Quality in International Sourcing

An Empirical Case Study of Chinese Suppliers

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Synosis

Factors influencing the quality performance of international suppliers were identified through a litterature review. These factors were used as basis for a mulitple case study involving two cases concerning the conformance of quality between Danish Customers and Chinese suppliers. It was identified that supplier opportunism, trust, cultrural ssertiveness, and quality specifications alignment were the factors mainly infleuncing the quality conformance. A sourcing strategy of dual sourcng were propose to circumvent these factors, with relevenat initiatives to be undertaken in order to ensure quality imporvements

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1 Introduction

Over the last decades the international business world has opened up revealing opportunities for almost every type of company. More and more business are seeking to exploit these opportunities in order seek improvements and optimization of their supply chain. (Jørgensen, 2010) One of the recent trends is to utilize the sourcing opportunities blossoming in low cost countries far from the original local business environment. China has become one of the main sourcing basins mainly facilitated by the low labor cost, wherefore great savings are achievable. (Nassimbeni & Sartor, 2007)

In order to reap the complete benefits of the opportunities of sourcing from China it is necessary to develop applicable sourcing strategies which would fit into a vastly different business context compared to the home base. In order to do so there are several obstacles to overcome such as coordination of activities, cultural barriers, knowledge transfer, and quality monitoring. (Nassimbeni & Sartor, 2007) Quality has for long been the main sales argument in the western world as it has generally been realized that the competition on price is not possible compared to the low cost countries. However now that western companies are benefitting from the low cost countries as well, how does this the influence the quality in the supply chain, and how does the sourcing company cope with this?

How quality will influence the sourcing from especially China and how quality practices within a supply chain operationally work, is the main focus of this research. It is based on empirical case studies conducted in China.

1.1 Research Question

The main research question and supporting questions are listed here:

How to choose an appropriate sourcing strategy influenced by the perspective of quality in a different business environment

- Which factors influence the quality management in an international supply chain and how would it be possible to improve the quality in the supply chain taken these factors into consideration
- How is the sourcing strategy influenced from a quality perspective in a different business environment
- How does cultural characteristics interfere with the quality performance in the international supply chain

1.2 Scope of the Research

- The empirical research focuses entirely on case studies from one particular company and only under Chinese circumstances.
- The main interaction analyzed is between Danish case companies and the Chinese Suppliers though from the view of a third-part supplier mediating the communication.
- The purpose is to aid in future decision making concerning how to implement quality management into the sourcing strategy under similar conditions as the research, meaning when external suppliers are hired to manage this process as a link between the customer and its foreign supplier.

2 Literature Review

The literature review focuses on literature concerning quality management from three perspectives: quality in the supply chain in general, quality in the international supply chain with focus on outsourcing and the use of international suppliers for specialized production tasks, and the cultural influence on quality.

2.1 Quality Management in the Supply Chain

Many authors have announced that the competition in today's business world is no longer between individual companies, but instead between supply chains. (Lambert & Cooper, 2000; Sila, Ebrahimpour, & Birkholz, 2006) The focus on the supply chain as a competitive unit has made companies re-evaluate their business from understanding what the customer desires and how it is possible to utilize both internal and external capabilities in order to reach these requirements. (Kannan & Tan, 2007) Therefore the management of suppliers as well as customers is of the essence to ensure competitiveness highlighting the need to cooperate with both ends of the supply chain referred to as supply chain management (SCM). (Kanyak & Hartley, 2008) The purpose of SCM is to ensure that the supply chain delivers the right product, in the right quality and quantity at the right time and place to the right price. A poorly operating supply chain can produce unwanted results such as poor product quality, high operating costs, late shipments, and excess inventory. (Sila, Ebrahimpour, & Birkholz, 2006) All the previously mentioned purposes of the SCM could be categorized into the overall term of quality, as even though the product quality is the most dominant consideration concerning quality, delivery performance and a suitable price fit could as well be considered an expression of quality. Henceforth, when mentioning quality all such aspects are considered as well.

A supply chain consists of continuous two party supplier-customer relationships from the provider of the raw material to the end consumer. It is all these relationships which need to work in coherence in order for the supply chain to be successful, with the influence of both first and second tier suppliers and customers. Sila, Ebrahimpour, & Birkholz (2006) identifies quality, price and trust to be the three main characteristics influencing the supplier-customer relationship with main influence of quality, though none of the three can be compromised. In order for the supply chain to be competitive it is therefore of the essence that the products fulfill the quality requirements set forward by the customers. Price is as well important as no matter how high the quality is, the product will not satisfy the customer if it is too expensive. (Sila, Ebrahimpour, & Birkholz, 2006)

To achieve the correct level of quality Kanyak & Hartley (2008) state that it is necessary for companies to look beyond their own internal organizations to manage quality, and to include both customer focus and supplier quality management in the supply chain through collaboration and integration with respect to quality. A firm which focuses entirely on their own internal quality issues could fail to identify the actual root cause of quality related issues. (Handfield, Monczka, Guinipero, & Patterson, 2009) The focus on internal quality management should not be forgotten in the aim of achieving the requirements set forward by customers, though the management of the external influence on quality has become increasingly important. (Sila, Ebrahimpour, & Birkholz, 2006) No matter how much a company internally commits itself to achieve high levels of quality their efforts will often be undermined by suppliers that do not

have quality practices established and are not able to verify the quality of their own products. (Kannan & Tan, 2007) A benefit of ensuring high quality from suppliers is the decreasing need of keeping safety stock as a buffer in case of defective incoming materials and a reduction of held inventory would make it more possible to identify other potential quality defects. (Kanyak & Hartley, 2008; Sila, Ebrahimpour, & Birkholz, 2006) The above stresses the importance of managing the quality in the supply process as identified by Kannan & Tan (2007) as well, which reference an article stating that the management of supplier quality are directly related to higher levels of quality conformance, reduced variation in quality performance, and reduced production cost. (Kannan & Tan, 2007)

2.1.1 Trust in the Relationship

There are different actions which could be taken in order to ensure and improve supplier quality. In their QM model Kanyak & Hartley (2008) verifies the importance of integration between supply chain members to improve the quality. (Kanyak & Hartley, 2008) One highly important aspect of integration as mentioned by Sila, Ebrahimpour, & Birkholz (2006), concerns trust. The authors adopts the definition of a trustworthy relationship as being when companies "does not act in a purely self-serving manner; accurately discloses relevant information when requested; does not change supply specifications, standards, or costs to take advantage of other parties; and generally acts according to normally accepted ethical standards". (Sila, Ebrahimpour, & Birkholz, 2006) Trust concerning quality is important as completely monitoring the behavior of the supplier is not beneficial for either part in the relationship and does not add value to the final product. (Sila, Ebrahimpour, & Birkholz, 2006) One way of building up this type of trust is through repeat business and long-term relationships, as the cycle of, or commitment to, repeated interactions would strengthen the willingness to expand the boundaries of the relationship. (Holcomb & Hitt, 2007; Handfield, Monczka, Guinipero, & Patterson, 2009) If true trust exists in the relationship this could both lead to improved quality, and not just meeting the standards, less costs, and improved adaptability to change as the supplier and the customer would be willing to collaboratively and openly focus on how to gain most benefits for both parties. In relation to this it is important that both parties are allowed to discuss openly any issues which might occur during the process as to facilitate the utilization of potential improvements. (Sila, Ebrahimpour, & Birkholz, 2006) If trust between the companies are not possible to establish and it has the proposed influence on quality, it would be necessary to reconsider the relationship and potentially find a new supplier capable of supplying the needed level of quality, though this would only be immediately possible in the circumstance that the product has a low asset specificity. In the case of high asset specificity efforts should be placed in gaining the trust of the supplier and developing trust to the supplier through extensive supplier management. (Sila, Ebrahimpour, & Birkholz, 2006)

2.1.2 Supplier Quality Measurement Systems

When the suppliers are to improve the quality it is important that they are informed about where they are doing wrong. (Kanyak & Hartley, 2008) To facilitate this it would be beneficial for a buying company to continuously perform supplier measurements and evaluations to identify potential areas for the supplier to improve. This could be done through supplier measurement systems and statistics on areas such as delivery dependability, product quality and cost reduction initiatives. (Handfield, Monczka, Guinipero, & Patterson, 2009). In a survey referenced by Handfield, Monczka, Gunipero,& Patterson (2009) it was identified that 51%

percent of the companies in the survey did not utilize such measurement systems, though 70% of the companies where such methods were implemented announced an improvement in the overall supplier quality.

Besides measurements a supplier measurement systems should entail procedures of how to handle improvement requirements in terms of Corrective Action Requests (CAR). Such requests are used when the buying company identifies a nonconforming product and should express to the supplier the type and level of nonconformance in order for the supplier to improve on such issues in future shipments. CAR's could aid in the prevention of future defects and would require the supplier to inspect and sort potential current products for any defects of the same kind. (Handfield, Monczka, Guinipero, & Patterson, 2009) Furthermore it would require the supplier to report the initiative taken to succumb to the CAR and verify the improvement.

At the other end of the supply chain it is also necessary to have mechanisms identifying the need of the customers in order to identify whether these are being met, and if not how to respond upstream in the supply chain. (Kannan & Tan, 2007) This could for instance be through customer satisfaction surveys. If new or unmet requirements are identified it is necessary to have these specified in the quality specifications and distributed to the supplier. One way to make the quality requirements or variables explicit to the suppliers could be through Quality Function Deployment (QFD), where the quality perception is transformed into exact specifications and characteristics of the product. (Sila, Ebrahimpour, & Birkholz, 2006; Nicholas J. M., 1998)

2.1.3 Long-term Relationships

In order to develop the needed trust and insight into the supplier it is necessary for the company to truly *know* the supplier, which speaks in favor of a long-term relationship. Long-term relationships or contracts are contracts which normally exceeds one year and symbolizes a commitment to continuous purchase from that particular supplier with which the contract is established. (Handfield, Monczka, Guinipero, & Patterson, 2009) Long-terms contracts are most beneficial concerning products with high asset specificity, where new suppliers are not immediately available. Oppositely is the arms-length relationship where suppliers are kept at a distance and the information sharing is kept at a minimum. (Williamson, 1981) According to W. E. Deming a supplier must be assured a long-term relationship in order to make a useful contribution for improving the system and therefore the quality. (Yeung, 2008) A long-term relationship is most often established with a supplier which has proved to be a preferred supplier categorized by having demonstrated its capabilities and conformance to requirements in previous purchases. (Handfield, Monczka, Guinipero, & Patterson, 2009) In the same way is important for the buying company, prior to a long-term relationship, to be recognized as a preferred customer at the supplier. This could entail both assigning a considerable amount of orders to that particular supplier, as well as identifying in particular what the supplier appreciates in the relationship such as stability, fulfillment of payment terms, and a minimum of design changes. (Handfield, Monczka, Guinipero, & Patterson, 2009)

2.1.4 Quality Specifications

Some of the most common barriers to successful supplier management are goal differences, lack of proper relationship management, and failure to arrive at a common understanding about

quality standards. (Lim & Tan, 2010) If deliveries from a supplier are generally nonconforming, thereby causing problems in the internal manufacturing at the sourcing company, it is important that this company works closely with the supplier to improve the quality. (Handfield, Monczka, Guinipero, & Patterson, 2009) When seeking to withhold a certain level of supplier quality it is important that both the sourcing and supplying company have the same understanding of quality and what determines a product conforming to the quality specifications. (Sila, Ebrahimpour, & Birkholz, 2006) This is a general requirement throughout the entire supply chain, and therefore the end-customers' requirements and specifications of quality should be communicated upstream in the supply chain to ensure total compliance. This makes it important that the quality specifications of any product are highly influenced by the customer input. (Sila, Ebrahimpour, & Birkholz, 2006) One of the major findings from Kannan & Tan (2007) is that customer input has a significant impact on both product quality and customer service, and that firms need to carefully assess customer expectations and use these when employing quality specifications to the suppliers. In the survey conducted by Kannan & Tan (2007) it was identified that customer input was directly and positively related to product quality. Other ways of developing quality specifications for suppliers or at suppliers could be through: (Sila, Ebrahimpour, & Birkholz, 2006)

- **Internal requirements** based on previous experiences with similar products
- According to **quality standards** such as ISO:9001-series and MIL standards
- Adaption of **industry specific standards**

Even though the above mentioned methods are adequate for developing quality specifications it is intensely important that they are as well influenced by the customer input, as in the end it is the customer who would approve or reject any products delivered. (Sila, Ebrahimpour, & Birkholz, 2006) If the company, whether supplier or buying, believes the specifications set forward by the customer is insufficient they should themselves add additional requirements, though it is important that whenever new requirements are added to the specifications, these are be communicated upstream in the supply chain. In a case study performed by Roethlein & Ackerson (2004) of a five party supply chain the quality goals, specifications and restrictions were extremely dissimilar at different levels within the chain. All the entities in the supply chain placed high focus on the importance of customer satisfaction, though quality goals and objectives were communicated and interpreted differently at the different levels in the supply chain. This would potential call for a disaster from a quality perspective, though this supply chain was actually rather successful. (Roethlein & Ackerson, 2004) The reason for the success could however be assigned to the strength or dominance of the manufacturer in the supply chain. This company employed communication mechanisms with the supplier, such as corrective action requests with regards to their own quality specifications highly influenced by customer response, ensuring that the deliveries from the supplier where according to requirements. (Roethlein & Ackerson, 2004)

The importance of quality specifications and goals alignment upstream through the supply chain requires as well that the buying company itself has a complete understanding of the products,

the requirements set forward and the implication on the production process. As mentioned by Handfield, Monczka, Gunipero, & Patterson (2009) referencing Keki Bhote[1]:

"At least half or even more of the quality related problems between customer and supplier are caused by poor specifications for which the customer is largely responsible. […]When bids go out to suppliers, the latter are seldom consulted on specifications for fear of losing the bid. [...]So the first cure for poor supplier quality is to eliminate the tyranny of capricious specifications" (Handfield, Monczka, Guinipero, & Patterson, 2009)

Therefore, when specifying quality objectives and goals for the product it is important that the buying firm considers the usage of the product instead of relying solitarily on the specifications from the design engineers. The specifications must be fair and in relation to the requirements from the customers. If specifications does not justify the usage and the production methods, or the buying company does not adequately state their requirements, this would interfere with the trust needed in the supplier-buyer relationship, and would therefore influence the quality and the potential for a long-term agreement.

In relation to the knowledge of its own products and the requirements set forward it is as well important that the buying company itself is aware of and understands the usage and application of quality control methods and tools in order for that company to aid the supplier in the application. If the buying company itself does not fully understand the application of such techniques it is not possible to adequately support the supplier when nonconforming products occur. (Handfield, Monczka, Guinipero, & Patterson, 2009)

One of the trends identified by Sila, Ebrahimpour, & Birkholz (2006) is that customers actually are more likely to be involved in quality initiatives than suppliers, though it is somewhat necessary for the supplier to be involved as well. This is especially important concerning new product developments where the interaction between customer input and design process is a key determinant of the product quality. (Kannan & Tan, 2007) In relation to the above mentioning of the customers knowing their own products, and being sure of the requirements it is important when searching and selecting suppliers that these are fully informed about the requirements prior to the establishment of a contract. (Sila, Ebrahimpour, & Birkholz, 2006)

In response to pressures to improve quality and reduce costs, many manufacturers have realized that concentrating on their core competencies while subcontracting out noncore operations is the way to survive the competition. (Yeung, 2008) With this focus on the supply chain, quality, customer focus, outsourcing, and value-added have become common terms used to explain how companies leverage their suppliers and remain competitive. (Kannan & Tan, 2007) Especially the focus of outsourcing and the usage of international suppliers have been used increasingly in the past years through the trend of globalization. (Lu, Ng, & Tao, August 2009)

Table 2-1 lists the identified factors influencing the quality performance of the supply chain as well as the authors arguing for the different relations.

[1] According to Handfield, Monczka, Gunipero, & Patterson (2009) Keki Bhote is one of the leading quality experts. Former Senior Corporate Consultant for Quality and Productivity Improvement at Motorola. Author of several quality related books including "World Class Quality" (2000) and "The Power of Ultimate Six Sigma" (2003)

Table 2-1: Factors influencing quality

Factor	Authors
Trust and openness	(Sila, Ebrahimpour, & Birkholz, 2006; Handfield, Monczka, Guinipero, & Patterson, 2009)
Long-term relations	(Handfield, Monczka, Guinipero, & Patterson, 2009) (Yeung, 2008) (Sila, Ebrahimpour, & Birkholz, 2006)
Customer focus	(Kannan & Tan, 2007) (Sila, Ebrahimpour, & Birkholz, 2006) (Kanyak & Hartley, 2008)
Knowledge sharing	(Sila, Ebrahimpour, & Birkholz, 2006)
Specifications alignment	(Sila, Ebrahimpour, & Birkholz, 2006) (Roethlein & Ackerson, 2004)
Measurement systems	(Kanyak & Hartley, 2008) (Handfield, Monczka, Guinipero, & Patterson, 2009)
Internal knowledge	(Handfield, Monczka, Guinipero, & Patterson, 2009)

2.2 Quality in Outsourcing and International Sourcing

In the past decade small- and medium-sized enterprises (SME's) has increasingly followed in the footsteps of the larger multinational enterprises and have offshored their manufacturing operations to external suppliers. (Jørgensen, 2010) It is not directly because of the globalization trend that companies are relocating production activities internationally, but merely the increased pace of globalization through advances in information and communication technologies, which has facilitated it. (Ferdows, 2008) Instead there are many different drivers for choosing outsourcing. The most common reason to commence in outsourcing is due to the cost benefit, either due to the utilization of low-cost labor regions or due to lower production costs at suppliers with specialized skills in specific processes and scale of economics. (Handfield, Monczka, Guinipero, & Patterson, 2009; McIvor, 2009) In studies from 2007 of Danish SME's the cost reduction was identified as the key motive. (Jørgensen, 2010) Another driver could be the reason to utilize the best manufacturers within a certain industry and thereby seek to gain performance improvements in for instance quality. (Ferdows, 2008; McIvor, 2009) Also the availability of and access to resources could drive companies to disintegrate certain activities. (Jørgensen, 2010) According to Lim & Tan (2010) the traditional argument which underlies outsourcing is the potential to "*improve service level, cut costs, free up time and capital to concentrate on what is most important- how to differentiate themselves and compete.*"

As described in the above, there are many different drivers for why to choose external suppliers for certain activities though one issue which remains important is that when commencing in outsourcing it has to be part of a long-term strategy and not only focus on the short-term cost savings. (Lim & Tan, 2010; Ferdows, 2008) In a survey referenced by Lim & Tan (2010) only 10% of the worldwide respondents were satisfied with the cost savings, and only 6% where

satisfied with the outsourcing overall. The advantages and possible risks of contracting activities to external parties therefore needs to be considered intensely on beforehand, and necessary precautions needs to be taken in advance. (Ferdows, 2008; McIvor, 2009) Table 2-2 identifies the advantages and disadvantages in outsourcing, some of which will be discussed later.

Table 2-2: Advantages and disadvantages derived from **(McIvor, 2009; Gilley & Rasheed, 2000; Lim & Tan, 2010; Lu, Ng, & Tao, August 2009)**

Outsourcing and the Utilization of International Suppliers for Specialized Activities	
ADVANTAGES	DISADVANTAGES
Improved financial performance/cost-advantage	Risk of suppliers entering the same market
Focus on core competencies	Supplier opportunism
Improve technological flexibility by switching suppliers	Fewer internal activities to cover fixed overhead costs
Improve internal operations	Constrain internal flexibility
Potential quality improvements	Risk of quality deterioration
Access and ability to leverage specialized capabilities and expertise	Longer lead times, and related issues - Larger inventories - Communication and Coordination difficulties - Unexpected transportation costs

2.2.1 Defining Outsourcing

It is generally difficult to identify one specific definition of the concept of outsourcing as many different authors have different view points on outsourcing. (Gilley & Rasheed, 2000) Wild, Wild & Han (2008) defines outsourcing as: *"the practice of buying from another company a good or service that is not central to a company's competitive advantage."* Other definitions from other authors referenced by Gilley & Rasheed (2000) are:

- *"products supplied to the multinational firm by independent suppliers from around the world"*
- *"the reliance on external sources for manufacturing components and other value-adding activities"*

The above definitions could indicate that outsourcing is falsely considered to be a simple purchasing of decisions, but all companies purchase elements of their operations and it is therefore important to make a distinction between the two. (Gilley & Rasheed, 2000) For the reminder of the study I will adopt the definition proposed by Gilley & Rasheed (2000) which consider outsourcing to occur in to instances.

- *Substitution outsourcing*: This is when a company replaced internally produced goods or services with supplies from external parties. This is most likely the simplest and most commonly understood perception of outsourcing
- *Abstention outsourcing:* The argument behind this type of outsourcing is that the true concept should not only consider activities that are actually shifted from internal to external. Abstention outsourcing occurs when a company purchases a good or service

from external suppliers instead of producing it internally. The important aspect of this type of outsourcing is though that it only occurs when the buying had the managerial and/or financial potential to internalize the production prior to the purchase.

From the above definition it is proposed that activities which at no point where possible to internalize is not considered outsourcing, but instead as a procurement activity. (Gilley & Rasheed, 2000)

Even thought there is considered to be a clear distinction between the two, the future study will consider both outsourcing and utilization of suppliers for procurement. The reason lies in the basic assumption that the interaction between the buying and the supplying company are fairly similar in the two instances. Whether a company has outsourced internal production tasks or NPD's which could have been manufactured in-house or decides to purchase a product developed internally from outside suppliers without the possibility of internal production, the basic integration and communication with the supplier is assumed to be equal. The difference may lie in outsourcing, where the buying and supplying company has an equal knowledge about the production process, contrary to purchasing situations where the supplier would potentially have a higher level of information impactedness concerning the production methods. It is important to stress that when considering the procurement from suppliers it is not of commodity products, but products that are specifically developed for the buying company. The latter point assimilates the definition by Holcomb & Hitt (2007) concerning strategic outsourcing; *"the organizing arrangements that emerges when firms rely on intermediate markets to provide specialized capabilities that supplement existing capabilities deployed along a firms value chain."* Thus it could be argued that the latter is a type of outsourcing as well, though to keep the distinction there is considered to be a difference in the two types of procurement activities.

To further elaborate on the definitions of outsourcing there is a difference in the choice of supplier. The usage of domestic suppliers could be determined as the simple term outsourcing, whereas the usage of international suppliers for the same tasks would be considered offshore-outsourcing.[2] It could be argued that the interaction in the buyer-supplier relationship is the same no matter the physical location of the two entities, though when considering offshore-outsourcing and the usage of international suppliers, aspects such as cultural differences interfere with the result of the quality initiatives, which will be discussed later, and other barriers such as language and distance interfere with the entire integration. With considerations to the origin of the cases later to be discussed, the focus will be on international suppliers and offshore outsourcing, rather than pure domestic outsourcing.

2.2.2 What to Produce Externally

For identifying what should be contracted out to external parties either through outsourcing or specialized procurement there are many different aspects to consider. Gilley & Rasheed (2000), which conducted a study for identifying the actual influence of outsourcing on company performance, where performance is considered quality performance as well, divided the activities in two:

[2] Dmitrij Slepinov, PhD – student at Aalborg University, Spring 2009

- Peripheral activities: These are the activities are not strategically relevant for the for the outsourcer
- Core activities: are activities related to the core competencies of the firm which in the long run could influence the competitiveness

Furthermore, these authors divide the outsourcing of activities into breadth; which is concerning how many activities are being outsourced, and depth; which is considered to be the extent a firm outsources a portion of a specific activity on average. Combined these two dimensions constitute the *outsourcing intensity* of a company reflecting its reliance on outsourcing. (Gilley & Rasheed, 2000) Even though it was indentified unsupported, Gilley and Rasheed (2000) hypothesized that firms intensely outsourcing the peripheral activities would gain higher level of performance and vice versa for companies intensely outsourcing near-core activities. The result of their studies therefore indicates that there are no directly influence on the intensity of the outsourcing performed and the benefits gained. (Gilley & Rasheed, 2000) Furthermore, the authors investigated the outsourcing activities in relation to the competitive strategy of the organization. It was identified that for companies with a cost-leader strategy outsourcing of peripheral activities improved the financial performance and outsourcing of near core activities would increase innovative performance. Likewise similar relationships were identified for differentiators focusing on innovation. As a last aspect of their study Gilley & Rasheed (2000), controversial to what was hypothesized, identified that companies operating in stable environments would have more to gain from outsourcing than companies in highly dynamic environments. Companies operating in highly dynamic environments would actually damage their performance through peripheral outsourcing. Consequently the study identifies that firms operating with either a cots leadership strategy or an innovation differentiation strategy in general stable environment have more to gain than companies which are not.

