



Frank Straube (Ed.)

## Successfully Managing Challenges in German-Chinese Logistics Networks

Christian F. Durach  
Benjamin Nitsche



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# PREFACE

Dear Reader,

In one way or another almost every company operating today is part of a global logistics network. This has come about due to years of globalization whereby a multitude of opportunities have opened up for businesses to enter new regional markets, find new sources of supply, and tap into the knowledge of a vast array of capable global partners so as to meet customers' demands more efficiently. The Chinese market especially has attracted numerous German companies from the automobile, electronics and consumer goods industries. For such companies, China has proven to be both a promising demand and manufacturing region.

Companies are regularly faced with the new challenges that arise with globalization. Successfully Managing Challenges in German-Chinese Logistics Networks is a new study by the Department of Logistics at the Technische Universität Berlin, Germany. It researches these challenges and associated mitigation strategies with a special focus on China, exemplary of many culturally distinct bilateral trade relationships around the globe. The study is intended to support companies who are facing such challenges to manage and plan their German-Chinese logistics networks more successfully.

The scale of the business interaction between these two global players, Germany and China—Germany is the biggest importer of Chinese goods in Europe; and China is one of the world's fastest developing economies—is the justification for the focus of this study.

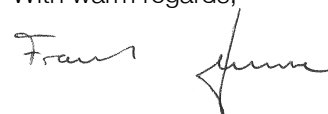
The study was conducted by the Competence Center for International Logistics Networks, which is part of the Department of Logistics, in close cooperation with

the Chair of International Logistics Networks and Services at the Tongji University, Shanghai, China. Both institutions are endowed by the Kuehne Foundation, in Schindellegi, Switzerland. This set-up clearly emphasizes the international nature of the work that was conducted here. The research cooperation has been fruitful from the very beginning. The study builds upon the research project “Navigator for German-Chinese Logistics Networks”. The project aims to support managers in planning robust international logistics networks. A network planning tool called “Navigator” has been developed in the course of this project. The tool provides valuable planning information, logistics data and management concepts. It is freely available online at <http://china.logistik.tu-berlin.de>.

The present study is intended to fulfill both the practitioners' needs for working in a globalized logistics network, and the academy's scientific interests in the phenomenon of international logistics networks. We hope and trust that this study will contribute to your understanding of the issue and will help those who plan tomorrow's global logistics systems.

We sincerely thank all the companies and logistics managers who have supported us until now through seven working group meetings, several online surveys and multiple on-sight interviews. We really appreciate your contribution and hope for your continued interest in and support of our research project.

With warm regards,



Prof. Dr.-Ing. Frank Straube  
Editor



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# MANAGEMENT SUMMARY

This study was motivated by the observation that business ties between Germany and China are constantly increasing. From such increasing ties, new challenges arise for managers, requiring them to establish efficient and robust logistics network structures that bolster their businesses. The present study depicts typical German-Chinese supply chains for the automotive, electronics and consumer goods industries, examines current challenges in German-Chinese logistics networks, provides an assessment of the value of seventy mitigation strategies to cope with such challenges, and illustrates three exemplary case studies in the observed industry clusters which offer original practical insights and comprehensive guidance.

Methods of analysis included two group exercises with forty-two practitioners, online questionnaires with over fifty respondents and three in-depth case studies. The entire study is enriched with up-to-date macro- and micro-economic data, as well as a study of seminal literature in the field.

Jointly with our study participants we could identify twenty-two disruptive events in German-Chinese logistics networks. These events were mapped on a two-dimensional graph. Dimension One looked at the likelihood of the occurrence of the event and Dimension Two looked at the potential impact of the event. Results of this mapping show that misunderstandings between German and Chinese business partners due to cultural differences, legal and regulatory uncertainty, faulty transportation infrastructure and compliance issues at customs are amongst the most prominent challenges in the Chinese market. Subsequent discussions about ten of these disruptive events identified seventy potential

proactive mitigation strategies. These mitigation strategies were then evaluated according to the difficulties which may arise during their implementation and their effectiveness at mitigating the disruptive event. The arithmetic product of these two measurements should give practitioners clear guidance for efficiently and proactively managing their logistics networks. Chapter 6, thereafter, gives detailed insights about how leading companies manage their German-Chinese logistics networks, and the challenges they are regularly faced with. The SteelCom case study provides an in-depth analysis of the supply chain structure of a first-tier German automotive supplier and its methods for coping with a lack of visibility in its global supply chain. The case study on Wafec, a German semiconductor manufacturer, provides a prime example of how the electronics industry manages to balance the trade-off between taking advantage of globally dispersed manufacturing cost advantages and the provision of a responsive supply chain. The case study on LuxCom, a manufacturer of luxury consumer goods, gives insights on how an established European company manages to cope with the challenges of exponentially increasing consumer demand in China.

This study is part of an ongoing research project at the Chair of Logistics, Technische Universität Berlin and the Chinesisch-Deutsches Hochschulkolleg, Tongji University, Shanghai. Its results provide insights into some of the major findings from our prolonged discussions with leading managers. It was also the inspiration for and the goal of several Bachelor's, Master's and Doctoral theses. Interested readers can refer to our homepage for further insights on the project.

<http://china.logistik.tu-berlin.de>

# 1 INTRODUCTION

In 1972, Germany and China began a diplomatic relationship that would soon become highly beneficial for both countries. Over time, business ties between Germany and China have developed and become very close. In 2013, Germany exported goods worth about US\$ 81bn while importing goods from China of about US\$ 74bn (see also Figure 1). This trade balance makes Germany by far China's biggest partner in Europe and its sixth biggest trade partner in the world. Simultaneously, China is Germany's most important trade partner in Asia and its third most important partner worldwide. The countries have jointly announced that they will continue to increase their trade volumes to US\$ 220bn by 2020. The increasing purchasing power of a vast portion of the Chinese population is one of the main factors driving ties to grow further (Straube et al., 2008). According to the Federal Ministry of Economic Affairs and Energy, 680m Chinese people will show demand for Western products, in particular German products, by 2020. Today only about 200m to 300m people in China fall into this category.

Not only is the demand side of the Chinese-German trade relationship very appealing for German companies, but China is also an attractive country when it comes to sourcing and producing. This is why many German

businesses have a profound interest in the country. However, doing business with China comes with many challenges that can have a significant impact on business performance. Besides intellectual property rights, China's current logistics performance is a major concern. While Germany spends about 7% of its GDP on logistics services, China, at 18%, has to spend more than twice as much (Handfield et al., 2013).

These matrices reflect a lack of efficiency when it comes to logistics. The deviating logistic performance between the two countries is also revealed in the so-called Logistics Performance Index (LPI). The LPI, an index issued by The World Bank, measures and evaluates logistical performance at country level. The index uses six categories to assess and evaluate logistics performance (customs, infrastructure, international shipments, logistics competence, tracking & tracing, timeliness). The index is assigned on a range from 1 to 5, where 5 is the highest value and 1 is the lowest value achievable. The LPI is calculated as the weighted average value of those six categories (see Figure 3). Even though China is continuously improving and catching up, its Logistics Performance Index is still significantly lower than that of Germany. In 2014, China was ranked number 28 in the world with

Figure 1: German Trade with China Detailed for Different Product Categories 2013

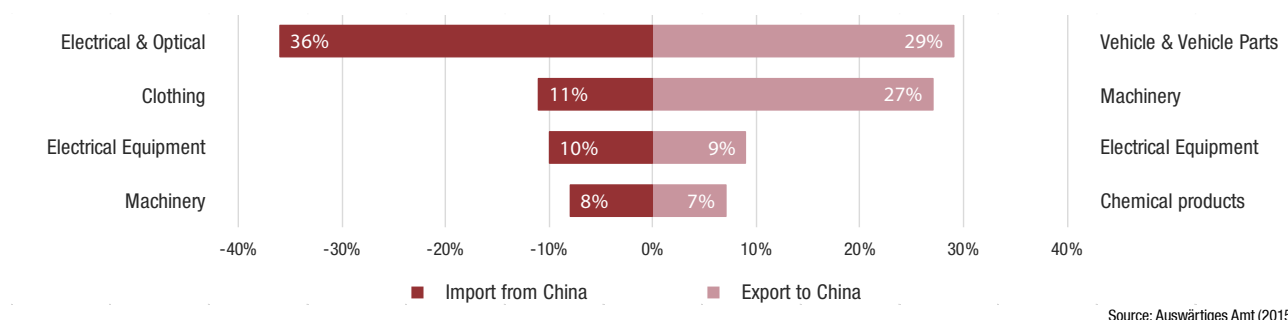
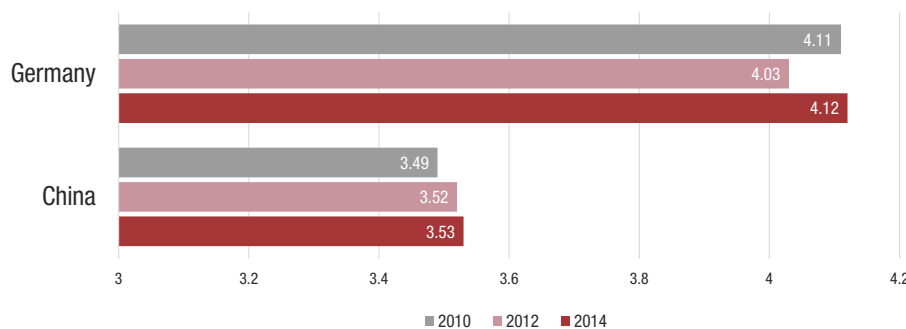


Figure 2: LPI Comparison between Germany and China



a score of 3.53, while Germany led the ranking with 4.12 points (see Figure 2)—a fact that most certainly still deters many Western companies from entering the Chinese market.

The main motivation for this study is the apparent importance of current economic relationships between Germany and China. Additional important statistical country insights can be found in Chapter 2.

While such previously discussed matrices provide the framing of this study, the increasing amount of supply chain risks for German companies that operate in China provides the main target. New business opportunities and particularities in supply chain risks are both attributes of the Chinese consumer and production market. Over the previous three decades, the Chinese market has experienced an unprecedented surge in both its national demand for products and its production output. The market has changed from a make-and-ship to an attractive sales market, appealing for many foreign firms. However, with new opportunities come new challenges that force foreign and domestic companies alike to reassess their supply chain infrastructure for both selling and sourcing goods. This is a task many foreign firms seem to struggle with.

European companies in particular have been reported to increasingly struggle with increased uncertainty in

the business environment. The Association of German Engineers estimates that about 20% of German companies will pull production out of China soon, as they underestimated risks associated with various factors, such as labour force, environmental rules and the financial market (Die Welt, 2012). Some of the biggest firms in the world, including Aston Martin, eBay, Google and Carrefour, have failed to thrive in doing business with China.

### Examples of Business Failures & Business Successes in China

Aston Martin, the UK-based sports car manufacturer, has had to recall more than 5,000 cars since 2007, after its supply chain quality control failed and a tier-three supplier from China used counterfeit material for throttle pedals (Larson, 2014). Steiff, the German toy manufacturer, has abandoned its Chinese production (about one fifth of production was outsourced to China), after it experienced increasing quality issues and long delivery times. Carrefour, the French retailer, had to significantly downgrade its performance outlook for 2014 as it underestimated logistical risks during its attempt to expand into China's regional cities, leading to stock-out rates of 30-40% (Supply Chain Magazine, 2014). Opel, the Germany-based automotive manufacturer, decided in 2014 to retreat from the Chinese market as it had failed to build an effective distribution network. Ebay, the

US-based online auction platform, entered China in 2004 and lost almost their entire market share to TaoBao, a local competitor, after it failed to understand the specific Chinese axiology, i.e. the value of personal relationships (Ou et al., 2014). Google retreated from China mainly after it refused to abide by the governmental rules (Helft and Barboza, 2010).

While obviously no single factor can explain the success or the failure of a company, most of them seem to have failed to grasp just how different the Chinese market is. Cases of successful companies such as Haier (Chen et al., 2004) suggest that companies' willingness to learn from each other in terms of failures and good practices is one of the key factors for success in China. For example, Rich Products Corp., the food product cooperation from New York, successfully formed a joint venture with Kangxin Logistics Ltd. Co. in 2003 which help the company gain access to local cold-chain supply chain facilities and skilled drivers (Ganster, 2009).

choosing to produce in, or source from, China. Supply chain disruptions are defined as 'unplanned and unanticipated events that disrupt the normal flow of goods and materials' (Craighead et al., 2007, p. 135).

This study strives to assist practitioners in estimating the risk of such China-specific supply chain disruptions based on their probability of occurrence and severity of impact. Ten of the most pressing disruption risks will then be further discussed in order to derive suitable mitigation strategies for those disruptions. Those strategies will eventually be assessed as to their effectiveness in proactively mitigating the disruptions and potential challenges during their implementation. The objective is to show supply chain managers how they can proactively and efficiently invest resources in order to successfully manage risks. As a research method, the nominal group technique has been applied, with 42 supply chain managers from multinational Western companies seeking to generate new ideas through extensive group discussions.

## Purpose of the Study & Definitions

Supply chain managers need to know the specific disruption risks they may expose their supply chains to by

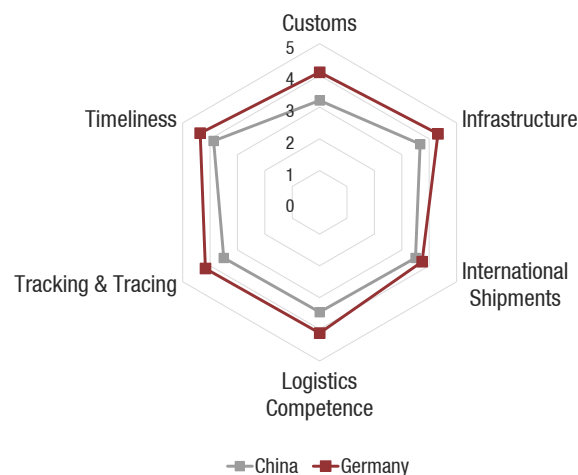


Figure 3: Comparison of the Categorical Performance between Germany and China 2014

## 2 COUNTRY INSIGHTS CHINA

The Chinese economy has grown rapidly since economic reforms introduced free market principles in 1978. Today, it is the second largest economy in the world (not counting the European Union) with an annual GDP just over US\$ 10tn and a total population of about 1.36bn. The World Bank labels the People's Republic of China as an upper middle income country, with an expected annual growth rate of over seven percent until the year 2017. From only four percent of global output in terms of GDP in 2000, China is expected to account for 11 percent by 2025. Since 2007, the industry sector has contributed more than 47 percent annually to GDP.

Contrary to common belief, China's export of goods and services is almost balanced with its imports. In 2013, 26 percent of all goods and services (percentage of GDP) had been exported, while 24 percent were imports. Such matrices make China a prime candidate for becoming the largest trading nation in the world in the second decade of the 21st century. China recorded an average capital flow of US\$ 219.49bn HML (HML=high minus low) from 1998 until 2015, reaching an all-time high of US\$ 1320.80bn HML in the fourth quarter of 2010 and a record low of US\$ -789bn HML in the first quarter of 2015. This flow of international capital reveals China's deepened integration with the global economy. As for China's foreign trade with Germany, although Germany has run a net import deficit with China since 2001, the gap has narrowed in recent years. In 2013, Germany imported goods and services worth US\$ 81bn, and exported about US\$ 74.5bn in goods and services to China.

