallest firm, Laboratoires Bailleul, production is done a 100 percent locally, with a majority of CMOs located in France. With its international expansion, the company considers working with local CMOs in these new markets. For the following business, Company A, 80 percent of production volumes are done locally. The next firm in the ranking is Company B, which has a higher part of production that is done globally than Company A. Going to the big segment, Abbott produces 70 percent of its drugs on a global scale. Finally, the biggest firm, Janssen, produces the majority of its drugs on an international basis. This pattern seems logical as larger companies serve more markets and global production provides them with higher economies of scale. The globalization of plant locations is thus positively correlated with the size of the company. However, the case of Abbott shows that, as companies enter emerging markets, regulatory bodies can force these companies to increasingly produce locally. The share of local production allows thus being close to customers, but seems to be mainly driven by legislation.

Regarding APIs, there is no real difference with the size, as most companies source it globally. Indeed, for Laboratoires Bailleul and Company A, 90 percent of APIs originate from China and India. However, these are purchased through a local distributor in the case of Laboratoires Bailleul. On the other end, API production for Company B, Abbott and Janssen is also nearly all done globally. The only difference being that for the two biggest firms, Abbott and Janssen, at least part of this supply originates from Europe and/or the US, whereas the other companies mainly source from Asia (in particular, India and China).

Regarding excipients, there is no difference as all companies globally outsource excipient production. However, the branded companies seem to have a higher propensity to use suppliers with global capabilities, supplying locally. Indeed, Laboratoires Bailleul and Janssen prefer this type of suppliers.

In conclusion, this first proposition is partly confirmed (for the production location) and partly refuted (for raw materials).

4.1.2 Proposition 2

Branded and generic sourcing choices differ, with generics favouring global over local sourcing, due to higher price pressure on generic drugs

Regarding production, this proposition is refuted, as there is no clear location difference between generics and branded drugs. Indeed, in the branded segment, Laboratoires Bailleul produces everything locally, whereas, for Janssen, the majority of production is done globally, with some local production still happening. On the generic side, Company A has 80 percent of local production, with high margin products being done on a group level. For Company B, production is global for the high margin products and local for the other ones (through CMOs); and Abbott has 70 percent of global production. The global/local plant location decision thus seems more related to the size, than the innovation difference, as discussed in Proposition 1. Additionally, the future the trend is unclear as Company B moves towards global and Abbott towards local production offshoring.

Regarding APIs, this proposition is refuted, as there is no clear difference between generics and branded drug makers, as both groups tend to source globally (see the paragraph on API sourcing in proposition 1 for details from the cases). Here, the difference between these two categories is more visible on the in-/outsourcing decision, with the big-branded group tending to partly produce APIs in-house (mostly in-house for Janssen). This is linked to the fact that big-branded companies produce blockbuster drugs, which sell at high volumes and high margins. Thereby, the opportunity cost of lost sales outweighs potential economies of scale reached through outsourcing. Moreover, the high volumes allow for strong in-house economies of scale, decreasing the comparative attractiveness of outsourcing API production.

Regarding excipients, this proposition is refuted, as there is no clear sourcing difference between generics and branded firms. Indeed, all companies source globally.

To conclude, this proposition is refuted on all considered points, as there is no global/local sourcing difference based on the innovation axis.

4.1.3 Proposition 3

A higher level of vertical integration is observed in the branded segment due to the high sensitivity of intellectual property rights of drug patents

Regarding drug production, the ratio of internal production is highest for the big-branded segment, with 60 percent in-house production for Janssen, as expected by the proposition. However, it is lowest for the small/medium-branded segment, with a total outsourcing for Laboratoires Bailleul. A potential explanation is that Laboratoires Bailleul is currently too small to efficiently use economies of scale and thus to afford own production facilities; this is confirmed by the fact that the company used to own a plant in the past, which turned out to be non-profitable. Another hint in that direction is the fact that Abbott (40-45 percent in-house) and Company B (11 owned plants), whilst being in the generic business, have more internal production than Company A (mainly outsourcing), implying that the share of internal production increases with the turnover, i.e. the size of the company. Moreover, this internalization potentially happens faster for companies producing branded than generic drugs. It seems thus fair to assume that the proposition is confirmed for production facilities. Additionally, it is interesting to point out that all companies tend to keep production of vital and/or high margin drugs in-house, as far as possible, in order to secure the constant availability of key products on the market.

Regarding API, the discussion is similar to the one for production, as Janssen has the highest in-house API production (majority in-house), but Laboratoires Bailleul the lowest (all outsourced). Here, a proof that internal production increases with the turnover is the fact that Abbott (30-40 percent in-house), the big-generic company, considers insourcing more API production in the medium term future, whereas Company A and Company B (all outsourced for both), with turnovers respectively 156 and 11 times smaller than Abbott, are not considering it. The proposition appears thus verified once more. An alternative explanation, which contradicts the proposition, would be that the vertical integration of API production is only linked to the turnover and that the innovation level has no influence on it. However, the size factor alone is not sufficient to explain the difference between Abbott's (30-40 percent in-house) and

Janssen's (majority in-house) internal sourcing ratios. The importance of the innovation level is thus confirmed, whilst remembering that the size of the company still plays a role.

Regarding excipients, the proposition is refuted as none of the companies produce excipients in-house. These are considered as commodities by all company segments and are always outsourced.

In conclusion, plants and API production tend to be more vertically integrated in the branded segment, as these are key differentiation points. However, this vertical integration trend is also strongly dependent on the corporate turnover, which accounts for the decisions of Laboratoires Bailleul. There is thus a certain threshold turnover necessary for vertical integration to happen in these two categories. Excipients, which are considered as commodities, are supplied externally by the entire industry, with no distinction according to innovation level.

4.1.4 Proposition 4

Local sourcing is used for products of high importance, in order to decrease the possibilities of disruptions in their respective supply chain; implying that trust in globally located suppliers is lower than in their local counterparts

Regarding production, there is not enough evidence in the different cases to fully evaluate this proposition. However, in the instance of Company A, low margin products are produced locally and high margin products internationally, at a group level. At first glance, this would imply that the importance granted to economies of scale outweighs the potential disruption costs. However, it is important to notice that the disruption risks do not seem to be handled with local (instead of global) sourcing, but rather with an in-/outsourcing of the production. The global/local sourcing mix has thus not enough impact for companies to actively use it in their risk management.