Other views concerning what to subcontract relates to the theoretical views of transaction cost economics (TCE), resource-based view (RBV) and relational view of the firm. Individually none of these theories can adequately explain the complexity behind the logic of outsourcing, but they all contribute extensively in understanding why outsourcing occurs and which activities could be relevant for outsourcing. (McIvor, 2009) The division of peripheral and core activities for the outsourcing purpose relates much to the RBV as in relation to outsourcing the RBV indicates that a resource with the potential to create competitive advantage is best kept internally, as well as activities in which the company has superior performance compared to competitors. Therefore McIvor (2009) introduces the distinctive capability position, which compares the capabilities of the company with competitors. If the organization has a non-distinctive capability position or a par performance on certain activities, relative to competitors, these are candidates for outsourcing. At the same time the RBV, in combination with the relational view, indicates that through outsourcing the company might gain access to specialized capabilities which through proper relational management could combine capabilities across organization to obtain a competitive advantage. (McIvor, 2009) By gaining access to specialized skills the potential for quality improvements are increased, as certain suppliers would be familiar or more capable of certain production processes.

The TCE on the other hand takes a governance perspective to the outsourcing discussion. According to Williamson (1981) supplier opportunism is a central concept in the discussion of

transaction costs though in relation to outsourcing this factor includes other factors such as asset specificity, small number of suppliers, uncertainty, and information impactedness. (McIvor, 2009) Especially asset specificity has been acknowledged as influencing the outsourcing decision, and in the case of a transaction with high asset specificity hierarchical governance is most often preferred. This does however not imply that the company should keep that specific activity in-house, but on the other hand could be circumvented by a greater collaboration with and a certain level of commitment from the supplier. This is increasingly important when the opportunism is high. (McIvor, 2009; Holcomb & Hitt, 2007) Though, if the opportunism in general is not possible to manage, and even though the company does not have a distinctive capability position, the activity is best kept internally eventually requiring the company to invest in their own manufacturing. (McIvor, 2009) Form another perspective, with high asset specificity the potential for a supplier to act opportunistically on the market is decreased, as specific investment at the supplier does not have any alternative usage outside the transaction. Though in contrast, with high asset specificity the potential number of suppliers is decreased, and the outsourcer might be locked in due to high switching costs, thereby being highly vulnerable to opportunism by the supplier within the relationship. (Holcomb & Hitt, 2007) Based on this McIvor (2009) proposes three different types of contracting to manage the opportunism represented in Table 2-3

Table 2-3: Contract types to manage for opportunism and their characteristics **(McIvor, 2009)**

Contract type	Characteristics	Relationship type
Non-Specific	- Low level of asset specificity - High number of potential suppliers	Arms-length relationship
Recurrent Contracting	- Moderate levels of asset specificity - Limited uncertainty - A specified number of suppliers	Short-term relationship with potential
Relational	- Small number of suppliers - High level asset specificity	Long-term relationship

In reality research has shown that practitioners consider both the organizational capabilities and the opportunism of suppliers when deciding whether to contract activities out. By combining these theoretical views McIvor (2009) proposes a framework which makes it possible to identify which activities should be internalized or outsourced based on several considerations. (McIvor, 2009)

2.2.3 Quality of Externally Supplied Activities

There is much evidence in the literature of suppliers in outsourcing arrangements failing to meet customer expectations quality. (McIvor, 2009) Outsourcing involves contracting with suppliers for the delivery of parts and components with pre-specified quality levels, which is similar to contracting out specialized production activities. (Lu, Ng, & Tao, August 2009) In the study conducted by Lu, Ng & Tao (August 2009), focusing entirely on activities outsourced to

Chinese suppliers, it was identified that product quality *will* deteriorate. The authors recognize that there are benefits to be gained from outsourcing, such as lower costs, though before commencing into outsourcing actions the trade-off between quality level and production costs must be considered in relation to the competitive strategy of the company. (Lu, Ng, & Tao, August 2009) The influence of contract enforcement was incorporated into the study to identify any relations to quality. The result illustrates that the contracts itself is not enough to verify a higher level of product quality, but instead the effectiveness of legal enforcement of such contracts in the specified region had a positive relationship to the decrease of quality deterioration. (Lu, Ng, & Tao, August 2009) The conclusion of this study is therefore that firms using product differentiation strategy under which product quality is of paramount importance should seriously consider not outsourcing the production of their parts and components, and if they choose to outsource anyway, they should investigate the legal opportunities in the region to which they outsource. (Lu, Ng, & Tao, August 2009)

In relation to these quality issues from external suppliers, in the above only focused on Chinese suppliers, Hart, Schleifer, & Robert (1997) discuss the incentives for external suppliers to initiate and implement quality improvement initiatives based on the allocation of residual control rights. Even though this article takes the point of governmental tasks being privatized or kept under local authority there are some rather important and interesting points which might relate to the subcontracting of manufacturing processes as well. The model which the authors propose has one distinctive point that could be related to completely privatized circumstances for outsourcing in specialized production contracting. The model indicates that when the residual control rights remain with the supplier he would need the approval of the buying company to implement any quality improvement initiatives, whether it is concerning the production process or the product itself, and would therefore diverge from such initiatives. The basic assumption is that if a quality improvement were implemented, the supplier would expect a certain pay-off for this initiative, which would not be realized without either a new contract or an agreement with the customer, and therefore the payoff for the supplier would be less. (Hart, Schleifer, & Robert, 1997) On the other hand cost reduction could be implemented without the approval of the buying firm, and even though that might have negative influence on the quality, the supplier would be more inclined to implement such initiatives as he would gain the entire cost reduction. (Hart, Schleifer, & Robert, 1997)

2.2.4 Overcoming the Risks of External Suppliers

Imposed by Gilley & Rasheed (2000) the reliance on outsourcing is not necessarily a feasible competitive strategy, as it might actually only postpone the fact that organizations has to repair whatever is wrong in the organizations. Though until then, it is important that the company seeks to overcome and take actions to prevent the dangers involved with outsourcing. As mentioned previously supplier opportunism has a great influence on whether to outsource, though there are certain actions that could be taken in order to prevent opportunistically behavior. McIvor (2009) argued for a contractual and relationship approach. This approach is adopted by Holcomb & Hitt (2007) whom clarifies that the best way of dealing with the supplier opportunism emerging from asset specificity, small numbers bargaining, and uncertainty is by entering a close inter-firm collaboration. Closer collaboration with a higher level of trust would reduce the potential for opportunism from either side of the relationship, and the potential that

both parties will be willing to make additional resources available is increased. (Holcomb & Hitt, 2007)

Another part of the supplier opportunism involves the risk that the supplier will gain much experience from the outsourcing and could eventually enter the same market as the buyer. (Lim & Tan, 2010; Gilley & Rasheed, 2000) Non-disclosure agreements, secrecy, and patent protection could aid in mitigating such instances thought there are certain regions of the world where such agreements are not particularly respected. (Ferdows, 2008; Wild, Wild, & Han, 2008) That is why companies with products composed of regular commodities and produced in standard production methods should be careful when diverging into outsourcing or contracting the production to suppliers. (Ferdows, 2008) One way to overcome the risk of the supplier evolving into a competitor could be to use multiple suppliers, for the different commodities, and then have an external party manage the assembly. (Lim & Tan, 2010) Though, the increase in the amount of suppliers could potentially harm the quality, as now more supplier need to be managed, more processes managed by different suppliers need to fit together, increasing the need for high quality, and it would decrease the potential for long-term relationships. (Nicholas J. M., 1998; Handfield, Monczka, Guinipero, & Patterson, 2009) To cope with the potential of suppliers becoming competitors, Lim & Tan (2010) proposes a framework introducing a flexible long-term strategy for outsourcing, incorporating the rate of learning as the supplier and the level of brand equity taking in to account future scenarios. The idea behind the flexible strategy is to have a mixture of outsourcing and internal production, and depending on the two factors the supplier should; eventually produce entirely in-house, outsource completely, or switch between suppliers. (Lim & Tan, 2010) By employing a strategy which accounts for future scenarios the company the company would for instance be able to commence on currently unattractive sourcing opportunities with a long-term potential, or focus entirely on short-term arrangements to keep options open a lower competitive risk. (Lim & Tan, 2010)

The opportunism aspect of small numbers bargaining affects as well the potential quality risks of outsourcing. The more suppliers available for supplying the product through lower level of asset specificity the more competition would be present and thereby ensuring availability of higher quality levels. (Gilley & Rasheed, 2000). As identified by Lu, Ng, & Tao (August 2009) quality will deteriorate through outsourcing, and even though contract enforcement effectiveness aids in mitigating this risk, this is not within the managerial scope of the company itself. Even though the enforcement of contracts is not possible to manage from the company's perspective the development of contracts with the supplier which clearly states the desired a required level of quality is important. (McIvor, 2009) Through such contracts clear alignment of qualitative goals and specifications for products needs to be communicated to the suppliers. (Holcomb & Hitt, 2007) The clear and concise deployment of such specifications relates to the impactedness of the information and thereby the tacitness, making knowledge transfers an important obstacle to overcome when contracting out. (Jørgensen, 2010)

2.2.5 Knowledge Integration

From the RBV it is important to consider the knowledge integration between the buying and supplying company to fully reap the benefits of outsourcing or contracting out. (Jørgensen, 2010) This includes transferring the specified and sometimes critical knowledge concerning the products, which in the past has been one of the main arguments against outsourcing in relation

to the fear of losing the advantage. (Gilley & Rasheed, 2000) There are three steps in the knowledge integration process; transfer, translation, and transformation. (Jørgensen, 2010) In relation to quality of the produce products it is proposed that it is mainly the first two steps which are necessary in the outsourcing perspective. (Jørgensen, 2010) These steps concern to firstly to transfer all codified or codifiable knowledge to the supplier. (Jørgensen, 2010) This would for instance be production process maps or measurements and drawings of the different parts. Secondly, it concerns translating tacit into explicit knowledge. It is the second process which would induce the biggest issues, and especially concerning quality it can be difficult. (Jørgensen, 2010) In order to effectively transfer such knowledge it is important to participate in the development of the learning capacity of the supplier, despite the dangers identified by Lim & Tan (2010), and as previously mentioned it highlights the importance of goal and specifications alignment. One of the challenges in relation to quality and knowledge transfer and translation in relation to quality is to have the supplier perceive the quality the same ways as the customer. This is especially the case in offshore relationships where the cultural differences could intervene. It could prove beneficial to find relations in the cultural characteristics to aid in the knowledge integration process and establish the potential for development of future relations. (Jørgensen, 2010)

Table 2-4 lists the identified factors influencing the level of quality when utilizing outsourcing or international suppliers for specialized production tasks.

Table 2-4: Factors influencing quality

Factor	Authors
Supplier opportunism - **Assertiveness** - **Numbers of suppliers** - **Uncertainty**	(McIvor, 2009) (Holcomb & Hitt, 2007) (Gilley & Rasheed, 2000)
Competitive strategy influence on performance	(Gilley & Rasheed, 2000) (Lu, Ng, & Tao, Outsourcing, Product Quality and Contract Enforcement, August 2009)
Access to specialized skills	(McIvor, 2009)
Contracts and agreements	(Lu, Ng, & Tao, Outsourcing, Product Quality and Contract Enforcement, August 2009) (Ferdows, 2008) (McIvor, 2009)
Relationship management	(McIvor, 2009) (Holcomb & Hitt, 2007) (Lim & Tan, 2010) (Nicholas J. M., 1998)
Residual control rights	(Hart, Schleifer, & Robert, 1997)
Knowledge Sharing	(Jørgensen, 2010) (Lim & Tan, 2010)
Specifications Alignment	(Holcomb & Hitt, 2007) (Jørgensen, 2010)

2.3 Culture and the Influence on Quality Management

The organizational culture of companies is highly influenced by the national culture or sub-culture of the country or region where the organization is situated. (Lagrosen, 2003) Therefore

during the following review on the cultural influence on quality the focus will be on the national cultural traits and how they influence quality perception and management. Furthermore, as mentioned in chapter 1 the focus of this paper is on the development of Chinese suppliers, wherefore consequently the cultural focus will be directed towards the Chinese culture.

Differences in organizational culture among supply chain members create a challenge for communication, collaboration, and integration in the supply chain. (Kanyak & Hartley, 2008) As previously indentified the integration and knowledge sharing concerning aspects of quality, across all entities in the supply chain is essential for improving the quality. (Jørgensen, 2010) Though, through diverse organizational and national cultures the perspective of quality and management of quality will differ. Kull & Wacker (2010) argues that when organizational cultural values differ from the values of quality management, any quality initiative will be less successful. Therefore it is important to identify which cultural values influences quality management, and thereby quality perception. (Kull & Wacker, 2010) In relation to section 2.2 companies should not attempt to change the organizational culture of suppliers as this would be difficult, but instead use the knowledge to mitigate the cultural influence by knowing how to approach such cultures in order to improve the quality received from external suppliers. (Jørgensen, 2010; Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010)The presence of quality investments at a supplier is not a sufficient condition for ensuring quality conforming products as the cultural characteristics of a country may hinder the effect of such quality initiatives. (Kull & Wacker, 2010)

2.3.1 Cultural dimensions and quality

Culture is defined as "a set of values, beliefs, rules and institutions held by a specific group of people." (Wild, Wild, & Han, 2008) Especially the values are of interest concerning quality as TQM perspective is defined through a certain set of values which are supposed to be employed at organizations highly focused on delivering quality products. It is therefore essential that the values of the organization harmonize with the values of TQM. (Lagrosen, 2003) Furthermore, does values drive attitudes, rules and beliefs making these the most important to focus on. (Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010) The most comprehensive, well-known and referenced cultural studies is the work by Geert Hofstede. (Lagrosen, 2003) Therefore Lagrosen (2003) uses the four cultural dimensions identified by Hofstede as the basis for his studies into the connection between cultural characteristics and the values of TQM in order to identify the interrelations between these. Kull & Wacker (2010) uses instead the nine cultural dimensions issued in the GLOBE studies[3] to identify the effectiveness of quality management initiatives in certain cultural settings, mainly focusing on Confucian Asian countries (China, Taiwan, and South Korea). Even though the dimensions from the GLOBE studies are basically extending upon Hofstede's dimensions there are some difference in the terminology of the two. In order to compare Lagrosen's (2003) and Kull & Wacker's (2010) studies to identify common cultural characteristics' influence on quality, the cultural dimensions of the two studies are compared and connected in Table 2-5.

[3] A 10-year study completed in 1997 of 62 societies around the world

Table 2-5: Relations between different cultural dimensions

Lagrosen (2003) - Geert Hofstede		Kull & Wacker (2010) – GLOBE studies	
1	Power Distance	Power Distance	1
2	Collectivism vs. Individualism	In-group collectivism	2
		Assertiveness	3
		Performance orientation	4
3	Masculinity vs. Femininity	Human Orientation	5
4	Uncertainty Avoidance	Uncertainty Avoidance	6
		Institutional Collectivism	7
		Future Orientation	8
		Gender Egalitarianism	9

Not all of the different cultural dimensions are directly comparable and concerning the dimension of collectivism being associated with three of the dimensions from the GLOBE studies it is important to stress that the comparison is not complete, but many of the characteristics of the three dimensions assimilate the characteristics of the dimension concerning collectivism and individualism. Lagrosen (2003) investigates all four dimensions in relation to quality management, whereas Kull & Wacker (2010) argues for the exclusion of three dimensions in their study. The dimension concerning gender egalitarianism is excluded as the management of quality is in no way affect by gender. (Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010) This could seem odd as Lagrosen (2003) uses the gender dimension in his studies, though this dimension in according to Hofstede is related to whether a culture is characterized by values associated with feminism or masculinity not the specific gender. Furthermore the authors argue that in-group collectivism and performance orientation has a zero-sum influence on quality management effectiveness as the values underlying these dimensions speak both in favor and against quality management. As these two dimensions is partially covered in the collectivism dimension by Lagrosen (2003), it could b argued that the positive sides are accounted for. A third issue with the comparison concerns the GLOBE dimension of future orientation which cannot be compared with any of the Hofstede dimensions adopted by Lagrosen (2003). However, Hofstede does actually have a dimension resembling that of future orientation which characterizes a culture as being short-term or long-term oriented. However as this dimension is not accounted for in the studies by Lagrosen (2003) it will not be considered.

The study by Lagrosen (2003) generally identifies the level of uncertainty avoidance and collectivism to be the two cultural dimensions affecting the quality management values. Similarly, Kull & Wacker (2010) identify uncertainty avoidance and assertiveness as the most influential on the quality management effectiveness. As illustrated in Table 2-5 collectivism and assertiveness are related, which especially concerns the view on relationship where low assertive cultures and highly collective cultures considers the relationship more important than the actual tasks, and acts less aggressive towards co-workers and partners.

Assertiveness is associated with a belief that individuals can dominate external forces and such individuals will often seek towards internal satisfaction and opportunistic behavior, which in a business concept could lead to supplier opportunism. (Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010) Furthermore highly assertive cultures will tend to blame individuals for quality non-conformance instead of the system, but as quality management is much based on a process perspective and systematic approach this is conflicting. The results highlighted by Kull & Wacker (2010) in relation to assertiveness indicates that cultures valuing individual responsibility have less effective group decision-making and seek to correct individual error rather than systemic error. This would further relate to a difficulty in identifying actual root-causes of problems. (Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010). The implications of collectivism being influential on quality management as identified by Lagrosen (2003) relates not as much to systemic approach, but more to the relationship characteristic of this dimension. Highly collectivistic cultures places much influence on relationships, not only internally, and therefore the customer focus is a common characteristic for companies in such cultures. (Jørgensen, 2010) It further incorporates the excluded dimensions of in-group collectivism and performance orientation, as these two dimensions respectively highlights shared goals, loyalty and pride, and group rewards for good performance. (Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010) As previously argued the integration between buying and supplying company is important in supporting a good relationship and a high level of quality, wherefore collectivism and the positive dimensions of in-group collectivism and performance orientation can be assimilated with a higher focus on quality conformance.

Customer focus is as well the reason for the strong relation between quality and uncertainty avoidance in the study by Lagrosen (2003). He indicates that cultures with high uncertainty avoidance have a positive influence on the level of customer focus. On the other hand the same cultural dimension has a negative influence the implementation of continuous improvements, as this would disrupt and change the systems and process implemented, resulting in a negative influence in relation to the quality values. However, quality management generally assists in avoiding uncertainty and therefore cultures with high uncertainty avoidance will be more inclined to accept quality management initiatives. (Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010) As high uncertainty avoidance represents cultures which are inclined to adopt more to law like conditions and processes Kull & Wacker (2010) identifies a positive relation between this dimension and the implementation of ISO systems as a part of quality management.

2.3.2 Chinese Culture and Quality

In the GLOBE studies used by Kull & Wacker (2010) China is identified as valuing power distance and assertiveness, actually they had the highest value of all studied regions. This indicates a problematic situation when dealing with supplier, as they would be more likely to focus on their own opportunities than to consider the customer perspective and work in collaboration, thereby damaging the quality performance. Concerning uncertainty avoidance Kull & Wacker (2010) indentifies China as being moderately leveled in this dimension thus positively affecting quality management and performance. Contrary, the perspective of Lagrosen (2003) adopted from Hofstede indicates a weak uncertainty avoidance in Chinese cultures. This has a positive influence on the adoption of continuous improvement efforts,

though at the same time diminishes the focus on customers. Even though this is in relation to the assertiveness discovery, the two indications do not align.

Even though some of the cultural dimension are not proved to relate directly to quality management or quality perception Kull & Wacker (2010) indicates their potential influence on quality in the Chinese culture. Both future and human orientation is expected to have a high influence on quality due to respectively the long-term objectives, knowledge acquisition encouragement and strategic thinking, and valuing inter-personal relationships and fair treatment. From the GLOBE studies China was identified as having a low future orientation as well as devaluating the human approach to management, thus affecting quality management negatively. (Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010) Power distance is expected to negatively influence the quality performance due to the hierarchical approach to management, and as China is identified as having a culture highly characterized by the distance and with workers relying heavily on the managers, the quality performance is as well negatively affected. (Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010) In general the Chinese GLOBE scores indicate a strongly negative moderation of quality management. (Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010)

Table 2-6 lists the identified factors influencing quality management and integration from a cultural perspective.

Table 2-6: Factors influencing quality

Factor	Authors
Finding common understanding	(Jørgensen, 2010) (Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010)
Uncertainty Avoidance	(Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010) (Lagrosen, 2003)
Collectivism / Assertiveness	(Lagrosen, 2003) (Kull & Wacker, Quality Management Effectiveness in Asia: The Influence of Culture, 2010)

2.4 Literature Sum-Up

'From the literature review and the different factors identified in Table 2-1, Table 2-4, and Table 2-6 several similarities and connections across the different literature positions can be drawn.

2.4.1 Similarities

One of the factors identified which could severely damage the quality and the general interaction with suppliers is the potential for the supplier to act opportunistically. If the suppliers are aware that the purchasing company has only limited opportunities for alternative suppliers, they would be inclined to act in accordance to their own benefits. One way to avoid this is by establishing long-term relationships with the suppliers. (Gilley & Rasheed, 2000; McIvor, 2009;

Holcomb & Hitt, 2007; Yeung, 2008) If the suppliers are assured a long-term commitment to future business they would be less reluctant to make improvements and useful contributions to the system, which could aid in improving the quality. Therefore relationship management of the suppliers becomes an important part of ensuring a higher quality of deliveries. To establish such relationships it would require a high level of trust and openness between the buying and supplying organizations where it in order to work collaboratively to overcome any nonconformance issues. (Sila, Ebrahimpour, & Birkholz, 2006) From the cultural perspective the collectivism is a value which is highly influencing the quality. This is in coherence with the need for long-term relationships, as the cultural value of especially in-group collectivism focuses on the need for strong relations between business partners and the alignment of shared goals and objectives. At the same time companies from such a culture would tend to be more loyal towards other companies which are willing to commit to the relationship, and by expressing the needed level of trust to the supplier, they would respond likewise. This would furthermore imply that if operating with less collectivistic or highly assertive cultures it is important to place even higher attention to the relationship management to avoid opportunistic behavior.

To ensure a trustworthy, long-term relationship one of the main factors is the knowledge sharing between customer and supplier. This includes collaborations and aiding in solving potential quality issues. It is important to recognize the information impactedness, meaning which company actually has the more knowledge. As argued for in section 2.2 when using outsourcing the knowledge between buying and supplying company concerning manufacturing processes is either equal, or the supplier has the advantage, therefore it is important to understand their contributions to solutions as well. There would be some product characteristics where the buying company has the main knowledge, though in order for the product to reach these specifications it is therefore important to collaboratively agree on the production process. In the same instance it is important for the buying company to consider the learning capacity of the supplier, as if they are not willing to or capable of learning from the shared knowledge it could be difficult to achieve required quality. In relation to the knowledge sharing it is important for the two companies to agree on the quality objectives and specifications. It could partly be ensured through contracts, agreements, and common drawings, but it is intensely important that the specifications determining a conforming product is agree upon and understood by both parties, as well as the verification procedure. This entails as mentioned by Handfield, Monczka, Guinipero, & Patterson (2009) a comprehensive knowledge by the buying company to understand in order for it to pass it on to the suppliers, and thereby accomplish a common understanding of the requirements. Both the uncertainty avoidance and collectivistic values in a culture would support the focus on the customer. Therefore companies with such characteristics would be more disposed to integrate the customer’s opinions and focus more intensely on achieving the need and requirements of the customers.

2.4.2 Contradictions

Not many contradictions in the literature has been identified, though one has been found which actually relates to the evaluation of the Chinese culture from Hofstede and the GLOBE studies. According to Lagrosen (2003) is China evaluated to have low uncertainty avoidance and be a collectivistic culture, whereas Kull & Wacker (2010) through the GLOBE studies has identified China to be high in both uncertainty avoidance and assertiveness. The authors agree on the

importance of these two characteristics based non Table 2-5 where assertiveness is compared to collectivism, though not on how China is characterized. This indicates the difficulties in actually characterizing a culture in accordance to which values it possesses, and therefore it would be difficult to understand how to react to the cultural characteristics. The needed interactions with suppliers are very different depending on whether assertiveness/collectivism and uncertainty avoidance are high or low.

Another point, which is actually not as much a contradiction as a wondering, concerns the interference with competitive strategy on outsourcing and the resulting performance from a quality perspective. According to Gilley & Rasheed (2000) cost-leaders and differentiators on innovations would have most to gain from outsourcing, but as identified by Lu, Ng, & Tan (2009) outsourcing to especially Chinese suppliers will deter the product quality. Therefore from the view of Lu, Ng, & Tan (2009) firms with a competitive strategy highly focusing on the quality of the products would not benefit from outsourcing. Therefore, by combining these two viewpoints it becomes necessary when deciding on outsourcing to consider the trade-off between innovative or cost related benefits to the inevitable decrease in quality.

2.4.3 Gaps

Even though there is somewhat of a similarity in the literature study of the different authors focusing on establishing long-term relationships with preferred suppliers building on trust and insight. Though having a preferred supplier indicates the opportunity for alternatives and that there are more suppliers used for the same product. It has not been identified what to do when there are no alternatives, and only one supplier is used. One could say that this would be partly covered when discussing opportunism in terms of assertiveness and a numbers of suppliers, as with very high assertiveness and only one immediate possible supplier the supplier opportunism is high.

Several of the authors agree that one of the important aspects of a long-term relationship is the knowledge sharing and integration across entities, trust in the relationship, and interaction between the supplier and the buyer to overcome issues. However not much is considered on how to actually employ this knowledge sharing. Furthermore the differences in explicit and tacit knowledge construct a barrier of what is possible to actually directly share.