In 2001, China joined the World Trade Organization (WTO) after 15 years of negotiations and declared the step as a strategic decision in the process of economic globalization. Since then, the public sector has lost some of its former importance and enterprises without competitive advantage have vanished from the market, while the private sector has managed to expand since accession to the WTO. This is due to two major factors. First, private companies now enjoy the same opportunities as state-owned enterprises and second, private companies generate quick access to foreign know-how, capital and technology due to commercial partnerships.

Since 2001, China has changed in many positive ways. The principles of free market economy, trade and investment have been integrated into popular thinking. The WTO's principles of nondiscrimination, reciprocity, binding and enforceable commitments, transparency and safety valves have slowly but steadily trickled down into Chinese politics and have started to attract more and more multinational companies. While only a few years ago China was still regarded as the factory of the world, since the WTO accession it has quickly become a major global manufacturing center, it is now also seen as an ever growing demand market.

China's GNI per capita still lacks far behind that of developed countries such as Germany (about US\$ 45,000). However, GNI per capita increased from US\$ 9,000 to almost US\$ 12,000 between 2010 and 2013. In the past, the Chinese labour force has increased on an annual basis and now consists of

793m people. However, recent statistics show that the number of workers in China will flatten out and eventually decrease. Without any doubt, this development will have a major economic impact. For example, as labour supply decreases wages will have to rise.

China's logistics industry has gained much importance in recent years. The government's current and 12th five-year plan stresses the development of the logistics industry so as to further facilitate and support continued economic growth. The government decided to link every city with a population of over 200,000 to

highways, and thereby seeks to expand its highway network to a total of 50,000 km. Today's high-speed train network will also be expanded with an additional 30,000 km of track, adding to the 70,000 km already existing. Furthermore, the total number of airports is set to expand from 175 in 2010 to 230 by the end of 2015. One of the biggest new airports will be built close to Beijing. With a planned area of more than 15,000 square kilometers, the four-runway facility will be bigger than Bermuda and is scheduled for completion by 2018.

# 3 TYPICAL GERMAN-CHINESE SUPPLY CHAIN STRUCTURES

This chapter introduces the typical supply chain structures in three different industries types with German-Chinese logistics networks structures. The data has been anonymously gathered from 57 companies throughout the course of this research project.

A supply chain consists of a series of operations and processes along a chain of actors, often called supply chain partners. Supply chains are typically characterized by three types of flows. Information flow (a bidirectional exchange of knowledge and information on a strategic, operational and tactical level), financial flows (usually a mono-directional flow of finances to pay for supplies and services) and product flow (a mainly mono-directional flow of material that has become more and more bidirectional due to an increasing trend towards recycling). The following table mainly focuses on financial and product aspects in order to characterize typical supply chains.

In this study, we looked at supply chains from a single-firm perspective. That is, we took on the perspective of one organization that is part of a series of supply partners, trying to identify how a typical German-Chinese logistics network looks for one of its core products. We wanted to identify company activities upstream (inwards) and downstream (outwards). In order to grasp an understanding of the different types and levels of supply chains, depending on the point of view and depending on the industry, we subdivided the supply chain data into three typical industries and into two or three tiers for each industry type.

The three industry types are: first, the automotive industry, since this industry type is known to have to deal with a whole array of different versions of their end products; second, companies within the electronics industry, since they are commonly known to be innovative; and third, the consumer goods industry, since, as its name implies, it has close links to the end customer (as a result we only looked at two tiers in this industry). To define the different tiers, we used the following categorization: an organization that sells its product directly to the end customer is an Original Equipment Manufacturer (OEM). A supplier that sends materials directly to the OEM is a first-tier supplier; one that sends materials to a first-tier supplier is a second-tier supplier. The results can be found in Table 1.

The consumer goods industry is characterized by a very high turnover per employee. In comparison, margins in this industry are usually somewhat smaller. However, as can be seen in the “Range of Turnover per employee”, such numbers have to be treated with caution as we can also detect a broad range between the companies under observation. As for the performance changes in 2014 in China, we can see that the automobile industry seems to have had a particularly profitable year - something which seems it will change in the near future. The lacking performance matrices in the consumer goods industry might be explained by looking at the experience of Carrefour as discussed in the introduction and similar events that have affected multiple companies which rely heavily on transportation infrastructure. As for the supply-side supply chain



Table 1: Typical Network Structures of Automotive, Electronics and Consumer Goods Industry

N = 57		Automotive			Electronics			Consumer Goods	
		OEM	1st Tier	2nd Tier	OEM	1st Tier	2nd Tier	OEM	1st Tier
Turnover	Ø Turnover per Employee (€)	600 T	1.4 m	1.1 m	700 T	600 T	800 T	2.1 m	1.4 m
	Range of Turnover per Employee (€)	400 T–1 m	59 T–2.4 m	140 T–3 m	450 T–1 m	200 T–1 m	150 T–17 m	400 T–3 m	23 T–3 m
Performance Changes in 2014 (in China)	Sales (%)	+ 20–35	+ 10–35	+ 10–35	+ 10–20	+ 20	+ 35	- 10–35	+ 10–20
	Profitability (%)	+ 0–20	+ 0–35	+ 0–20	+ 0–10	0	+ 20	+ 0–20	+ 10–20
	Market Share (%)	+ 0–10	+ 0–35	+ 10–20	+ 0–10	+ 0–10	+ 10	+ 0–10	+ 0–20
	Transport Mode	Ship, Plane or Mix	Truck or Mix	Truck or Mix	Ship or Mix	Ship	Plane	Truck, Plane or Mix	Ship, Truck, Plane
Supply Side (Single product)	Ø Number of Suppliers	125	140	95	135	100	25	300	100
	Ø Number of Supplier Locations	450	140	40	160	10	10	600	50
	Ø Delivery Frequency	30–500	10–200	150–300	3–20	50–60	7–360	40–1 T	500–700
	Ø Quantity per Delivery	250–500 T	Bulk	Bulk	100–70 T	15T–28 T	60T–80 T	40–3 T	–
Demand Side (Single product)	Transport Mode	Truck or Mix	Truck or Mix	Mix	Ship or Mix	Mix	Plane	Truck or Mix	Truck, Plane or mix
	Ø Number of Customers	75 T	160	45	10	45	18	550	250
	Ø Number of Customer Locations	500	150	45	25	28	3	1,350	250
	Ø Delivery Frequency	1–5	30–500	10–200	2–10	3–20	50–60	50–400	40–800
	Ø Quantity per Delivery	1–5 T	250–500 T	bulk	100–70 T	15T–28 T	10T–50 T	50–400	40–3 T

structure, we can see that the automobile industry and the consumer goods industry have to handle quite a dynamic supply chain. Not only are the numbers of suppliers fairly high, but the delivery frequencies and delivery quantities are too, something that certainly increases their proneness to supply chain disruptions.

The same complexity holds true for the downstream supply chain structure of these two industries.

In the following chapter, we will research the most pressing disruption risks in these supply chain structures.

# 4 QUALITATIVE RESEARCH APPROACH

The methodological process within this study seeks to first identify and assess disruption risks in the Chinese market (Step I), discuss suitable relational mitigation strategies (Step II) and rank the identified mitigation strategies on the dimensions ‘challenges’ and ‘effectiveness’ (Step III). Step I took place online in order to ensure complete anonymity. Step II & III took place on-site in workshop settings to allow for moderated group discussions following the round-robin approach.

## Identifying Main Challenges

Two groups of 21 experts each from Western manufacturing firms were set up in Germany and China (see Figure 4). The German sample allowed us to gain more insights from people who have extensive experience with China but are shaped by a different cultural environment. Potential participants were selected based on two major criteria. First, the identified firms had to either be from the manufacturing industry or provide logistics services to this industry. A small set of logistics service providers was included, because in the authors’ experience company managers seldom command sufficient transformational expertise to identify risks in complex logistics services. Second, the Western firms (either from Europe or North America) must operate in China.

Each workshop group was limited to 21 participants. The selection of experts ensured a combination of different views, insights and management strategies,

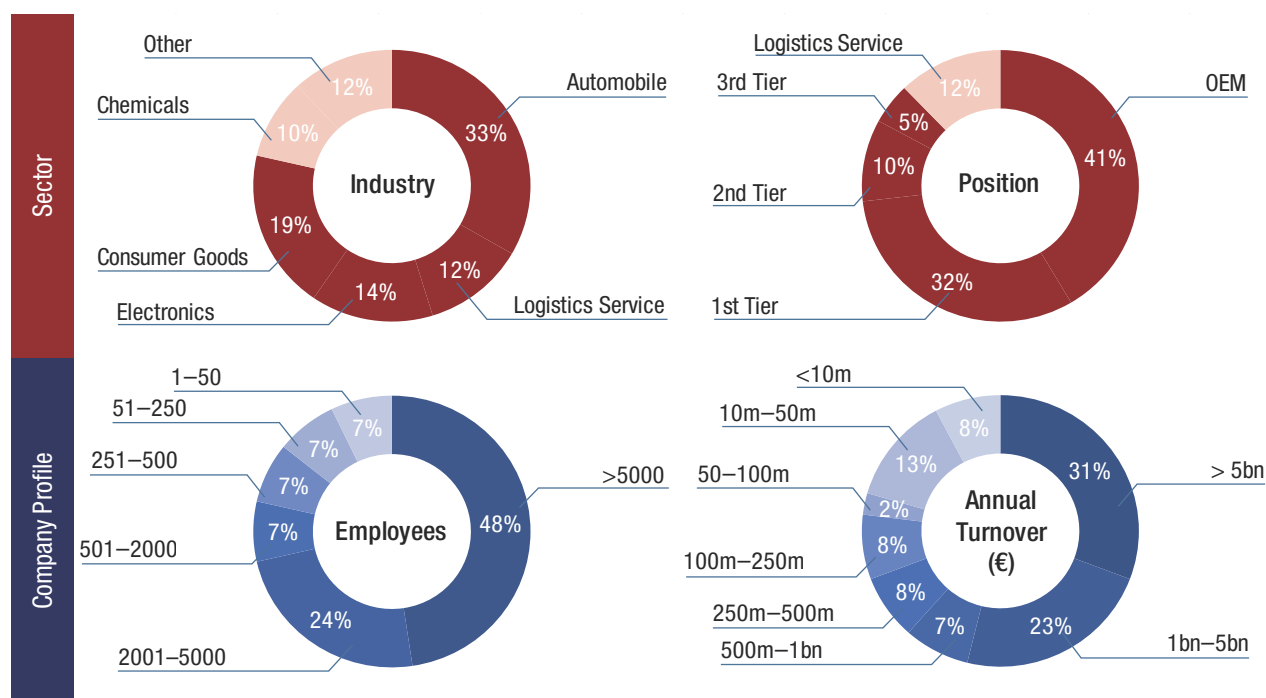
potentially allowing for the generation of new ideas and concepts.

All 42 participants were first sent an online questionnaire and asked to list the most relevant supply chain disruption risks in the Chinese market, according to their experience. Altogether, a list of 22 risks was compiled. In consolidating the lists of risks, synonymous terms were grouped together based on logical deduction (e.g. “legal uncertainty” and “regulatory uncertainty”), whereas topics that were merely related were kept separate (e.g. “industrial espionage” and “counterfeit sub-products”).

The experts were then sent the compiled list of disruption risks. They were asked to write down any additional ideas or questions they might have. They were also invited to seek explanation about any of the listed disruption risks which were not clear to them. Apart from some minor clarifications in wording, no additional disruptions were identified during this phase.

The participants then anonymously assessed the significance of the identified disruption risks in a second online survey. They were asked to rate each item on a 7-point Likert scale (1 = do not agree at all; 7 = totally agree) in answer to the following question (Norrman and Jansson, 2004). “To what extent do you agree with the following statements? (1) This disruption risk has a very high probability of causing events that negatively impact our supply chain operations. (2) This

Figure 4: Sample Constitution



disruption risk has a catastrophic negative impact on our supply chain.”

Step I resulted in the mapping of the disruption risks depicted in Table 3. The logic employed for this evaluation rests on the experts’ long personal experience in supply chain management for Western firms in China, their exposure to disruptions in these supply chains, as well as major concerns in the current economic environment.

### Identifying Suitable Mitigation Strategies

The purpose of step II was to find mitigation strategies in two separate workshops in Shanghai, China, and Berlin, Germany. In order to cultivate the creative generation of mitigation strategies through high personal commitment, the experts were asked to choose a subset of risks that have a high priority from their own perspective (Thompson, 1965). In detail, the 21 experts were presented the scatter plot of the 22 disruption risks. The group in Shanghai decided to

discuss mitigation strategies for ten out of the 22 risks, while the group in Berlin, which met four months later, chose a subset of five risks out of the ten discussed in Shanghai. This process was also chosen to allow the experts to choose risks they thought they could find mitigation strategies for.

To support a common understanding of the selected disruption risk, the experts first split into small groups of four or five and individually discussed their understanding of each risk, as well as potential causes and consequences. Each discussion group followed the round-robin procedure and was guided by a neutral moderator from our institute. For each risk, the experts were given five minutes to individually write down their understanding, as well as causes and consequences, of the risk. They were then asked to present their results individually.

The experts then proceeded to discuss mitigation strategies in their groups. For each risk, they were given 10 minutes to individually generate ideas for

mitigation strategies, which in their view should be part of a set of suitable mitigation strategies. In the round robin fashion, the experts were then individually asked to name their identified strategies. The moderators consolidated the results across all groups and presented them to the assembly.

### Ranking Mitigation Strategies

The list of identified mitigation strategies was then tabulated according to the associated disruption risks. A final online questionnaire was sent out to all 42 workshop participants. They were then asked to

assess all identified mitigation strategies based on two dimensions: “challenges” and “effectiveness”.

“Challenges” are understood as the difficulties that may arise at each company when implementing the respective mitigation strategy. “Effectiveness” looks at how successful the strategy will be in mitigating the disruption risk when implemented. The combination of challenges and effectiveness may be interpreted similar to “efficiency”. A mitigation strategy that is easy to implement and highly effective in its application can be considered to be highly efficient.