Regarding API, it is considered by all companies to be the most important and the differentiating part of the drug, so that local sourcing would be expected according to the proposition. However, this is not the case (see the paragraph on API sourcing in proposition 1 for details from the cases). It seems that the costs linked to API production make local sourcing an uncompetitive option. The risks of global sourcing are thus mainly dealt with the in-/outsourcing mix, with the biggest firms being able to produce

their most critical APIs in-house (see the paragraph on API sourcing in proposition 3 for details from the cases).

Regarding excipients, their categorisation as commodities by all companies, implies that these are elements of low importance. The proposition is thus confirmed as all companies perform a global sourcing of excipients.

In general, it seems that the importance of a product impacts the in-/outsourcing decision but not the global/local mix. Whereas for excipients the proposition is confirmed, as these non-strategic components are sourced globally, it is refuted for production plants and APIs and works the other way around, with important products being produced globally.

4.1.5 Proposition 5

The location of owned plants and the supplier selection are based on strategic and cost-efficiency criteria

Regarding owned plant location, it appears from the different case studies that, in the pharmaceutical industry, it is neither based on strategic nor on cost-efficiency reasons; this proposition is thus refuted. Indeed, looking at the cases, it appears that the most common and important location criterion is historical presence (this is the case for Laboratoires Bailleul, Janssen and Abbott). Additionally, several more strategic and cost-efficiency aspects play a role, but the importance of these functions is proportionally minimal. The main criteria are: closeness to the main market, CMOs' application of the GMP/GDP norms, desired quality at the required price and reasonable lead-times (for Laboratoires Bailleul); and financial, regulatory, closeness to market, partnerships and availability of very specific supplies (for Janssen).

Regarding supplier selection, all pharmaceutical companies look for one main criterion: quality. The difference between firms appears on the other aspects. Total cost is very important to Laboratoires Bailleul, whereas Janssen focuses on reliability (i.e. attractive lead-time and adherence to the promise) and process technology (so that child-sickness is out). Whereas, in the generic segment, Company A prioritizes supply accuracy (with reliability and trustworthiness of suppliers) and cost, Abbott focuses on financial background and compliance to regulation. These criteria are all have strategic and/or cost-efficiency importance; this confirms the proposition.

In conclusion, the proposition is refuted in the case of owned plant locations, whereas it is confirmed in the case of supplier selection. This indicates potential improvement opportunities for the industry's plant location decision-making.

4.1.6 Proposition 6

Transaction cost economics is actively used by decision-takers for backward vertical integration in the pharmaceutical supply chain

From the various case studies, it appears that transaction cost economics seems rather non-significant in the active decision-making process of companies. Indeed, transactional risks are mostly considered as weak in each case. Many vertical integration decisions fit the predictions made by theory; however, interviewees generally did not consider transaction cost economics to be a significant cause for their choices. This can be related to the fact that many other factors, like strategy and regulation, play a decisive role in integration decisions in the pharmaceutical business. TCE is thus a good predictor of actual integration choices, but is hardly ever the basis for the decision. This is confirmed by Coase (1988a, p. 44), who explains that the asset specificity risk is generally present but only important in the eyes of academics, not in those of decision makers.

4.1.7 Summary

A brief summary of the key findings is offered below, in Table 4. Which part of a proposition is verified or refuted is highlighted in the last column. This table is then followed by conclusions reached from confronting the results.

Proposition 1	The share of global plant locations and sourcing increases with the size of the company, whatever pharmaceutical business these are in (branded or generic)	- *Verified (production location)* - *Refuted (APIs & excipients)*
Proposition 2	Branded and generic sourcing choices differ, with generics favouring global over local sourcing, due to higher price pressure on generic drugs	*Refuted*
Proposition 3	A higher level of vertical integration is observed in the branded segment due to the high sensitivity of intellectual property rights of drug patents	- *Verified (production location & APIs)* - *Refuted (excipients)*

Proposition 4	Local sourcing is used for products of high importance, in order to decrease the possibilities of disruptions in their respective supply chain; implying that trust in globally located suppliers is lower than in their local counterparts	*- Verified (excipients)* *- Refuted (production location & APIs)*
Proposition 5	The location of owned plants and the supplier selection are based on strategic and cost-efficiency criteria	*- Verified (supplier selection)* *- Refuted (plant location)*
Proposition 6	Transaction cost economics is actively used by decision-takers for backward vertical integration in the pharmaceutical supply chain	*Refuted*

Table 4: Summary of proposition verification.

The global/local mix for APIs seems not to be directly linked to the size or the innovation level of companies, with most firms sourcing APIs globally. However, these two criteria seem to have a direct impact on the in-/outsourcing decision. Indeed, the size plays the role of a threshold; i.e. a certain sales level needs to be reached in order for in-house API production to be competitive, which is most likely linked to the economies of scale reached through high sales volumes. Once the threshold sales level is reached, the innovation level has a positive impact on the degree of insourcing, which can be linked to the importance of intellectual property rights of drug patents.

Regarding drug production plants, the global level of sourcing is positively correlated to the size of the company. In a similar way, drug production is proportionally more in-house for branded products than for generics, with a sales level threshold to be reached, as mentioned in the previous paragraph.

The global/local decision is not actively used to manage the supply chain risks. This is done through the in-/outsourcing mix, with critical components insourced when possible.

4.2 Practical perspective

This part is based on two separate interviews with representatives from the consulting sector, specialized on pharmaceutical clients. Their insights allow for a larger

view on the discussion. The subsection is divided into specific topics relevant to the industry.

4.2.1 Manufacturing

Manufacturing is increasingly being outsourced to CMOs. These CMOs are, in terms of operational excellence, more effective, more productive, and more efficient. Indeed, manufacturing operations have never been the core business of a pharmaceutical company. Instead, research and sales are the core elements. However, this outsourcing trend is not uniform across the industry. Indeed, whereas generic firms mostly work with CMOs, branded companies are trying to create platforms/hubs. Additionally, there is no trend towards insourcing of outsourced products (E. Van Den Brempt, personal communication, July 28, 2014); nor is there a reshoring trend, as offshoring is still predominant (L. De Busscher, personal communication, June 23, 2014).

In general, the distance between production and market is related to the sensitivity of the product (L. De Busscher, personal communication, June 23, 2014).

Looking at the sourcing of raw materials, API production is done internally as long as possible, as the API is the most important ingredient (E. Van Den Brempt, personal communication, July 28, 2014).