Other cultural values were indicated to influence quality but through their researches these were not confirmed. Their researches, however, concerns mainly how the *management* of quality is affected by the different cultural values, not if the actual quality is affected. Only Lu, Ng, & Tao (August 2009) argue for the direct influence on quality when outsourcing to china, but with no perspective of the culture. It is proposed that the inherited cultural believes will have an influence on the quality of the products produced. Both Lagrosen (2003) and Kull & Wacker (2010) argue from a managerial point of view how the quality will be affected but not much is considered from the production floor perspective. How does the cultural believes of the production workers affect the quality both in terms of product quality and lead times? The production workers are subjects to the same cultural believes as the company and the culture in which they work, therefore even though certain cultural traits might affect the potential for effective quality management, it is the culture of the workers which directly influences the quality of the products and the deliveries.

3 Methods

In this chapter the applied methodology for the research will be described. Initially the research process will be presented together with the aim of the research. Considering these it will be argued why the methodology of case study has been chosen and the process of selecting and conducting the case studies will be described.

3.1 Research Process and Aim

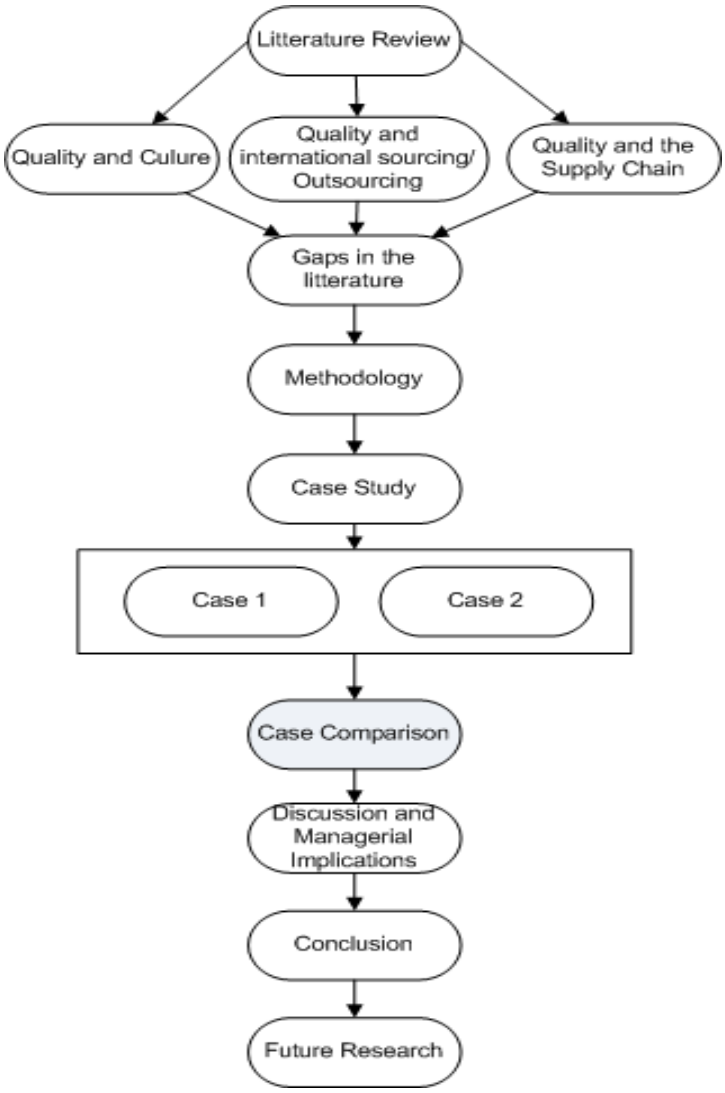

Figure 3-1: Research Process of the Study

In reference to the research objectives described in chapter 1 the aim of this research is to:

1. Identify potential gaps and coherences in the literature relevant for quality in the international supply chain

2. Identify potential pitfalls for companies and their managers commencing in sourcing activities from international suppliers with empirical focus on China, and present possible solution for how to overcome these problems occurring.
3. Identify the optimal sourcing strategy to minimize the occurrences of nonconforming products in relation to the required quality, with focus on how to implement quality management and control

The research has a qualitative approach based on experiences where focus is placed on understanding the subjectivity of a social phenomenon, hence the phenomenological paradigm. (Noor, 2008) The experiences are gained through the internship at China Outsourcing Company as an active member of the quality assurance department. For conducting studies within the phenomenological paradigm the most common research methods are action research, case study, grounded theory, and ethnography. (Punch, 2005) Relating to the objective and aim of the study the focus is on identifying how and why quality is affected in international sourcing in order to propose a new direction. This involves the study of a contemporary phenomenon in a real life context supported by the presence in China. Even though the study is conducted as an interactive part in the quality assurance of suppliers, there is very little control of how the quality is actually affected by the behavior of the participant in the supply chain. These three characteristics of the study would imply the case study as the best possible research method. (Yin, 2004) The general definition of a case study is that it is a phenomenon occurring within a bounded context, but mainly it is considered as a research strategy. A case study may be performed on an event, an entity, an individual or even a unit of analysis, and anything alike. (Yin, The Case Study Crisis: Some Answers, 1981; Eisenhardt, 1989; Noor, 2008)

Therefore case studies have been chosen as the research method where a number of cases will be selected and through a cross-case comparison the results will constitute the empirical foundation for the discussion and identification of an alternative perspective on quality assurance in international sourcing. The processes of the case studies will be described in the next section but it can be generally summarized in Figure 3-2 adopted from Noor (2008). The formulation of theory Figure 3-2 is considered to be the literature review where differences, similarities and gaps are identified. This is a valid method for identifying a prior scope of the phenomena to investigate. (Christensen, 2006)

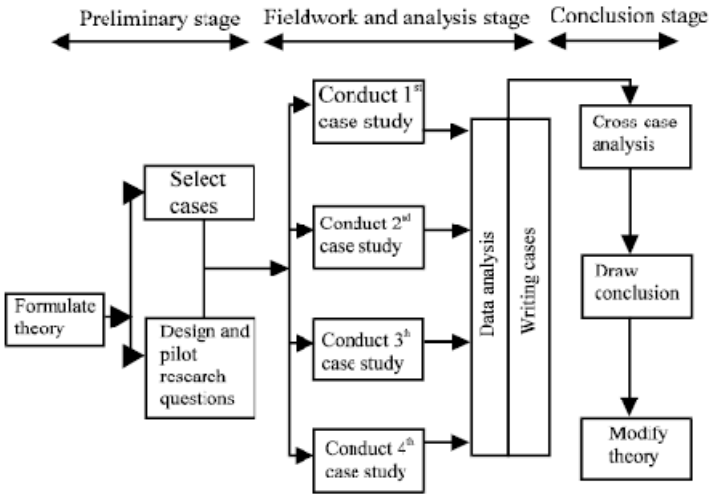

Figure 3-2: Process of Conducting Case Studies (Noor, 2008)

3.2 Case studies

There are different types of case studies. The type chosen for this study is explanatory collective case study, also referred to as the multiple case study, where several studies are investigated to gain insight into a specific issue or theory and by using several cases more in-depth information will be gained about the phenomenon and general conditions. (Punch, 2005)

3.2.1 Selecting Cases

The cases for the study have been selected based on initial work with several cases. The similarity between the two cases chosen is the material of the products. Both cases concern the sourcing of metal products with a high requirement to the appearance of the products. Furthermore are the products of great strategic importance to both customers wherefore the quality conformance is central. The cases represent the main customers of China Outsourcing Company and would represent the typical interaction between the customers and the supplier. Furthermore, are cases entailing more than just quality management of the product, but as well supplier management, to incorporate the perspective of relationship management?

The case studies are separately supplemented with additional case examples from interaction with suppliers and customers at China Outsourcing Company where issues influencing quality were experienced. These additional cases are presented in Appendix D: Additional Case Examples, and related to the literature study and the identified circumstances.

3.2.2 Conducting Case study

The case studies were performed based on the work experience at China Outsourcing Company and generally analyzed in accordance to the indentified similarities, contradictions and lacks of the literature study. The cases are structured in accordance to the main identified factors in Table 2-1, Table 2-4, and Table 2-6 and discussed in section 2.4**.** Each case will therefore be analyzed in accordance to the assertiveness, uncertainty, and number of suppliers as in relation to Gilley & Rasheed (2000) to identify the level of potential opportunism in the relationship between the case company and its suppliers, as well as the implications of the relationship including for instance trust, control rights, cultural aspects, and duration of relationship. Furthermore will the extent of knowledge sharing and learning capacity between the supplier and the case company be analyzed in relation to verify the alignment of the quality understanding and objectives? The above mentioned analytical areas will be focusing on the combined interaction with the supplier, and are followed by specific investigation of the performance of the different products produced by the supplier in relation to occurrences of nonconformance.

The data selection and collection for the cases has been conducted through the participation in work of the quality assurance department at China Outsourcing Company, and through open ended questionnaires sent to the involved participants from the case companies. The questionnaires were much inspired by the questionnaire developed and used by Gilley & Rasheed (2000) in their research, though with focus on the quality aspects as well. The questions were sent to one respondent from each of the case companies and they were encouraged to involve other participants in answering the questions if it was sought needed. It

was however assumed, based on the work experience with the different respondents, that the chosen employees at the case companies were the most relevant for answering the questions. From reviewing the feedback on questionnaires additional questions were provided if misunderstandings occurred or if additional information were needed. The initial questionnaires can be seen in Appendix F: Questionnaire**.** The data obtained through the work experience has been through unstructured conversations, meeting minutes, observations, and documents from the common database. Where possible, statistical evidence has been formulated or provided by co-workers, but mainly the data are of qualitative origin.

3.3 Validity, Reliability and Limitations

By combining data collection techniques such as questionnaire, observations, documentations, and basic conversations, triangulation is sought achieved which supports the reliability and validity of the findings. This is in relation to the arguments by Yin (1981) that the conduction of case studies may be a combination of data gathered from several sources such as observations, fieldwork, records, or any verbal reports. (Yin, The Case Study Crisis: Some Answers, 1981; Eisenhardt, 1989)

The case studies are conducted based on the interactions with both the customers of COC and the suppliers to those customers, which would give the potential of viewing the interaction from both the supplier and the customer perspective. All data and analysis is conducted with the basis in an intermediate company between the buying and supplying companies, and as the study focuses on identifying a sourcing strategy with quality perspective for the direct interaction between supplier and buyer, this perspective might harm the reliability and validity of the developed framework.

One of the limitations in the data collection concerns the access to data. As the case companies used in this studies are customers of the company in which I was employed some data has been inaccessible. Furthermore, has it been necessary to completely trust their perspectives and answers of the questionnaires as the company related questions has not been possible to verify through analysis of internal documentation at the case companies.

Another limitation concerns the documented data from COC. Much of the data were only available in Chinese writing hindering the direct usage of these data. Through the studies there was not any direct mandate or authority to demand such documentations translated, wherefore online available translations were attempted. Such translations were often misleading or impossible to understand, and therefore most of the written data obtained and used where from English or Danish documents.

Case studies are in general considered to be impossible to generalize to a greater population, but two specific actions are taken to improve the generalizability. Firstly is the study concerning a multiple case study thereby intently combining and evaluating results from more cases in order to get a broad understanding of the circumstances from different perspectives. Secondly has the analysis been structured similar for all studies thereby making it possible to replicate the case studies to identify, similarities, contradictions, or gaps in future research.

The way the case studies in this study will be attempted generalized is through the development of a general sourcing strategy with focus on for quality improvements based on the results from

the analysis. This corresponds to the generalization through conceptualization as proposed by Punch (2005)

4 Case Study

This chapter entails initially a company presentation of China Outsourcing Company in order to set the frame for the following case studies. The cases are analyzed based on the indentified issues from the literature and structured similarly to generate potential for comparison. The chapter concludes with a case comparison to identify common traits in the two cases.

4.1 China Outsourcing Company

China Outsourcing Company (COC) is a Danish owned company with headquarters in Birkerød, Denmark, but with all major activities being performed at the Chinese office in Xiamen. The company was established in 2004 by Carsten Ingemann Egelund (CIE), Chief Technical Officer, and Michael Cholewa, Chief Executive Officer, who both had experience working in China and with Chinese suppliers. Ever since its establishment COC has focused on aiding, in sourcing activities for mainly Danish companies based on the vision in Table 4-1.

Table 4-1: Vision of COC

VISION
China Outsourcing Company strives to create the "best in class" added value to our customers through focused consultancy in relation to outsourcing.
China Outsourcing Company should be able to perform a broad aspect of services in relation to outsourcing, either through internal competences or by use of qualified cooperators.
China Outsourcing Company should always remain close to the customers in Denmark on all levels of the company, and as well to the suppliers in China.

COC can be categorized as a small to medium sized enterprise (SME) with around 31 office employees and no less than 15 production operators. There is a certain lack of specialization at COC as there are no specific characteristic of the projects embarked on by COC. Projects range between medical equipment and heavy industrial machinery, and in materials such as metal, plastic, glass, stone, wood, and fabrics. It could be said to be a strong capability that COC is flexible and builds up knowledge in many areas, though as well a weakness as without a certain level of specialization the requirements to the knowledge of the workers, in order to perform the tasks in relation to the vision, is extensive.

4.1.1 Organizational structure and Business Activities

The company is structured in accordance to the functional principles as illustrated in Appendix A: Organizational Diagram During the study there were different organizational changes though the structure represented in Appendix A: Organizational Diagram is most generic structure of the company.

COC is an intermediate company maintaining the relationship between Chinese suppliers and customers from around the world though mainly Danish. The main task is to communicate the

need of the customers to the suppliers in order to deliver the products promptly and conforming to the specifications set forward. The company has three main business activities which are interrelated but on different levels where each level includes the lower level. **Quality control** is the simplest activities performed in terms of commitment and interaction for the employees at COC. These activities are performed for foreign companies with present sourcing and manufacturing in China, and where COC is hired to perform quality control and assist in improving the quality levels at the suppliers. Second level concerns **Supplier Management**. In these instances COC are introduced as the sourcing company and are responsible for identifying suppliers which meet the customers' requirements and are able to deliver in a proper quality. Concerning these activities COC gains responsibility of the product quality level at the suppliers, and are in close contact with the supplier in order to improve the quality standards. **Outsourcing projects** are the largest and most integrated of the three business activities where COC not only manages the suppliers for certain products, but assists as well in product development through project management, and are working on behalf of the customer in order to manage all activities related to the implementation of an outsourcing project at a Chinese supplier. This type of projects could involve internal production or assembly at COC as well. Projects referred to in the further report have been allocated to each level in Table 4-2 for reference.

Table 4-2: Referenced projects in relation to type of activity

Business Activities		
Quality Control	**Supplier Management**	**Outsourcing**
Novida	MK-Krøger A/S	SoRoTo
	LaCo	Menu

Depending on the nature of each activity various employees are involved across the organization. A complete team involved in a certain project would include one employee from each Engineering, Project Management, Strategic Sourcing, Quality Assurance, and Customer Service. Such a complete team is mainly used for outsourcing projects where engineering competencies are necessary for product developments. The same structure is often the initial team for supplier management when suppliers need certification of capabilities or drawings needs to be verified, however as this type of projects moves along its life time and becomes a steady task, the project manager and the engineer becomes latent team members, only used for additional information if necessary. Instead managerial responsibilities diverts to the customer service department. If a project involves a certain degree of production internally at COC the production department is represented in the project team as well, mainly by the production manager. For quality control projects only employees from Quality Assurance and either Project Management or Customer Service is involved. Direct negotiations and communications with customers are managed mainly by the Danish placed sales director, the general manger, project managers or customer service. The language barrier is often a hurdle which is why the Danish general manager and sales director are heavily burden with customer interactions, and why the quality department rarely is in direct contact with customers.

4.1.2 Quality Control at COC

COC is ISO: 9001 certified which thereby proves that they have an effective, functional quality management system to which all procedures in relation to production and quality control has to follow. All quality inspections are performed as acceptance sampling by attributes, meaning that all potential defects are described as a single attribute. This is both for appearance, measurement, and functionality, which are the three main inspection areas in COC inspection procedures. Any item identified with either one or several defects according to the specifications counts as one nonconformance. There are no statistical in process inspections, as everything is performed as acceptance sampling.

As part of the ISO certification COC is following the acceptance sampling forms herein provided. These forms directly inform how big a sample, of a certain batch size, is necessary to inspect in order to both satisfy the customer, and to live up to the ISO standard. However in order to determine the sample sizes one must first choose the Inspection Levels. There are seven levels divided into two groups; general and special inspection levels. The most commonly used inspection level both in general and at COC is the general inspection level 2 where new projects are regularly assigned to. (Jensen, 2005) If special circumstances concerning the products are present, for instance if destructive testing are necessary, the specialized levels are assigned. If a product continually fails QC inspection the level is often increased to general level 3 which is the toughest requiring the largest sample sizes. On the other hand, if inspections are generally accepted the inspection level could decrease to general level 1, and potentially to a special level.

Having determined the inspection level, it is as well necessary to determine the Acceptable Quality Level (AQL). This level is usually decided in collaboration with the customer, as it is an expression of the percentage of errors the customer would accept in a shipment. Determining the AQL gives COC's quality inspectors a specific amount of defects allowed, and if this amount is surpassed during inspections the batch is either rejected, or sorted out. However, COC does not work only with one particular defect determination. When determining the AQL the customer together with COC have to decide on an AQL for both Major and Minor defects. Major defects are the failures in a product which cannot be accepted, and the AQL is therefore lower, allowing for smaller amount of these passing through, whereas the Minor defects are of lesser importance and can to a higher degree be allowed.

There are different ways of determining an AQL though it is mainly based on experiences of the quality inspector and the requirements from the customer for certain levels. Due to the broad spectra of projects involved at COC this places increased requirements to the interaction with the customers in order to determine how to evaluate the quality, and what specifications should be determined major or minor. If previous experiences are not an adequate method for applying different inspection levels alternative methods could be used. It is important that the customer understands the method of using acceptance sampling based on attribute, in order for it to adequately participate and contribute with the information needed to determine the acceptable quality and inspection levels

4.2 MK-Krøger A/S

4.2.1 Company and Products Description

MK Krøger A/S (MK) is a developer and producer of caulking guns with more than 200 different models, all with different purposes. According to Jesper Falkjær[4] the core competences of this company are the development and sales of customized solutions. The company has own internal production and assembly with facilities located in Denmark, but MK has several sales offices around the world including, China, USA, Japan, Australia, Poland, Brazil and Greece. This gives them a close interaction with the immediate market. All caulking guns are assembled in-house and several of the components, even though they are specially developed, are standardized across the different products. All plastic components are internally produced, which mainly concerns the handle of the guns, but MK are also specialized in working with CNC and stamping processes for metal and aluminum.

The competitive strategy utilized by MK could be characterized as a focus differentiator. According to Jesper Falkjær, "it is difficult to compete with low cost countries on the price, and they therefore have to differentiate themselves on other points, where focus is placed on innovative products of high quality, but still at a reasonable price." Besides the innovative and customized solutions the main sales factor for MK is therefore the superior quality and in extension a short delivery time to customers. From their close interaction with the different markets they are aware that the delivery dependability and short delivery time are, besides quality, of high importance, when customers choose their products. The quality focus concerns both the functionality and the appearance of the products with an equal emphasis on both, as according to Jesper Falkjær: "It is important that the products exude a high level of quality and we (MK) do therefore not wish to use components with appearance defects."

It is within the production of metal components MK has contracted several items to specialized suppliers. Six items within the processes of stamping and five items for aluminum casting has been outsourced or contracted out to suppliers. This represents a limited depth of outsourcing as MK operates with 3-4000 different components wherefore only approximately 0.3% of the production has been outsourced. The components currently outsourced are those components used for most products, but there are potential for future outsourcing of other components. However, the potential might exist, but further outsourcing of other items is not considered until the problems explained in the following sections are solved.[5] COC is involved in the supply of the items for stamping. Therefore, these items are in focus for this case study and listed in Table 4-3. Drawings and pictures of the items are accessible in Appendix B: MK Products.

[4] Jesper Falkjær, Production Manager at MK Krøger A/S
[5] Jesper Falkjær, Production Manager at MK Krøger A/S

Table 4-3: MK products handled by COC

Item number and reference	Description	Supplier
1401	Half tube for the sealing cartridge. Exists in a red (1401A) and a blue (1401B) version	Chinese and Danish supplier
4001	Half tube for the sealing cartridge.	China Outsourcing Company
1425X	Connection bar inside the handle	Chinese and Danish supplier
20028 (Jc)	Connection bar inside the handle, exists in a standardized and a Japanese (2028Jc) version	Chinese and Danish supplier
20025	Connection bar inside the handle	Chinese and Danish supplier

4.2.2 Level of Outsourcing

As mentioned the products listed in Table 4-3 are all products completely or mainly produced by external suppliers. The half tubes are mainly supplied from China, though MK has some internal manufacturing as well concerning the 4001. The connection rods are produced by two suppliers. One supplier is located in Denmark and the other is the same Chinese supplier as for the half tubes. According to Jesper Falkjær none of these items had previously been produced internally, but stated in the questionnaire response MK has the opportunity regarding managerial capability and resources to invest in the production of the items. Therefore the subcontracting can, according to the definition posed in section 2.2, be considered an outsourcing, as with the opportunity to internally produce MK has deliberately decided to outsource the production to suppliers. Before outsourcing the production to China the Danish supplier had been used for several years, where that supplier through economics of scale could supply at a lower cost than MK could produce internally. The main reason for choosing outsourcing was based on cost considerations and the desire to obtain further costs savings to increase competitiveness. As indicated above the low cost countries are driving down the prices wherefore MK in line with the competitive focus strategy focuses on differentiation, but cannot disregard potential cost improvements. The outsourcing was intended to result in a 30% cost reduction which was initially achieved.

The interaction between COC and MK, as listed in Table 4-2**,** mainly concerns supplier management of the Chinese supplier. This entails several functions being managed by COC regarding the Chinese supplier, and includes purchase, shipping, and quality assurance and control. Besides the supplier management COC has undertaken the production of one of the items themselves, the 4001. Stated by Jesper Falkjær all these activities would be possible to manage internally, and would therefore be categorized as outsourced as well. Combined with the above finding of limited depth in the outsourcing, the breadth, expressed through the number of activities outsourced, would constitute a fairly limited outsourcing intensity, wherefore the reliance of the outsourcing should be limited. (Gilley & Rasheed, 2000) Considering the strategic importance of the outsourced products in relation to the intended competitive strategy applied by MK they are though fairly dependent on the outsourcing, as the savings are necessary to obtain.

According to MK the outsourcing to china has given new challenges which they were not familiar with by using the Danish supplier. Several issues in relation to the performance of the Chinese supplier has influences the Danish production. Such issues are:

- Late deliveries
- Nonconforming quality
- Larger storage
- Distance to the supplier

These issues have made the company consider whether it would be preferable to have the outsourcing from China withdrawn, and continue and develop the relationship with the Danish supplier[6]. The only issue keeping MK from doing such regards the cost savings, which are necessary for the company to remain competitive. If similar cost savings could be achieved by the Danish supplier it is assumed that the production will be withdrawn from China. As it is the delivery time and the higher quality which differentiates MK from its competitors, the challenges from the Chinese supplier severely interferes with the competitive situation of MK. The troublesome issues of the Chinese supplier will be discussed in the following section.

4.2.3 Quality Assurance and Performance

As a main part of the outsourcing of managerial obligations to COC they became responsible for quality assurance of the production. This naturally includes the quality assurance and control of the in-house production at COC, but as well the quality assurance at the Chinese supplier. The Chinese supplier did not perform any formalized internal quality inspection during or after the production of the different products, and did thereby not provide quality verification of their own production. This was the responsibility of COC. Ensuring the quality standard at the Chinese supplier was performed through several weekly visits to the supplier to perform in-process quality control (IPQC) though they were planned on an ad hoc basis. As the main production was not internally and was mainly produced in batches, not as a continuous process, it was not possible to conduct actual statistical process control of the production. Instead, as previously described, the quality control were conducted through acceptance sampling, where several items were chosen from either the finished or semi-finished stock, to verify the compliance to the quality specifications. Whenever non-compliances were discovered the supplier were forced to sort out the poor performing items, and the production process and machinery/tools were inspected in order to identify root causes of the problem and potential solutions. As the supplier finished the production the products were sent to COC storage for completion of the final quality control (FQC). The FQC includes the execution of measurement reports sent to the customer for verification, pictures to demonstrate the inspection methods and potential appearance defects, and functional inspection where, if possible, assembly of the products was performed. Due to quality issues with previous shipments the inspection procedures included marking every measured item thereby making it possible for the customer to compare own measurements with the reports conducted by COC and test the compliance to specifications.