# 5 KEY CHALLENGES AND DIFFICULTIES IN GERMAN-CHINESE LOGISTICS NETWORKS

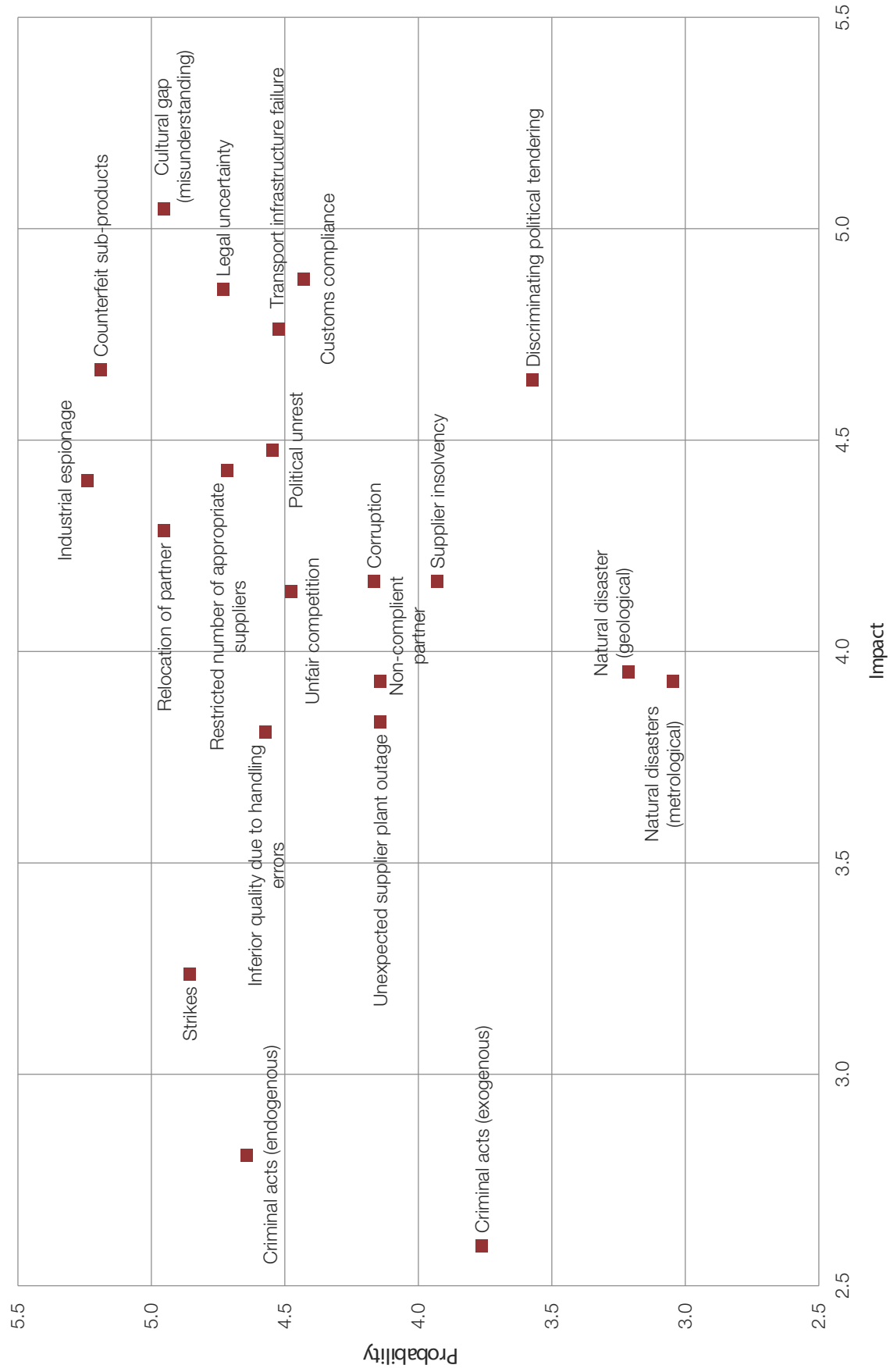
The following Table 2 maps the disruption risks identified for the Chinese market, categorized in two risk dimensions, origin and controllability. Due to the inclusive research approach of this study, some risks are inevitably overlapping or interdependent. To exhibit interdependence, the risks have been further divided into active and passive risks, i.e. active risks can be considered a potential root cause of passive risks. The

table further categorizes the risks according to their controllability by an individual firm. For example, even though economic downturn is a man-made disruption risk it can hardly be attributed and prevented by one company. Criminal acts on the other hand are relatively easy to control, so long as enough capital is available for the appropriate protection measures (e.g. firewalls, fences, cameras etc.).

Table 2: Main Disruption Risks in the Chinese Market

		Active Risks	Passive Risks
<div>Uncontrollable</div> <div>Controllable</div>	External	<ul style="list-style-type: none"> <li>› Natural disaster (geological)</li> <li>› Natural disaster (metrological)</li> <li>› Economic downturn</li> <li>› Political unrest</li> <li>› Criminal acts (exogenous)</li> <li>› Discriminating political tendering</li> <li>› Legal uncertainty due to legal changes</li> </ul>	<ul style="list-style-type: none"> <li>› Transport infrastructure failure</li> <li>› Customs compliance</li> </ul>
	Internal	<ul style="list-style-type: none"> <li>› Malfeasance</li> <li>› Unfair competition</li> <li>› Industrial espionage</li> <li>› Counterfeit sub-products</li> <li>› Cultural gap (inter-organizational miscommunication)</li> <li>› Non-compliant partner</li> <li>› Supplier insolvency</li> <li>› Strikes</li> <li>› Relocation of partner</li> <li>› Criminal acts (endogenous)</li> </ul>	<ul style="list-style-type: none"> <li>› Inferior quality due to handling errors</li> <li>› Restricted number of appropriate suppliers</li> <li>› Unexpected supplier plant outage</li> </ul>

Table 3: Risk Assessment of Main Disruption Risks in the Chinese Market by Probability and Impact



Initially, the authors attempted to categorize the disruption risks into the five distinct supply chain disruption risk classes proposed by Wagner and Bode (2008)—(1) Demand Side Risks, (2) Supply Side Risks, (3) Regulatory, Legal and Bureaucratic Risk, (4) Infrastructure Risk and (5) Catastrophic Risk. This attempt unexpectedly revealed a sixth class of disruption risks: (6) cultural risks (e.g. malfeasance, cultural gap). This unforeseen discovery empirically corroborates a perception underlying this study. Besides the usual risks that internationally operating companies face in their network, China poses a whole new category of risks, “culture”.

In the next table we display the mapping of all the identified 22 risks. As aforementioned all 42 participants were asked to rate each item on a 7-point Likert scale (1 = do not agree at all; 7 = totally agree) in response to the following question: “To what extent do you agree with the following statements? (1) This disruption risk has a very high probability of causing events that negatively impact our supply chain operations. (2) This disruption risk has a catastrophic negative impact on our supply chain.” This mapping further supports our underlying perception, as we can see that all participating companies rate the disruption risk of “cultural gap” particularly high.

In the following section, the ten risks selected for further discussion by the experts will be outlined in more detail. For each risk the working definition is provided, followed by a discussion of consequences and potential risk drivers. Eventually, the identified relational mitigation strategies are proposed.

### Cultural Gap (Miscommunication)

The experts perceive culture gap as the differences in values, behaviours and attitudes of people. These

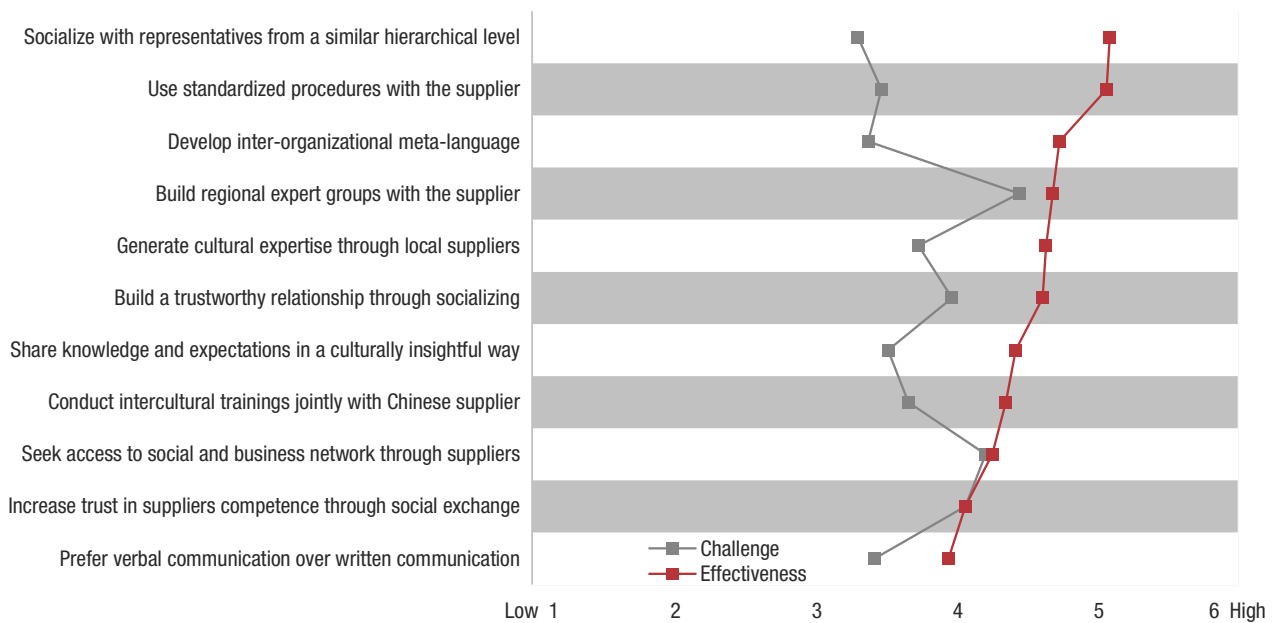
people are destined to work together yet are hindered by their cultural gap. Cultural gaps affect how a group of people perceive and/or react to conversations and situations. Western firms in China encountered communications issues with their suppliers due to language barriers and a lack of cultural knowledge (e.g. relevance of hierarchy). Such miscommunications may result in extended lead times or exceeding of deadlines as well as defective or malfunctioning products, causing frustration and distrust on both sides.

Such experiences often lead to cultural stereotyping and distrust with respect to decision making and working practices. The lack of trust is both an outcome and a driver of the negative impacts of miscommunication. The experts mentioned that on occasions where they sought to overcome trust issues by setting up formal agreements, they had to learn that the cultural interpretation of such agreements varies among the partners. It is the intangible expressions (practices, beliefs, traditions and values) that pose the highest risks when cultural gaps are present. When we asked the experts for potential relational approaches to mitigate this risk, they proposed the following strategies:

- > Strategic supplier selection is the starting point of a successful collaboration. Companies that have gathered experience in the Chinese market have learned that choosing a local partner who is willing to jointly overcome the cultural gap is most important. This partner can be of benefit not just for the mutual relationship but also for complementing your lack of cultural skills when dealing with authorities or inexperienced local firms.
- > Even though distrust is seen as one of the root causes of misunderstanding, Western firms in China need to emphasize their supplier selection process, rather than placing too much emphasis



Figure 5: Mitigation Strategies to Deal with the Cultural Gap



on crafting a solid contract, as these have less value than in Western societies. Moreover, this also includes the preference of verbal communication over written communication. Even though this might be considered tiring and time consuming, it is important to make sure that both sides understand each other.

- > Productive communication with suppliers to proactively prevent miscommunication requires both partners to be willing to spend more time and effort to share expectations, ideas and knowledge in a culturally insightful way. From a Western-firm perspective this includes the often discussed construct of “Guānxi”, the Chinese form of relationship management. A business relationship includes social activities with partners of the same hierarchical level outside of the workplace through joint sports activities or family dinners.
- > Finally, both partners have to be willing to invest time and resources into the relationship. That includes basics such as company visits, as well as more intense measures such as joint or unilateral

intercultural trainings (e.g., employee exchanges or language trainings) to further social soft skills. An international provider of chemistry goods mentioned that they have even started building joint teams with their partners to develop a meta-language between their companies, i.e. pictures, signs and standard procedure models (hard skills) rather than written communication.

### Legal Uncertainty

No doubt, the overburdening of authorities due to increased complexity and economic growth requires new laws and regulations in the Chinese market. However, the experts expressed their concerns about the unpredictability and business impact of such laws.

Legal uncertainty is seen as the enforcement, execution and changes of supply chain-relevant laws and policies by local authorities, as well as the different interpretation of such laws by various authorities. Such uncertainty can lead to an involuntary restructuring of supply chains (i.e., footprint and transportation),

unexpected loss of investments, and negative supply chain volume effects.

The negative impact of legal uncertainty can mainly be attributed to three dominating factors. First, the time-line of legal changes in China, i.e. the fact that many changes are implemented in an ad-hoc fashion. A representative from a manufacturer, for example, complained about a recent ad-hoc regulation change that urged the firm to start sourcing all spare parts from China within four days of the announcement of the change. Second, as this example shows, such changes are often hard to predict. This is attributed to the lack of transparency during the phase of law construction. Third, the lack of implementing regulations that explain how new laws and policies have to be interpreted by the local authorities. Western-firms especially seem to struggle with the different interpretations of laws by local authorities.

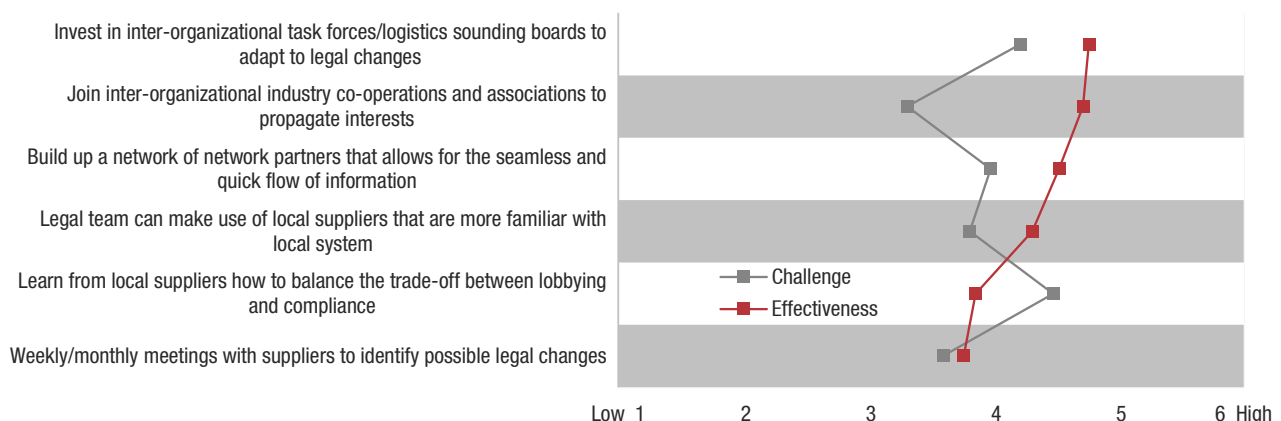
The experts agreed that it is difficult to cope with this challenge from a supply chain perspective; yet, they were confident that they could find some useful solutions and proposed the following agenda:

- > Forming industry co-operations and associations that help to jointly propagate interests is a useful strategy for informing the government about

the business impacts of potential legal changes. Experts with a Chinese family background in particular hypothesized that the Chinese government is sometimes unaware of the details of the effects that their regulations might have on industry. However, finding the right association partners in the Chinese market is itself a challenging task, as lobbyism is still in its infancy.

- > Most experts therefore prefer to be well-informed themselves rather than seeking to bring crucial information to the attention of the legislative system. A vital key to success in this strategy is to have a network of supply chain partners which allows for a quick flow of information and rumours. This, again, requires socialization and an understanding of “Guānxi”.
- > Global players seem to have adopted a special relational strategy to cope with legal uncertainty. A major provider of tobacco products has implemented a strategy that follows a “global for local” approach. Twice annually, the firm summons representatives of its local subsidiaries and strategic suppliers to its headquarters to exchange information on potential legal changes. After deciding on a joint appropriate response, it is the local teams’

Figure 6: Mitigation Strategies to Deal with Legal Uncertainty



and supplier's responsibility to implement such responses.

- > Investing into sounding boards with suppliers that continuously monitor and adapt to legal changes has been agreed to be certainly the most appropriate response to the current uncertain situation in China. However, due to budget restraints, none of the participating companies have yet implemented it.