4.2.2 Research and development

This second part focuses on trends in R&D. With the current patent cliff, companies acquire product portfolios from their competitors. Additionally, R&D is increasingly externalized to Contract Research Organizations (CROs). Whereas, for European companies, research is still strongly based in Europe, development is mainly done in China, India and Singapore, primarily for cost reasons (L. De Busscher, personal communication, June 23, 2014). The growing outsourcing has two main reasons. First, over the past years, spending on internal R&D has been rising relative to the output. Second, external parties are better at the operational part of R&D (E. Van Den Brempt, personal communication, July 28, 2014).

4.2.3 Supplier management

A recent trend is the creation of programs where pharmaceutical companies get their strategic suppliers certified by authorities for quality assurance, leading to shorter lead times, as fewer inspections for these incoming goods are needed (E. Van Den Brempt, personal communication, July 28, 2014).

Overall, the industry-wide selection criteria for suppliers are quality of the product, followed by compliance with the authorities and the unit variable cost (E. Van Den Brempt, personal communication, July 28, 2014).

The interviewees confirm that, within pharmaceutical manufacturing, companies barely change suppliers of raw materials linked to API because of the time-consuming registration of new suppliers. However, changing excipient suppliers is slightly easier, with excipient production always being outsourced (E. Van Den Brempt, personal communication, July 28, 2014).

4.2.4 Product

A last trend is for pharmaceutical companies to move towards the sale of complete health systems, instead of "just" drugs, by creating an ecosystem. Moreover, big pharma is working on the development of open platforms/knowledge centres. But this is also progressively the trend for pharmaceutical companies from other segments, which are increasingly looking at the system and not just at the product (E. Van Den Brempt, personal communication, July 28, 2014).

Chapter 5. Conclusion

In this final chapter, the outlines of the thesis are described as well as the main results of this research. This is followed by several industry recommendations and ends by discussing the limits of the thesis and potential future work directions.

5.1 Summary

This thesis focuses on the question of how to best combine global and local sourcing in the pharmaceutical sector, by focusing on the location of API and excipient suppliers, as well as drug production plants. In order to thoroughly study this question, six propositions are developed, using a division of the pharmaceutical industry in four main segments, according to size and innovation level.

From a structural point of view, a literature review on global/local sourcing and on transaction cost economics has first been performed, in order to fully understand these concepts and the key findings for each proposition. This research has then been actively used during the data collection part. The methodology is based on a total of four case studies, one for each identified segment. The cases have been carefully chosen to allow a generalization of the main findings. After a detailed presentation of the four cases and additional background information on the pharmaceutical supply chain, a cross-case analysis has been performed. In that part, the results from the different cases have been compared and the initial six propositions reconsidered in light of the real life findings. Moreover, this has been enriched by a general view from the consulting world.

5.2 Main findings

Analysing the question of how to combine global and local sourcing in the pharmaceutical sector has lead to several findings and implications. The main ones are:

- The share of global plant locations generally increases with the size of the company, whatever pharmaceutical business these are in (branded or generic). However, the same is not valid for the sourcing of raw materials, where there is no correlation with the size of the company.
- The global/local sourcing choices do not differ between branded and generic producers, even though margins are smaller in the generics business.

- The branded segment is characterized by a higher level of vertical integration due to the high sensitivity of intellectual property rights of drug patents; this is only true for drug and API production.
- There is no clear evidence pointing out that local sourcing is linked to the importance of the product. However, the product importance directly impacts the in-/outsourcing decision.
- The predictions of transaction cost economics are generally valid in the case of vertical integration in the pharmaceutical sector. However, it appears that this is not linked to the importance granted by business people to the TCE theory, as they do not consider transaction costs during the decision making process.
- Commodities (i.e. excipients) are always outsourced globally (with the main sources being located in China and India) for cost-efficiency reasons, irrespective of innovation level or size.
- As pharmaceutical companies aim for long-term partnerships with their suppliers, they need to effectively screen and select the best candidates. Adequate selection criteria are already available for suppliers, but unfortunately not yet for owned production plant locations. Additionally, the firms should reduce their current supplier base, in order to build stronger relationships with the remaining ones.
- Generally, the global/local decision seems to have a secondary strategic importance, compared to in-/outsourcing decisions.
- There is no reshoring trend currently happening in the pharmaceutical industry, nor is there one to be expected in a foreseeable future.
- Finally, with the challenges the industry currently faces, it seems that some companies are moving away from their classic business model, towards a more cooperative approach. Companies do this by building platforms with other players (from low and high tech), in order to provide a complete health system.

5.3 Industry recommendations

Based on the findings of the cross-case analysis, which are enriched by the consulting view, several recommendations are developed for the industry.

First, regarding plants, growing companies should consider global production sites in order to benefit from economies of scale, avoid costly excess capacity and reduce the amounts of time-consuming registrations with authorities. This has to be balanced with the sensitivity of the produced product, as sensitivity and "globalness" are negatively correlated. In the case of a very sensitive product, or due to regulation, local production might be necessary. However, this is likely to negatively impact profitability. Moreover, the higher the importance of intellectual property rights, the more production should be done internally, with a trade-off happening between cost efficiency and patent sensitivity. Generally, this last point has little influence for generic drug producers, which are not subject to patent protection. Additionally, there is potential for the pharmaceutical industry to improve the location of its production plants by using more strategic and cost-efficiency selection criteria.

Second, the impact of the global/local mix of API sourcing was found to be minor, while the internal/external decision is key. Indeed, for strategic reasons, it is strongly recommended that companies produce the API of their best-selling drugs in-house, if sales volumes are sufficient to produce profitably. Whereas this does not seem the most cost efficient option for small companies, it is strongly recommended to consider it, as the firm grows. Indeed, the impact and opportunity cost of lost sales is positively correlated with this growth. Guaranteeing in-house production of major APIs becomes thus key for securing the profitability of the company. Moreover, should an external supplier be tasked with the production of APIs, it should be analysed thoroughly and chosen wisely, as switching API suppliers is extremely costly and therefore uncommon in the pharmaceutical industry. Hence, good selection criteria are vital for the success of a company.

Excipients are considered as commodities by all firms and are outsourced globally. Looking into other regulated commodity businesses can thus be useful to discover new best practices. From a sourcing perspective, the majority of excipients are sourced globally from China and India. In order to avoid bad quality and/or counterfeit products, it is consequently necessary to secure the supply chain and to make it transparent.