Quality compliance to specifications are related to a certain set of characteristics of the products which can basically be divided in two areas; measurements and functionality which are

[6] Jesper Falkjær, Production Manager at MK Krøger A/S

interrelated, and appearance. For inspection purposes MK and COC in collaboration made an unofficial priority where functionality, measurements, and appearance where prioritized in that order, though none of them could be compromised, which often resulted in rework and/or sorting by the supplier. The appearance characteristics were mainly in focus on the items which are directly visible to the customer on the completely assembled caulking gun, wherefore it should only concern the half tubes (1401 and 4001). These items were powder coated in two different colors, and based on the requirements from the customer the coating could not display any kind of contamination, scratch or missing paint anywhere, and it had to be exactly the right thickness of the paint. For evaluating appearance of the powder coated items several samples had been checked and identified by the customer as defective samples, which the supplier should use for comparison when producing and packing the components.

Measurements and functionality are two closely connected inspection areas as with the wrong measurements the function, which has a definitive influence on the diversification strategy sought by MK, would suffer. Due to the close connection between the measurements and the functionality the tolerances of the items were rather tight; though considering the production process necessary for the items it should be possible to meet those. As mentioned previously no statistical quality control were performed wherefore it would be difficult to identify any tendencies in the production process in order to control the tolerances. From experiences conducting FQC of the products clear tendencies in the measurement variations were identified. Generally all measurements were very close to the either the upper or lower tolerance. This indicated a necessary action to adjust the manufacturing process and the tools, though when confronting the supplier they refused. Their argument was simply that there would be no reason to change the process when the tolerances are met.[7] Generally during the production of the various items, the supplier would deliberately design the process to for instance make one particular measurement close to the top tolerance, and through attrition of the manufacturing tool the measurement would approach the lower tolerance. An example of such behavior is illustrated in Box 2 on page 39 concerning the reaming of certain items.

All characteristics inspected in relation to measurements, functionality and appearance were inspected as attributes, wherefore if measurements were identified to be outside tolerances they would be categorized as either a major or minor defects depending on the deviation and functional influence. Lastly one characteristic not considered separately by the customer concerns welding, as the production process of almost all items had some type of welding process involved. This specific criteria were inspected mainly through IPQC were the strength of the welding had to be tested. If an item had several defects, no matter whether it was both functional, measurement wise or appearance it would count as only one defective item making the inspection per batch and not per item. This is important in relation to the defined AQL.

For evaluating the compliance of an entire batch a certain level of acceptable quality and an inspection level had been determined for each product and defect characteristic, as in accordance to the ISO 9001 procedures. These levels are listed in Table 4-4

[7] Production Manager at Minhyu

Table 4-4: Inspection Levels and AQL for MK products

Defect Characteristic	Inspection Level	Acceptable Quality Level	
		Major	Minor
Functional	I	1.0	2.5
Measurements	S4	1.0	2.5
Appearance	I	1.0	2.5

These levels indicate that any prioritization of the defect characteristics is not in place, even though functionality has been identified as the main inspection area for the items. Furthermore, as these levels are standard for all MK products there are no diversification between items that are visual to the end consumer and those that are hidden in the product, which mainly concerns the appearance characteristic. Based on these it is equally likely to reject a batch of connection bars due to appearance issues, as it is likely to reject the half tubes for the same reason. In relation to the literature review emphasizing the importance of a fair transaction concerning the quality requirements, this probability is not likely to be "fair". Appearance issues of the connection bars should be of less importance as it should not have been an equal rejection reason as both functionality and measurements. It must be mentioned that the characteristics of appearance defects are not exactly the same on the half tubes and the connection bars, but in general appearance should not be a strictly important inspection criteria for internal parts. It relates to the importance of considering the usage of product when determining quality specifications, as argued by Keki Bhote. (Handfield, Monczka, Guinipero, & Patterson, 2009) With both the inspection criteria and the different inspection levels determined it was possible to perform the quality inspection.

In general the quality performance of the supplier both in terms of actual product quality and delivery dependability must be defined as non-complying. Throughout the research period the supplier had continuous quality problems with almost every single product produced, and the deliveries were due to these quality defects often delayed. The different non-conforming cases in relation to the products will be elaborated in a later section, though generally the performance of the supplier was poor. Neither MK nor COC had a measurement system on which to actually evaluate the supplier, but if such had been established it would give support for re-evaluating the supplier, and potentially search for alternatives. In the research period there was not one shipment without quality defects or rejection of certain products. For every production order issues were identified either through IPQC or FQC which required sorting and/or rework by the supplier. This was one of the reasons why not any regular order were delivered at the agreed upon delivery date or in the exact amount ordered by the customer. It was very common to only ship the orders partly or to supplement promised orders with other items to load an entire container. During the research period 11 orders and shipments were accepted and planned, but only 10 shipments were made, and not nearly all orders were completed and definitely not delivered at the right time or quantity. Out of the 10 actual shipments these were on average 48 days delayed compared to the agreed upon delivery date. This includes when delivery of one order did not contain the exact quantity they were considered delayed, as when the remaining quantity is delivered after the agreed upon delivery date the entire order are evaluated late. Of every order approximately 34% of every item in these orders were missing when shipping out,

which were mainly due to rework and sorting by the supplier as an alternative way of supplying the shipments partly in time even though non-conforming items had been discovered through either IPQC or FQC. This had the influence that the orders were spread throughout several shipments, and actually one specific order were shipped over six times before the entire quantity had been delivered. In **Error! Reference source not found.** and **Error! Reference source not und.** it is illustrated how the orders were promised to be shipped and how they were actually shipped. There is no indication of the delivery dates, quality issues identified or reason for differences.

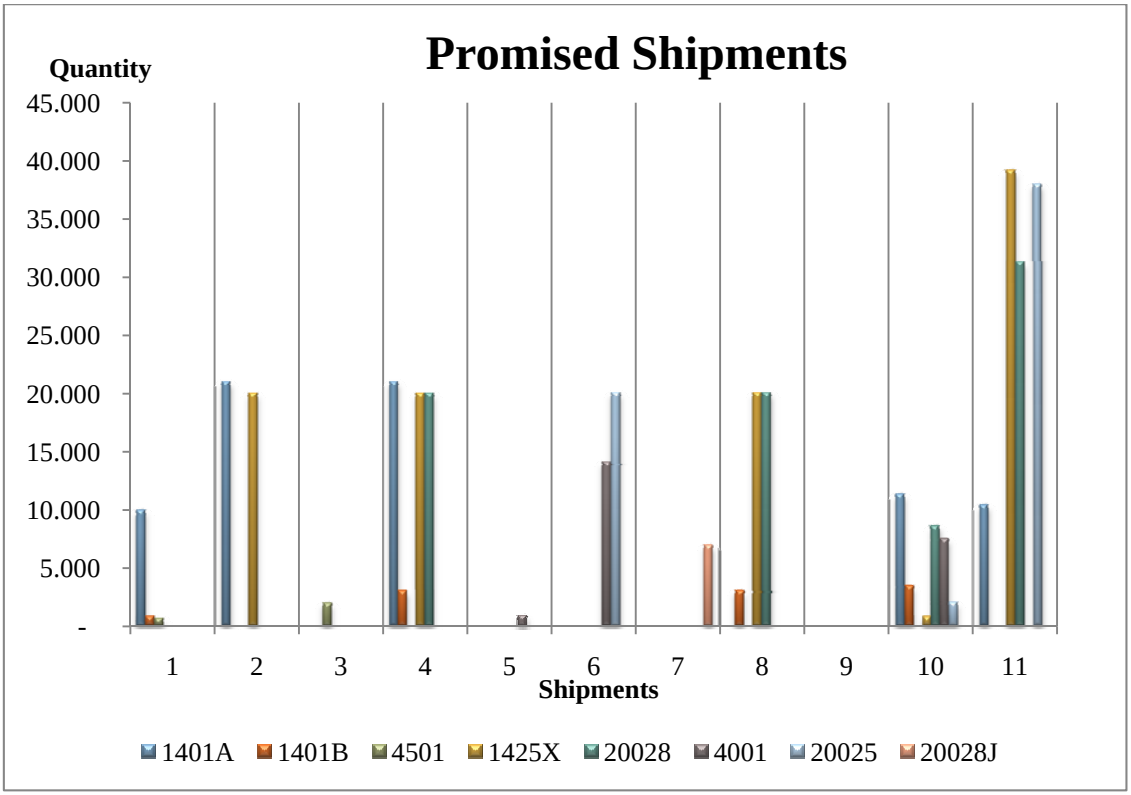

Figure 4-1: Promised Shipments for MK

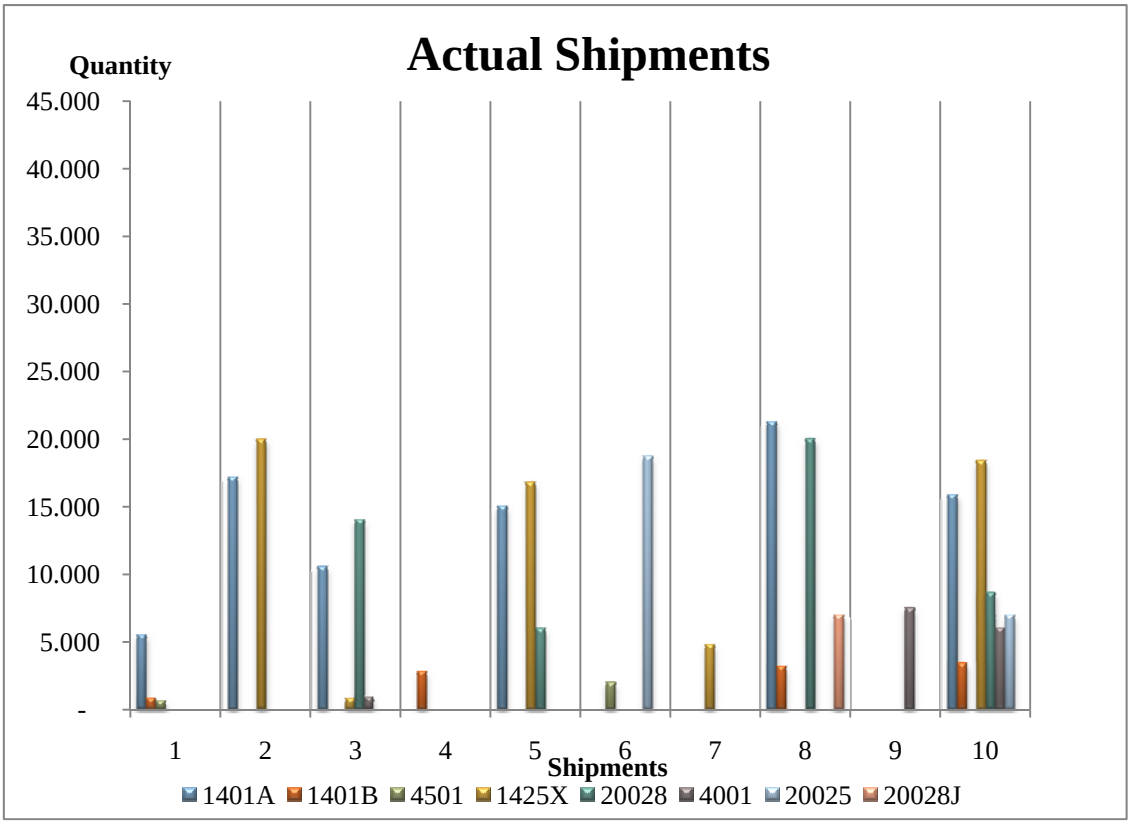

Figure 4-2: Actual Shipments for MK

When orders are placed from MK at COC these are likely to be consistent with a fully loaded container either 20 ft. or 40 ft. This implies that when orders are not fully produced the containers are not completely full and money is lost on the shipments. The average costs of shipping containers from Xiamen, China to Denmark is for the 20 ft. and 40 ft. respectively USD1750 and USD3350[8], which has to be paid no matter whether the container is full or not. To overcome this, the shipment could be shipped as a partial shipment (LCL) where the price instead is USD90 per cubic meter, though if the quantity exceeds 20 cubic meters it is unprofitable to use LCL. No matter what, the remaining items not shipped as planned would in most cases be necessary to send as LCL after wards, so instead of utilizing the excess space in the container it cost extra to have the parts sent additionally. MK did not calculate the exact additional costs resulting from the late deliveries and non-conforming items, though it was generally believed that the intended 30% costs savings sought were not obtained.[9]

With the poor performance of the supplier it should sincerely be considered whether the supplier was even able to live up to the supply and quality requirements, and actually indicated that the approval of the supplier was not performed sufficiently. Even though MK had a back-up supplier in Denmark it is an inappropriate situation, when cost savings are necessary to be competitive at the market, and by having a single sourcing strategy in China MK increased their risks and experienced non-conformance which potentially could harm their business. It is important to pay close attention to the performance of the Chinese supplier and therefore to implement a performance measurement system to verify the poor performance, and have exact data to support the need for improvement by the supplier. Though if implementing such a measurement system, it is important to determine a level of acceptance, as if the performance is just measured, and not reacted upon, the performance is not likely to improve.

4.2.4 Supplier Relationship

In order to identify firstly the needed relationship for the MK to establish with their supplier it is necessary to identify the type of product form a category management perspective. (Handfield, Monczka, Guinipero, & Patterson, 2009) In category management the product are identified in accordance to the value potential and complexity or risk impact. This would aid in identifying certain actions to be taken in relation to the sourcing such as sourcing strategy and relationship duration. The model proposed by Handfield, Monczka, Guinipero & Patterson (2009) resembles the model proposed by Kraljic (2002) where the products in the portfolio are categorized as bottleneck, critical, routine, or leverage products. The products from MK, managed by COC and produced by the Chinese supplier would categorize as either critical or bottleneck items, as they are all, critical to internal operations, only a few available suppliers due to assertiveness, quality is critical, and there is a large expenditure. There are different ways to manage these types of products. Either MK should attempt to standardize the production processes in order to expand the potential number of suppliers or they should attempt to establish a long term relationship with the current supply partners in order to ensure supply and quality.

The Chinese supplier for MK products were called Minhyu (MY), and the relationship with this supplier, was initiated in June/July 2010, where the supplier were approved based on produced samples. Prior to this supplier, another Chinese supplier named “Metusan” (MTS) were used for

[8] Customer Service Specialist at COC Marshall Zhou
[9] Jesper Falkjær, Production Manager at MK Krøger A/S

the same products, though due to a problematic relationship and decreasing quality this supplier proved unsuitable for the production tasks which is why MY were identified and selected as the new supplier. The transition between these two suppliers were fairly abrupt, as when MY was approved all purchases conducted for MK in China were shifted to MY with no alternative supply options. From the beginning of the relationship COC and in extension MK has been truly interested in a long term relationship with MY as several investments has been undertaken, for instance visiting the supplier, and developing and producing the stamping tools for the production. The interest in a long term relationship were used continuously as an argument for MY to improve their processes and machinery whenever defects were identified, but rarely was it accepted by the supplier as an argument, instead they argued for a reduction in the requirements. As the usage of MY was fairly new the issues occurring for the first few productions of each item can be assigned to a running-in period of the supplier becoming familiar with the products. The basic beginning is likely to have some enrollment problems which could influence the quality, however, when the same problems occurs throughout several shipments and suggestions for improvements are turned down continuously, it indicates a lack of ability and willingness to improve as part of an opportunistic behavior.

Supplier opportunism

As identified through the literature review supplier opportunism is affected by the asset specificity of the products, number of suppliers and uncertainty. All products produced by MY for MK basically involve four manufacturing technologies; punching, stamping, welding, and coating, either powder coated or zinc plated. For all transforming processes specialized tools for manufacturing were developed. These tools are unique for the products, and cannot be used in any other productions. The machinery used for the production is rather standardized, though with specialized tools the asset specificity of the products is medium/high. This means that the supplier does not have the opportunity to utilize the knowledge nor the tools for other transactions and the costs related to the production would be considered sunk cost, which cannot be regained. This decreases the potential for supplier opportunism, and would give rise to the supplier being more willing to engage in a longer commitment, in order to regain the costs and to continuously utilize the knowledge gained to further profit.

With higher asset specificity the potential number of suppliers is decreased. The technologies for producing the items is a commonly known technology which indicate a large potential supplier base, though involving one supplier initially and committing to that supplier through collaborative development of the production process and specified knowledge sharing severely limited the potential number of suppliers. Due to the high asset specificity it was not possible to directly shift between suppliers. As the tools and knowledge used by MY is medium specific MK might find themselves locked in and due to the switching costs this entails it is less possible to shift to a new supplier even though the performance of the supplier is below the requirements. With this limited opportunity it gives the supplier incentive to exploit the situation unless the relationship is maintained. MY was aware that they have the price advantage compared to the Danish supplier, wherefore they know that MK would be more likely to have the products produced in China. Therefore even though they would provide a lower total quality they would remain a supplier, though from the perspective of MK it has to

have a limit. If they continuously accept the problematic performance MY will never learn, and they would most likely continue their opportunistic behavior.

In order to circumvent the poor performance and engaging MY in quality improvements MK was continuously attempting to lower the uncertainty of the transactions and orders. Through COC, MK continuously put forward their prospects of future orders. The fact is that MK would place approximately five orders each year at COC in area of DKK 870,000, which would result in orders in annual value of MRMB 5.4[10]. Even though taking the profit margin applied through COC to the prices, it must still be considered a vast amount to the supplier, considering their size. Assumed by Strategic Purchasing Manager at COC, Gordon Gou, MY had an annual turnover of approximately MRMB20, whereof COC or MK would account for approximately one-fourth. This purchase amount has, however, not yet been realized due to the many quality issues identified.

The quality issues identified also affected the uncertainty of the supply. MY was never sure whether their production could be accepted, which is either because they were not able to fulfill the requirements, or because they are unwilling. In defense of MY it was as well experienced that MK did not exactly state all requirements to the product on beforehand. During the initial phases of the production start up some extra specifications were realized by MK, which had to be implemented. The argument by MK for not initially having clarified certain specifications was that it was thought logically implied in the manufacturing drawings. Though, MK did not realize the differences in what is considered logical in a business culture different from their own. As response to this type of uncertainty MY placed requirements for a price increase of the products. The arguments from MY related to the material prices increasing and the government raising the minimum salary paid to production workers. Each month COC prepared a commodity report of price increases where it was proved that the material did not increase on a general level, and even though the minimum wage was indeed raised, it was still wondered whether the actual price increase were due to the additional rework and sorting required to MY in order to fulfill the requirements, thereby increasing the costs of the products. This wondering could act as the beginning of an untrustworthy relationship between the organizations.

Trust

Different trust issues were experienced between the companies from both perspectives. The examples in Box 1: Trust Influencing Examples, illustrates that neither of the parties in the collaboration truly trusted each other, and with good reason. Once such trust issues have surfaced it is difficult to regain the trust either way in the relation, but it is important that both parties continuously seek to overcome these issues in order to support the long-term relationship.

[10] Exchange rate of RMB100 = DKK80.88, from www.valutakurser.dk 18/5-11

Box 1: Trust Influencing Examples

Example 1: Concession

The first batch ordered at MY of 20025 had severe problems with a particular hole size. The tolerances of the hole according to the specifications were 5.01 to 5.05, but approximately 40% were identified to have holes exceeding those tolerances. After discussion with MK it was agreed to give concession to the supplier under the condition that it would be improved for future shipments, even though it would have potential influence on the functionality of the products. The supplier agreed to this condition, and COC was highly involved in identification of the root cause and gave considerable suggestions for how to improve it. Most suggestions were turned down resulting in the following production of the same items still having measurement issues. When confronted, the supplier argued that last time the customer approved these issues, so it should be possible to accept them again, though MK refused.

Example 2: Sorting

In several occasions defects were identified at the supplier during IPQC. These issues were concerning functionality, measurements, and appearance. Whenever the amount of defects exceeded the AQL the supplier were required to sort the items in accordance to the defective characteristic, and agreed to do so. COC provided suggestions for how to perform the sorting and in rare occasions training for the personnel as well. Though when the supplier announced the sorting to be finished, there were a number of occasions where it was still possible to identify a considerable amount of defective items. The issues were mainly concerning sizes of holes in the connection bars and paint problems for the half tubes. This fertilized a disbelief in the supplier actually performing the sorting, wherefore COC sent representatives to supervise the sorting.

Example 3: Straightening

On issue identified for some of the products were a slight bending of the items, affecting the functionality and measurements of the products, as well as interfering with the assemble process in Denmark. This was not identified until the products were received in Denmark and therefore MK was highly involved in correcting the production process to avoid this issue. The supplier, MY, manufactured a straightening tool and implemented an additional process of straightening the items in order to rectify the bending on all items. In order for MK to approve this process improvement 50 items went through this process and were shipped to the Denmark. MK approved the items and thereby the process, wherefore MY continued the current production. Special attention was paid to the issue during IPQC and measurements were after straightening within tolerances. However when next shipment arrived in Denmark MK complaint again that the items were too bended, though all items had gone through the bend process. This resulted in disbelief from the supplier to MK, in relation to the approval of the process.

Example 4: Measurement reports

As response to previous quality issues not being identified through quality inspection even though a high percentage of shipped items to Denmark were defected it was required to mark every measured and inspected item, for MK's reference. This is a clear evidence of mistrust between COC and MK, and no matter how reasonable the mistrust is it is not suitable for a long term relationship to withhold such a stand.

Control Rights

The control rights of the production relates to who actually manages the production. (Hart, Schleifer, & Robert, 1997) In the case of outsourcing the production to MY, or in any other outsourcing situation, the supplier remains in control of the production process and any quality initiative or changes not called for by the customer. This limits the incentive for the supplier to engage in quality improvements unless identified by the customer and required to, which again would require non-conforming products to have been produced initially. One way for the customer to remain partly in control of the production process is to have the specialized tools developed and paid for. MK did pay for the tools which were approximately DKK70,000 for all tools. This investment was affecting the potential for switching suppliers, as even though investments have been made, MK owns the tools and were therefore able to withdraw the tools from MY and have it placed at a different supplier. This is however only a "theoretical" opportunity, as the withdrawal of tools can be a difficult action. The previous supplier MTS refused for several months to release their tools, even though they as well were purchased by MK, furthermore if changes has been applied to the tools the supplier would be entitled to those changes and would most likely require additional payments for the tools[11]. Even though MK did pay for the tools, they were developed by MY, and did not actually live up to the requirements from MK, as expressed by Jesper Falkjær "We would like to see a more Western approach to tool development." However the tools were approved by MK in several occasions, wherefore this desire is rather unsuitable. The best way of overcoming such issues were to provide MY with exact drawings and requirements to the tools, prior to their development, or have the tools developed internally at MK. This was for instance the case concerning the aforementioned straightening of the products in Box 1, Example 3. As it was identified that the straightening process by MY was not sufficient MK developed and shipped a new tool to be implemented by MY in the production process.

As mentioned the production control is within the managerial scope of MY which is why MK does not have direct influence of process. The example in Box 2: Example for Production Process Control, illustrates the implications of this on the quality.

[11] Carsten Ingemann Egelund, General Manager at COC

Box 2: Example for Production Process Control

Example 1: Bending and Reaming

Concerning the connection bars of 1425X and 20025, the specifications of these items include some holes which need to be very exact. The way MY attempted to provide these exact measurements were by bending the holes smaller than the requirements and then ream the holes to the exact size. The reaming were performed with reamers within the tolerances, though as the reamer would wear down during the process the size of the reamer were at the top of the tolerances, so through the wear down, they would remain within the tolerances until the holes became too small. This would allow for a longer production period with one reamer. This did have a widespread influence on the quality as during IPQC and FQC of the products items were continuously identified to be either too small or too big in the holes. MK suggested changing the bend process and leaving out the reaming, but the supplier refused to change the reaming process and the reamer, and would not change the bend process to bend exactly within tolerances, as it was believed this would be less possible to control.

Example 2: Welding and straightening

It was identified that the aforementioned problematic bend of the products were caused by wear down of the welding fixture, and even though suggested by both MK and COC to continuously change the welding fixture when worn down, the supplier refused. Instead MY would add the straightening process as a standard part of the production process. This example resembles an old cliché often stated about China; “Why do it right the first time, when you can rework it”.

The two examples in Box 2: Example for Production Process Control, clearly indicate that MY has the control rights of the products and even with considerable suggestions from the customer they were not willing to improve the current process, but would instead add processes. This is problematic, as these improvements did not actually improve the quality sufficiently, and by adding more process there are more possibilities for quality failures and higher costs of producing. This is representation of the business culture at MY as they want to remain in control of their own process, and they do not need advises from external parties, even though they are the actual customers.

Cultural influence

With this perception by MY it is fairly evident that that they do not uphold a proper customer focus, and were basically unwilling to integrate themselves with customers. This perspective fits with the general characteristic of Chinese culture, where assertiveness is a common phenomenon. The assertiveness of MY was as well evident in the general way they perceived the relationship. As indicated by all of the above, MY focused highly on their own business and

opportunities, and there were several signs of MY acting only in accordance to their own perspectives, and did not really consider the relationship as important, but rather their own progress. Power distance within the company was clearly evident at MY. Whenever issues were identified with the production and any changes needed to be made the production manager at MY bridled completely and was very reluctant to accept criticism and suggestions. However, when the general manger and CEO were present at the improvement discussions he was more willing to interact and focus on collaborative improvements.