## Transport Infrastructure Failure

Transport infrastructure failure is defined as the deficiencies in availability, capacity and quality of transport routes and the transport equipment used to maintain supply chain operations. It has been reported that contrary to common beliefs, it is not just the underdeveloped western regions of China that pose a threat to supply chain operations, but with increasing frequency it is the infrastructure in the eastern part of the country that fails. Such failures lead to the damage or loss of

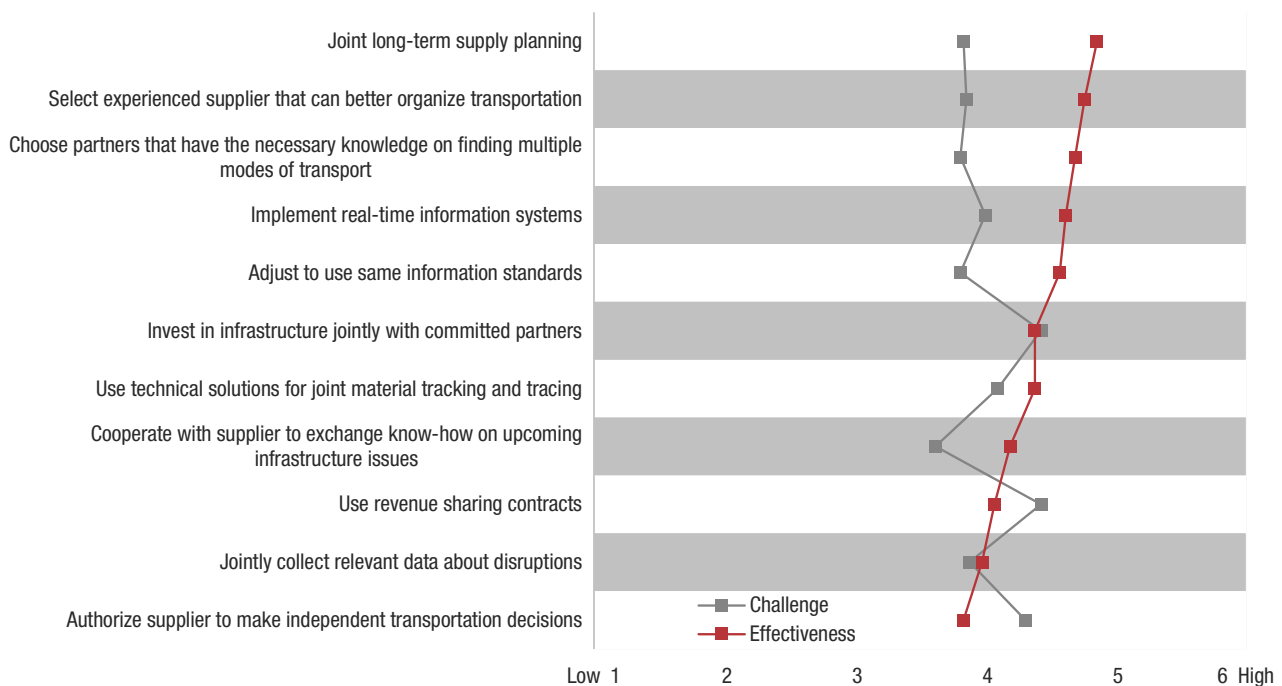
goods and extend lead times, disrupting the seamless flow of material.

There are three main factors driving to this disruption risk. First, the growing urbanization in the eastern part of the country inevitable leads to an increase in traffic. This over stresses the transport capacity (Zeng et al., 2012). Second, the construction and operation of infrastructure is often contracted out to private providers. Such providers further contract it out to a subcontractor and so on, putting the final constructor and operator under strong cost pressure. Third, the maximum load limits of transport infrastructure and equipment are often ignored.

The following mitigation approaches to this risk haven been identified:

- > All participants unanimously agreed on a rather old-fashioned approach. Whenever possible, they seek to identify and select suppliers which are located in close proximity.

Figure 7: Mitigation Strategies to Deal with Transport Infrastructure Failure



- > Most of the contributing Western companies seem to have chosen to outsource transport-related services. Most companies see themselves unable to cope with this risk. To follow through, it is deemed most appropriate to rely on universal service providers (USPs). The experts trust USPs to better find adequate responses to infrastructure failures, as they have the necessary resources and capacities.
- > Efforts to achieve close information exchange with partners on potential upcoming disruptions allow, however, not just an appropriate response by the service provider but by the shipping and receiving company as well. As pointed out by several participants, the increasing use of telematics systems allows companies to create visibility on the road.
- > Especially the larger companies in our sample have recently started to invest in their own infrastructure (e.g. ports equipment and hubs) jointly with committed suppliers and service providers.

### Restricted Number of Appropriate Suppliers

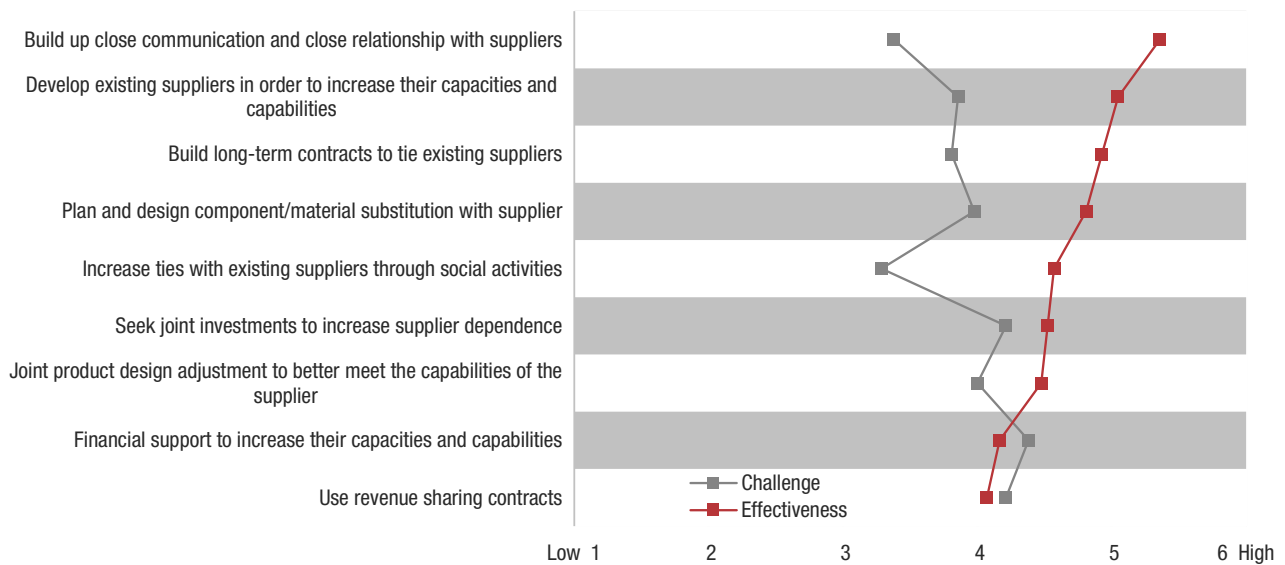
The experts reportedly experience a lack of appropriate suppliers for some of their products. That is, the firms have issues identifying suppliers that are capable of constantly and punctually providing products in the quality and quantity needed, leading to a lack of dispensability of existing suppliers.

The experts complained about increased supplier dependency and reduced delivery reliability. The lack of competition among suppliers is also identified as a main cause of quality issues and late shipments. Parts shortages may therefore hamper the buying firm's delivery reliability to its own customers. Such a situation reduces the potential to learn from other suppliers and increases innovation and cost management.

As opposed to the intentional, purposeful rationalization of the supply base (e.g., seeking price reduction through increased scales), such an oligopolistic situation may lead to moral hazard, which refers to a supplier not putting forth the agreed upon effort — otherwise known as 'shirking'. From the group discussions the following coping strategies emerged:

- > The experts agreed that a best-practice approach is proactive product design adjustment in order to expand the number of potential suppliers. However, none of the company's has yet followed through with this approach. Their current relational approach is to seek to adjust the product design to the capabilities of existing suppliers, and therefore seeking to decrease quality failures.
- > From a governance perspective, all firms attempt to build long-term contracts with their existing suppliers. Despite the difficulties associated with contractual agreements in the Chinese market, safeguards, such as contractual clauses for non-performance, are considered partially useful to offset moral hazard.
- > Moreover, it is inevitable that in situations of increased dependence the buying firm needs to show commitment to the relationship. Some companies have even started giving financial support to their suppliers in order to increase their capacities and capabilities. Seeking joint investment would certainly be the optimal solution, as it increases interdependence.
- > Building up close communication channels and close relationships with current suppliers is proposed as a current good practice. Such an approach allows confidence and trust to be established between both companies, and also allows

Figure 8: Mitigation Strategies to Deal with a Restricted Number of Appropriate Suppliers



them to be proactive and supportive in case of issues on either side.

### Counterfeit Sub-Products

Procurement departments at the participating firms reportedly struggle with quality issues due to counterfeit material allegedly penetrating their supply chain. In particular, this risk was described as the copying or processing of counterfeit products by suppliers and sub-suppliers. Product counterfeiting includes product brand piracy and near brand usage by companies upstream the supply chain.

> The group discussions documented that the mere fact of having counterfeit products in their supply chain is not the main concern. Reportedly, the production disruptions resulting from the reduced workability and machinability of such products, as well as subsequent safety issues due to product failures, are the main concerns of the experts. The root cause of this risk is twofold. First, the participating Western-firms' tendency to out-source some of their activities even in developing markets drives the risk of losing control over the

manufacturing process. However, the obvious mitigation strategy, 'insourcing', is not an option to the experts, as by outsourcing the firms seek to obtain and utilize new knowledge and reduces prices in order to achieve a positive performance impact (Bertrand and Mol, 2013). This is an opportunity which no firm wants to deprive itself of. Second, the experts report a lack of legal protection in instances of counterfeited products, resulting in only limited risks for counterfeiting companies. Moreover, instead of trying to identify the forger, it is sometimes the buying firm who is held legally responsible for safety issues stemming from counterfeit sub-products. Several protective relational responses have been proposed:

> It is imperative to find a supplier that can be trusted to be a supportive partner in protecting against counterfeit products. The Western firms often strategically rely on 'local champions' as suppliers, as these have more experience in identifying the black sheep in the market. Such strategically valuable suppliers are often also partners in creating approved vendor lists for suppliers.

- > Supplier training is used as a means to raise awareness of product counterfeiting and its consequences for the supplier. This includes visits to their plants by purchasing managers and technical staff to provide feedback on their purchasing activities and raise awareness of issues in product design, quality and technical performance due to counterfeit sub-products.
- > It appears that certain product types are more vulnerable than others to counterfeiting. Thus it is particularly important to raise awareness and exchange information with suppliers about which product parts are particularly prone to counterfeiting.
- > In general, it was emphasized that strong buyer-supplier relationships allow for the establishing of joint methods for the design of products, processes and information, and their continuous development provides protection against counterfeiting.

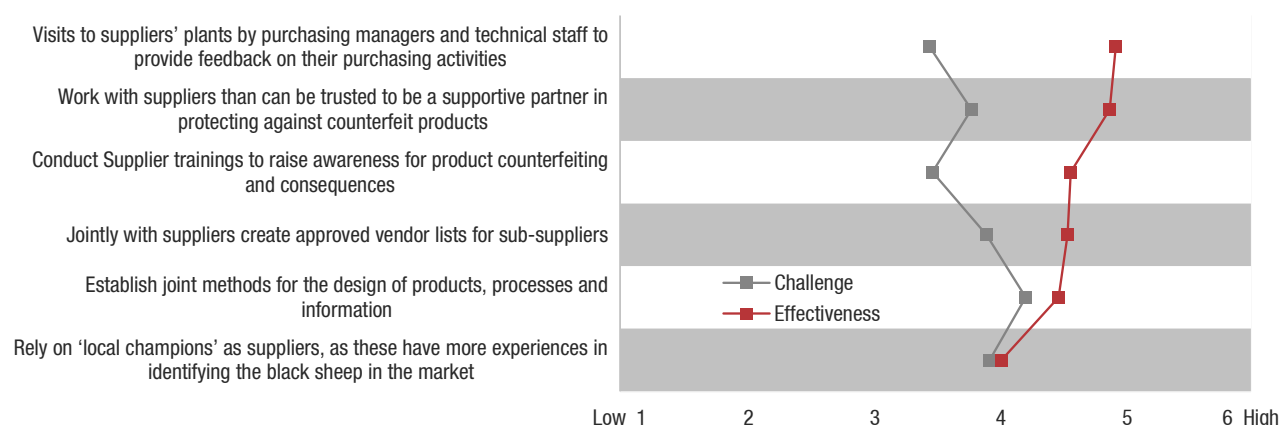
## Customs Compliance

All representatives of participating companies reported continuous operational issues with Chinese customs. Failure to comply with Chinese custom regulations has the potential to cause an unexpected and excessive

increase in lead time, hence causing disruptions in the supply chain. Many professionals report that Chinese custom behaviour is hard to predict and some even characterize it as arbitrary. Fast changing ad-hoc regulations—similar to the legal uncertainty issue—are the main cause of issues for Western companies. For instance, a German car manufacturer who participated in the workshops was forced to select a local supplier for a certain part, since new custom regulations prohibited the import of that very part from foreign suppliers. Since the change of custom regulations was announced one week before implementation, the OEM struggled to find a proper local supplier and faced an expensive supply chain disruption. Another issue with Chinese customs is that it can also be used as a punishment mechanism for companies that do not act in accordance with the government's expectations. At the Shanghai Auto Show 2014 an exhibition car missed its premier and arrived a few days too late because customs authorities did not allow the car to pass. Western firms struggle with the non-transparent process and are a victim of volatile custom decisions. The proposed responses aim to improve communication processes with Chinese customs and build a beneficial relationship:

- > A better understanding of, and improved communication with, Chinese customs is seen as key to

Figure 9: Mitigation Strategies to Deal with Counterfeit Sub-Products



handling customs compliance issues. Companies seek to present themselves to custom authorities as reliable and compliant partners, simultaneously increasing their influence on Chinese custom authorities in order to avoid future issues. Chinese culture heavily relies on personal interactions. Therefore, the experts and company representatives are advised to build up personal relationships with custom authorities to ensure smooth operations and gain essential information about regulatory changes at an early stage.

- > It is a valid strategy to employ a third-party customs agency that professionally handles communication with customs as well as informing and supporting companies on custom regulations. While this strategy can provide expert knowledge, professional connections and years of experience, it is also a costly alternative and adds an additional layer to the communication process, thus making it more complex.
- > The use of family bonds is a special characteristic of the Chinese market and an often used instrument to overcome organizational barriers. From a Western perspective, it is an unusual and unexpected solution, but it is still necessary when dealing with an opaque system where personal relations matter and govern decision-making

processes. A direct link through family members has the potential of directly increasing information flow, gaining advantages and benefits in operations and obtaining various other benefits.