Due to its regulatory features, the pharmaceutical business is very stable with regards to its suppliers. A good supplier management process thus needs to be in place, in order to develop long-lasting partnerships, or even production platforms between

different main players. The key is supplier selection, as supplier changes are a hassle for the company, no matter whether a supplier is global or local. Key selection criteria should preferably include quality, reliability, process technology, compliance to regulations, financial background and total costs; these are necessary to determine whether a long-term partnership is possible. Once a supplier is selected, prices should certainly not be squeezed to the maximum, as this would negatively impact quality, which is vital for product sales, brand image and corporate reputation. Certain KPIs need to be introduced to make sure that suppliers still comply with contract clauses; but involving these suppliers in further projects, to ensure their future cooperation and competitive prices, may be more worthwhile. Indeed, this last point increases the future value of cooperation and thereby reduces the risk of short-term opportunism.

On an additional note, looking at the whole ecosystem and offering a complete health system is a great opportunity for pharmaceutical companies to generate added value.

5.4 Limits and Prospects

As every research, this thesis has limitations and the main ones are outlined here; future possible refinements and extension paths then follow these.

First, as stated in the research methodology section in the beginning of this work, a major limitation on the external validity occurs due to the lack of literal replication (i.e. several similar cases each time). This is due to the limited resources available and can explain why some case specific findings cannot be generalized to the sector. Literal replication is thus considered a useful step for further research on the topic and development on this research question.

Another limitation is linked to the methodological choice made to segment the industry in four groups. This strict view on the pharmaceutical sector leaves out certain players, like biotech companies or healthcare equipment providers. Adding these actors could complete the view on the industry from a broader perspective, which might reveal supplementary trends.

Furthermore, in future work, raw materials sourcing could be segmented not by its nature (API or excipient), but by the product type it leads to: injectable, solid, gel, liquid, transdermal patch...

Additionally, prospective work on the topic could deepen the focus on one specific raw material (API or excipient) and add additional sourcing features, in order to have an even stronger understanding of the topic.

This study has been focusing mainly on direct supply sourcing; it might be interesting to include the sourcing of indirect supply to compare it to other industries; as well as the sourcing of packaging material for the finished products.

Finally, future work can help develop empirical research on global/local sourcing by applying the case study research to other industries, which would allow deepening the understanding of sourcing practices in specific sectors. This could, at a later stage, lead to a cross-industry analysis, which would provide an interesting and broad picture on sourcing and its impact across the board.

Glossary

Active ingredient

"An active ingredient is any component that provides pharmacological activity or other direct effect in the diagnosis, cure, mitigation, treatment, or prevention of disease, or to affect the structure or any function of the body of man or animals" (U.S. Food and Drug Administration, 2014a).

Big Pharma

"Pharmaceutical firms with revenue in excess of $3 billion, and/or R&D expenditure in excess of $500 million" (Enyinda, 2009, p. 29).

Brand name drug

"A brand name drug is a drug marketed under a proprietary, trademark-protected name" (U.S. Food and Drug Administration, 2014a).

Excipient

"An inactive substance that serves as the vehicle or medium for a drug or other active substance" (Oxford Dictionaries, n.a.).

Generics

Products that *"are usually produced by a manufacturer who is not the inventor of the original product, and are marketed when intellectual property protection rights are exhausted"* (EFPIA (European Federation of Pharmaceutical Industries and Associations), 2013, p. 17).

"A generic drug is the same as a brand name drug in dosage, safety, strength, how it is taken, quality, performance, and intended use (…) a generic drug product must contain the identical amounts of the same active ingredient(s) as the brand name product. Drug products evaluated as "therapeutically equivalent" can be expected to have equal effect and no difference when substituted for the brand name product" (U.S. Food and Drug Administration, 2014a).

Good manufacturing practice (GMP)

"*That part of quality assurance which ensures that products are consistently produced and controlled to the quality standards appropriate to their intended use"* (European Medicines Agency, n.a.).

Information impactedness

"When decision makers are inclined to act opportunistically in the presence of uncertainty/complexity and a small number of exchange relationships exists, or develops, the exchange relationship is said to be characterized by information impactedness" (Moschandreas, 2000, p. 44).

New Economic Geography

It focuses on the impact of trade liberalization on the location and clustering of firms and highlights various agglomeration (mainly pecuniary externalities leading to self-reinforcing mechanisms) and dispersion (like labour immobility or congestion) forces (Ottaviano & Puga, 1998; Venables, 2008).

Offshore/Offshoring

"The locating of a manufacturing facility outside of the company's headquarters region" (Ellram *et al.*, 2013, p. 15).

Quasi-rent

"An amount equal to the difference between (a) the revenue a seller would actually receive if its deal with a buyer were consummated according to the original terms of the implicit or explicit contract, and (b) the revenue the seller must receive to be induced not to exit the relationship after it has made its relationship-specific investments" (Besanko, Dranove, Shanley, & Schaefer, 2013, p. 506).

Bibliography

Abbott. (2014). *2013 annual report.* Retrieved from http://www.abbottinvestor.com/phoenix.zhtml?c=94004&p=irol-proxy

Abbott. (2015). Abbott. Retrieved March 7, 2015, from http://www.abbott.com/

Abbott. (n.a.-a). *Abbott Established Pharmaceuticals: Overview.* Retrieved from http://prod2.dam.abbott.com/en-us/documents/pdfs/media-center/pharmaceuticals-fact-sheet.pdf

Abbott. (n.a.-b). *Abbott: A Durable Growth & Income Investment.* Retrieved from http://prod2.dam.abbott.com/en-us/documents/pdfs/investors/Abbott_Overview.pdf

Abbott Laboratories. (2014). *Established Pharmaceuticals: Broad and Growing Portfolio of Branded Generics.* Retrieved from http://prod2.dam.abbott.com/en-us/documents/pdfs/investors/our-strategy/Established_Pharmaceuticals_March_2014.pdf

Accenture. (2012). High performance in pharmaceuticals procurement. Retrieved March 6, 2014, from http://www.accenture.com/Microsites/basle-switzerland/Documents/PDF/Accenture_High_Performance_Pharma_Procurement_2012.pdf

Arnold, U. (1999). Organization of global sourcing: ways towards an optimal degree of centralization. *European Journal of Purchasing & Supply Management, 5*(3), 167-174.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management, 17*(1), 99-120.

Besanko, D., Dranove, D., Shanley, M., & Schaefer, S. (2013). Economics of Strategy: Glossary. *Economics of Strategy: International Student Version* (6 ed., pp. 560): John Wiley & Sons Singapore Pte. Ltd.

Bozarth, C., Handfield, R., & Das, A. (1998). Stages of global sourcing strategy evolution: an exploratory study. *Journal of operations management, 16*(2), 241-255.

Bradley, S. P., & Weber, J. (2003, July 29). *The pharmaceutical Industry: Challenges in the New Century*. (9-703-489). Harvard Business School Case.