4.2.5 Knowledge Sharing

All knowledge sharing between MY and MK were managed through COC, both due to the distance and the language barrier. The focus on customers are very much related to the possibility of knowledge sharing, and as already mentioned the focus on MK as their customer was rather limited at MY. The sharing of usable knowledge was very restricted mainly due to the reluctance of the production manager at MY to accept the suggestions from COC and thereby in extension the customer. One of the biggest difficulties was to establish a common understanding of the required quality. Often the argument from MY was that despite the quality defects the product were still usable. Even though that might be the case, MK was not willing to accept any non-conformance, wherefore difficulties often occurred in order for them to accept a rejection. The common understanding of the quality is much related to the alignment of the specifications. If specifications are not aligned it is much difficult to live up to the requirements, though the lack of alignment is an issue for both parties. Actually the alignment is much related to the abilities of COC; however, if COC is not informed by MK about the specific requirements, they cannot be passed on to the customer. On many different occasion certain specifications were not completely identified by MK, as previously explained, wherefore MY could not fulfill such requirements, and therefore were reluctant to accept the rejection. On the other hand, were MY not following the drawings and the specifications actually shared between them, and they did not consider the same aspects of the products important as MK did.

In the development of the specifications COC was the main actor though with heavy influence of MK. The different specifications to be focused on as well as the inspection level and AQL were discussed in collaboration and developed. Though having discussed these it did not seem as COC had an approval of the actual QC instructions. There were many issues with these instructions as for instance measurements which were not important for continuous quality inspection, due to their embeddedness in the manufacturing tools. Furthermore, COC did not seem to have used a critical perspective to the input from MK, but instead merely adapted anything that was put forward. It is very important from the perspective of COC that they challenge the requirements from MK, as it is COC who knows the culture and the circumstances at the supplier the best, and if not challenging the requirements, it is not ensured that the supplier is able to fulfill these. Even though MK were involved in the approval of MY it would have been very beneficial if the representatives from COC would have given a realistic perspective on the capabilities of MY before a large scale production were planned.

4.2.6 Case Examples of Non-conformance

Example 1: Paint issues

AS explained above the painting of the half tubes is an important characteristic for MK, though unfortunately there were many quality issues in relation to the paint. When painting the items every item was inspected and checked before packed, and any determined nonconforming were sorted out and reworked. MK had at one of their visits to MY identified defect samples which were to be used as comparison when packing the products. When performing the quality inspection it was though evident that they did not use those and when visiting the supplier it was definitely proved. Therefore COC accepted the challenge of training the employees by example, and it was agreed with the manger of the paint facility that they should focus on training the workers by use of the defect samples before any production. This improved the performance considerably. However in the beginning of February 2011 the Chinese new year were celebrated, and commonly after Chinese New Year not all employees return to their former job. This was the case at the paint facility where new employees had to be hired, and immediately after the Chinese New Year new paint issues emerged. The manager at the paint facility apparently forgot about the training wherefore COC had to again stress the importance of the training and the usage of the defect samples.

One of the important characteristics of the paint was, besides no contaminations allowed, that the paint thickness were exact. The regular way of testing the thickness and strength of the paint is through cross-hatch test, though this was not enough according to MK. One shipment of 1000pcs of 4001 had 16pcs with too much paint and the MK issued a complaint. As this gives only 1.6% percent defects it was considered an unfair complaint to the supplier. When considering the operating characteristics curve of the specific inspection levels and AQL, there is a probability 92% of accepting such a batch. Though, as the paint thickness continued to be an issue for MK they invested in a micron measurement tool to be implemented in the quality inspection procedures. This was issued just before the research period was ended. Therefore the implementation of this procedure where not supervised. Considering the powder coating being performed by hand, it is very difficult to ensure a common thickness of all items, and as the production method has been improved by MK it is not considered a fair requirement towards MY.

Example2: Knob sizes

The most important aspect of the 1401 half tubes is the fit to the assembled caulking gun which are determined by four knobs on the one end which has to be very exact, to ensure a tight and sustainable fit. These knobs are ensured the right dimensions through two stampings; one initial stamp and one stamp after painting. This relates to the inclination at MY to add more processes rather than making the items correct immediately, and actually it had influence on the quality of the items. When stamping the items after painting scratches often occurred on the painted surface resulting in rejections of many items. As MY are reluctant to improve the process the issue were circumvented by re working and applying soft material around the padding tool to avoid sharp metallic edges.

Example 3: 4001 In-Process Quality Control

COC were producing the 4001 internally, though the painting were managed by MY, which made it possible to conduct IPQC more often, and emphasizing the importance of quality awareness by the production workers. However, avoid quality related issues. The main issue concerned the appearance quality of the welding. All welding were inspected by the workers assembling the half tube to the removable welding fixtures, however all items were inspected again when the production had finished, and non conforming items were grinded at the welding. The welding process for these items entailed mainly two welders, two assemblers, and five to six disposable welding fixtures. As the welders are working on two fixtures the assemblers are preparing the next fixture and inspecting and sorting the finished products. Through a time study of the manufacturing process it was identified that it would be more appropriate to have three or even four assemblers to supply the welders, as the assembling of the products took more time than the actual welding. By using more assemblers the welders would be supplied with new fixtures continuously, but it could have an influence on the quality as well. By having more employees making the assembly and inspecting, they could use more time actually verifying a good welding appearance, and thereby it could potentially be avoided to have the last 100% inspection.

Example 4: Poor Golden Sample

The approval of MY as an adequate supplier were completed by MK based on supplier visits and samples produced. These samples were identified as golden samples which should function as reference for future production. During the initial production and shipments different quality issues were identified at arrival in Denmark. These issues were discussed with the MK based on their complaints, however inspecting the golden samples it became evident that these did not fulfill the requirements either. If samples are to be used as reference for production it is very important that these are in compliance to all quality specifications, as the supplier would argue that these represent their abilities. When MK then complaints about quality issues evident in the golden samples as well it is very difficult to take these complaint to MY and have them change their production and possible sort and rework issues in the proceeding production.

4.3 SoRoTo

4.3.1 Company and Products Description

SoRoTo is a Danish family owned company specialized in producing and selling machinery for the construction industry. It is a company with sales all over Europe and in Australia as well, but the main market remains the Danish market. The company was established in the mid-eighties as a result of a general lack of small and handy concrete mixers for indoor usage. Today the company is owned by the three brothers, Sonny, Ronny, and Tommy, whom occupies the three top positions in the company. The core competencies of the company are according to the general manager Ronny Andersen[12] product development and sales and services. As a result of the recent global financial crisis SoRoTo experienced a downfall in sales in coherence to the general down turn of the building industry in Denmark. They have slowly regained their ground

[12] Ronny Andersen, General Manager at SoRoTo

and are again moving towards prosperity with boosted sales and thereby sourcing through COC from China.

The main customers of SoRoTo are DYI retailers and they have contracts with some of the main chains of shops in Denmark. The competitive strategy used by SoRoTo in the market can be categorized as a focus differentiation, where it is the functionality and the quality that are in focus. The actual founding of the company was based on an innovative approach to concrete mixers, which had never been produced in a particular small size and easy to transport[13]. Therefore the functionality of the products is what is most characteristic of the products as they are innovative in their design and usage. Furthermore, the quality has to comply with the prices and the need of the customer, but on the same time the appearance of the products has to express the same level of quality. SoRoTo focuses much on the after sales services which is one way SoRoTo attempts to diversify itself from the competitors, even though the sales factors lead towards functionality, quality, prices, and service in that particular order. The motto they operate through in the company is: "If you have bought a SoRoTo machine, you should never have a problem" indicating that the quality of the products has to be best in class. According to Ronny Andersen; "prices has to be compatible with market prices but not necessarily the cheapest, unless that is possible as well," however the search for low costs can in no way compromise the quality.

SoRoTo did previously have a complete internal assembly but now they are only assembling approximately the last 10% on certain products when received in Denmark, other products are completely marketable at the arrival in Denmark. Furthermore, as the after sales service is of great importance to SoRoTo they operate their own service shop, where any broken down machinery are repaired from customer complaints.

There are three main products in the SoRoTo portfolio which is operated through COC; two types "Mini-dumper", which is a motorized wheelbarrow, five types of concrete mixers ranging from 40 Liters to 300 liters, and belt conveyors in four different lengths from 3.3 meters to 8 meters. It is the concrete mixers and the belt conveyors which are in focus for this case study, as these are the products being manufactured on a more regular basis. The product portfolio includes other smaller products such as a handheld mixer, stone cutters, and general accessories for the everyday use on a construction site, and even though some of these are managed by COC as well they will not be considered on a large scale in this case study. In Table 4-5 the products in focus are listed with brief information, though during the case study the mixers will be considered from two perspectives; the actual mixer including the frame and barrel of the mixer, and the mixer arms to be placed inside the mixers.

[13] Tommy Andersen, Production Manager at SoRoTo

Table 4-5: SoRoTo products managed by COC

Products	Description	Supplier
Concrete Mixers	40 Liter	Production of parts: Chinese supplier Assembly: China Outsourcing Company
	80 Liter	
	100 Liter	
	120 Liter	
	300 Liter	
Belt Conveyor	3.3 Meters	China Outsourcing Company and internally
	4.5 Meters	
	6.0 Meters	
	8.0 Meters	

4.3.2 Level of Outsourcing

SoRoTo has never in the existence had any large scale production of mixers internally, though previously were assembly of mixer managed at their own facility. On the other hand have belt conveyors previously been produced internally and currently a limited number are still produced internally when necessary. Besides the few belt conveyors produced internally SoRoTo are utilizing external suppliers for 100% of their products but maintain a limited assembly percentage in Denmark. For instance concerning the mixers they are making the final assembly internally. SoRoTo are using several suppliers from many different countries to supply them with products though concerning the mixer and belt conveyors they are entirely sourced from China and through COC.

As listed in Table 4-5 COC could be considered the main supplier for SoRoTo and are doing the last manufacturing or assembly before items are shipped to Denmark. Besides being the main supplier for SoRoTo COC manages several other important activities as indicated by Table 4-2. This includes the supplier management and actual production of SoRoTo products, and involvement in the development of products, especially concerning the “mini-dumpers”, however also other development tasks are outsourced to COC regarding for instance collapsible frames for the concrete mixers. Many of the tasks besides the heavy production of parts for the either the mixer or belt conveyors are actually possible to manage internally, wherefore it can be determined as outsourced in accordance to the definition in section 2.2. This indicates a relatively high breadth of outsourcing influencing the outsourcing intensity. Concerning the production it is only partly possible to produce this in-house, where it is the production of belt conveyors and assembly of mixer, the tasks performed by COC, which SoRoTo has the purpose of internalizing. COC is responsible for managing suppliers and supplying 100% of items from China, which equals approximately 85% of the entire outsourced activities at SoRoTo, illustrating an especially high outsourcing depth of the production. The breadth and depth of the outsourcing combined gives a fairly high outsourcing reliance and it has therefore great consequences when the performance at COC is not living up to the requirements.

Having outsourced the production and supplier management in China to COC has given rise to both challenges and improvements to SoRoTo according to Ronny Andersen. Previously all mixer parts were sourced from India through an Indian agent located in Denmark, though due to

poor quality the contracts were terminated and the outsourcing shifted to COC[14]. The change in outsourcing partner and sub suppliers has increase the quality of the products considerably. However one challenge still remains in the outsourcing perspective which relates to the reaction time in china and the distance. Due to the distance it has been necessary for SoRoTo to uphold a larger inventory, and when defects are discovered in stored items, it therefore takes much longer time to see the improvements in products to be sold[15].

4.3.3 Quality Assurance and Performance

Being the last production step for both belt conveyors and mixers to SoRoTo COC was naturally responsible for the quality control of the final assembly. The sub supplier did not perform any formalized quality inspection of the produced items, wherefore it was never verified by the supplier that their products were in compliance to specifications. Therefore COC was partly managing in-process quality control (IPQC) at the sub-suppliers as well to ensure that incoming parts were fulfilling requirements. The IPQC at the sub supplier were managed through irregularly planned supplier visits which were very much influenced on the production flow at the supplier. The production of parts for the mixers were a batch production wherefore no weekly IPQC were conducted. Due to this it was very important for COC to be informed by the supplier when they were starting production in order to plan for inspections. The IPQC performed during the manufacturing of belt conveyors and assembly of mixers was easier to plan as this was conducted internally. The way these inspections were performed was much ad hoc as with internal production there is a great opportunity to walk through the production when manufacturing is actually happening and conducting the necessary inspections of both semi-finished and completely finished stock. Furthermore having COC's internal production workers perform these manufacturing tasks it was easier to have a direct communication with them and apply in-process training to the workers. Due to the close connection between the production and the quality department it was emphasized considerably that the workers themselves when performing their tasks should always inspected the items being assembled or manufactured, and if problems were identified grab a hold of the quality inspectors to immediately discuss and improve defects.

For IPQC purposes and inspection of spare parts to be shipped certain inspection levels and AQL's were determined. These are listed in Table 4-6. According to Ronny Andersen SoRoTo has not been involved in the development of these inspection levels, and it had not been explained to SoRoTo exactly what this would entail. The example in Box 3: Missing understanding of AQL and the following perception of the customer, illustrates potential problems encountered when it has not been specified to the customer what acceptance sampling of a batch includes. The entire issue in the example might have been raised due to several other non-compliances in the same shipment, but this particular example was highlighted by the customer.

[14] Tommy Andersen, Production Manager at SoRoTo
[15] Ronny Andersen, General Manager at SoRoTo

Table 4-6: Inspection Levels and AQL for SoRoTo products IPQC and spare parts

Defect Characteristic	Inspection Level	Acceptable Quality Level Major
Functional	I	1.0
Measurements	S4	0.4
Appearance	I	1.0

Box 3: Missing understanding of AQL and the following perception of the customer

Example 1: Acceptance sampling and approval based on AQL

Within a specific shipment of several hundred spare mixer arms to be used in Denmark SoRoTo identified one particular mixer arm which had a wrong shape. Even though there were other issues with this particular shipment they made a big fuss out of this *one* item and questioned the quality assurance performed by COC. What SoRoTo failed to understand is the procedure of an acceptance sampling, and the possibility of one single non-conforming item passing through. The argument from the customer was that these items had been through several quality inspections and this particular arm should therefore have been identified.

In contrast to the previous case study the final quality control of completely assembled mixers and belt conveyors were not conducted based on acceptance sampling. SoRoTo required a 100% FQC of all items shipped. For this purpose specific inspection checklists had been designed stating all the major inspection criteria. When conducting the FQC on mixers each product was assigned such a checklist, and when all criteria had been inspected the checklists were signed by the quality inspector and placed inside the mixers to illustrate the quality conformance. Likewise was a checklist for the belt conveyors outlined though these were not sent along with the products. Having completed the inspection quality reports were sent to SoRoTo prior to the shipment, to verify that the inspection had occurred and that the products were confirmed.

The most important criteria for determining quality compliance of the final assembled products, both mixers and belt conveyors, were related to the functionality. Concerning the mixers the functionality test concerned a test of the “dead-mans switch” which should turn of the motor when the lid was elevated more than 5 cm. For testing this, it required the lid to be assembled to the mixers, which often resulted in scratches on the barrels, and then disassembled again for the shipment packing. Furthermore the function tests entailed that the mixer arms inside the barrel should be able to turn smoothly though with a maximum gap between the arms and the barrels of 1-2mm. When applying these mixer arms this as well often resulted in scratches inside the

barrel. One of the other characteristics focused on was the appearance of the products. Even though it was identified above, as stated by Ronny Andersen, that the appearance were of less importance this specific characteristic was the main complaint from SoRoTo. From a quality perspective this could indicate a rather well performing assembly and production, as if the only issue which SoRoTo would have on the mixers were the less valued appearance issues, the overall quality is good.

Relating to the mixer arms themselves one particular aspect were more in focus than anything else; the strength of the arms. Previous to the research period SoRoTo had experience considerable non-compliance on this particular issue. The cause of the problem was a crack in the bend of the mixer arms as a result of the production process at the sub-supplier. This crack made the arms much weaker and by a simple hammer-test they would completely break with just one hit. It was therefore required that all mixer arms shipped to the customer whether it was assembled to the mixers or as spare parts should be inspected for this particular issue and if any cracks were identified the mixer arms had to be reworked by cutting out the crack and weld the inside the bend. Though due to several instances where cracks were not identified through quality inspections it was determined to completely weld all received mixer arms from the sub-supplier until a new production method had been developed and approved.

The function test of the belt conveyors was rather simple, the product had to run smoothly for at least one hour to verify the electrical connections and that the belt itself was straight. In relation to this it was important to test the tightness of the electrical connections, as if they were not tightly screwed the possibility exists that having run for a longer period the cords would grind against each other and fire could occur.[16] The general quality performance of the belt conveyors was good and there were only limited remarks to these. One particular issue involved oil leaking from the motors due to a bad gasket being used inside the motors which were an area no possible to inspect for COC. The oil leakage had occurred after the functionality test where the oil had been heated up, and severely affected by the transportation period, it was therefore not discovered until arrival in Denmark.

4.3.4 Supplier Relationship

The supplier relationship status for SoRoTo is considered from two perspectives; the relationship between COC and SoRoTo, and the relationship between the Chinese sub-supplier and SoRoTo. It might seem odd that the sub-supplier is considered though as this supplier is the only supplier for concrete mixers, the main product in the SoRoTo portfolio, and the because SoRoTo were much involved in and affected by the actions of this supplier the relationship is important to consider.

In the entire product portfolio of SoRoTo the belt conveyors and especially the mixers represents the main products. This is based on the statement by Ronny Andersen that COC manages approximately 85% of all outsourced productions and as these two products are the main products for SoRoTo at COC they are very important to SoRoTo. In the same way are SoRoTo very important to COC as they account for approximately 50% of the entire turnover at COC. Based on this these two products can be categorized as critical products wherefore it would be preferable to seek a partnership with COC to ensure the supply. The interaction

[16] Tommy Andersen, Production Manager at SoRoTo

between COC and SoRoTo has been present almost since the establishment of COC in 2004. The two companies are very much familiar with each other's requirements, and SoRoTo is the customer which COC has been most involved with for the longest period, but the relationship cannot be defined as a partnership, more as a close long-term relationship which has remained profitable and positive for both parties. One reason that it cannot be exactly defined as a partnership, and not likely preferable to become this, is that both companies are very much dependent on the supplies from the sub-supplier. The Chinese supplier used for SoRoTo's mixers are called "MeTuSan" (MTS) and is the same supplier as referenced in section 4.2: MK-Krøger A/S**.** The interactions was initiated in 2007 were MTS was chosen when shifting supplier in China. Initially the relationship included a commitment to continuous and stable orders as a long-term relationship, though as the financial crisis interfered the following years, the construction industry in Denmark being severely affected, the orders failed to be realized. Even though the relationship were maintained during the critical years this had a very bad influence on the relationship due to the missing orders which affected the production at MTS in the research period as well. MTS is a supplier with an approximate turnover of MRMB80, where the order for SoRoTo products accounts for approximately MRMB 3.5.[17] According to the strategic purchasing manager at COC, the company and thereby in extension SoRoTo could only be categorized as a moderate important customer, which would indicate that the production tasks for the mixers were prioritized lower in relation to other customers at MTS.

Supplier Opportunism

The products managed by COC in relation to assembly of mixers and production of belt conveyors can hardly be categorized as being asset specific. The methods for completing these tasks do not require any specific machinery or tools, besides a simple welding fixture for producing the belt conveyor frame. The production know how can influence the asset specificity of the products, though the knowledge can fairly easily be made explicit through assembly procedures, wherefore the general asset specificity is low. Combined with the long-term relationship established through several years between COC and SoRoTo the asset specificity affects the potential for opportunistic behavior, and it is not in the interest of COC to act opportunistically. SoRoTo is one of the main customers of COC if not the main customer, and losing them by not acting in accordance to the best interest of both parties could be fatal. One example though of a partly opportunistic behavior by COC is evident in Box 4: Trust influencing example, as if COC did not perform as presented in the example the company would not be able to supply SoRoTo with the required products and the continuous relationship would be in danger.

Asset specificity is as well not particularly high at MTS concerning the parts produced for the mixers. The parts are specifically designed for SoRoTo though the production technologies are standard methods transforming standard materials. This low specificity increases the potential number of suppliers wherefore MTS would theoretically be interested in maintaining and focusing on the production for SoRoTo to ensure higher quality. Considering the contribution to MTS in terms of orders and the financial crisis affecting the relationship this was however not the case. Actually the lower prioritization of SoRoTo and COC as a customer resulted in a

[17] Gordon Gou, Strategic Purchasing Manager at COC

reluctance to supply the parts, wherefore COC initiated the process of identifying potential new suppliers. It was not that MTS acted directly opportunistically by seeking their own progress, though more due to their unwillingness to involve themselves in the relationship. The actions of MTS are affected much by the uncertainty which resulted from the decreasing orders as a result of the financial crisis. There are however many other factors influencing the problematic relationship with MTS, such as untimely payments and financial issues between MTS, COC and SoRoTo.

Trust

As evident from the example in Box 4: Trust influencing example, COC was in this relation not acting completely trustworthy in this relationship. They were actually not following clear directions given by the customer. From another perspective SoRoTo is neither completely fair nor trustworthy. First of all they do not completely consider the usage of the products when complaining about the appearance issues. Some of the scratch issues mentioned by SoRoTo are from inside the mixer barrel, which after first usage by the end consumer will be severely scratched. Secondly, the customer actually mentioned in the questionnaire that products with appearance defects will only be rejected "if they cannot be repaired".[18] Actually COC and SoRoTo has settled on a common understanding of the issue without any word being spoken, but even though it is commonly accepted, as it is not something that is definitely agreed, COC will continue to hide the fact that they are repairing. On the other hand it might be positive that nothing has been agreed explicitly, as this avoids COC to relax on this issue and continue to focus on improving the appearance.

Box 4: Trust influencing example

Example 1: Repairing Paint Problems

One of the quality requirements most difficult for COC to comply with are the appearance requirements of the concrete mixers. During assembly the products are very likely to be scratched removing the powder coating which from the customer requirements are not acceptable. In the beginning of the research period one of the first complaints on quality related to poor repair of scratches. It was therefore stated by SoRoTo that repairs were no longer allowed. This proved a severe challenge to COC, and it was actually not possible to avoid scratches even though several initiatives were taken. As the first complaint were given the repairing paint were changed and approved by SoRoTo with the condition that it should not happen in the future. However as it was not directly possible to avoid it was decided by COC to continue with the improved repairing process without the consent of SoRoTo. This is a huge trust issue, as now that SoRoTo is not aware that the repairing is still a general procedure it could severely damage the relationship if it is identified.

[18] Ronny Andersen, General Manager at SoRoTo

In the supply chain MTS is not acting properly trustworthy either. This manifested itself in their continual promise to manufacture the requested part for agreed upon delivery dates. These dates were then used to plan the shipments for SoRoTo, and as the company were in urgent need of products and actually in risk of losing some of their contracts with the DYI retailers SoRoTo used the delivery dates to convince their customers to be patient. However, MTS were continuously behind schedule, and in some instances the production had not even been initiated on the day the delivery were promised. This had extensive influences on the delivery dependability of COC and caused a chain effect downstream in the supply chain. MTS did not uphold a chain perspective and did not realize the damaging effects their actions had. They promised delivery dates that evidently were impossible for them to achieve.

Control rights

When initiating the relationship and interactions with MTS SoRoTo paid for the manufacturing tools through COC. This gives them a certain level of control of the production process as SoRoTo were able to require changes to the items if they would consider the quality to be improved. Furthermore they would be able to withdraw the manufacturing tools from the supplier if they desire to change supplier and thereby ensure an equal manufacturing quality at a potential new supplier. The example in Box 5: Loss of control rights of the process, gives evidence for how MTS made changes in the production process of mixer arms without the customer consent. Even though the changes were necessary and issued by both COC and SoRoTo, MTS did not involve or seek approval for the changes in the process before implementing it.

Box 5: Loss of control rights of the process

Example 1: Changing production process

The production process of the mixer arms had to undergo several changes due to the issues of the crack in the bending which resulted in a less sustainable product. The first change to be implemented to the process by MTS was to change the bending from a stamping mechanism to manually bending the mixer arms. Though without having approved the process neither by COC nor SoRoTo, MTS supplied parts end in this new way. Due to the customer focus and the years of experience it was important to COC to have this process approved before the parts could be used wherefore samples were sent to SoRoTo for approval. In the mean time without COC or SoRoTo consent they changed the process yet again to hydraulic pressure. Again COC desired approval from SoRoTo before the parts could be used.

Caused by the history between COC and SoRoTo the two companies have worked closely together to establish a suitable production process, and even though the production is outsourced to COC giving them the actual control rights SoRoTo is often integrated in changes in the production process. The example in Box 5: Loss of control rights of the process illustrates how COC seeks to involve SoRoTo when changes are happening to the production despite the

changes actually being made by the sub-supplier. Furthermore does SoRoTo on occasions visit COC's facility in China and interacts and aids in the production, which is the common procedure when shipping directly from China to the SoRoTo's Australian customer. IT can therefore be said, that through the close collaboration between COC and SoRoTo, the customer maintains a certain level of control rights of the production.