### Inferior Quality due to Handling Errors

Logistics performance in China is very heterogeneous. Next to world-class infrastructural projects such as the Shanghai sea port, China still possesses many inferior infrastructure components that lack safety, security and efficiency. The same picture can be drawn when it comes to logistics education or the implementation of a proper IT infrastructure. While in some areas logistics performance meets or even exceeds Western standards and expectations, other areas show an incredible shortage of logistics quality due to the lack of skilled workers or failure to provide the right logistics technology. For instance, for retailers or restaurants such as McDonalds, the mode of transport over the last mile is often a scooter. In busy and chaotic China city traffic, those scooters are involved in many accidents, consequently damaging the transported goods. Also, transportation by scooter is more prone to weather conditions such as rain or heat. The lack of the appropriate logistics technology, such as fork lifts, causes many products to be damaged, especially during the handling of goods. For instance, there is no consistent pallet system in China and on

Figure 10: Mitigation Strategies to Deal with Customs Compliance





many occasions no pallets are used at all. It seems that boxes are the number one load carrier, making handling less efficient, more costly and timely, and also more vulnerable to handling errors and damage. For example, trucks with no hydraulic loading ramps force employees to unload products manually, often resulting in throwing carton boxes to co-workers or on the floor, who pile them up for further handling, sometimes placing them on a new pallet. Inferior infrastructure such as poor-quality roads, especially in the countryside, together with insufficiently secured cargo is another factor for reduced product quality due to handling errors.

> Increasing supply chain transparency by implementing monitoring techniques will help to detect causes of and responsibilities for handling errors, as suggested by workshop participants. It is the basis for the employment of other mitigation measures. However, implementing monitoring activities in general is not an easy undertaking as the Chinese market is highly segregated. Consequently, firms must manage to cooperate with many partners to increase visibility in their supply chain.

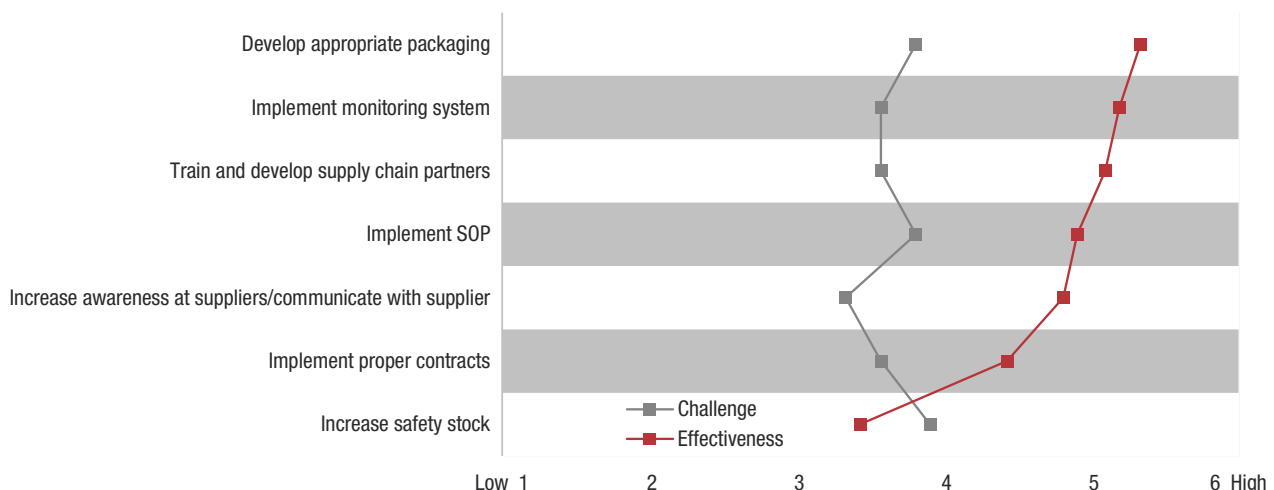
> As an avoidance strategy, experts suggest developing appropriate packaging that takes the

peculiarities of the Chinese market into account. For example, Amazon has equipped its scooters with a solid case that protects products from physical damage, weather influence and theft.

> It is a necessity to develop and educate supply chain partners and operating staff when doing business in China, simply because the labour force lacks awareness and understanding of logistical problems including handling errors. This process will be costly and demanding, especially due to the cultural gap, but it will play an important role in reducing quality issues due to handling errors in the short term.

> As a balance strategy, experts reported that giving up little supply chain efficiency by holding additional safety stock will craft a robust supply chain and minimize disruptions. However, as one participant pointed out precisely, this strategy does not tackle the root of the problem but just focuses on reducing the negative consequences. That is, while this strategy might be helpful in the short run, it is not advisable to implement it as a long-term solution.

Figure 11: Mitigation Strategies to Deal with Inferior Quality due to Handling Errors





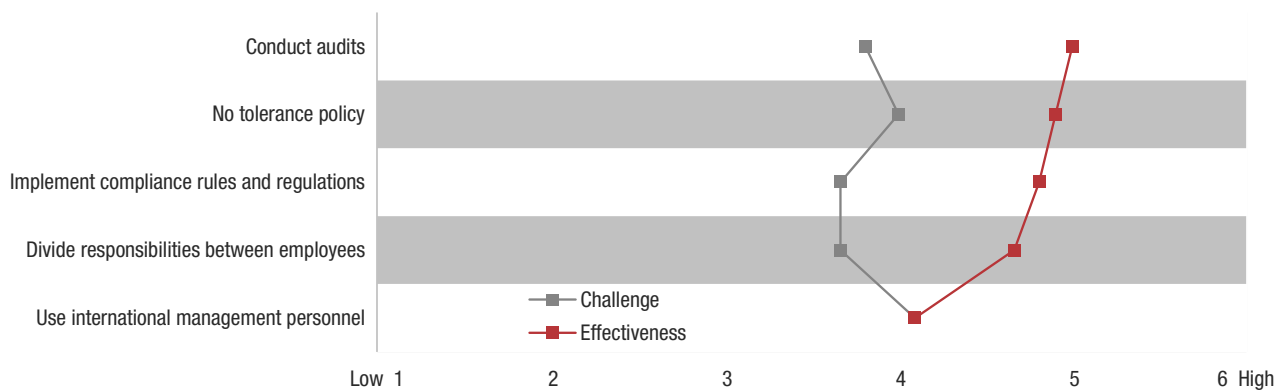
## Malfeasance

Malfeasance (corruption) is an issue that occurs on all levels of society and can be found in many countries. It is however especially prevalent in developing and/or poor countries. When present at all levels of society, malfeasance affects many elements such as political development, business performance, the competitive landscape, education, the environment, economic development, etc. China has a reputation for being a rather corrupt country and is listed number 100 out of 175 in the Corruption Perception Index (CPI) 2014, on the same level with Suriname and Algeria and ranking worse than 57% of other countries worldwide. The Chinese government is aware of this situation and president Xi Jinping has been driving an anti-graft campaign since 2013. The Chinese state tries to actively fight malfeasance in governmental agencies, state-owned companies and the private sector. China's efforts in fighting malfeasance produce doubting headlines in both Western and Chinese newspapers because of the harshness and rigidity with which the government fights this crime. In fact, corrupt actions can even be penalized with a death sentence. Despite the massive campaign against malfeasance, the current status is still that China is a corrupt country. Most Western companies follow ethical principles and have compliance rules and regulations in their home markets. Yet, since they have had to operate in this environment for a long time, they have often employed locals that have brought local practices to the firm or they have had to do business with corrupt local firms. Therefore, company representatives reported that their firms are facing more and more internal and external issues related to malfeasance. The governmental advancements against malfeasance are an opportunity for the country, the public, business and individuals. Companies need to protect

themselves from active and passive corrupt activities and implement certain measures to do so.

- > Auditing is a great way to check and control activities conducted by company personnel at suppliers and to implement quick counter-measures in case of deviating behaviour. Regular audits further show suppliers that the buying firm takes its responsibility to prevent malfeasance seriously, is willing to employ counter-measures and monitors misbehaviour actively. Auditing is a control mechanism which actively tries to steer supplier behaviour.
- > The implementation of a regulatory framework and a proper enforcement mechanism directs suppliers and gives a clear guidance as well as a background for orientation. According to one business representative, compliance rules must be formulated precisely and communicate clearly, thereby becoming a strong statement that reflects the purity of the buying-firm's intention.
- > It is a valid and well-known strategy in the banking sector to share responsibility among employees in order to reduce the vulnerability to fraud, malfeasance or other criminal activities. In China, firms should employ responsibility sharing policies in all areas of their most vulnerable intra-organizational and inter-organizational processes. (Durach et al., 2015). A single employee cannot be corrupt by his or herself, any more than the company as a whole only acts corruptly if all members involved in the process are corrupt.
- > The solution of employing international management personal is based on the assumption that they are less vulnerable to malfeasance than their Chinese counterparts. This strategy comes at a cost: Westerners mostly lack an understanding

Figure 12: Mitigation Strategies to Deal with Malfeasance



of the Chinese market and the way personal and business relationships are formed, thereby reducing the overall cultural competency of the company (see Cultural Gap).

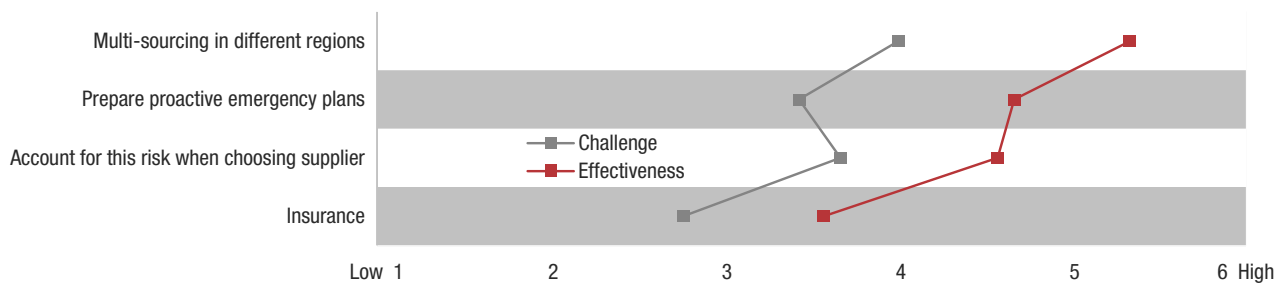
## Natural Disasters

Natural Disasters are catastrophic events that not only have severe impacts on people and nature, but also on business operations. There is little local chance that a natural disaster will hit, but if it does, the consequences are usually devastating and long-lasting. Many disasters have occurred in recent years. Remember, for example, the nuclear catastrophe in Fukushima following an earthquake in 2011 or the 2004 tsunami that hit Asia, especially Indonesia, India and Thailand. Despite the small chance of a disaster occurring locally, on a global scale floods, tsunamis, earthquakes, volcanic eruptions etc. are quite frequent. This is one of the main reasons why global supply chains are more vulnerable to disruptions caused by natural disasters than local supply chains. Due to their global supply chain structure, even companies that are located in relatively protected environments might potentially suffer if a disaster strikes elsewhere in the world. For example, the earthquake in Japan affected one of the major German car manufacturers. That OEM outsourced the manufacturing of electronic

and entertainment equipment to a tier-one supplier who sourced from firms located in the earthquake area. The German car manufacturer did not sense any immediate impact after the earthquake but had to realize unexpected stock-out situations after one week. The crisis eventually forced the company to increase their supply chain visibility in order to detect the effects of natural disasters at an earlier stage.

> Sourcing from multiple suppliers as a risk diversification strategy is rated by experts as the most effective, but also the most challenging, mitigation measure. It allows shifting material flows within the supply chain in order to maintain production flow and deliver products to the ultimate customer. Although multiple-sourcing is known to be effective, firms still struggle to implement this strategy since they face issues conducting a cost-benefit-analysis. While the premium of having multiple suppliers as well as the additional coordination efforts can be calculated quite easily, firms often do not know how to assess the benefits of implementing the strategy. Efforts to optimize their short-term financial results often prevent them from implementing multiple-sourcing as a disruption-mitigation measure.

Figure 13: Mitigation Strategies to Deal with Natural Disasters



- > Industry professionals pointed out that proactive emergency plans help to mitigate the impact of natural disasters. Firms must employ processes far in advance and deal with this unlikely but devastating issue actively. Plans must be crafted in cooperation with supply chain partners, and the supply chain must be shaped in accordance by, for example, convincing suppliers to hold overcapacity in case production must be shifted within the supply chain.
- > Firms must account for the risk of natural disasters in their supplier selection process by trying to avoid suppliers that are mainly located in areas with a high risk of natural disasters such as seismic zones. As one expert made clear, firms should adopt the total cost of ownership (TCO) approach in their supplier selection process, taking a supplier's locational vulnerability to humanitarian catastrophes into account during the supplier selection process.
- > The classic approach to mitigate against risks which are unlikely to occur but have severe consequences, ranging from car theft to impact of natural disasters, is to insure against this risk,. However, this strategy will not ensure a continuous flow of goods during the impact of a supply chain risk, but only compensate financially for the damages encountered.

## Supplier Insolvency

The insolvency of a supplier is the consequence of lower inbound cash-flow compared to the outbound cash-flow over a long period of time. Subsequently, the supplier will run out of cash and will therefore be unable to satisfy the buying firm's demand for goods and services, ultimately leading to a disruption of the flow of goods. With respect to China, supplier insolvency is a pressing issue. Many markets in China are highly segregated. Companies have to deal with enormous growth numbers and are additionally required to improve their performance by investing in the latest IT-technology. The combination of competitive pressure, price pressure as well as the constant need to invest in order to manage growth and customer demands are the main reasons for supplier insolvency. Bankruptcy can be found in all business sectors in China. Many cases make it to the headlines such as the bankruptcy of Suntech Power, formerly the world's largest supplier of solar panels, or the case of Wintek, which used to be Apple's biggest supplier for touchscreens, but had to file for insolvency protection leaving \$37m unpaid to its own suppliers. Experts at the workshop commonly agreed that despite cost pressure, the financial well-being of the suppliers should be a major concern of the firm's directive, ensuring long-term relationships with the potential to produce mutual benefit.

Figure 14: Mitigation Strategies to Deal Supplier Insolvency



- > Diversifying risk by employing more than one supplier was named as the most effective strategy to protect a company against supplier insolvency cases. Flexible agreements must be made with all suppliers in case any of the suppliers has to file for bankruptcy. In that case, the flow of goods must be redirected within the supply chain to maintain proper supply chain function. Therefore, suppliers must hold flexible capacity.
- > Placing an emphasis on strong financial figures during the supplier selection process is an avoidance strategy with the goal of preventing supplier insolvencies in the supply chain. However, it is essential to understand, as a group of business representatives consistently reported, that key financial data only represents past financial performance and is not a safeguard for stable future financial performance. However, it is commonly perceived as strong indicator.
- > A cooperative approach asks companies to overcome short-term, profit-oriented thinking and re-focus their thinking to a long-term, cooperative approach. In particular, representatives claim that giving up a small amount of profitability to ensure those suppliers are financially sound will effectively prevent supplier insolvency. But, there are certain drawbacks to this strategy. Firstly, it is difficult to access which price is fair for both sides,

especially in the Chinese market. Some Chinese business people have a reputation for trying to take advantage of their business partners for their own benefit. Secondly, even though the own company follows a fair sourcing approach, it doesn't mean that the other customers of the supplier follow the same approach. Hence, the benefit of fair sourcing on the supplier's financial performance is limited and correlates with customer size. Lastly, sometimes the price for the product is not the problem but rather it is the cash cycle i.e. the time span between expenditure for an input factor to the reimbursement for the output factor—that forces companies to file for bankruptcy.