Bucklin, L. P. (1965). Postponement, Speculation and the Structure of Distribution Channels. *Journal of Marketing Research, 2*(1), 26-31. doi: 10.2307/3149333

Cheung, S. N. S. (1983). The Contractual Nature of the Firm. *Journal of Law and Economics, 26*(1), 1-21. doi: 10.2307/725182

Coase, R. H. (1937). The nature of the firm. *economica, 4*(16), 386-405.

Coase, R. H. (1988a). The nature of the firm: influence. *Journal of Law, Economics, & Organization, 4*(1), 33-47.

Coase, R. H. (1988b). The nature of the firm: Meaning. *Journal of Law, Economics, & Organization, 4*(1), 19-32.

Coase, R. H. (1988c). The nature of the firm: origin. *Journal of Law, Economics, & Organization, 4*(1), 3-17.

Commons, J. R. (1959). Method: Transactions and Concerns. *Institutional Economics: Its Place in Political Economy* (Vol. 1, pp. 52-93). Madison: The University of Wisconsin Press.

Daemmrich, A. A. (2009). *Where is the Pharmacy to the World?: International Regulatory Variation and Pharmaceutical Industry Location*. Working Paper. (09-118). Harvard Business School.

Demsetz, H. (1988). The theory of the firm revisited. *Journal of Law, Economics, & Organization, 4*(1), 141-161.

EFPIA (European Federation of Pharmaceutical Industries and Associations). (2013). The Pharmaceutical Industry in Figures. Retrieved November 23, 2014, from http://www.efpia.eu/uploads/Figures_Key_Data_2013.pdf

Ellram, L. M., Tate, W. L., & Petersen, K. J. (2013). Offshoring and reshoring: an update on the manufacturing location decision. *Journal of Supply Chain Management, 49*(2), 14-22.

Enyinda, C. I. (2009). *Modeling risk management in the pharmaceutical industry global supply chain logistics using analytic hierarchy process model.* (Doctor of Philosophy Dissertation), North Dakota State University. Retrieved from http://search.proquest.com/docview/304958491?accountid=12156 (3384580)

European Medicines Agency. (n.a.). Good-manufacturing-practice and good-distribution-practice compliance. Retrieved February 18, 2015, from http://www.ema.europa.eu/ema/index.jsp?curl=pages/regulation/document_listing/document_listing_000154.jsp

Gelderman, C. J., & Semeijn, J. (2006). Managing the global supply base through purchasing portfolio management. *Journal of purchasing and supply management, 12*(4), 209-217. doi: http://dx.doi.org/10.1016/j.pursup.2006.10.002

Ghoshal, S., & Moran, P. (1996). Bad for Practice: A Critique of the Transaction Cost Theory. *The Academy of Management Review, 21*(1), 13-47. doi: 10.2307/258627

Golini, R., & Kalchschmidt, M. (2009). Threats of sourcing locally without a strategic approach: impacts on lead time performances. In G. Reiner (Ed.), *Rapid Modelling for Increasing Competitiveness* (pp. 277-292): Springer London.

Gray, J. V., Skowronski, K., Esenduran, G., & Johnny Rungtusanatham, M. (2013). The reshoring phenomenon: What supply chain academics ought to know and should do. *Journal of Supply Chain Management, 49*(2), 27-33.

Grover, V., & Malhotra, M. K. (2003). Transaction cost framework in operations and supply chain management research: theory and measurement. *Journal of operations management, 21*(4), 457-473.

Handfield, R. B. (1994). US global sourcing: patterns of development. *International Journal of Operations & Production Management, 14*(6), 40-51.

Hennart, J.-F. (2010). Transaction cost theory and international business. *Journal of Retailing, 86*(3), 257-269.

Hill, C. W. L. (1990). Cooperation, Opportunism, and the Invisible Hand: Implications for Transaction Cost Theory. *The Academy of Management Review, 15*(3), 500-513. doi: 10.2307/258020

Holweg, M., Reichhart, A., & Hong, E. (2011). On risk and cost in global sourcing. *International Journal of Production Economics, 131*(1), 333-341. doi: http://dx.doi.org/10.1016/j.ijpe.2010.04.003

IBM Business Consulting Services. (2004). Pharma 2010: The value-creating supply chain: An IBM Institute for Business Value executive brief. Retrieved November 25, 2014, from http://www-935.ibm.com/services/de/bcs/pdf/2006/pharma_2010_supplychain.pdf

IMS Institute for Healthcare Informatics. (2012). The Global Use of Medicines: Outlook Through 2016 (pp. 32). Parsippany, USA.

Jin, B. (2004). Achieving an optimal global versus domestic sourcing balance under demand uncertainty. *International Journal of Operations & Production Management, 24*(12), 1292-1305.

Johnson & Johnson. (2014). *Annual report 2013.* Retrieved from http://files.shareholder.com/downloads/JNJ/3881788502x0x733042/DDD2ABD5-2CC6-41D2-8ACB-EC2A967727E4/ar2013_JNJ.pdf

Johnson & Johnson Services. (2015). Johnson & Johnson. Retrieved January 23, 2015, from http://www.jnj.com/

Kannan, V. R., & Tan, K. C. (2003). Attitudes of US and European managers to supplier selection and assessment and implications for business performance. *Benchmarking: An International Journal, 10*(5), 472-489. doi: doi:10.1108/14635770310495519

Kotabe, M., & Murray, J. Y. (2004). Global sourcing strategy and sustainable competitive advantage. *Industrial Marketing Management, 33*(1), 7-14.

Laboratoires Bailleul International. (2014). Laboratoires Bailleul. Retrieved January 20, 2015, from http://www.bailleul.com/

Lahidji, B., & Tucker, W. (2014). *The Case for Re-shoring Manufacturing Jobs*. Paper presented at the Atti del XXVI Convegno annuale di Sinergie, Università di Cassino e del Lazio Meridionale. Retrieved from http://www.sinergiejournal.it/rivista/index.php/XXVI/article/viewFile/975/753

Les Echos. (n.a.). Laboratoires Bailleul. Retrieved January 20, 2015, from http://www.bilansgratuits.fr/entreprise/fiche/56208515900043.htm

Loppacher, J. S., Luchi, R., Cagliano, R., & Spina, G. (2006). *Global sourcing and procurement strategy: a model of interrelated decisions.* Paper presented at the Supply Chain Forum: An International Journal.

Mathews, D. (2012, June 28). Interview: Dan Mathews on pharma marketing trends and the PMEA programme: The chair of judges for PMEA 2012 examines the current and future challenges for the sector. In PMLiVE.com (Ed.).