Cultural Infleunce

Customer focus of MTS in relation to the production for SoRoTo is due to the issues in the relationship fairly limited. The supplier were often willing to interact with both COC and the SoRoTo representatives when they were in China, however most of the promises made during these meetings were not kept, and every time the issues were raised with the supplier they argued for the financial conditions of the relationship and argued for a price increase. MTS would promise specific delivery dates, though if one of their other customers potentially with a higher profit margin on the products or accounting for a larger percentage of the turnover than COC and SoRoTo, the mixer items were put aside to focus on the other customers. The supplier did apparently not value the close relationship with COC and SoRoTo, and the prospect of a long term relationship. This indicates a supplier with low collectivistic and highly assertive behavior and without human orientation towards relations, whom acts in accordance to its own benefits, as in accordance to the national cultural characteristic of China.

The cultural aspect of COC as a supplier was an interesting aspect, as it is a company which has combined Danish business culture with the Chinese national culture. Denmark and China are much different on many of the characteristics identified in section 2.3. First of all is the power distance in Denmark very flat where as in China the hierarchical construction of the company is very important. This had a considerable influence within COC where the Danish managers focused much on empowering the employees asking them to take initiative and make decisions, whereas many of the Chinese employees would continuously seek approval of the Danish managers. The examples in Box 6: Cultural examples of COC, illustrates what this entailed in relation to power distance.

Box 6: Cultural examples of COC

Example 1: Quality Supervisor

During the research period I was employed as the Quality Supervisor, which was in control of the quality department, employing on average 4 employees. It was not all the employees who did the following but it was rather common. Whenever a quality issue was detected either in the in-house production or at suppliers, the quality inspectors from the quality department would regularly address me and ask what to do with in the specific situation. I was there for a total of eight months, whereas most of the employees had been employed for several years. Their knowledge of the products, procedures and processes were much broader than mine. Therefore whenever they came and asked, I would regularly answer with another question in terms of what they would think or what they used to do.

Example 2: General Manager's Approval

Whenever decisions had to be made almost regardless of what circumstances were and what it was about, every Chinese employee working in the office would always seek to get the approval of the general manger. Concerning quality issues these were often discussed with the general manger as well, and I must admit to having adapted that common behavior during the internship. I would regularly take my concerns and decisions to the general manager and discuss them before they were actually completed. These communication and approval processes would unnecessarily extent the reaction period on certain quality issues, which should have been handled immediately at discovery. In the worst cases shipments were actually delayed due to the missing approval from the top manager.

Due to many of the employees having been employed at COC for a longer period it was however possible to see some of the employees questioning the managers and openly expressed their opposing opinions, which were not commonly seen at the Chinese suppliers. Though due to the employees' power distance perception they were often succumbed to the directions of the general manger.

As the Danish managers within COC praised the need for long-term relationships with high customer focus on that customer requirements are fulfilled to excellence, the inclination of the Chinese employees to act in accordance to the assertiveness characteristic of Chinese culture where diminished. There would be instances in relation to mixer defects, for instance scratches, where the employees would argue that it would not be possible and too expensive to actually succumb to the requirements by SoRoTo and have MTS repaint the parts, which would indicate a more assertive behavior.

Through the in-house production of the SoRoTo products at COC it was possible to investigate how the cultural characteristic would affect not only the white but the blue collars as well. The main cultural characteristic influencing the quality or the produced items would be the power distance, though maybe not due to a continuous search for approval but rather in relation to the Confucianism embedded in the Chinese culture and expressed through power distance. During the assembly of the concrete mixers scratches did occur, and the employees doing the assembly new it, however, if they unfortunately scratched the products, they would not say anything. The employees would not mark up the scratches so they could easily be identified for the repair painting, because this was not their tasks. Instead they expected the quality inspector, and in most occasion me, to go through all assembled items to find possible scratches. This had a great influence on the performance of the particular quality characteristic, as occasionally some scratches were not detected by the inspector, but when arrived in Denmark and the assembly work would be completed by SoRoTo they would find them and issue a complaint. Basically the blue collar workers did not accept any responsibility as it is not within their work scope. Several other instances like the one above indicates the same, for instance regarding the correct shape of mixer arms or the tightness of certain bolts in the construction.

4.3.5 Knowledge Sharing

Through the long relationship between COC and SoRoTo they have build a common understanding of the main quality issues concerning functionality and sustainability of the products. These have been achieved through a common development of the quality specifications. Much of the knowledge relating to whether products are accepted is embedded in the employees at COC and many of the requirements are actually not documented explicitly. Returning to the appearance quality issues mentioned above, the two companies are however not completely aligned. The discussion of whether scratches can be repaired or not is a clear evidence of this misalignment. From COC perspective scratches cannot be avoided and therefore it has to be acceptable to repair through hand painting. The argument for this perspective is mainly placed in the usage of the products where scratches will occur immediately. From the perspective of SoRoTo the products cannot be sold if the items are scratches and scratches in the paint will potentially lead to rusty items. It was announced that COC and SoRoTo would have a meeting with focus on the scratch issues in order to align the requirements however it was never planned.

The openness of both companies has aided in improving the quality of the products. Whenever potential quality defects were detected which were not accounted for in the specifications, meetings were held with the customer to identify the potential influence and whether it would be acceptable. The openness and the willingness to interact with each other and share common knowledge obtained through assembly and production between the companies was a clear improvement factor. The example in Box 7: Example of Lacking Knowledge Sharing, is though illustrating a specific situation where this was not the case. The ignorance illustrated in the example is proving the general cultural characteristic of the Chinese where customers are not necessarily included in improvements specified upstream in the supply chain.

Box 7: Example of Lacking Knowledge Sharing

Example 1: Lack of knowledge sharing

In preparation for a particular shipment the IPQC identified a certain issue with the placement of the threads to apply the motor. The motor is assembled to the mixers in Denmark, so it did not have a direct influence on the assembly work at COC. The problem however, with the identification of the defect, was that no one were told about it. During the assembly it did not affect the production workers, and the inspector having identified the problem did not inform the others in the organization. The items were shipped to Denmark, and as soon as the defect was detected a complaint was issued. When confronting the quality inspector with the complaint, he argued that the supplier had been made aware of problem and that it had been corrected for the following shipment. It was an easy fix for the SoRoTo, but the ignorance of the inspector concerning the importance of information sharing left them angry, and again questioning the inspection procedures.

4.3.6 Case Examples of Non-conformance

Example 1: Bad assembly

The quality performance of COC was mainly influenced by the slack in the production and assembly process. The best example concerns the concrete mixers. In the mixer four mixer arms are placed; two similar arms which should be aligned with the side of the barrel, one arm to cover the bottom, and one arm to turn in the corner of the side and bottom of the barrel. When assembling, it often occurred that several of the same mixer arms were placed in one barrel. It is a very simple non-compliance which should not occur, as the only reason is due poor effort and general carelessness of the assemblers. The defect is not as influential, as the mixers would be further assembled in Denmark and they would evidently find the defect and correct it before the product is sold. It does however have an influence on the credibility of COC production and quality inspections when such defects are not identified

Example 2: Bad quality inspection and reporting

As previously mentioned the procedure for making FQC of the concrete mixer involved the preparation of a handwritten report to be place inside the mixers verifying the quality compliance. However, continuous times quality defects were still identified in Denmark, defects within specifications which were listed in the report but evidently not inspected for. It was therefore not only the production workers which were careless, though the quality inspectors as well. This concerns for instance the aforementioned example of the mixer arms, though more critically the cracks in the mixer arms. Due to the constant issues with the cracks it was finally determined that all mixer arms should be welded, until the new production method was implemented by the supplier and approved by COC and SoRoTo. This made inspection procedure easier as it is obvious when a welding has occurred compared to inspecting for cracks.

4.4 Cross Case Comparison

Indicated in the two case studies there is a severe effect on the quality supplied by the Chinese suppliers in relation to the factors identified in the literature review. Both cases experienced great difficulties in obtaining the desired quality both in terms of product quality and in actual deliveries and quantity. Based on the case studies there are several indicators of why the quality performance of the suppliers is suffering. Table 4-7 illustrates the comparison of the two cases in relation to the quality influencing factors identified in chapter 2. There are similarities and differences in the two cases concerning both the influencing factors and the quality performance experienced. These will be analyzed in the following sections

Table 4-7: Comparison of the two cases

Customer / Factors	MK-KøgerA/S	SoRoTo	
		MTS	COC
Supplier relationship	Attempted long term	Long Term	Long Term
Customer focus at suppliers	Low	Low	High
Asset Specificity	High/Medium	Medium	Low
Number of suppliers	2	1	1
Uncertainty	Low	Medium	Medium
Trust	Low level	Medium	Medium
Percentage of turnover at supplier	27%	4.4%	Approx.50%
Specifications alignment	Low	Medium	High
Measurements systems	None	None	
Preferred Supplier List	Yes	No	
Internal knowledge and influence on Quality Inspections	Extensive	Limited	

4.4.1 Supplier Relationship and Performance

By categorizing the purchases conducted by MK and SoRoTo it is possible to identify the best possible strategy for managing suppliers. (Handfield, Monczka, Guinipero, & Patterson, 2009) Figure 4-3 illustrates the four categories acknowledged by Handfield, Monczka, Guinipero, & Patterson (2009) and Kraljic (1983), the characteristics of each category, and where the two cases would be situated in the matrix. The purchases for both of the two customers would be characterized as a critical supply. MK uses two suppliers for the products, one based in Denmark and one in China. The Chinese supplier is considered the preferred supplier and the local Danish supplier is only for emergency in order to maintain delivery assurance, would characterize as a limited number of quality suppliers. The products supplied are standard components within MK, and are used in many different products value added to the operations. SoRoTo utilizes single sourcing on the products in the cases. The products investigated in the case are the main products of the entire portfolio and represents approximately 85% percent of the entire purchasing volume. Besides being indicated from the parameters in Figure 4-3 this was also evident from the outsourcing intensity, especially concerning SoRoTo.

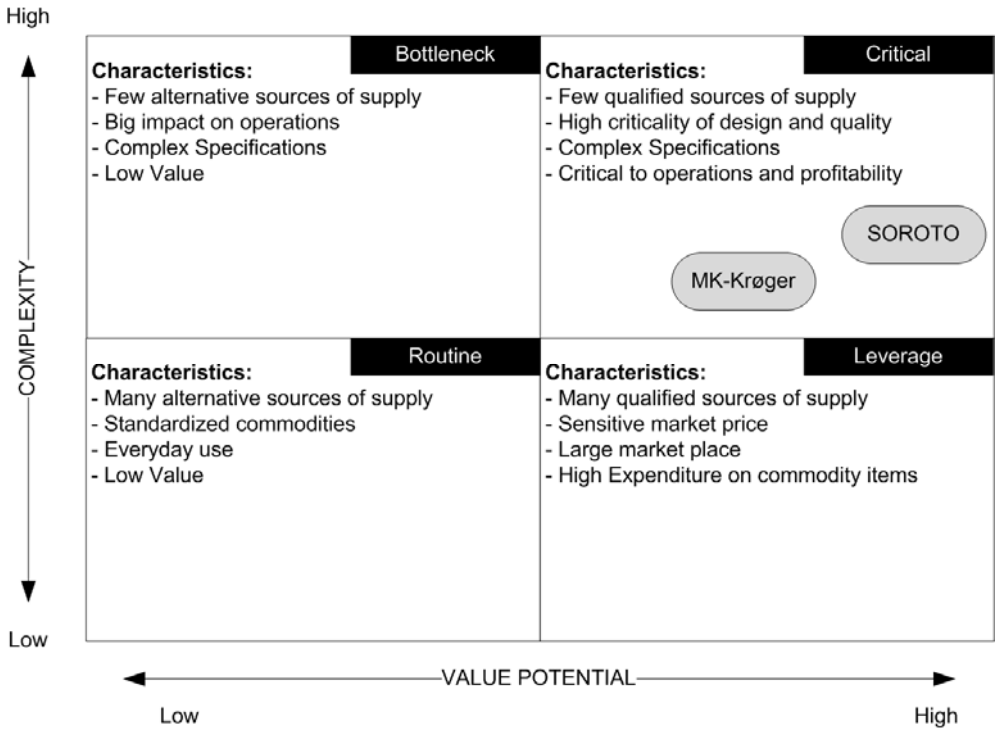

Figure 4-3: Portfolio Matrix for Category Management (Handfield, Monczka, Guinipero, & Patterson, 2009)

When the supply is considered critical to the sourcing company it is suggested to develop long-term relationships or even partnerships with the supplier in order to ensure the supply. (Kraljic, 1983) In relation to the literature study in chapter 2 long-term relationships with preferred suppliers should aid in improving the quality performance of the supplier, if the relationship is well managed. Such relationship should be built on information sharing, achieving mutual benefits, and striving towards shared goals and objective. One issue though concurrent in the two cases is that the supplier was never proved a preferred supplier. According to the definition of a preferred supplier in section 2.1.3 the supplier should have demonstrated its capabilities in previous purchases, though in the two cases the long-term relationship was sought immediately. This suggests the utilization of a single sourcing strategy where it is sought to fertilize the relationship with a supplier by compiling all orders at that particular supplier. With a single sourcing choice it is necessary to have a well established relationship with your supplier, as with poor supply there are no alternative.

Both cases illustrated the desire to establish long term relationships with a preferred supplier, though neither MK nor SoRoTo had any other opportunity. SoRoTo utilized only one supplier for all the products, wherefore it makes no sense to discuss preferred suppliers. The only alternative SoRoTo had, was to internalize the production of belt conveyors, which was done occasionally when supplies were short. Through the case study of SoRoTo it was illustrated that this single sourcing choice had severe influence on their internal operations. As a result of poor supply and delayed shipments due to bad quality the business foundation for SoRoTo were endangered, as they could not comply with demand, and would potentially loose all major contracts with customers. MK did have an alternative supplier in Denmark, where prices were much higher, quality was generally conforming, and delivery schedules were kept, though this supplier were only used when the Chinese supplier did not fulfill requirements. The sourcing

choice of MK can therefore as well be defined as single sourcing, as the Danish supplier was only used when anything else failed. Just like SoRoTo they experienced difficulties with this sourcing choice as the supplier was generally not able to fulfill the requirements or deliver as planned.

Based on this it can therefore be stated that considering the circumstances neither MK nor SoRoTo have been successful in establishing or maintaining a true long term relationship with a shared objective between both customer, COC, and the supplier. This endangered their internal operations and especially concerning MK it has given rise to considerations of in-sourcing or back-shoring the supply to the former used Danish supplier. It is however, not solitarily due to poor establishment of long term relationships that has resulted in this situation.

4.4.2 Influence of Poor Supplier Performance

SoRoTo and MK have through their mainly single sourcing strategy experienced severe consequences resulting from poor performance from the suppliers. This was in contrast to both customers being willing to commit to the long-term relationship by decreasing uncertainty in orders thereby ensuring the supplier a continual turnover. Considering the quality performance in relation to product quality and delivery dependability, SoRoTo was the company mostly influenced despite the fact that the actual product quality was superior to previous suppliers they had experienced. The most considerable quality defect experienced related to the less valued appearance characteristics of the products, but poor delivery performance of the supplier endangered their raison d'être. MK did have a backup supplier in Denmark, though the many quality defects limited the benefits obtained from the outsourcing and damaged the internal production. Through the single sourcing strategy the company experienced a wide variety of different quality non-conformances and late deliveries which increased the costs of operations. The late deliveries were further damaged by the many quality defects, as when one order had to either be reworked or sorted, the next order already placed would be further delayed, and it did result in a helix situation. Some of the non-conformance in the case of MY could be assigned to the initiation phase of the production and that it did require some time for the supplier to fully understand the production of the items, though an initial phase of eight months is too long.

In the literature review in chapter 2 it was identified that through long-term relationships the inventory needed at the sourcing company would be reduced. This should be as a response to the improved quality conformance of products as less backup storage would be need to circumvent any non conforming items supplied. In the cases the opposite proved evident. Both Case companies expressed an increase in the inventory. Even though it was not entirely caused by the poor quality performance it had a considerable influence. It was expressed as non controllable factors such as the distance to the suppliers and the uncertainty in demand would cause the sourcing companies to obtain a larger inventory in order to succumb to incremental changes in demand.

Both SoRoTo and MK in collaboration with COC implemented inspection procedures aiding in ensuring conforming products from the suppliers by marking all inspected items. By doing this the supplier, in this case COC would have to prove the compliance to the quality requirements increasing the likelihood of potential defects being discovered. When identifying non-conforming products meetings were held with the suppliers, but in none of the cases was the

corrective action requests used, which was actually a common procedure within COC. By using the corrective action requests it would be possible to illustrate to the both MK and SoRoTo that non-conforming issues were reacted upon, and the supplier would need to document its improvements and actions taken to overcome the problem.

Therefore in both cases the customers were heavily influenced by the poor performance of the Chinese suppliers and the lack of engagement in improving the performance. The companies were operating with a general diversification strategy where the quality was a common denominator for their competitive advantage, though still taken the price into consideration. This resulted in high requirements to the quality for which the suppliers in general were not able to meet, and the competitive situation for the companies was harmed.

4.4.3 Supplier Opportunism

MK and SoRoTo were much influenced by opportunistic behavior of the supplier. Many aspects interfered with the supplier opportunism, but in general the suppliers utilized their position towards both of the case companies to gain as much benefit as possible without considering the downstream influences. By having a fairly high level of asset specificity the opportunity for the case companies to quickly shift suppliers were limited, and unfortunately with reference to the cultural characteristics of China, this were utilized by the suppliers in different ways. According to the cultural characteristic assertiveness, Chinese suppliers are inclined to consider their own prosperity above shared objectives which was clearly evident in both cases. In negotiations the suppliers increased the prices as a response to continual quality claims and resulting rework. As neither of the suppliers were able to fulfill the agreed upon quality requirements they were often required to rework or sort the produced items, thereby increasing the costs. In the case of MK the 30% cost decrease compared to the Danish supplier were therefore decreased without actually befitting MK with a higher quality or on-time deliveries.

Neither MK nor SoRoTo could be characterized as a preferred customer of either of the suppliers. SoRoTo was in relation to the total turnover estimated for the supplier only a “small fish in the pond” with a limited demand. MK had the potential to become a preferred supplier, or at least a considerable supplier with potential orders of 27% of the total turnover at the supplier, but due to the poor quality performance at the supplier this amount was never realized. The high purchasing amount should be an incentive for MY to focus on MK as an important customer, though as explained by the Strategic Sourcing manager at COC, Chinese suppliers does not generally consider the total amount of orders placed. Instead they would focus on the potential profit from an order by order perspective. This could be the main reason for both suppliers requiring a price increase during negotiations of further orders. Both suppliers realized that due to quality complaints, and rework, the costs of production increased wherefore instead of changing the production set up and eliminating the root cause they would add new production methods and increase the prices. It was however not only the lack of potential turnover which did not categorize MK and SoRoTo as preferred customers to their respective suppliers. There were certain contextual circumstances which as well affected this. As briefly mentioned SoRoTo did not entirely comply with the payment terms and there was a certain degree of financial dispute in the relationship, as well as a lack of ensuring stability in the demand. MK changes to the requirements due to their failure of informing about specifications which were important. According to Handfield, Monczka, Guinipero, & Patterson (2009) it is necessary to

identify and succumb to what the supplier appreciates in the relationship in order to become a preferred supplier, and in this relation the authors clearly indicates the fulfillment of payment terms, minimum of design changes, and a stability in the relationship.

4.4.4 Trust in the Relationships

In both of the supplier-customer relationships there were severe trust issues influencing the negotiations and the general interactions of the involved parties. In the case of SoRoTo the trust issue between them and MTS revolved around the uncertainty factor of the supply, which as well partly could explain the behavior of the supplier. Even though no one can be blamed for not foreseeing the influence of the financial crisis, it had the devastating effect that the orders announced by SoRoTo towards MTS were declined wherefore the supplier most likely lost interest with the customer and acquired a negative attitude to the relationship. In relation to this there were several financial issues between the companies which influenced their willingness to cooperate. These have not been thoroughly studied, but are assumed as contributing factors to the disintegration of the relationship. The trust issues between COC and SoRoTo were of less serious magnitude, though still an area which needs to be sorted out if the relationship should further blossom.

MK had severe trust issues with MY and vice versa, and additionally with COC. As no shipment delivered either to COC or to MK would pass through without any remarks considerations had to evolve concerning whether MY would be possible to ever produce the required quality in the required amount at the required time. Furthermore was the detection of errors on inspected items at COC discovered at MK which would raise questions to the capabilities of the COC inspection procedures and quality engineers. Likewise was trust issues brewing from the perspective of COC and MY towards MK, due to the approval of the processes implemented for solving non-conforming items being approved and then later rejected, all requirements not being clearly formulated to the Chinese supplier, and elevated expectations in relation to the approved production methods.

4.4.5 Internal Knowledge and Knowledge Sharing Between Entities

To ensure the suppliers engagement in achieving the requirements from a quality perspective it is important that a common perception of quality is established. Neither MK nor SoRoTo was able to successfully do so with the Chinese suppliers. This could be influenced by the neglection of involving the supplier in the development of the quality specifications. Therefore it was not collaboratively agreed what would constitute a conforming products. As it was identified by Sila, Ebrahimpour, & Birkholz (2006) it is common to integrate the customer in the development of the quality requirements, though suppliers are less involved. COC did collaboratively develop the requirements with both MK and SoRoTo, but the perspectives of the suppliers were not accounted for in these, wherefore it could be both difficult for the suppliers to understand and agree upon the requirements.

In relation to the internal knowledge at the two customers regarding the procedures of quality inspections there was a considerable difference. MK had extensive knowledge and was able to participate in discussion concerning the acceptable quality levels, as well as defining them prior the establishment of the relationship. This made the knowledge transfer between COC and MK much more efficient as they were aware of each other positions. Contrary did SoRoTo not have

the same amount of knowledge in relation to the procedures of acceptance sampling, wherefore their perspective on nonconforming product were vastly different, and the main reason why 100% inspections were required.

4.5 Conclusion of the Case Studies

MK experienced difficulties as the supplier was not able to live up the requirements indicating a poor evaluation process for selecting the supplier. This had considerable consequences for the supply and the internal operations at MK. SoRoTo was never considered a preferred supplier and was downgraded in accordance to other customers at the supplier due to uncertainty in the order placement. Therefore less attention was paid by the supplier towards fulfilling the requirements of SoRoTo. Without alternative sources of supply for critical products in the portfolio the risk of not having a well established log-term relationship with shared objectives and goals could turn out to influence the business and potentially endanger the raison d'être.

In the case concerning MK they had all the opportunities to establish a long term relationship with the supplier. They had a considerable impact on the entire turnover at the supplier, they committee to future orders to give the supplier the incentive to improve production, they were willing to give concession on products in the initiation phase to illustrate their engagement in the relationship, and still the relationship was not functioning optimally. The initial choice of MK was basically a wrong choice. There were factors influencing the relationship negatively in terms of all requirements not being stated or that that some approval was later rejected, but generally the supplier was not able to fulfill the requirements. When single sourcing in China has been chosen this is a very dangerous revelation. SoRoTo were unfortunately much influenced on external factors based on which the supplier lost interest. Prior to the financial crisis the relationship was well established, though missing orders lead the supplier to seek elsewhere. As this was the only supplier for SoRoTo they were locked in and under the mercy of the supplier.

In general the Chinese suppliers were difficult to engage in long term relationships with shared objectives. Much is to blame on the cultural aspects influencing their ability and willingness to improve on quality performance, as they would utilize the relationship to their own benefit in the form of extreme of supplier opportunism. When such sever supplier opportunism is experienced McIvor (2009) suggests that the sourcing company should internalize the production to avoid the potential damage. This might be possible for MK and but not at all possible for SoRoTo, and in doing so both companies would lose competitive strength in their markets. Therefore it would be more appropriate to identify an alternative sourcing strategy.

5 Discussion

This chapter entails a discussion of two possible sourcing strategies to implement under the circumstances identified in the case studies, and proposes a combines strategy. End ends with a description of how the proposed strategy could be implemented with relevant initiative to ensure quality conformance in the supply chain.

5.1 Multiple or Single Sourcing

As illustrated through the case studies both case companies experienced difficulties in the single sourcing relationship with their respective supplier. SoRoTo had at the moment only one potential supplier wherefore it resembles a sole sourcing decision where no alternatives are present. This situation only resembles sole sourcing as other potential suppliers are present, though not immediately. Pure sole sourcing is when only one supplier would ever be present. MK had an alternative supplier in Denmark but deliberately chose to only source the products from the Chinese supplier and use the Danish as a back-up, wherefore this is a clear case of single sourcing.

Due to the high focus on supply chain management and optimization in today's business world many companies have changed the attention from arms-length, short-term multiple supplier relationships to long-term single sourcing partnerships which relates to the development of improved quality performance. (Shin, Benton, & Jun, 2009) The benefits of single sourcing are not completely unitary among scholars. Much literature indicates that from single sourcing a purchasing company would gain access to improved quality performance and continues cost reductions. (Narasimhan, Nair, Griffith, Arlbjørn, & Bendoly, 2009) This is much in line with Deming's 14 points which are commonly known to improve quality performance. According to the fourth point a long term relationship should be sought with a single supplier to award this supplier by purchasing more. On the other hand Michael E. Porter argues that buy collecting all purchases at one particular supplier this would give the supplier the opportunity to exploit its power by increasing prices and reducing quality as examples. (Larson & Jack, 1998) Table 5-1 lists the different advantages and disadvantages of single and multiple sourcing.