- > Vertical integration tries to solve supplier financial issues by buying the company and integrating it in its own firm. This strategy might be valuable in a single case. However, it is not applicable on a larger scale. In today's competitive environment companies commonly outsource processes in order to focus on their core competencies and remain competitive.

# 6 Case Studies

## SteelCom: A Case Study in the Automotive Industry

The following case study describes the supply chain structure of a German 1st-tier automotive supplier named SteelCom. It is based on interviews and company presentations with six representatives from the purchasing and supply chain management departments at the company's headquarters in Germany.

### Company Overview

SteelCom is a globally active provider of turned parts and different commodities with over 5,000 employees. The company's product portfolio is subdivided into 10 product groups that combine an annual turnover of about € 500m. Due to this wide variety of products, SteelCom has to handle over 25,000 active stock keeping units and 2,000 suppliers all over the world. The purchasing volume of each supplier ranges from 5 €/a up to 12m €/a, while the top 100 vendors own a volume of over 80,000 €/a each.

In addition to being a first-tier supplier for OEMs in the automotive industry, SteelCom also sells its products directly to the after-sales market. In fact, the after-sales business contributes approximately 60 percent of total annual turnover. The rest is generated through OEM business. The after-sales business helped SteelCom cope with the world financial crisis in 2008/2009 when the OEM business suffered a huge decline. SteelCom benefits from a diverse customer structure, which allows the company to have a relatively low dependence on OEM customers. SteelCom's biggest customer contributes about two percent of total annual turnover.

### Product Description

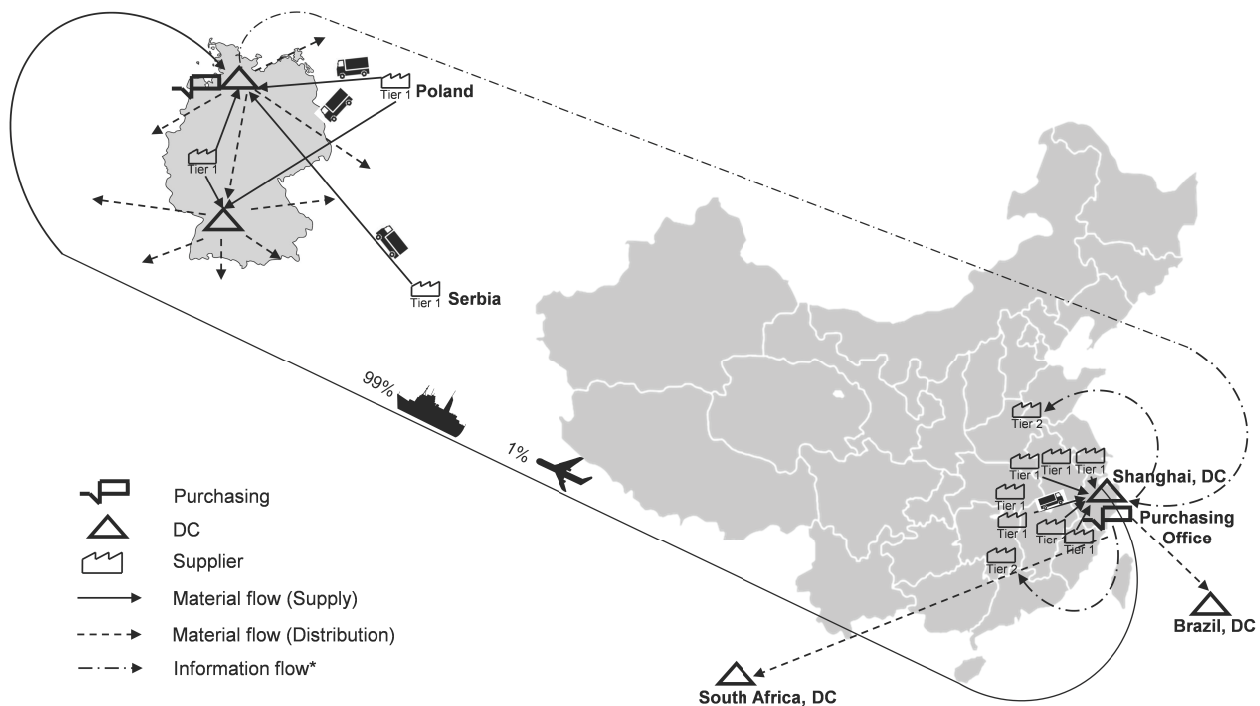
SteelCom offers a broad range of turned parts. Here we will describe the supply chain of SteelCom's pipe couplings. There are different types of couplings, though most of them consist of three main components. The company sells about 5m pieces of couplings per year, generating 15m €/a in sales. The annual purchasing volume amounts to nearly € 6m.

### Upstream Material Flow

SteelCom has been doing business with Chinese suppliers for over 25 years. For their pipe coupling product, they have managed to develop seven key suppliers in China which are capable of manufacturing every type of coupling in their portfolio. To lower the risk of out-of-stock scenarios, SteelCom spreads this risk by holding at least two suppliers per product type.

Each year, the global purchasing headquarters in Germany has to determine an annual order quantity for every supplier and product type. During the course of the current year, the headquarters in Germany do not directly order from its suppliers. The company established a Chinese purchasing office, located in Ningbo, which forwards the headquarters' orders to their suppliers on a weekly basis. Thus the Ningbo purchasing office has to deal with all issues related

Figure 15: SteelCom's Supply Chain for Pipe Couplings



to the company's network of Chinese suppliers. Consequently the German headquarters have no direct control over their Chinese suppliers, making it hard to solve recurrent problems in a short period of time.

All seven suppliers are located less than 300 km away from the Ningbo purchasing office, allowing short-term on-site visits in case of urgency.

On a weekly basis, a distribution center located in Shanghai receives all finished goods from suppliers for consolidation before forwarding them to Germany and other demand markets. Based on many years of supplier development, the Shanghai distribution center rarely has to deal with quality issues. The rejection rate is in fact close to zero. From there, 40 percent of the goods are delivered to global distribution centers in Germany, Brazil and South Africa by vessels. Each of the two distribution centers in Germany receives at least one shipment per week. An urgent air shipment

to Germany is needed for less than one percent of deliveries. The remaining 60 percent of goods are sent directly on truck to customers within the Chinese market.

As aforementioned, on a yearly basis the headquarters have to determine a binding annual order quantity according to their sales forecasts for each supplier, to help them plan their capacities accordingly. Nevertheless, during the year the purchasing headquarters face a lead-time of six months from order placement to arrival in Germany for every single order. This is noteworthy, considering the fact that the complete cycle time of pipe couplings—including material purchasing of the supplier (2–3 weeks), production (3–4 weeks), transport and warehousing in China (1–2 weeks) and transportation to Germany (5 weeks)—is only about 12–14 weeks. Additionally the lead-time varies from five to seven months, resulting in a delivery reliability of less than 60 percent.

## Downstream Material Flow

After customs clearance in Germany, some of the shipments received are directly forwarded to a second DC located in Germany. Both distribution centers have to deliver pipe couplings to 75 percent of all customers worldwide consisting of OEMs and sales branches for the after-sales business. In total, SteelCom operates hundreds of sales branches worldwide, half of which are located in Germany. The majority of goods within Europe are dispatched via truck.

Despite a supply-side delivery reliability of 60 percent the distribution centers are able to manage a delivery reliability of 99 percent to their customers. Unfortunately this comes with high safety stocks in most cases. Both distribution centers handle an average stock value of € 3m each.

## Challenges in SteelCom's International Logistics Network

Especially in the Chinese logistics network, SteelCom faces numerous supply chain disruptions per year, caused, for example, by power outage at manufacturing plants and short-term renegotiations with suppliers. According to the interviews, SteelCom also faces the problem that Chinese suppliers do not abide by contractual agreements. Instead they are willing to privilege short-term-project businesses to earn more money instead of sticking to contractually agreed businesses with their long-term partners. Long lasting business ties do not automatically imply a well-functioning, trustful relationship. The interview partners argue that, especially with Chinese suppliers, trust has to be earned and it cannot be gained without understanding and respecting Chinese culture.

Low delivery reliability and disruptions can also be caused by the fact that suppliers are not integrated into the buyer's ERP systems. Reportedly, some

suppliers still work with Excel sheets which are manually adjusted according to the changing environment. This leads to mistakes and misunderstandings between SteelCom and its suppliers. Furthermore its suppliers do not proactively communicate changes or delays in the production schedule, even if they know about them at an early stage.

## Mitigation Strategies

Facing volatile lead-times and an extremely low delivery reliability of 60 percent by their Chinese suppliers, SteelCom has had to develop strategies to smoothen the resulting volatility. To add more flexibility to their supply structure, SteelCom implement three European back-up suppliers located in Germany, Serbia and Poland. These back-up suppliers help them to react to supply problems more quickly. Short transport lead-times of one or two days are feasible and outweigh slightly higher prices. All three suppliers share 30 percent of the total annual order volume of pipe couplings and they know about their role as back-up suppliers.

To enhance transparency and trust on both sides, SteelCom proactively shares their ABC and XYZ analyses with their suppliers, to show them their importance and future potential. Especially with their Chinese suppliers, it helps them to develop a trustful relationship. This strategy also aims at giving their Chinese suppliers incentives to change their manner of production planning. As shown above, despite the existence of committed annual order volumes and regularly updated order forecasts, the Chinese suppliers only start their purchasing and production planning processes after concrete order placements. This leads to lead-times of six month between order placement and goods received. By sharing different analyses, SteelCom shows them their potential and aims to incentivise their Chinese suppliers to switch from a make-to-order to a make-to-stock production model.



## Wafec: A Case Study in the Electronics Industry

The following case study describes the supply chain structure of a German first-tier electronics supplier named Wafec. It is based on several interviews, company tours and company presentations with three representatives from the purchasing and supply chain management departments at the company's headquarters in Germany and its distribution center in China.

### Company Overview

Wafec is a European semiconductor manufacturer with more than 30,000 employees. The company operates production sites and finished goods warehouses all over the world, supplying semiconductors to a diverse portfolio of customers mainly in the automotive industry. Because of its vast product portfolio of over 4,000 types, Wafec has to handle up to 5,000 suppliers in their supply chain network.

The supply chain processes of Wafec are designed and set up according to the SCOR-Model (Plan, Source, Make, Deliver and Return). "Supply Chain" and "Purchasing" departments have a cross functional responsibility for the entire enterprise including all legal entities such as strategic planning, customer logistics management and classical logistics. "Purchasing" takes care of strategic sourcing decisions in close alignment with the supply chain department.

### Product Description

In the following section we will have a closer look at the wafer production at Wafec. A wafer is a thin slice of semiconductor material, such as a silicon crystal, used in the fabrication of integrated circuits and other micro devices. The wafer serves as the substrate for microelectronic devices built in and over the wafer and undergoes many micro fabrication process steps such as doping or ion implantation, etching, deposition of various materials, and photolithographic patterning. Wafers are usually applied where energy has to be

transferred, directed and transformed efficiently, e.g. in servers, laptops, cell-phones, photovoltaic cells, wind power or lighting systems. The basic structure of its supply chain is representative of the majority of supply chains at Wafec.

Wafer production is split in two parts (1) front-end production and (2) back-end production. During front-end production wafers are produced and the structures are carved into them. Subsequently, the back-end production builds the hardware on the single circuit after thinly slicing the wafers.

Front-end production is mainly conducted in Europe; back-end production takes place mainly in South East Asia and in China.

### The Wafer Supply Chain: Material Flow

"Purchasing" is responsible for cross functional strategic purchasing. Material for front-end production (evaporation material, gas, target, etc.) is sourced from Asian countries and shipped to the front-end production sites in Europe. Dispatchers at the local production sites take care of the operational material planning.

Potential suppliers in the Asian market can increasingly be identified via the internet or existing social networks. Homepages usually allow for identifying the size of the company, its products and a potential history. Thereby, it is helpful to find customer references.



After identifying a long-list of possible suppliers, the selection procedure starts and may take several months till a phase-in can be done.

The Wafec supply base builds upon 4,000 to 5,000 suppliers, where the main goal is meeting a target to achieve “economies of scale”. Changes in the supply base, depending on the specific requirements of a customer’s contract, have to be communicated to the customer.

Transportation to the production sites from the supplier is usually organized by the logistics teams. They set certain shipping requirements and name the logistics service provider to be used for shipping. To organize legal aspects, Wafec makes use of incoterms.

After having understood the aforementioned global sourcing process, we will now have a closer look at the Wafec logistics network, starting in Europe.

Front-end production has an average cycle time of about three months due to a highly complicated chemical production process. Finished wafers are transported from several countries in Europe by truck or sprinter to the next international airport and, on a frequent basis, transported by aircraft to South East Asia and China for back-end production. Wafers from certain European sites use the big gateways from Paris, Frankfurt or London airports with destinations in Hong Kong or Shanghai. From there they are further transported by truck to sites in China. Ninety-nine percent of all Wafec products are transported by aircraft at some point in order to maintain flexibility and minimize lead times. Finished goods are brought to one of the finished goods warehouses in Asia, Europe or North America and distributed globally to serve customers according to the reflected concept.