Mathews, D., & Brimacombe, A. (Producer). (2013, May 28). Life Sciences: An Overview of Trends & Challenges. [PowerPoint slides by Accenture]

McIvor, R. (2013). Understanding the Manufacturing Location Decision: The Case for the Transaction Cost and Capability Perspectives. *Journal of Supply Chain Management, 49*(2), 23-26. doi: 10.1111/jscm.12010

McKinsey & Company. (2011). A wake-up call for Big Pharma. Retrieved January 3, 2015, from http://www.mckinsey.com/insights/health_systems_and_services/a_wake-up_call_for_big_pharma

McKinsey & Company. (2013). *Building new strengths in the healthcare supply chain: Pharmaceuticals and Medical Products Operations*. Retrieved from http://www.mckinsey.com/insights/health_systems_and_services/strengthening_health_cares_supply_chain_a_five_step_plan

Monczka, R. M., & Trent, R. J. (1991). Global sourcing: a development approach. *International Journal of Purchasing and Materials Management, 27*(2), 2-8.

Monczka, R. M., & Trent, R. J. (1992). Worldwide sourcing: assessment and execution. *International Journal of Purchasing and Materials Management, 28*(4), 9-19.

Monczka, R. M., Trent, R. J., & Petersen, K. J. (2006). Effective global sourcing and supply for superior results: CAPS Research (Institute for Supply Management & the W.P. Carey School of Business at Arizona State University).

Moschandreas, M. (2000). Business Economics. In Cengage Learning EMEA (Ed.), (Second ed., pp. 44-46): Cengage Learning. Retrieved from http://books.google.ch/books?id=ncVfjhTULyAC.

Murray, J. Y., Kotabe, M., & Wildt, A. R. (1995). Strategic and financial performance implications of global sourcing strategy: A contingency analysis. *Journal of International Business Studies*, 181-202.

Nakayama, T., Momotake, S., & Nakayama, M. (2014). *Comparative Analysis of Reshoring Production between Japan and US*. Paper presented at the Second International

Conference On Advances In Social Science, Management And Human Behaviour - SMHB 2014. http://www.seekdl.org/upload/files/20141110_075138.pdf

News-Medical.Net. (2015, February 27, 2015). Mylan acquires non-U.S. developed markets specialty and branded generics business from Abbott. Retrieved from http://www.news-medical.net/news/20150227/Mylan-acquires-non-US-developed-markets-specialty-and-branded-generics-business-from-Abbott.aspx?

Ottaviano, G. I., & Puga, D. (1998). Agglomeration in the global economy: A survey of the 'new economic geography'. *The World Economy, 21*(6), 707-731.

Oxford Dictionaries. (n.a.). Excipient. Retrieved March 1, 2015, from http://www.oxforddictionaries.com/definition/english/excipient

Park, H. Y. (2000). Foreign direct investment and global sourcing choices of firms in the US. *Managerial and Decision Economics, 21*(6), 211-221.

Petersen, K. J., Prayer, D. J., & Scannell, T. V. (2000). An empirical investigation of global sourcing strategy effectiveness. *Journal of Supply Chain Management, 36*(1), 29-38.

Pharmaxie. (n.a.). Fiche Laboratoire: Bailleul. Retrieved January, 20, 2015, from http://www.pharmaxie.com/p306s4numlabo19/Fiche-laboratoire/Bailleul.html

PhRMA (Pharmaceutical Research and Manufacturing of America). (2012). Pharmaceutical Industry Profile 2012. Retrieved November 25, 2014, from http://www.phrma.org/sites/default/files/pdf/phrma_industry_profile.pdf

Pisano, G. P. (1994). Knowledge, integration, and the locus of learning: An empirical analysis of process development. *Strategic management journal, 15*(S1), 85-100. doi: 10.1002/smj.4250150907

PricewaterhouseCoopers. (2007). Pharma 2020: The vision: Which path will you take? Retrieved November 13, 2014, from http://www.pwc.com/gx/en/pharma-life-sciences/pharma-2020/pharma-2020-vision-path.jhtml

PricewaterhouseCoopers. (2011). Pharma 2020: Supplying the future: which path will you take? Retrieved November 13, 2014, from http://www.pwc.com/gx/en/pharma-life-sciences/pharma-2020/pharma-2020-supplying-the-future.jhtml

Quintens, L., Pauwels, P., & Matthyssens, P. (2006). Global purchasing: state of the art and research directions. *Journal of purchasing and supply management, 12*(4), 170-181.

Rexha, N., & Miyamoto, T. (2000). International sourcing: an Australian perspective. *Journal of Supply Chain Management, 36*(4), 27-34.

Rossetti, C., & Choi, T. Y. (2005). On the dark side of strategic sourcing: experiences from the aerospace industry. *The Academy of Management Executive, 19*(1), 46-60.

Schneider, C. O., Bremen, P., Schönsleben, P., & Alard, R. (2013). Transaction cost economics in global sourcing: Assessing regional differences and implications for performance. *International Journal of Production Economics, 141*(1), 243-254.

Schuetze, A., & Siebelt, F. (2013, October 9). Talks over Celesio could drag on for weeks - sources. *Reuters*. Retrieved from http://www.reuters.com/article/2013/10/09/celesio-mckesson-talks-idUSL6N0HZ3EN20131009?type=companyNews

Shah, N. (2004). Pharmaceutical supply chains: key issues and strategies for optimisation. *Computers & chemical engineering, 28*(6–7), 929-941. doi: http://dx.doi.org/10.1016/j.compchemeng.2003.09.022

Sharon, N., & Eppinger, S. D. (2001). Sourcing by Design: Product Complexity and the Supply Chain. *Management Science, 47*(1), 189-204. doi: 10.2307/2661567

Shelanski, H. A., & Klein, P. G. (1995). Empirical research in transaction cost economics: a review and assessment. *Journal of Law, Economics, & Organization, 11*(2), 335-361.

Simon, H. A. (1955). A Behavioral Model of Rational Choice. *The Quarterly Journal of Economics, 69*(1), 99-118. doi: 10.2307/1884852

Simon, H. A. (1957). Introduction to the second edition. *Administrative behavior: a study of decision-making processes in administrative organization* (Second ed., pp. ix-xxxix). New York: The Macmillan Company.

Simon, H. A. (1972). Theories of bounded rationality. In C. B. McGuire & R. Radner (Eds.), *Decision and organization* (Vol. 1, pp. 161-176). Amsterdam: North-Holland Publishing Company.