Table 5-1: Advantages and Disadvantages from the Two Sourcing Strategies (adopted from (Costantino & Pellegrino, 2010))

	Single Sourcing	Multiple Sourcing
Advantages	Partnership between buyers and suppliers allows cooperation, shared benefits and long-term relationship based on high levels of trust	Increased competition among suppliers leads to better quality, price, delivery, product innovation and buyer's negotiation power
	Large commitment of the supplier that is willing to invest in new facilities or new technology	More flexibility to react to unexpected events that could endanger supplier's capacity
	Reduction of risk of opportunistic behavior	Alternative sources of materials
	Lower purchase price from reduced production costs, better knowledge of the manufacturing process and achieved economies of scale	Reduced probability of bottlenecks due to insufficient production capacity to meet peak demand
Disadvantages	Great dependency between the buyer and the supplier	Reduced efforts by supplier to match buyer's requirements
	Increased risk of supply interruption, especially for asset specific products	Higher costs for the purchasing organization (greater number of orders, telephone calls, records, etc.)
	Increased vulnerability of supply	

Comparing the listed advantages of single souring in Table 5-1 to the results of the case studies, none of these were actually achieved. Studying the advantages closer it is evident that these are only possible under certain circumstances, the main point being the willingness and commitment of the supplier chosen for single sourcing. If the supplier is not willing to commit to a long-term relationship, perhaps because they do not perceive it as beneficial, the opportunistic behavior is not avoided, the lower prices not achieved, and the investments not performed. Therefore it is a crucial factor that the supplier is willing to cooperate towards common goals in order for the purchasing company to obtain the advantages. On the other hand were the disadvantages of single sourcing unmistakably present in the cases. Neither SoRoTo nor MK did receive their products in time and both were affected internally by their dependence on the supplier.

As indicated through the literature review in chapter 2 some of the main initiatives to improve to improve quality in the supply chain entail trustworthy long-term relationships and knowledge sharing. Both of these would indicate the usage of single sourcing as the best way to improve quality. On the other hand are negative influences on quality such as potential supplier opportunism and cultural characteristics giving reason for choosing multiple suppliers, as indicated by the case studies.

There are pros and cons for both types of sourcing strategy in the case studies. The main barrier for using multiple sourcing in the cases concerns the asset specificity in the products, as both MK and SoRoTo has a certain level of asset specificity either because the product itself are specialized or because specific tools are needed in order to produce them. This factor limits the potential for using multiple sourcing as the switching costs between suppliers would be too great and the process of approving different suppliers each time would be both time-consuming

and costly. In addition are the tight tolerances, especially for MK an obstacle as achieving these tolerances proved the most difficult task for their current supplier, wherefore it would most likely be a difficult tasks for other suppliers as well. Considering single sourcing and the experiences gained from the case studies this is not the most suitable choice either. Both companies were much affected by the supplier opportunism resulting in untimely and non-conforming deliveries. Another issue in this relation concerns capacity. In the case of MK the supplier was not able to produce the product in time for delivery indicating a lack of capacity; whereas MTS, the supplier for SoRoTo, had much capacity but did not consider SoRoTo as an important customer wherefore they were often placed last in the production planning. In such instances McIvor (2009) suggests that the companies should internalize the production to overcome the supplier opportunism, though this would not be in the best interest for any of the companies. Instead mechanisms to countervail the opportunism should be implemented and the sourcing strategy potentially changed.

One way to overcome the choice between multiple suppliers and single sourcing is by choosing a dual sourcing strategy. This would imply building a close relationship with two different suppliers supplying the same products. By doing so the purchasing company would decrease the negative influences of supplier opportunism and ensure supply, as well as gain the benefits resembling single sourcing. (Larson & Jack, 1998) There are some extra costs embedded in such a strategy compared to actual single sourcing as the ordering costs will be increased. (Burke, Carrillo, & Vakharia, 2007) The usage of an effective dual sourcing is described in Appendix D: Additional Case Examples, where MENU, one of the other customers of COC, uses two main supplier for all porcelain products, and has as well three alternative suppliers, just in case. This has given them the opportunity to shift between supplier in accordance to their previous performances and current production capacity, whereby acceptable, conforming supplies are ensured on time.

5.2 Sourcing Efficiently in China

Single sourcing may not be the most efficient purchasing strategy in china from a Quality perspective. The cases clearly illustrate that quality issues arise from Chinese suppliers without considering the downstream influences on the supply chain. Based on the experiences from the case studies there are various influencing areas where the purchasing company should place attention in order for the single sourcing to become a viable strategy, and ensuring conforming supplies. One way to handle these areas could be by dual sourcing in order to always have an alternative. For dual sourcing to be efficient it is still important that the two chosen suppliers are much committed and engaged in the relationship wherefore the initiatives taken in order for a dual sourcing to be applicable is much equal to the initiatives for single sourcing. Based on the case studies dual sourcing would be the most applicable sourcing strategy for those companies in China. By dual sourcing it is actually meant that the purchasing company should seek to develop “single sourcing” relationships with two suppliers. (Yu, Zheng, & Zhao, 2009) This is mainly to ensure delivery, to avoid the situation which SoRoTo is currently in, though as well to improve the quality. When utilizing two suppliers the possibility of either of them acting opportunistically is reduced, as the consequences of a non-conforming supply becomes clearer. In the cases, MK for instance kept on placing orders at the supplier even though the quality performance was generally poor. Therefore the supplier lost incentive to rush improvement

through, and instead asked for either concessions or requirements reductions, in order to be able to initiate the following order.

5.2.1 Avoiding Supplier Opportunism

In order to decrease the opportunity of supplier opportunism by the Chinese suppliers they need to understand the consequences of poor performances. Not only the downstream influences but what the consequences for themselves would be. Through dual sourcing it is possible to shift between suppliers and the original suppliers should be informed of this, either directly when establishing the relationship or through the actions of the purchaser. In order to illustrate the consequences to the suppliers it is necessary to establish a measuring tool where clearly defined threshold requirements are established. Such a measurement tool should be used to verify the supplier's performance, based on which it would be possible to argue for a change in supplier. When conducting dual sourcing the actual purpose is not to use either of the suppliers entirely, but to use them simultaneously where each supplier is assigned a certain proportion of the order quantities, though with a higher proportion going to either the most capable supplier or the supplier with lowest costs. (Treleven & Schweikhart, 1988) The measurement tool used should then aid in deciding upon where to place the most orders, and if performance is declining this should be changed to the second supplier.

One way to develop such a measurement tool is through a weighted point system. In such a system important performance parameters of the supplier are identified and weighted in accordance to importance. (Handfield, Monczka, Guinipero, & Patterson, 2009) With a purpose of improving the delivery performance and general quality these parameters should be weighted the most important. Based on the performance of the suppliers they are assigned specific scores ranging from excellent to poor, and calculating the overall average score would give the sourcing company documented evidence for changing main suppliers. An example of how such a weighted point system could be designed is illustrated in Table 5-2. The data in Table 5-2 are imaginary and based on an example in Appendix E: Supplier Measurement System**.**

Table 5-2: Example of Weighted-Point system for supplier measurement

	WEIGHT	SCORE	WEIGHTED SCORE
Delivery on the agreed upon date	0,3	3,25	0,975
Percentage non-conforming	0,3	2,83	0,85
Quality improvement initiatives	0,1	2,00	0,2
Corrective action response	0,15	4,00	0,6
Cost comparison with other suppliers	0,15	4,00	0,6
Total Ranking			3,225

By using a measurement system as illustrated in **Error! Reference source not found.** and urther explained in Appendix E: Supplier Measurement System**,** the purchasing company would obtain explicit data for evaluating the performance of suppliers on which to base the further actions taken to improve the supplier relations. This should as well be aligned with the use of Corrective Action Requests, in order to formally inform the supplier of a necessary

improvement as well having the supplier to document the improvements implemented. This would result in objective evaluations of the suppliers instead of subjective evaluations which can be biased according to who are evaluating the supplier. The usage of a measurement system relates to the important argument from Kanyak & Hartley (2008) concerning the suppliers being informed about their current performance in order to create incentives to improve. It is important before implementing such a system that the purchasing company determines when a supplier is performing acceptable. This should be based on the total ranking of all the performance categories, though the system would as well indicate the specific performance categories where the supplier is not performing in accordance to requirements, wherefore it would be easier to identify where improvements are necessary. The usage of a measurement system was proven effective by the customer MENU, as explained in Appendix D: Additional Case Examples. They had implemented a measurement tool integrated into their supplier database where suppliers were measured according to for instance quality performance, delivery dependability, production capacity, price competitiveness. Together with the basic information, agreement status, audit status, and competences these measurements were used to categorize the suppliers in three levels (A, B, C) where the highest ranked suppliers would be the main supplier for order placement and new projects. This aided in ensuring that MENU always used the best capable suppliers for their projects, and gave the incentive for suppliers to improve in order to gain more business.

In order for the measurement system to be effective it is though important that, firstly, the supplier is made aware of such a system, as this would influence their disposition of acting opportunistically, and secondly that the supplier have a desire to remain the main supplier of the purchasing company and therefore would be willing to invest in improving its performance. In order to get the supplier engaged in improvements it is important that the purchasing company seeks to become an important customer and if possible the preferred customer. This would entail committing to place future orders at the specific supplier in order for the supplier to be dependent on the turnover created through the relationship though as well to nurture the important aspects of the relationship perceived by the supplier. (Handfield, Monczka, Guinipero, & Patterson, 2009) This is much similar to the identified initiatives for single sourcing, though in the case of dual sourcing, if the supplier fails to fulfill the requirements of the relationship, another supplier is available immediately. This is a critical point of dual sourcing, as by using two suppliers simultaneously the amount of orders placed at each supplier would be considerable less compared to single sourcing. It could therefore act as an obstacle for the supplier commitment. Due to this constraint it is important for the purchasing company to have the supplier engaged in the relationship and make them understand the potential. This could be done by committing to future orders, or for instance by announcing a potential of becoming a single supplier for the components, as long as the performance meets the requirements. This does not contradict the initial statement of dual sourcing being the most appropriate, as through continuous proper performance it could be beneficial for both parties to engage in a single sourcing, long-term relationship, just not as the initial engagement. Another way to prove oneself as an important customer to the supplier could be to indicate developments of future products and activities to be managed by the supplier. If it would be possible to become a preferred customer at the supplier this would work as a countervailing mechanism for opportunistically behavior. (Narasimhan, Nair, Griffith, Arlbjørn, & Bendoly, 2009)

The commitment of the supplier to a preferred customer is not necessarily enough to prompt quality improvement initiatives, and if the purchaser is only using dual sourcing the desire to become the preferred supplier is not either necessarily enough. Therefore it would be beneficial for the purchasing company to implemented further countervailing opportunism-blocking mechanisms. It was identified by Hart, Schleifer, & Robert (1997) hat through outsourcing where the supplier would uphold the manufacturing control rights the incentive to initiate quality improvement efforts was declined. As indicated through the literature study the Chinese culture is much assertive and identified through the cases the focus of Chinese companies is much on the profit and monetary benefits. (Kull & Wacker, 2010) It would therefore be beneficial for the purchasing company to use this knowledge to create the incentive for suppliers to improve their quality. This could be done through a voluntary price increase in relations to quality improvements and performance. In both cases the usage of AQL and acceptance sampling defined whether a batch of products were conforming to the requirements of the customer, and these could as well be used to construct a price increasing tool for quality improvements, as a bonus scheme. An example of how this could be designed is illustrated in Table 5-3.

Table 5-3: Example of Bonus Scheme for Supplier Improvement

Bonus Scheme	
Original price + x%	Complete conformance
Original price + y%	Pass tight inspections
Original price	Within AQL requirements

The implementation of both the measurement tool, and the following consequences of poor performance, and the bonus scheme for improved quality would work as a carrot-and-stick approach. This would give an incentive to improve the quality aligned with the cultural characteristic and general business behavior of Chinese suppliers. The usage of dual sourcing and the potential implementation of a bonus scheme are both additional costs compared to the single sourcing strategy. This could result in a general reluctance for sourcing companies to engage in these initiatives. Though considering the potential benefits of having a long term relationship with one of the suppliers, which has proven capable of supplying conforming items and engaging in improvements, as well as always having the opportunity to reestablish the relationship with the second supplier if needed, the additional costs are well spend compared to experiences the difficulties identified in the case studies.

5.2.2 Quality Understanding

Before implementing both of the above initiatives it is important for the supplier and the customer to agree upon a common understanding of quality. As evident from the case studies the exact definition of a conforming product was not aligned between the participants. The perception of quality is different in different cultures. This is evident from both cases as well as from the additional case examples in Appendix D: Additional Case Examples, where Chinese suppliers perceive functional quality way above appearance. This was proven a big issue through the case studies as many of the quality complaints were due to appearance defects. When agreeing on a common quality standard it is very important for the purchasing company

to take the production methods into account when stating the requirements. Through the approval process of the suppliers the manufacturing technologies and methods have been approved wherefore stating requirements not in line with the these would be partly acting untrustworthy as in the definition by Sila, Ebrahimpour, & Birkholz (2006). The common quality perception should be clearly expressed through the specifically designed quality inspection specifications for each product, and it is important to have the supplier's consent in these in order to ensure that all parties are on the same page. These specifications should clearly state all the critical characteristics of the products which are to be inspected for, as well as the maximum level of defects allowed. They have to be implemented throughout each of the involved organizations in order for the production workers to be aware of the potential defects as well facilitate the performance of in-process inspections during manufacturing.

To further ensure a general understanding of the quality level the requirements should be supported by an overall quality manual which states the necessary requirements in general for all products purchased at the specific supplier. Such a manual were used by MENU as described in Appendix D: Additional Case Examples. This manual was implemented across MENU, COC and the suppliers which ensured a clearly defined process of inspections and reporting of occurring defects as well as the actions to be taken as response to non-conformance. For ensure quality conformance such manual should clearly state where to conduct quality inspections in the manufacturing process. In the two cases studied the supplier did not perform any official quality inspections themselves. The reason might be that this was the purpose of COC, though as stated by Kannan & Tan (2007) it is important that the supplier is able to verify its own conformance to requirements. It is important to emphasize the necessity of the supplier conducting quality inspections, and even though it could seem as an untrusting requirement it would be beneficial to both parties if the supplier would submit reports made of the inspections to the purchasing company. Therefore it is suggested to collaboratively agree with the supplier where in-process inspections are necessary and have the inspection reports submitted to the purchasing company. This is in the best interest of both parties. The supplier will be more likely to identify any defects occurring in the process and would be able to adjust if necessary, thereby avoiding a potential rejection by the customer. The purchasing company would be ensured of a conforming supply and through the inspection reports submitted by the supplier, they could potentially aid in solving problematic issues. The requirement of having in-process inspection reports supplied would potentially compromise the trust issue of the relationships, as it could by the supplier be perceived as a act of mistrust, in the same way as described in the case studies concerning the FQC reporting. Though it is a temporary insurance of the process performing as required and through continuous compliance to the requirements it could potentially be sacrificed.

5.2.3 Knowledge Sharing

Aiding in the improvements of potential quality issues leads to the issue of knowledge sharing, which as identified in the literature review is a highly influential factor on the quality performance of the supplier. It is much related to the development of the quality specifications as the knowledge impactedness the purchasing company has from previous experiences with manufacturing of the products, especially concerning outsourcing, should be used to develop these specifications. Before initiating the actual process of knowledge sharing there are several actions to be taken and factors to be accounted for by the purchasing company.

First of all the purchasing company needs to identify which knowledge to transfer, as well as ensure that they have the right knowledge and that they are capable of transferring it. Relating initially to the specifications, it is vastly important that the purchasing company is aware of which specifications are the most critical for the product from a quality perspective. Referring to Keki Bhote's statement of most non-conformances being caused by poor specifications it is extremely important from the sourcing company to be clear and concise, and not develop capricious specifications. In a product not all specifications are equally important in relation to quality conformance, either because there is no direct influence on the product capabilities or appearance, or perhaps they are embedded in the manufacturing tools, as illustrated in the MK case. In Appendix D: Additional Case Examples there is an example concerning exactly the identifications of the important measurements for quality specifications, as when the customer CMS-dental provided COC quality department with drawings of the products, they failed to initially inform about important measurements. This resulted in the development of quality inspection instructions where all measurements were thought equally important. Even though they would be, the measurements embedded in the plastic injection moulds would be fixed, and conducting 30 measurements on a product which are 43.7mm * 35.6 mm is not an appropriate requirement. In the same instance it is important to identify proper tolerances of these measurements. Even though as stated by Genichi Taguchi[19], that tolerances are not enough to ensure complete quality performance as this could result in poor quality when several items are connected, it is important to identify the minimum and maximum tolerances of each measurement. (Jensen, 2005) As identified in the case studies tolerances were perceived by the suppliers to be the optimal goal, wherefore no improvements would be necessary. Though as stated by Taguchi, poor quality is through committing to tolerances rather than designing the production to produce at the nominal value. To succumb to both the believe of Taguchi and the general behavior of the Chinese suppliers, tolerances could be kept very tight. This is though not complying with the statement of Keki Bhote, but if it is only the most important specifications which these tight tolerances are applied to, at can be justified. It would however give additional obstacles as the risk of non-conformance is increased. Though through collaboratively developing the specifications with the supplier this risk should be overcome.

Relating to the qualitative specifications of the products it is important that the purchasing company is able to specify exactly how these are to be evaluated. Unlike the measurement specifications the qualitative requirements are often tacit and difficult to describe in exact terms. For identifying the qualitative specifications and making them explicit Sila, Ebrahimpour, & Birkholz (2006) suggest the usage of quality function deployment. This is a method where the important functions and capabilities of the final product are transformed to specific identifiable characteristics on which to evaluate the products.

When having identified which quality related knowledge to pass to suppliers the knowledge needs to be decontextualized. The knowledge of the purchasing company especially in relation to the quality perception is much affected by the context in which it is initially created. This concern for instances the cultural characteristics of the original knowledge creators, the economic circumstances, the social constructs, and the technological capabilities. Prior to engaging in the knowledge sharing it is important to consider the knowledge, and in this relation

[19] Genichi Taguchi is one of the quality gurus behind the development of Total Quality Management

the quality requirements, from where they are created and extract it from the context, in order to be able to apply it in a new context, which in the cases concerns the Chinese business culture. The difference in the context would for instance concern the tendency to apply more processes to ensure quality conformance rather than improving the current process, which is related to the cost of labor. This is why the specifications stated in the inspection instructions for the suppliers should be related to the context in which they are applied rather than in the context where they are developed. This is very important in order for the translation process to be effective as if it is considered in the original context it would be difficult for the workers at the supplier to adapt to the new knowledge. (Jørgensen, 2010)

Having identified the knowledge to be transferred and related it to the context in which it is applied it is necessary to identify how to best transfer the knowledge. To do this Ferdows (2008) identifies two parameters to classify the knowledge on and thereby find the optimal transfer method. These two parameters are type of knowledge evaluated along tacit or codified and speed of change evaluated as either slow or fast changing. The speed of change concerning the knowledge relevant for quality inspections and assuring conformance are considered to be slow changing, especially for well implemented products at the purchasing company. As stated above, quality manuals and clear inspection instructions should be developed which clearly identifies the specific quality characteristics to inspect for, wherefore it could be argued that the knowledge has been codified. According to Ferdows (2008) the best way to transfer slowly changing codified knowledge is to develop manuals and systems. This is supporting the above description of developing a quality manual. However, due to the difference in the contextual circumstances some of the tacit knowledge attempted codified would be misunderstood and possibly not applicable. This would make the transfer through explicit data problematic wherefore it is suggested for tacit, slowly changing knowledge to be implemented by moving people. (Ferdows, 2008) This could be completed through supplier visits where training sessions are conducted in order to have the workers at the supplier retrieve the tacit knowledge through practical application. Such training should mainly focus on the blue collar workers actually performing the production as well as the quality inspectors at the supplier. Though as it was indentified in the case studies the employee return rate are fairly high in China this is not sufficient. It is necessary to have the managers at the supplier facility involved in the training as well, as they are the responsible for training new workers and ensuring that continuous training is performed. Proper training of the employees at the supplier would improve the overall learning capacity of the supplier wherefore potential new projects would be more applicable. (Jørgensen, 2010; Lim & Tan, 2010)

It is not only the knowledge concerning the products conformance which needs to be transferred between the customer and supplier, but also the knowledge related to how the conformance is verified through inspections. It was identified in the cases that the suppliers did not have any formalized procedures for conducting quality inspections, and no reports were submitted. This indicates that the suppliers need training and instruction on how to actually perform such inspections, which initially would require the purchasing company to be aware of this. Concerning the MK case it was evident that the customer had considerable experience with the inspection procedures, and was able to interfere and suggest improvements to this. This was however not common for all. Several of the additional cases described in Appendix D: Additional Case Examples and in the case of SoRoTo as well, the customer was not actually

aware of how exactly the products were verified and how the procedure of conducting the quality inspection based on acceptance sampling would interfere. This made it difficult for those companies to understand that potential defects could occur, and they were not able to interact with COC in defining the procedures. Therefore it is suggested for purchasing companies to ensure appropriate quality inspection to initially identify how they need the inspections to be performed, and then in collaboration with the supplier develop the specific inspection procedures, to implement at the supplier and apply it to the quality manual.

5.3 Additional Remarks

One problem with using dual sourcing concerns the quantity and the amount of orders placed, if it cannot be justified to use two suppliers as the order quantity is too small, single sourcing might be the only option. In the case of SoRoTo this might be the case as the order quantities are fairly low and with a certain degree of uncertainty. In this specific case it is important to act with the single supplier as explained above, though it would be necessary to have a supplier engaged in the relationship and willing to commit to improvement efforts necessary to fulfill the requirements. One way to ensure this is to become the preferred customer at the supplier and as it is identified that profit is the main focus of Chinese suppliers it would be important to find and use a supplier where ones purchases would account for a considerable amount of the total turnover.

The identified initiatives for improving the dual sourcing strategy does not take into consideration the initial approval and evaluation process the suppliers. Prior to choosing a supplier it is very important to ensure that the supplier is able to meet the requirements on a strategic as well as operational level. (Talluri & Narasimhan, 2004) The above initiatives are based on the assumption that a thorough evaluation process has been conducted prior to choosing the supplier, and are therefore focusing entirely on how to improve the relationship with the supplier in the perspective of improving the quality of supplies.

6 Conclusion

The identified influential factors on quality in international sourcing of anti-commodity products were confirmed of their influence, but the not all of the expected influences was verified through the case studies. The main influencing factors identified relates to the cultural characteristics of assertiveness and collectivism, the risk of supplier opportunism, trust in the relationship, and the alignment of a quality definition and specifications of products.

One particular factor concerns the establishment of long term relationship with single suppliers, single sourcing, was assumed to improve the quality performance positively. This is however much affected by the cultural characteristics of the supplier. If the supplier does not perceive the relationship to be a collaborative mean to achieve common goals they would be inclined to behave opportunistically in negotiations. Such opportunistic behavior is much related to the assertiveness and collectivistic characteristics of the culture where own personal benefits are perceived more important than the collaborative achieving of common goals. This would harm the quality conformance of the supply chain both in terms of product quality and delivery dependability.

Establishing long-term relationships with suppliers does not necessarily imply an improved quality performance, as several of the indentified factors have to be taken into consideration. Single sourcing strategies could be effective though it is much affected by the environment and circumstances of the relationship. The sourcing strategy proposed for environments resembling the ones in the cases would be to engage in dual sourcing wherefore supplies are more likely to be ensured, and quality improvements encouraged. This strategy should moreover be characterized as developing a common understanding of quality requirements, identifying and transferring relevant knowledge for ensuring quality conformance, and implementing countervailing mechanisms to block potential supplier opportunism.

Quality will not necessarily deteriorate when sourcing from China.

It just needs the proper level of management!

7 Suggestion for Future Research

The initiatives identified for ensuring efficient sourcing is based on the assumption that the supplier to interact with has been approved through a selection and evaluation process, there by disregard this process of the sourcing strategy development. Talluri & Narasimhan (2004) emphasize the importance of the supplier selection and evaluation process in determining the relevant sourcing strategy. The result of the case studies indicates that certain initiatives regarding the evaluation process are necessary when deciding upon single sourcing in a different business culture. It would therefore e an issue for future research to focus on how evaluation criteria are affected by the verified factors influencing the quality. Furthermore does the study consider only Chinese suppliers and their performance in relation to attribute quality inspections from acceptance sampling. There are no indications on how Chinese suppliers are performing if conducting statistical quality inspections or controlling the production process more thoroughly. Even though the study indicates that this is generally not applied in Chinese productions further studies should investigate how Chinese suppliers would perform in relation to quality performance when statistical process control is implemented. This could potentially affect the choice of sourcing strategy.