Figure 16: Supply Network for Wafer Production at Wafec—The Front-end Production

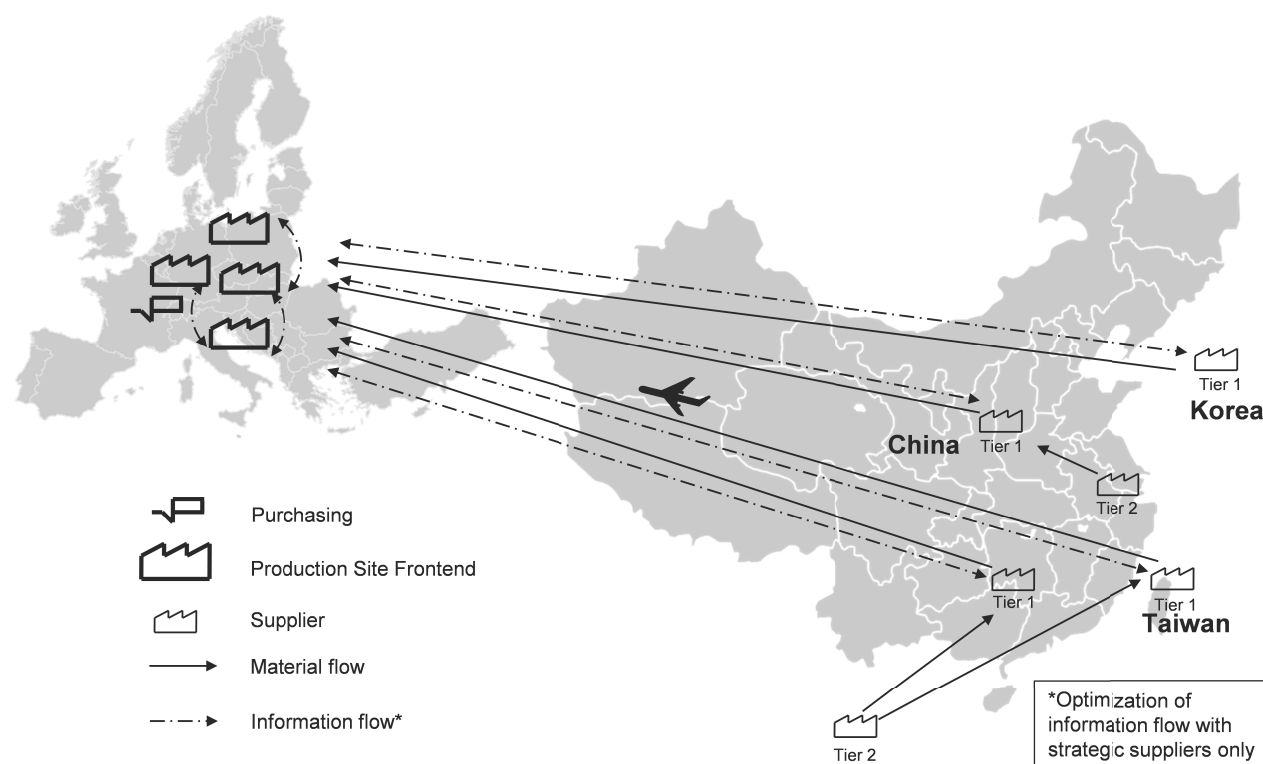
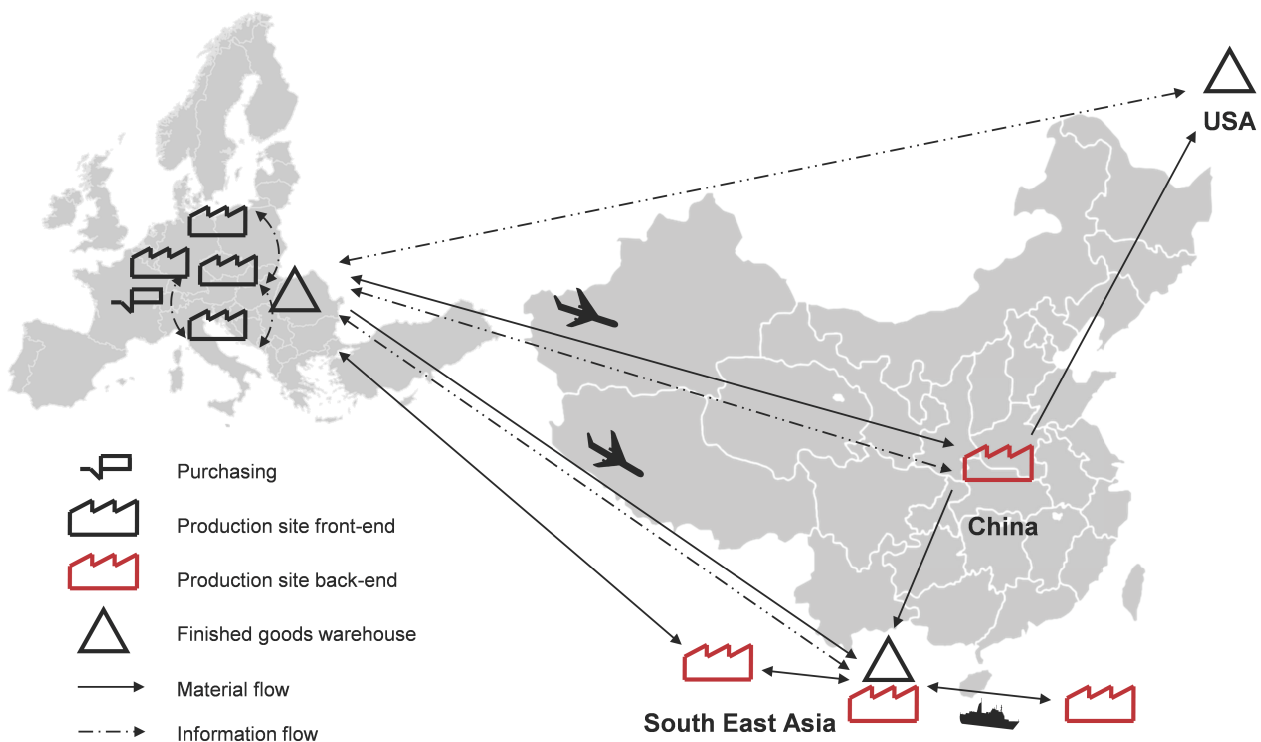


Figure 17: Supply Network for Wafer Production at Wafec-The Back-end Production



Production in Asia usually sources additional material locally. These purchasing activities are again supported by “Purchasing”.

All transportation is the responsibility of the local logistics managers. These teams have to follow a strict timeline. The time-targets are set centrally at headquarters. Time starts running when the production process is finished.

Total cycle time of a typical product is on average around three to four months; yet, an order penetration point (OPP) after the end of front-end production allows storage of certain front-ends (called “Die-Bank”), in order to enable inclusion into various products. From the OPP, it takes about 10–30 days for back-end production to build a customized product until availability at the customer site.

### The Wafer Supply Chain: Information Flow

Predominantly, first-tier suppliers are contracted and supplied with information regarding product demand. These suppliers in turn regularly send feedback on their ability to supply pending orders. Information exchange is mainly limited to strategic suppliers.

As aforementioned, “Supply Chain” at Wafec mainly specifies the rules and guidelines for all relevant processes. However, operational planning is performed by the local planners. They also keep track of available capacity in production. Deviation between demand and available capacity is aligned globally. Such processes have to be moderated. As a result, decisions are made concerning available resources or to build and allocate additional capacity, if necessary. Demand forecasts are generated on a monthly basis.

Logistics service providers (LSPs) are frequently kept informed about volumes to be transported in a generic

way. Wafec makes use of about 10 core LSPs. If necessary, i.e. if volatility is above 10–15 percent, they will be informed by the local logistics managers. For internal exchange of Wafec transportation information, regular panels are held within the logistics community.

Suppliers are usually integrated via IT interfaces, where the supplier provides pick-up and drop-off time information. These suppliers usually track up to 17 events which they could send via the IT interface; yet, information on all events is not needed at this point.

### Challenges in Wafec's International Logistics Network

Looking at the supply chains of final products where Wafec's semiconductors are being installed, Wafec is located several tiers behind the end-customer which makes it difficult to promptly react to unpredictable, volatile end-customer demands. Because of its supply chain position, the well-known bullwhip-effect hits Wafec to a high degree caused by an overshooting in the whole value chain. That is further amplified by long lead-times within Wafec's supply chain. Taking into account that the average cycle time of semiconductors is about three to four months, Wafec's customers have to forecast and order semiconductors at least several weeks in advance. In addition, their customers have to provide forecast updates on a regular basis. The better the forecast matches the demand, the better Wafec can serve their customers. Unfortunately, the forecast accuracy is not as good as hoped and customers often change their orders at short notice.

Furthermore, Wafec is faced with the ever-shortening product life cycles of semiconductors. In the past, after a ramp-up phase, there was an appropriate phase of stabilization and optimization whereby demand planning, supplier collaboration improvement

and inventory control was possible before the product was phased out. Nowadays, Wafec experiences increasing dynamics in product life-cycle management combined with a steadily growing number of different semiconductor types. A lot of products are constantly in a ramp-up or ramp-down phase and successors launch before their predecessor can be phased out. Demand planning is becoming more and more difficult, and the risk of excess or obsolete inventory rises. The pace and complexity of product life-cycle management induces various risks that have to be handled proactively. Appropriate concepts have to be developed and countermeasures have to be implemented.

To effectively manage their supply chain on a long-term basis, Wafec has to constantly analyze volatility in the global economy and the semiconductor market in order to come up with reliable strategic decisions. According to the experts, it is easier to manage a down-turn than to predict and manage an up-turn in the electronics industry. Nevertheless, a fast identification of a down-turn is essential, because a delay in detection has a linear impact on savings. Managing the up-turn is more challenging because Wafec has to foresee it months in advance and delayed detection even has an exponential effect. The circumstance that global GDP growth rates are not in line with the global semiconductor market growth forces Wafec to manage both at the same time, which hampers their long-term capacity planning.

Along with the aforementioned challenges, Wafec's global supply chain has to handle a multitude of legal requirements and trading programs. National laws, customs regulations and security programs vary a great deal depending on the origin and destination of the product. For example, most material flows within the global supply chain are realized using air freight.

The corresponding security standards and requirements in air freight hamper efforts to reduce product cycle-times.

## Mitigation Strategies

Wafec's logistics processes are designed to cope with any supply chain disruption and have proven effective and efficient during several crises. Their standard transit flow is based on harmonized and optimized processes and tools that ensure high reliability and standard operations at reasonable cost combined with best-in-class performance. In case of a supply chain disruption, special processes and emergency concepts have been installed over the last years. To recover from unforeseen crises or disasters as fast as possible (e.g. Fukushima nuclear disaster, supplier factory fires, floods etc.). Wafec also proactively implemented special business continuity measures and processes.

Wafec therefore takes care of Business Continuity, which serves to enhance the robustness of the supply chain and corporation. Standard operation procedures (SOP) are being developed, including security precautions to be followed. Regular meetings of the relevant teams help to improve strategic risk management. Thereby, Wafec is a member of TAPA (Transported Asset Protection Association) and recognizes security standards for the care and handling of freight, thereby using Freight Security Requirements (FSR). These requirements have been established to ensure safe and secure in-transit storage and warehousing.

Auditing of transportation routes is a common procedure as well. These audits verify compliance with implemented measures in terms of standard operation in order to track transports (e.g. when they stop, how truckers are hired etc.). Security Center teams even

have the possibility to connect to cameras in Wafec warehouses worldwide to check for disruptions.

The increasing demand for semiconductors worldwide sometimes leads to a situation whereby the demand is much higher than the current supply. In these cases, Wafec faces a so called "allocation" problem where they have to decide carefully to whom they will supply. In order to solve allocation issues, Wafec also attempts to align customer orders with capacity planning in seeking to increase their forecasting capabilities.

As mentioned above, volatile end-customer demand, short product life cycles and long order lead-times exacerbate the difficulty of predicting future customer demands. Even if Wafec's customers order specific amounts of semiconductors several months in advance, they are constantly updating their forecasts, postponing orders on a short term basis or, for example, increasing their order quantities two weeks before shipping. To better plan their capacities accordingly, Wafec helps their customers to improve their forecasts. Firstly, they measure and track their customers' forecasting accuracy. Secondly, they analyze the customer order behaviour. Thirdly, Wafec shares its analysis and assessment of forecast accuracy and order behaviour with their customers and discuss improvement activities with them. According to the experts, most customers do not realize their impact on Wafec's production. In many cases, Wafec is able to forecast their customers demand more accurately than the customer itself. Both parties benefit a great deal from this exchange of knowledge. For example, one customer always increased its order quantity by 10 percent two weeks before dispatch. During discussions with Wafec the customer realized that it constantly underestimates its own demand and adjusted future orders accordingly. So, collaboration is key.

## LuxCom: A Case Study in the Consumer Goods Industry

The following case study describes the supply chain structure of a French manufacturer of consumer goods named LuxCom. It is based on an extensive on-sights interview, a plant tour and multiple online conversations with the head of logistics at the company's main distribution center in China.

### Company Overview

This case study deals with the supply chain structure of the multinational luxury goods manufacturer LuxCom, headquartered in France. Through multiple mergers and acquisitions the company has significantly expanded its product portfolio over the last three decades. The company holds more than 30 subsidiaries which in turn manage several luxury brands each. In total, the company achieves annual revenues of about \$ 21bn and a profitability of about 15 percent before taxes. LuxCom's major division contributes up to 50 percent of its profit. With respect to China, LuxCom's major division is responsible for about 57 percent of its total sales. A high rise in sales and profitability is attributed to an internationalization strategy, first pursued by LuxCom in the 1970s, accompanied by an immense marketing campaign and store openings in both the U.S. and Asia. "Going global" helped LuxCom to increase its sales figures from 1990 to 2000 by more than 420 percent to \$ 2.2bn. Overall, LuxCom employs roughly 60,000 workers from which more than 10,000 can be attributed to its most profitable division. LuxCom operates more than 1,500 stores worldwide, with its main markets presently being Europe, the US, the Middle East and Asia. Specifically, the Chinese market, which will be the focus of this case study, makes up almost all of the demand in Asia. LuxCom shows growth rates in the Chinese market of up to 20 percent annually. In order to keep up with this dynamic development, LuxCom has adopted many manufacturing processes from car makers and consumer-electronics companies with

the goal of increasing its flexibility and ensuring shelf availability rates close to 100 percent.

### Product Description

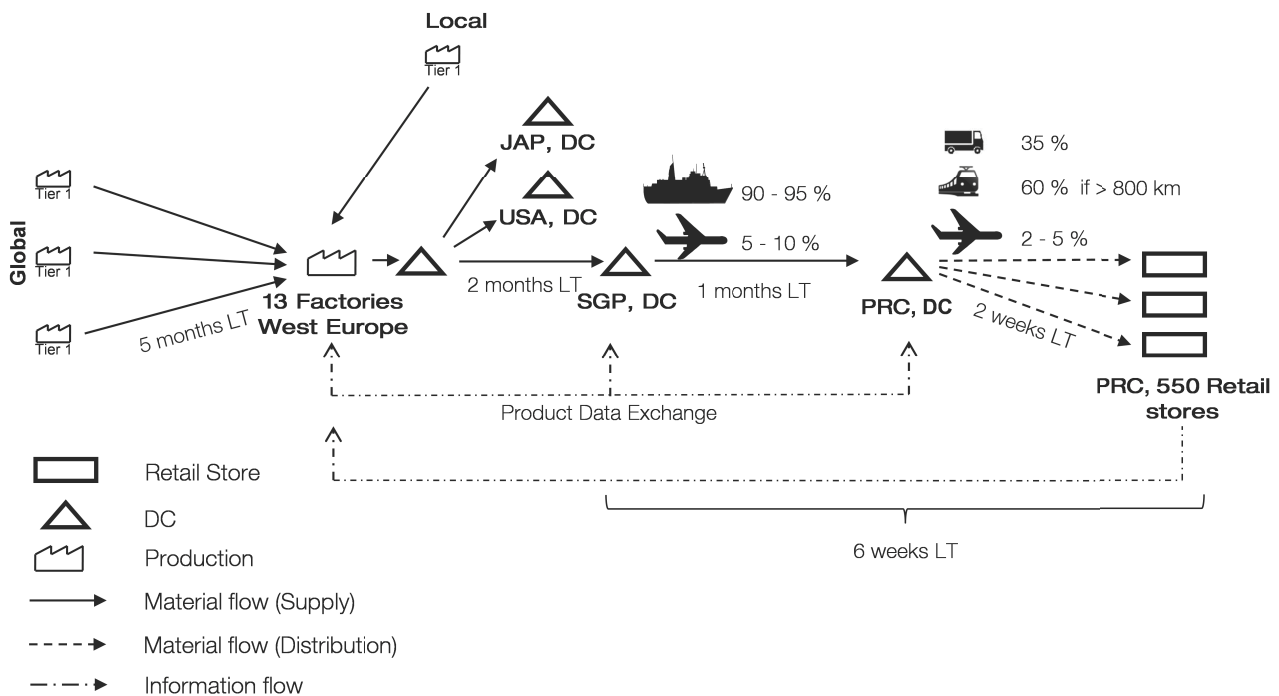
LuxCom produces several categories of luxury products such as liquors, purses and perfumes. This case study focuses on perfumes produced for different brand labels. Two major fields deserve closer attention and distinguish the production of perfumes from the production of other luxury goods.