Singh, M. P. (2005). *The pharmaceutical supply chain: A diagnosis of the state-of-the-art.* (Master Thesis), Massachusetts Institute of Technology. Retrieved from http://hdl.handle.net/1721.1/33354

Société. (2015). Laboratoires Bailleul. Retrieved January 20, 2015, from http://www.societe.com/societe/laboratoires-bailleul-562085159.html

Sousa, R. T., Liu, S., Papageorgiou, L. G., & Shah, N. (2011). Global supply chain planning for pharmaceuticals. *chemical engineering research and design, 89*(11), 2396-2409. doi: http://dx.doi.org/10.1016/j.cherd.2011.04.005

Steinle, C., & Schiele, H. (2008). Limits to global sourcing?: Strategic consequences of dependency on international suppliers: Cluster theory, resource-based view and case studies. *Journal of purchasing and supply management, 14*(1), 3-14.

Tate, W. L., Ellram, L. M., Schoenherr, T., & Petersen, K. J. (2014). Global competitive conditions driving the manufacturing location decision. *Business Horizons, 57*(3), 381-390. doi: http://dx.doi.org/10.1016/j.bushor.2013.12.010

Tavassoli, S. M. (2013). Manufacturing Renaissance: Return of manufacturing to western countries: Center for Strategic Innovation Research, Blekinge Institute of Technology.

The Economist. (2009, July 20). Globalisation. *The Economist*. Retrieved from http://www.economist.com/node/14031230

The Economist. (2011, December 3). Drugmakers: Cliffhanger. *The Economist*. Retrieved from http://www.economist.com/node/21541018

The Economist. (2013a, September 23). When did globalisation start? *The Economist*. Retrieved from http://www.economist.com/blogs/freeexchange/2013/09/economic-history-1

The Economist. (2013b, May 21). Why have containers boosted trade so much? *The Economist*. Retrieved from http://www.economist.com/blogs/economist-explains/2013/05/economist-explains-14

The Economist. (2014, November 15). Pharmaceutical M&A: Invent it, swap it or buy it. *The Economist*. Retrieved from http://www.economist.com/news/business/21632676-why-constant-dealmaking-among-drugmakers-inevitable-invent-it-swap-it-or-buy-it

The Kaiser Family Foundation. (2005). Follow the Pill: Understanding the U.S. Commercial Pharmaceutical Supply Chain. Retrieved September 20, 2014, from http://kaiserfamilyfoundation.files.wordpress.com/2013/01/follow-the-pill-understanding-the-u-s-commercial-pharmaceutical-supply-chain-report.pdf

Trent, R. J., & Monczka, R. M. (2003a). International Purchasing and Global Sourcing - What are the Differences? *Journal of Supply Chain Management, 39*(3), 26-36.

Trent, R. J., & Monczka, R. M. (2003b). Understanding integrated global sourcing. *International Journal of Physical Distribution & Logistics Management, 33*(7), 607-629.

Tunisini, A., & Bocconcelli, R. (2009). Reconfiguring supplier relationships between local and global: History matters. *Industrial Marketing Management, 38*(6), 671-678.

Tunisini, A., Bocconcelli, R., & Pagano, A. (2011). Is local sourcing out of fashion in the globalization era? Evidence from Italian mechanical industry. *Industrial Marketing Management, 40*(6), 1012-1023. doi: http://dx.doi.org/10.1016/j.indmarman.2011.06.011

U.S. Food and Drug Administration. (2014a). Drugs@FDA Glossary of Terms. Retrieved January 3, 2015, from http://www.fda.gov/Drugs/InformationOnDrugs/ucm079436.htm - B

U.S. Food and Drug Administration. (2014b). New Molecular Entity Approvals for 2013. Retrieved November 24, 2014, from http://www.fda.gov/Drugs/DevelopmentApprovalProcess/DrugInnovation/ucm381263.htm

United Nations Conference on Trade and Development. (2014). *World Investment Report 2014: Investing in the SDGs: an action plan*. Switzerland: United Nations Publication Retrieved from http://unctad.org/en/PublicationsLibrary/wir2014_en.pdf.

UPS. (2005a). Building Supply Chain Capabilities in the Pharmaceutical Industry; Part 1: Trends impacting the supply chain. Retrieved November 24, 2014, from http://www.ups-scs.com/solutions/white_papers/wp_pharma1.pdf

UPS. (2005b). Building Supply Chain Capabilities in the Pharmaceutical Industry; Part 2: Winning supply chain capabilities. Retrieved November 24, 2014, from http://www.ups-scs.com/solutions/white_papers/wp_pharma2.pdf

Van Arnum, P. (2012). Decades of Change for the Top Pharmaceutical Companies: Tracking change from spinoffs of chemical companies to life-sciences powerhouses. *Pharmaceutical Technology Sourcing and Management, 8*(7). http://www.pharmtech.com/pharmtech/Most+Viewed+Articles/Decades-of-

Change-for-the-Top-Pharmaceutical-Compa/ArticleStandard/Article/detail/780565

Venables, A. J. (2008). New economic geography. In S. N. Durlauf & L. E. Blume (Eds.), *The New Palgrave Dictionary of Economics*. Basingstoke: Palgrave Macmillan.

Verif. (n.a.). Laboratoires Bailleul. Retrieved January 20, 2015, from http://www.verif.com/bilans-gratuits/LABORATOIRES-BAILLEUL-562085159/

Vonderembse, M. A., & Tracey, M. (1999). The Impact of Supplier Selection Criteria and Supplier Involvement on Manufacturing Performance. *Journal of Supply Chain Management, 35*(2), 33-39. doi: 10.1111/j.1745-493X.1999.tb00060.x

Williamson, O. E. (1975). *Markets and hierarchies, analysis and antitrust implications*. New York: The Free Press.

Williamson, O. E. (1985). *The economic institutions of capitalism*. New York: The Free Press.

Williamson, O. E. (1988). The logic of economic organization. *Journal of Law, Economics, & Organization, 4*(1), 65-93.

Williamson, O. E. (1998). The Institutions of Governance. *The American Economic Review, 88*(2), 75-79. doi: 10.2307/116896

Yin, R. K. (2014). *Case study research: Design and methods* (5 ed.): Sage Publications, Inc.