In relation to the above, the companies investigated in this study could be characterized as SME's both in terms of the suppliers in China and the Danish customers. It is assumed that larger, multinational companies on the purchasing side are initially aware of the supplier performance and the actions taken to ensure quality conformance, as well as larger suppliers would be more in control of the production and quality management process. Though it is suggested to conduct further studies into larger organizations to identify how the different factors influence the quality performances and which initiatives that should be taken to ensure conformance.

It would as well be interesting to investigate the situation of two case companies using the same supplier in order to investigate if there are any differences in their approach to the supplier as well as how the supplier interact and engage in the two different relationships.

This study has only entailed focus of Chinese suppliers. Indicated in the cultural works of Kull & Wacker (2010) and Lagrosen (2003) combined the other Confucian Asian countries have slightly different cultural traits. The Chinese culture was actually considered less applicable for quality management initiatives based on the cultural characteristics. It would therefore be interesting to investigate other similar countries to identify whether it is the Confucianism inherited in the cultures which influences their ability to adapt to quality related initiatives.

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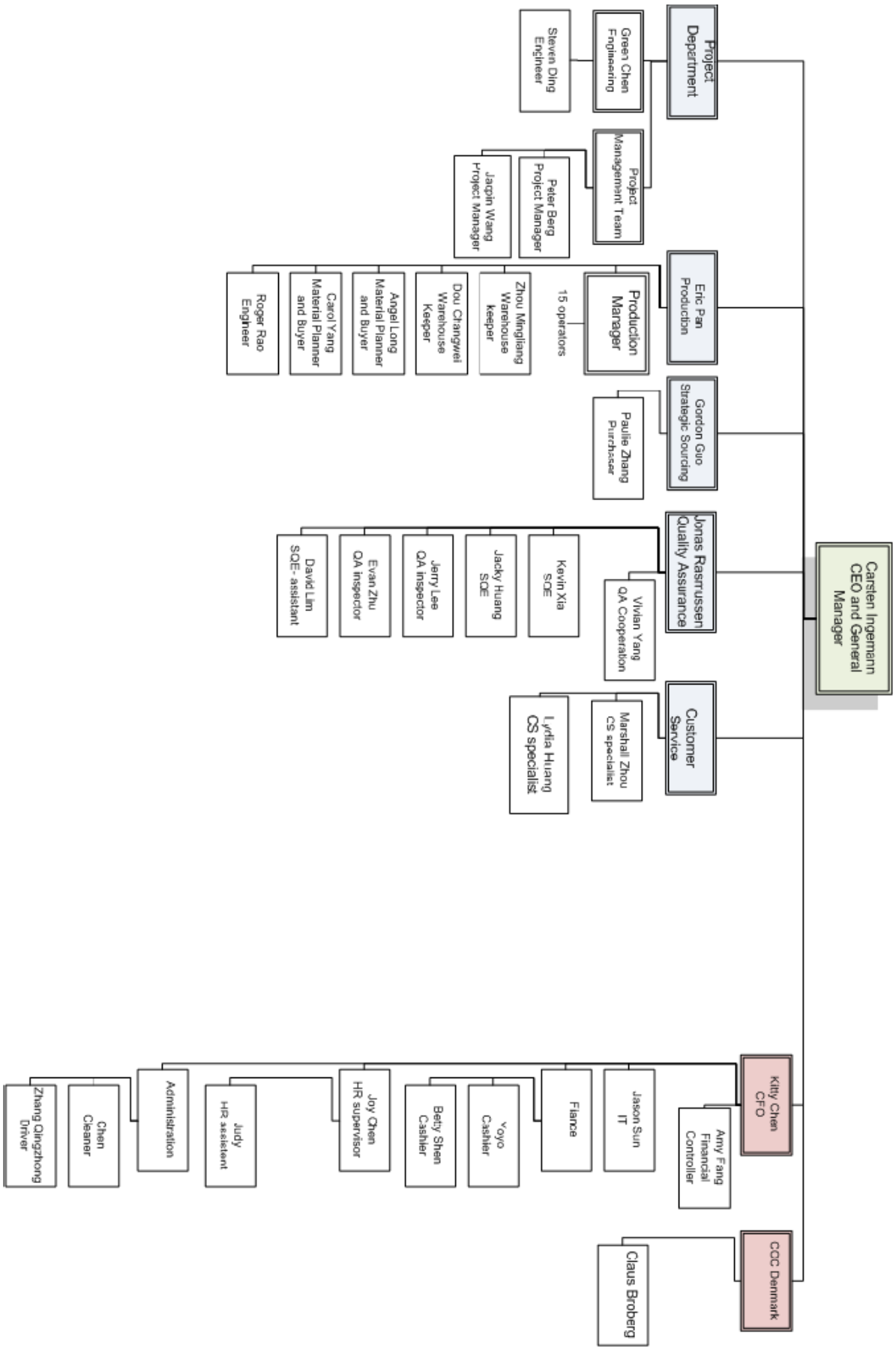
Appendix A: Organizational Diagram



Appendix B: MK Products

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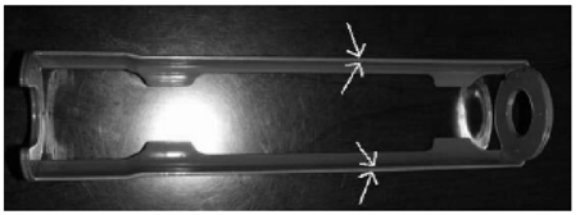

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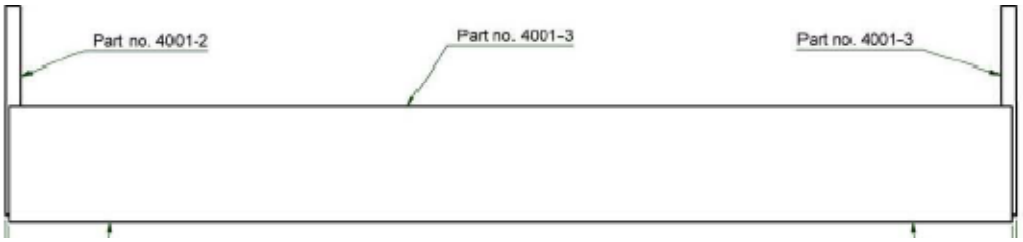

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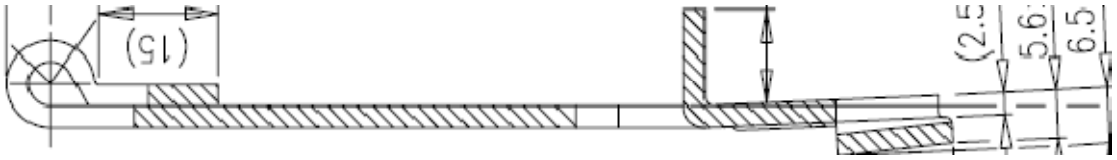

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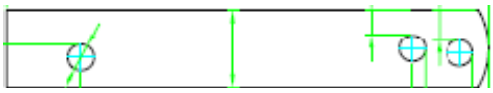
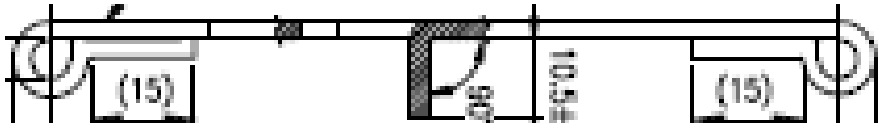
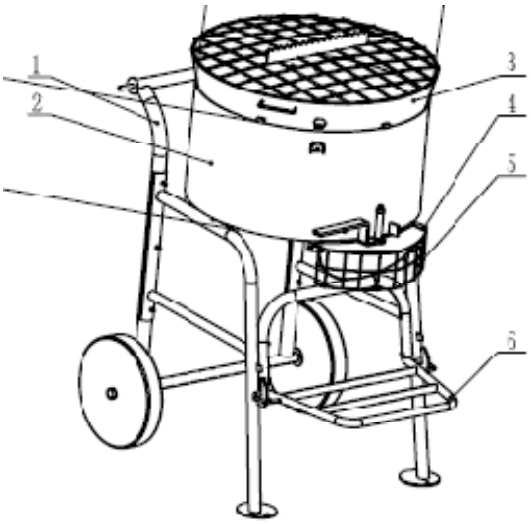


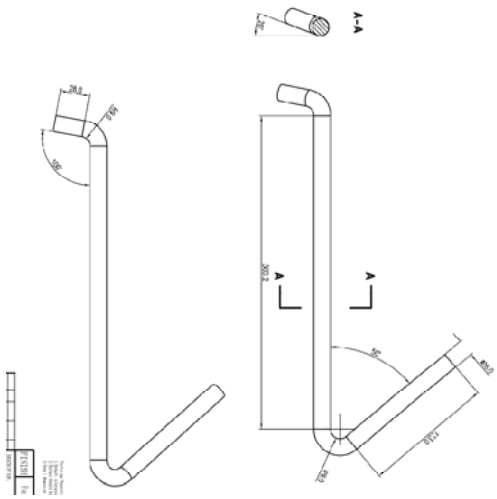
B.5: 20025



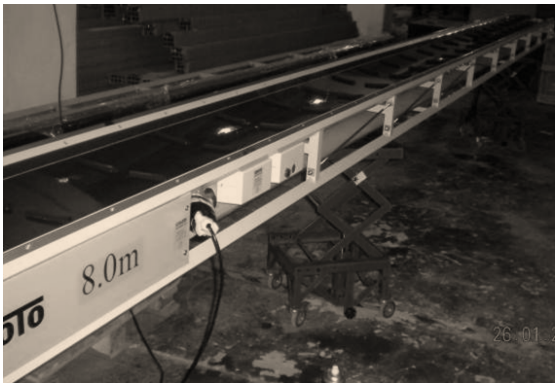
Appendix C: SoRoTo Products

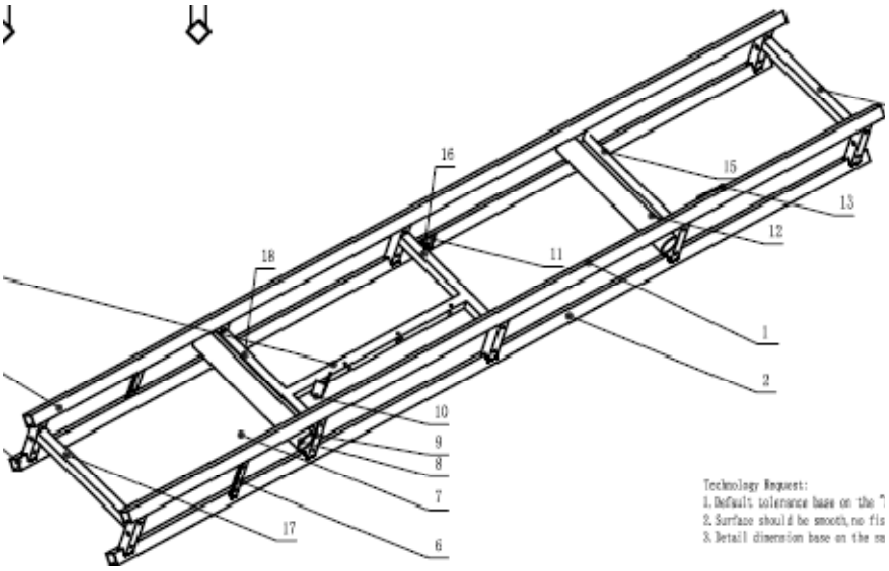
C.1: Mixers and Mixer Arms





C.2: Belt Conveyors





Appendix D: Additional Case Examples

This appendix will outline some additional case experiences to support the performed case studies and the results of these. The case examples are concentrated on four additional customers to COC: MENU, a Danish company famous for the designs of tableware, interior accessories and everyday products, made of especially porcelain and plastic; Novida, a Danish design company within interior design and furniture; CMS Dental, a design company working with dental equipment; and LA-CO, an American company specialized in the development and production of liquid paint markers.

D.1: MENU

For each product produced for MENU there was a specifically developed inspection instruction document. It is basically the same as the inspection instructions described in the case studies, though with one specific difference. Due to the high importance of the appearance quality all criteria in these specifications are made numerical. It might seem ridiculous that scratches in the glaze for instance, are defined in accordance to how long they are to determine whether it is a major or minor defect, though by having it defined this specifically, it is never a subjective evaluation of the appearance. Any type of defect in either of the products are specifically determined in relation to the size of the potential defect, the concentration of the defect, and the location of the defect in order to determine whether it is conforming to the quality requirements. These specific criteria for the different defect types are as well in relation to the size of the product as for large items more or larger defects are allowed. The very specific quality inspection instructions did have a positive influence on the general quality level of MENU‘s products and it made it less likely that borderline defects would be accepted.

Problems with these specifications did though occur within COC. As such specific instructions are very time consuming to formulate, inspection instructions were often copied to similar products. These resulted in often problematic situations where the requirements did not correspond to the products. In such cases the quality inspector was encouraged to rely on his previous knowledge and experience, as this was very important in for evaluating the potential defects in for instance porcelain, due to the characteristics of the material.[20]

Not only did MENU understand the entire process of how quality inspections were performed, they actively engaged in defining how they should be performed. Combined with the clear and specific inspection instructions introduced a Quality Manual was developed to ensure a standardized inspection procedure and general interaction with the supplier, which increased the quality level and created a common collaboration with suppliers. The Quality Manual, or Quality Management Work Instruction as it is called internally at COC, was a document developed in a collaboration of MENU and COC, where all general procedures of the quality assurance are stated. This document gives clear guidelines for collaboration between COC, MENU, and the supplier in relation to:

- Responsibilities of the different involved parties.

[20] David Ye, Former Project Manager at COC, current Project Manager at MENU China Office

- Work procedures and flow of inspections concerning, when to perform, how to perform, and how to arrange the inspections.
- Different types of inspections such as Pre-shipment, In-process, and Re-inspection.
- Inspection levels and AQL for all products based on material.
- Different sampling plans in accordance to the prior performance of the products, and when to shift from normal to tight inspection.
- Reporting inspection results
- How to handle problematic products
- Consequences of non-conforming shipments

This manual is implemented in all relationships with suppliers, and they are made aware of their responsibilities by the project manager at COC in order to ensure their compliance to the requirements and quality standards. The manual helps in ensuring the action taken based on non-conforming products; therefore the suppliers are prior to the engagement in the relationship, aware of what is required and what will occur if this is not complied with.

MENU utilizes a broad span of suppliers for their different product. In total the entire supplier portfolio entails 12 different suppliers managed by COC. For every component there are at least 2 suppliers. The general strategy is to establish a long term relationship with one supplier in order to improve the costs spend on supplier management and utilize economics of scale, but to maintains at least one alternative suppliers to overcome capability issues and ensure supply. Suppliers are categorized in three levels (A, B, C) depending on their production capabilities and the quality of their production, where the suppliers rated the highest are determined as the preferred supplier. Being categorized as the preferred supplier entails new projects often being proposed to those suppliers initially in order to compile and concentrate as much business as possible with the main suppliers. Whenever a supplier has been used for a certain production they are kept within the database as a potential alternative if the main supplier is not able to produce or would experience a decrease in quality.[21] For the production of porcelain two main suppliers were used, but three smaller suppliers were kept as alternative for smaller production.

D.2 Novida

The activities performed by COC for Novida entailed purely quality inspections and assurance and different suppliers. One of these tasks was performed at a supplier of spray painted wooden furniture. The introduction to these tasks was organized as a part of a supplier visit together with representatives of Novida. On beforehand Novida sent pictures of defect samples which they had previously received in order for the COC representatives to gain an understanding of what type of defect that was to be inspected for. This should then be the basis for developing the inspection instructions for the quality inspectors to for future tasks. Inspecting samples at the supplier together with the Novida representatives resulted in several issues. Not as much in relation to the quality of the products, but more concerning the clear specification of requirements. All the items had several paint defects with scratches, running paint, saw marks, excessive paint , missing paint, contamination under paint etc. The general perspective of the supplier was at these were ready for shipment, though this was not in conformance to the perception of neither the COC nor Novida representatives.

[21] Lilly Zhang, Former General Manger at COC current Office Manager at MENU China office

The Novida representative did not have any direct requirements to the specific type of defects, making it difficult to argue for a rejection, instead they were inspecting the products based on subjective requirements, and argued that the inspections should be performed in accordance to what was considered “pretty”. What they failed to understand is that “pretty” is not a requirement which can be used by others as this evaluation would depend much on the personal background of the inspectors. In China functionality is much more recognized as important rather than appearance and as long as the product is working, that would be acceptable. Therefore the evaluation of “pretty” by a Chinese inspector would most likely deviate from the Danish inspectors, though it might as well deviate between Danes or westerners as well.

Therefore COC representatives attempted to specify the requirements in relation to numerical values, in order for the potential future inspections to be based on objective criteria. This suggestion was initially refused by the customer as the general believe was, that it could not be that simple. The suggestion made were much similar to the above mentioned inspection instructions in the MENU example, where defects are considered in size, location, concentration, and the product size. The suggestion was never completely confirmed by the customer, even though corrections were made in relation to the inspection procedure in accordance to their desires. Due to this the first inspection to be conducted by COC resulted in a rejection of the batch produced by the supplier, wherefore the shipment was delayed. The inspection was conducted on the basis of the suggested inspection instructions even though not approved by the customer. As no alternative suggestion or re-modification of the instructions were asked for, and the fact that the inspector need to understand the requirements these instructions were used anyway.

D.3 LA-CO

The relationship between LA-CO and COC evolved around the supplier management, production establishment, and quality control of a particular metal nozzle for liquid paint markers. In developing this project, COC merely received a sample of the item without any drawings or specified requirements. The only requirements given by the customer was the need for the product to have certain durability, relating to the strength of the material as it would often be used on rough surfaces and that the paint exuding from the tip should be constant and with a complete cover[22]. Based on these requirements and samples from the Chinese supplier accepted by the customer, COC developed the specific requirements used for the products. The important measurements were defined based on the usage of the product and the functionality tests basically involved firstly an air pressured machine which would grind the tip on sand paper, and secondly paint test on stainless steel. The appearance of these products was of less importance so, even though considered during inspections the requirements were almost non-existing. The customer did not respond to any of the suggestions made for the inspection instructions wherefore they were introduced at the supplier and used for the IPQC and FQC inspections, and all shipments were accepted from the beginning. This example illustrates how the lack of internal requirements at the customer did not influence the establishment of the production and that if the specific requirements are basically non-existing the Chinese supplier is much capable of supplying.

[22] Peter Berg, Project Manager and Assistant General Manager at COC

D.4 Stelton

Stelton was customer of COC which purchased different wall units and shelves for display of interior accessories. The products were made of plywood where upon a composite material were glued in order to give it an exclusive appearance. During the production and attachment of this material to the plywood surface, excess glue would exude through the connections. This had previously been a problem as the glue was not removed prior to a shipment. When the supplier was asked to remove the excess glue he reused as it would have no purpose. The shelves and the wall units were in good condition from a functional perspective, but the excess glue was very visible. Therefore COC had to remove the all excess glue before the products could be shipped, which was much to discomfort of the supplier.

Appendix E: Supplier Measurement System

In this appendix the supplier measurement system is briefly introduced more in detail, and how it operationally functions. It is important to stress that the data in the following tables are imaginary and does not relate to nay of the cases in the study.

E.1: Scoring System

As the propose measurement system is a weighted point system it is necessary to identify which performance characteristics are scored. In the below table is a random scoring system illustrating the basic idea. It is necessary firstly to identify the performance parameters on which to measure the supplier's capabilities. Secondly the value expressing the performance should be determined, and lastly how the performance is evaluated. Some of the performances in this scoring system are based on subjective analysis for instance concerning the level of improvements implemented, though others are based on actual performance.

Scoring System					
Delivery	on date = 5	>1 week = 4	>2weeks = 3	>4 weeks = 2	4 weeks< = 1
Non-conformances	0% = 5	>0,25% = 4	>0,5% = 3	>1,0% = 2	>2,0% = 1
Improvements	? = 5	? = 4	? = 3	? = 2	None = 1
CAR response	>1 week = 5	>2weeks = 4	>4 weeks = 3	>6 weeks = 2	6weeks< = 1
Cost comparison	Least expensive = 5	= 4	= 3	= 2	Most Expensive = 1

E.2: Supplier Performances

The below table illustrates how it is possible to keep track of the actual performance of the supplier in reliant to the parameters. The data obtained from this record will be used to allocate scores of the parameters, and it is based on the average scores for each measurable attribute.

			DELIVERY					Quality Conformance	
Ship-ment	PO no.	Product	Preferred Date	Agreed Date	Delivery date	Days late	Score	Non-conformance	Score
1	6661		01-jan	03-jan	09-jan	6	4		
		Product A						5,00%	1
		Product B						0,03%	4
		Product C						0,10%	4
2	6662		12-feb	15-feb	15-feb	0	5		
		Product A						3,00%	1
		Product B						0,40%	3
		Product C						0,18%	4
3	6663		13-apr	20-apr	27-apr	7	4		
4	6664		15-maj	20-maj	01-jun	12	3		
5	6665		25-jun	25-jun	05-jul	10	3		

6	6666	28-jul	30-jul	25-aug	26	2		
7	6667	24-aug	28-aug	15-sep	18	2		
8	6668	27-sep	29-sep	12-okt	13	3		
AVG					12	3,25		2,83

E.3: Weighted Point System

The final table combines the scores and multiplies them with the assigned weight of the performance parameters. The weights are based on the perceived importance of each parameter, and the scores are either retrieved from the record or added subjectively.

	WEIGHT	SCORE	WEIGHTED SCORE
Delivery on the agreed upon date	0,3	3,25	0,975
Percentage non-conforming	0,3	2,83	0,85
Quality improvement initiatives	0,1	2,00	0,2
Corrective action response	0,15	4,00	0,6
Cost comparison with other suppliers	0,15	4,00	0,6
Total Ranking			3,225

Appendix F: Questionnaire

General information concerning the company and the products

What do you perceive as the company's core competences?

Does the company have internal production or assembly?

What would be the most important aspect of you product?

- Function
- Appearance
- Costs

What is the main sales point in your market?

- Quality and appearance
- Function
- Price
- Etc.

What is you general product strategy?

- Low cost – compared to the market
- Differentiation – better products, higher quality at a higher price, innovative performance
- Focus low cost- lower costs without compromising too much on the quality
- Focus differentiation – quality is more important but the costs cannot exceed the market norm

If costs were to increase would you allow it for?

- Improved function?
- Improved appearance?

To what degree would perfectly functioning products be rejected due to appearance issues?

Outsourcing / external foreign supplier

How much is outsourced in general?

What was the reason for choosing outsourcing?

- Strategic decision
- Financial concerns/cost savings?
- Necessity caused by a lack of internal capabilities/resources? Before sourcing the products where the items then produced in-house?

Was the outsource product produced internally prior to the outsourcing?

- *If not*, has internal production been considered prior to the outsourcing
- *If not*, why was external suppliers chosen instead of internal investments in production facilities

Would it be possible to produce in-house if necessary, or would it require additional costs? Was the internal production even considered?

- Why/ why not

How much of you production in general is managed by external suppliers?

- Is only one supplier used for every item?

How much of your production/percentage of products are outsourced through COC?

- Is only one source used for each item/process or are there several?
- Do you have any internal production alongside the outsourced?

Is COC the first outsourcer that has been used for this particular product?

Was the product complete implementable when the outsourcing was initiated or was COC involved in the design and development of the product?

Which processes would you consider COC to be handling for you company?

- On a scale of 1-5, how important are these activities in relation to your competitive advantage

Activity	**1** Not at all important	**2**	**3** Partly important	**4**	**5** Definitely important
Production/assembly					
Supplier Management					
Procurement					
R&D					
Shipping					
Inventory					
Quality Management					
Etc?					
Etc?					

To which degree would it be possible to manage this activity in-house (on a scale of 1-5)?

Activity	**1** Not at all within our capability	**2**	**3** Partly within our capability	**4**	**5** Definitely within our capability
Production/assembly					
Supplier Management					
Procurement					
R&D					
Shipping					
Inventory					
Quality Management					

Which benefits do you recon have emerged from the outsourcing of the activities?

- Have there been any side effects to the in-house production? Both positive and negative?
- Is there potential for further outsourcing through COC

How great influence does technological changes have on your production/products?

Would technological change in the industry affect your outsourcing decision? How? (Internalize, change supplier, require supplier to change, no influence at all)

What are the main challenges experienced by the outsourcing through COC to China or through previous experiences with outsourcing?

What is your general perception of the outsourcing through COC in terms of quality, service etc.?

Quality Control

To which degree have your company been involved in the development of the quality inspection instructions?

- How was the AQL levels determined for your projects? By COC standard procedures? By yourself?
    - If you were involved, why was the different levels chosen
- Have you had any influence on the inspection areas focused on during quality inspections and how?
    - Have you company clarified the important dimensions to inspect?
    - Is appearance specifications clearly defined either through text, measurements or pictures

Has a specific quality manual been developed clearly stating the quality inspection procedures and tasks beside the inspection instructions?

How would you suggest the quality could be performed in relation to your products managed by COC or any other outsourcer?