1. Perfume ingredients might have impacts on health or the environment and must be treated accordingly in the production process to ensure employee safety and compliance with environmental standards.
2. Fragrance compounds are essential for the individual perfume scent and are determinants of product quality such as persistence and strength. It is a particularity of fragrance compounds that they are very sensitive constructs that tend to degrade or break if not handled correctly. These characteristics demand tailored processes that eliminate the influences of heat, light, oxygen or organic materials in order to ensure product quality.

### Upstream Material Flow

Thirteen production sites are located in Western Europe. Those sites receive both local and global supply shipments. Supplies of chemicals and other materials generally originate from suppliers worldwide,

Figure 18: Supply Network for LuxCom



yet LuxCom procures its most valuable chemicals and materials from local suppliers in order to reduce lead time length and variation, and reduce fixed capital due to increased stock. Lead times from global suppliers are usually around five months, which in turn requires a detailed long-term planning processes and increased inventory levels. Europe-based suppliers, on the other hand, are able to fulfill orders in less than two months in most cases. Based on a total cost of ownership approach, LuxCom decided to source all packaging materials from China. Perfume bottles are a bottleneck in the procurement process.. The number of existing suppliers is limited. Even though perfume bottles are sourced locally from Europe, they have the longest lead time in the upstream supply chain.

### Downstream Material Flow

Finished products are all shipped to a central DC in Europe that, besides supplying the European markets, ships products to a second DC in Europe, one

in the U.S., two in Japan, one in Singapore and one elsewhere in Asia. The lead time between the DCs in Europe and Singapore can extend to up to two months. It is the task of the DC in Singapore to supply the entire Asian market (except for China) with perfumes. Due to the high importance of the Chinese market, China itself contains one DC on its east coast which has the sole purpose of supplying over 550 retail stores in China. It takes on average one month to fulfill orders of the Chinese DC from the Singapore-based service center. Vessels are the common mode of transport accounting for 90 to 95% of all shipments based on volume.

As LuxCom shapes its supply chain with a focus on flexibility and velocity while aiming at increasing availability rates on shelves to 100 percent, the company is forced to transport 5 to 10 percent of its products via air freight between Singapore and China. These ad-hoc measures decrease the lead time to about one day. Distribution in China is organized by local LSPs



and makes use of three different modes of transportation. Thirty-five percent of the perfumes (based on volume) are transported by truck, usually over distances smaller than 800 km. For distances larger than 800 km, LuxCom uses transportation by train in order to take advantage of bundling and price-decreasing effects., LuxCom employees a specialized LSP for each mode of transport. The lead time between DC and retail store averages around two weeks. To maintain the flexibility of its supply chain and guarantee shelf presence, two to five percent of the perfumes are transported within China quickly via air freight.

### Challenges in LuxCom's International Logistics Network

Two main challenges arise in LuxCom's international logistics-network: first, increasingly volatile demand, and second, constantly changing custom requirements.

Volatile demand structures are driven by changing customer demand and the impacts of severe external events. The luxury goods market has witnessed exceptional growth over the previous three decades. The extremely wealthy, for a long time, were the traditional customers of luxury goods. However, on account of a progressive opening-up of the market to a wider audience, the luxury industry has witnessed exponential growth rates, resulting in an unprecedented increase in the bottom-line of these luxury companies. Unlike luxury cars, perfumes belong to the category of affordable luxury goods. These are pricey, high-quality goods, such as iPhones or expensive perfumes, which nonetheless fall within the affordable price range of the majority of people.

In China, increasing incomes for many have been accompanied by a change in lifestyle. Newly rich

classes strive for status symbols, driving demand for luxury goods. On the other hand, external catastrophic events such as the SARS virus outbreak in Asia, the onset of war in Iraq or the 9/11 attacks regularly lead to an unexpected plunge in the demand for luxury goods. In addition, demand volatility is further exacerbated by seasonality, extensive promotions and new product launches.

As reported by LuxCom, the company's second major challenge is constantly changing customs requirements. As reported, many companies across all industry sectors struggle with customs in China. In most cases, missing or misleading information regarding the imported goods lead to unnecessary holding of goods at the border, increasing lead time as a consequence and causing stock-out situations in extreme cases.

### Mitigation Strategies

LuxCom handles over 60 brands in the Chinese market and is therefore affected by volatile demand on many levels. They used to send their products directly from a distribution center in Western Europe to its stores around the world. Today, the holding has set up one "shared service center" (SSC) that all brands are required to hire as a transportation and storage service provider. The SSC has built a global distribution hub outside of a major European city that ships to six regional distribution centers: two in Japan, one in Singapore, one elsewhere in Asia, one in the U.S. and one in Europe. This SSC allows for bundling capacity as well as information and expertise. The SSC holds safety stocks of four to eight weeks in its DCs.

LuxCom pursues strong interconnectivity between their outlets and their production sites using electronic data interchanges. The seamless transmission

of worldwide store sales information, for instance within a week of a product launch, enables the European production sites to adjust their production schedules accordingly. Despite an optimization of its logistics network, LuxCom has additionally changed its manufacturing strategy, adopting best-in-class practices from other industries such as automotive or electronics, bringing more flexibility and efficiency into their factories. In the past, luxury brands relied on the experience, taste and gut feeling of their designers and creators and emphasized craftsmanship as their USP. In case of a successful product, stores were sold out within a week and the rigid manufacturing system did not allow quick response times. Long waiting lists resulted. The emergence of fast-restoring fashion labels like Zara or H&M that are able to have up to 16 seasons per year has put pressure on the whole industry and changed customer perceptions. As customers' willingness to wait decreased, availability became more essential,

and hence luxury manufactures were also forced to re-think their manufacturing process. These adapted changes enable LuxCom to ship fresh collections to its boutiques every six weeks—more than twice as frequently as in the past. The issue of long lead-times, up to eight days, between the Chinese DC and outlets located in Western Chinese cities remains prevalent.

In order to deal with the aforementioned customs issues, a constant data exchange between the DCs in China and Singapore as well as the manufacturing firm in Europe has been established. This ensures that the product information required by customs is up-to-date. Most product delays at customs in the consumer product market stem from errors in declaring the products. The more effort companies invest in providing the correct information during customs declaration, the fewer correction processes have to be implemented. LuxCom makes use of an inter-organizational SAP platform that even requires its suppliers to enter the required product data.



# 7 DISCUSSION AND CONCLUSION

The importance of German-Chinese business relationships for the success of many global enterprises is apparent and continuously increasing. Already early in the 21st century, China left behind its status as the “factory of the world”. Chinese companies are becoming worldwide competitors for market share, a factor that should be taken seriously in virtually every industry sector. Also, as the world’s biggest sales market, China’s significance for German companies continues to grow.

Even though many successful German-Chinese logistics networks have been developed, major challenges, old and new, still need be tackled. This study has listed and ranked 22 challenges leading to network risks. These challenges are currently perceived as the most pressing from a Western firm’s perspective, and are therefore placed at the top of an agenda for successful supply chain management. They are certainly strong contributors to the situation whereby many German companies continue to withdraw their production from China (Trentmann, 2015).

The particular aim of this study was to expand knowledge of supply chain challenges in German-Chinese networks and help practitioners manage them proactively and efficiently by applying appropriate strategies. By applying the nominal group technique with a group of 42 supply chain experts from Western firms, we identified the aforementioned set of 22 supply chain disruption risks in China. The experts assessed these risks by evaluating (1) the probability that this

risk will have a negative impact on their supply chain and (2) the severity of damage that will be caused by this risk when it occurs. It turns out that disruptions stemming from cultural and legal risks are currently evaluated as both, most probable and most impactful. These risks rank far ahead of the risks one would first have in mind when thinking of the Chinese market, such as handling errors, malfeasance, political unrest or natural disasters. In a second round, the group of experts developed strategies to deal with the ten most pressing risks in the Chinese market. One would expect that an increase in the routines of exchanging information between supply chain partners is most beneficial to decreasing risks in German-Chinese logistics networks. However, it turns out that managers should learn from this study that it is rather their capability to develop *guānxi* with the suppliers than the establishment of rigorous routines of information exchange that will help them to most effectively mitigate potential disruptions. *Guānxi* is a China-specific network of personal and close business relationships with preferential treatment among partners. *Guānxi* relations are based on mutual obligations and the reciprocal exchange of favours.

One commonly distinguishes between two types of *guānxi*: channel and non-channel *guānxi*. Channel *guānxi* describes the business connections between buyers, suppliers and distributors, whereas non-channel *guānxi* is politically connoted and refers to relationships with political leaders, officials in industry bureaus and officials in regulatory/supporting organizations.

Figure 19: Main Management Clusters to Deal With Challenges in German-Chinese Logistics Networks



Guānxi creates the opportunity for Western firms that understand it to substantially improve their performance in the market. Western firms are encouraged to adopt guānxi practices in their operations in order to be successful in China. The development of guānxi has a substantial positive effect on supplier performance and behaviour towards the buying firm, subsequently contributing to reduction of supply chain risk. Both channel and non-channel guānxi play an important role in daily supply chain risk management.

It could be shown that channel guānxi can especially help to efficiently deal with the cultural gap between Western and Chinese supply chain partners. The study participants have therefore rated social, channel guānxi enhancing strategies such as “socialization on similar hierarchical levels” or “the development of a meta-language” as some of the most efficient strategies to prevent supply chain disruptions stemming from cultural gaps. Western firms which are looking for Chinese supply chain partners are also highly advised to use so-called “local heroes.” Local heroes are

Chinese nationals that have been trained in a Western firm and who are now sent to China in order to identify and select appropriate Chinese partners. Local heroes can best bring together and proactively mediate the idiosyncrasies of both worlds.

Non-channel guānxi is very important when it comes to the prevention of disruptions stemming from legal uncertainty. The second highest ranked disruption risk according to this study is “disruptions due to unexpected legal changes.” Close relationships with politics and officials, maybe even be fostered with the help of Chinese supply chain partners, are needed in order for Western firms to become aware of potential changes ahead of time and in order to prepare for potential negative legal changes.

To gather further comprehensive insights on supply chain structures in different industries above and beyond the challenges identified in the workshops, we conducted multiple in-depth expert interviews with representatives from leading three firms from the

automotive, electronics and consumer goods industry. According to these interviews and additional company data, three case studies have been developed, which explain supply chain structures, challenges and depict contextual best practices.

Drawing on the findings of the workshops and case studies, we propose six main clusters of mitigation strategies (see Figure 19). This meta framework is intended to help companies to structure and find original mitigation strategies that are above and beyond the strategies identified and discussed in this study. The framework builds on two main pillars, “Governance” and “Investment”. Both pillars can be seen as the main enablers of a successful business operation in the Chinese market. First, without the appropriate governance (*guānxi*) of supply chain partners, such partners may not just be a liability to your business, but also restrain your firm from access to crucial knowledge. Therefore, successful companies move from an exploration of the supply chain partnership, to an expansion, and eventually to a true relational commitment. This process, however, needs to be aligned with investments in physical (e.g. information and communication systems) and human assets (e.g. employee exchanges). While “Governance” and “Investment” are the main pillars, “Management” can be seen as the roof in this framework. Not just top management, but management in general, needs to find risk mitigation strategies in the areas of employees, processes and systems. While these areas mainly have an intra-organizational focus, mitigation strategies should also be sought on an inter-organizational level, i.e. supply chain partners and network design strategies. Central to all these clusters is the cluster of “Organizational Alignment.” That means managers have to check whether their intra-organizational and/or inter-organizational processes are configured in such

ways that they allow for reducing disruption risks that can be categorized as “self-induced.”, The management of supply chain partners (customers, suppliers and logistics service providers) is crucial to reaching and sustaining an efficient inter-organizational alignment. According to the experts, risks can no longer be managed in an egocentric manner. To compete in a complex environment, companies have to manage risks cooperatively with their supply chain partners. Without timely information exchange (as opposed to a continuous exchange) companies are destined to fail. To ensure an expedient exchange, an appropriate partner selection process is of the same importance as an ongoing development and integration process for key supply chain partners. To avoid supply chain disruptions, companies should cooperate horizontally and vertically instead of acting opportunistically. Although the efficient management of existing partners, according to the described clusters, should limit supply chain disruptions, “Re-Design” strategies can become necessary if specific risks affect existing supply chain structures. In these cases, re-design measures for sourcing or distribution structures can be useful to spread risks among different partners or even to eliminate specific risks in total. As has been explained in the case of SteelCom, they faced numerous supply chain disruptions per year because of Chinese suppliers that were not capable of delivering on time. To secure a constant material flow and to limit the dependencies on their Chinese suppliers, SteelCom was forced to implement a dual sourcing strategy with back-up suppliers located in Eastern Europe. They have thereby managed to decrease their supply insecurity by around 20 percent, and reduced out-of-stock situations to less than 2 percent. Even though the supplier selection and development process took a lot of time and tied up many resources, their strategy eventually helped them to improve

their delivery reliability to the customer. However, it also has to be mentioned at this point that firms are highly encouraged to constantly re-evaluate their suppliers and sourcing structures applying a “total cost of ownership” approach. As we have learned from our exchanges with supply chain experts, too many sourcing decisions are still solely based on an analyses of direct costs (e.g. purchase price, transport costs) rather than on an holistic approach which also takes into account indirect costs (e.g. quality considerations, supplier service support).

Summing up, logistics systems always have to acknowledge the contextual factors of the country settings in which they operate, and logistics managers need to develop strategies and measures that take account for these settings. To be successful in the Chinese market, we have found that cultural parameters are of the utmost importance. Logistics managers need to understand the Chinese culture first, before designing and implementing strategies correspondingly. Measures that have been useful in other countries will not necessarily be successful in China. Without an alignment of strategies according to Chinese culture, the increasing number of risks will be difficult to manage.

Literature on China-specific supply chain risks is still sparse. This study has sought to fill this gap and provide managers of Western firms with an agenda of the most pressing risks in the Chinese market, a set of mitigation strategies as well as with three insightful case studies of German/European-Chinese logistics networks. We hope and trust that the findings of this study will make a small, yet valuable, contribution to the operation of successful German-Chinese logistics networks and support the more sustainable economic co-development of both countries.

Thanks to the generosity of the Kuehne Foundation, this project will be continued in order to address further practical research issues. Relevant topics in the vicinity of demand and supply volatility in international networks, or challenges arising from tendering and selecting appropriate logistics service providers in the Chinese market will soon be addressed in our ongoing exchanges with practitioners. The interested reader can follow our research updates, make use of our online logistics planning tool and/or participate in some of our workshops. Please go to our homepage for more information:

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## Successfully Managing Challenges in German-Chinese Logistics Networks

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The study presents results from several years of work looking into successful Western firms' operations in the Chinese market. It lists current and emerging logistical challenges in

German-Chinese logistics networks and proposes a set of mitigation strategies. The study also gives in-depth insights into three case studies from the automotive, electronics and consumer goods industries. The China-specific nature of this study is exemplary for many culturally distinct bilateral trade relationships around the world. The entire study is enriched with up-to-date macro- and micro-economic data, as well as a study of seminal literature in the field; applied research methodologies include two group exercises with forty-two practitioners, several online questionnaires with over fifty respondents and three in-depth case studies.

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