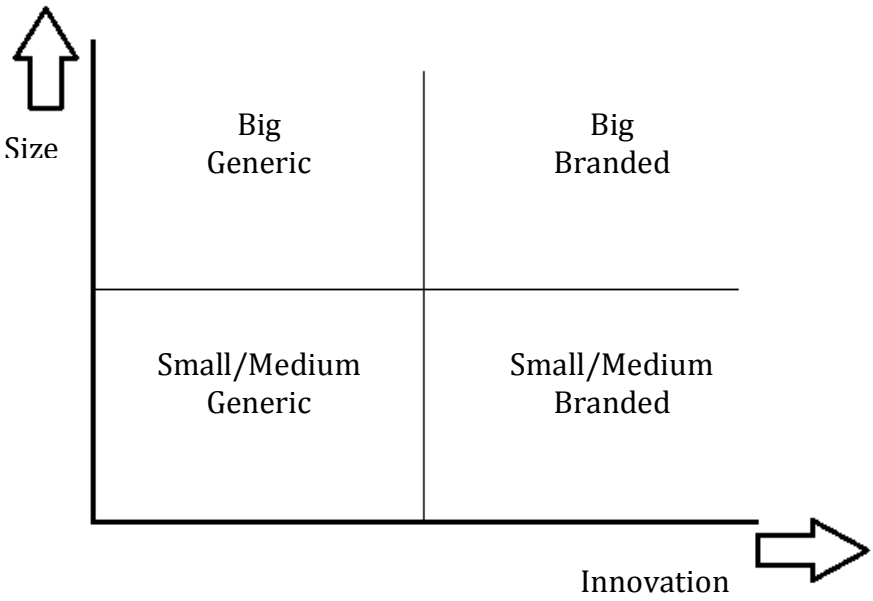
Appendix

Appendix 1. Interview guide

"How to combine global and local sourcing in the pharmaceutical sector? Patterns of an industry" - *Interview guide*

Introduction

Introduction, objectives of the interview, structure of the interview.



General questions

1. Could you please briefly introduce yourself?
2. What are your current tasks and responsibilities within this company?
3. Could you briefly introduce the company you are working for and its geographical coverage?
4. Does your company only produce brand-name drugs or also generic drugs? *(In this interview we will focus on brand-name OR generic drugs)*
5. How many products/drugs do you produce? And how many are considered blockbusters/best sellers? *(Which ones?)*
6. What does your sourcing/procurement cost represent? (*In percentage of your revenue and in percentage of your profit)*
7. What proportion of your sourcing/procurement is done globally/locally? How do you manage this mix?

8. How do you get to know all different existing suppliers?
9. Where is your R&D done? And why? Are there differences for research compared to development?
10. What advantages do you take out of this? What are the disadvantages?
11. Have you always been doing it this way? Are there any planned changes for the coming years regarding the location of your R&D? *(And the people doing it, if outsourced)*
12. If outsourced, why do you outsource it? *(If not, why not and what are the consequences and reasons?)*

Main subject

Questions will focus on the supply of raw materials/semi-finished goods AND the location of production sites, unless stated differently.
We will focus on the company HQ when looking at the decision global/local.

Global/local

13. What do you understand under global and local **sourcing**?
14. What advantages do you see in sourcing globally? And in sourcing locally?
15. How many parties do you approximately source from? And where are they **located**? *(In order of importance)*
16. What is the share of low cost/developing country purchasing in relation to the entire purchasing volume?
17. In which of these five levels do you consider your firm to currently be?
    a. Engage in domestic purchasing only
    b. Engage in international purchasing as needed
    c. International purchasing as part of sourcing strategy
    d. Integration and coordination of global sourcing strategies across worldwide locations
    e. Integration and coordination of global sourcing strategies with other functional groups
18. How do you combine your global and local sourcing?

Sourcing

19. Is your sourcing strategy adapted to the product categorization? (**ABC categorization**)/ Is there a difference in location for suppliers of materials for A, B or C (Pareto principle - 20/80) type of products?
20. What is your **sourcing policy** for critical items? Is it different to non-critical item sourcing?
21. Do you implement some kind of redundancy for the supply of critical items? If so, how is it organized?
22. How do you select a location for a **production site**?
23. Which location advantages are of the highest importance when selecting the location of a production site?
24. Regarding the location of production sites, do you currently witness a "**reshoring**"/"backshoring" trend in your industry? And in your company? Are there differences per region?
25. To what extent does the location of your suppliers have an impact on the location of your production site?
26. Which future evolution/trend do you see for your sourcing strategy?

Supplier selection

27. Based on which criteria do you select your suppliers? (**Selection criteria**)
28. Once chosen, how do you assess your suppliers? (**Assessment criteria**)
29. Regarding suppliers performance, would you say that usually: *(Per main supplier)*
    a. Products are delivered in the quality that was agreed upon?
    b. Delivery of the products meet quoted or anticipated delivery dates?
    c. Delivery lead-time is shorter in comparison to industry average?
    d. Costs of the product are low in comparison to industry average?
    e. Suppliers demonstrate great flexibility?
30. How would you classify the following criteria in order of importance in the selection of a supplier? *(1 being the most important and 11 the least)*

Quality	
Cost	
Trust	
Product technology	
Process technology	

Ability to modify product/flexibility	
On time delivery	
Schedule reaction	
Lead-time	
Established in Europe	
Other:	

Transaction cost economics

31. With regards to transaction costs economics, which **modes of governance** do you usually make use of in handling the transactions with your suppliers? (On a continuous spectrum going from market to hierarchy/firm) Does this have particular reasons?
32. To measure transaction costs how would you answer these questions:
    a. Do your suppliers invest in transaction-specific assets? *(Potential hold-up problem)*
    b. What effort is required in developing the relationship to your suppliers?
    c. What is the sustainability of your relationship with your suppliers? Do you switch them often or do you keep them for the long run?
    d. What effort is required in monitoring the performance of the supplier? Is it complicated by geographical distance or by long transportation times?
    e. Is addressing problems that might arise in the relationship with the supplier a challenge?
    f. What is the likelihood of a supplier taking advantage of the relationship?
33. Do you usually have high **coordination costs**? *(Cost of exchanging information and incorporating that information into the decision making process)*
34. Do you usually face high **transaction risks** with your suppliers?

    Transaction risks include:

    a. Risk that other parties in the transaction will not take their agreed upon responsibilities.
    b. Asset-specific investments made by one party in the relationship.
    c. “Small numbers bargaining”; opportunistic behavior if firm procures from market and only a few suppliers.
    d. “Loss of resource control”; outsourcing a product that may be proprietary in nature and which may again increase the probability of opportunistic behavior

Ending

- *Summary of the main ideas*

35. Finally, how would you define your company's strategy to combine global and local sourcing (of procurement/sourcing and location of production sites)?