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E-auction as a complement to IOCM

- A case study from the automotive industry

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Abstract

The role of PSM has gained considerable attention in recent years as one of the key functions to impact company performance (Zsidisin, Ellram & Ogden, 2003; Kähkönen & Lintukangas, 2012). And considering that purchasing is today the single largest expenditure for the majority of organizations (Dyer & Nobeoka, 2000; Agndal & Nilsson, 2009), it is interesting to expand the idea of IOCM and explore how companies can work even closer with their suppliers to impact inter-firm transactions. E-auction is an exciting tool from a cost saving perspective, but its application has been constrained due to increased complexity in buyer-supplier relationships (Jap, 2002; Pereira, Sellitto, Borchardt & Geiger, 2011). For example, in the automotive industry it is common to purchase complete solutions from a limited number of suppliers while standardized products or subcomponents are purchased further up the supply chain (Araujo, Dubois & Gadde, 1999). Hence, I want to develop an understanding of the expectations for E-auction to be used as an interorganizational tool with the purpose of improving the purchase process of first-tier suppliers. The research is conducted from the perspective of inter-firm characteristics in the automotive industry and the case study is based on one automotive company and four first-tier suppliers. The findings suggest that for E-auction to be used in an interorganizational setting, the buyer needs to have IOCM activities in place that allows them to identify subcomponents, purchased by first-tier suppliers with E-auction potential (Smeltzer & Carr, 2003). Secondly, the buyer must be aware of the purchase strategies and processes of their suppliers to ensure that E-auction can provide greater efficiency compared to existing processes. Finally, for E-auction as a joint effort to be attractive for suppliers as a cost saving collaboration, the buyer would need to provide their suppliers with lacking resources and competences.

Keywords: *E-auction, IOCM, Transaction Cost Economics, Industrial Network Approach, Purchasing and Supply Management, Buyer-supplier Relationship*

Word list: Purchasing and Supply Management (PSM), Interorganizational Cost Management (IOCM), Transaction Cost Economics (TCE), Industrial Network Approach (INA), Target Costing (TC), Research and Development (R&D), Net Present Value (NPV), Original Equipment Manufacturer (OEM), Supplier Involvement in Product Development (SIPD), Product or Process Change Notification (PPCN), Total Cost of Ownership (TCO), Request for Quotation (RFQ), Supplier Team Feasibility Concept (STFC).

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1. Introduction

To ensure competitiveness, many firms are increasingly focusing their efforts on their core competencies and as a result of this strategy, companies are outsourcing non-core activities and relying more heavily on their network of suppliers (Van Der Meer-Kooistra & Vosselman, 2000; Cooper & Slagmulder, 2004; Scholz & Zentes, 2006; Windolph & Moeller, 2012). With more functions being outsourced, the role of Purchasing and Supply Management (PSM) has gained considerable strategic attention in recent years, especially regarding the management of total cost and supplier relationships (Zsidisin et al., 2003; Kähkönen & Lintukangas, 2012). Purchasing is today the single largest expenditure for the majority of organizations and for many manufacturing firms, purchasing stands for approximately 60-70 percent of total manufacturing cost (Dyer & Nobeoka, 2000; Agndal & Nilsson, 2009). As a result, the end products are a function of the productivity of a network of actors working in collaboration (Dyer & Nobeoka, 2000). Thus, the ability to effectively manage buyer-supplier relationships and the cost structure of the supply chain can result in significant cost savings for the buyer (Zsidisin et al., 2003; Kähkönen & Lintukangas, 2012; Windolph & Moeller, 2012).

E-auction, with the objective to reduce purchasing costs, is an example of a market-based purchasing tool used to improve results through enhanced supplier evaluation and selection (Prescutti, 2003; Hartley, Lane & Yunsook Hong, 2004; Hartley, Lane & Duplaga, 2006). E-auction has been found to improve financial results for the buyer at a low upfront cost, but the success of its application has been limited to the purchasing of non-critical items such as commodity goods in arm's length relationships (Jap, 2002; Tassabehjii, 2010; Pereira et al., 2011). Complex supplier interactions and strategic products limit the possibility to adopt E-auction and with that, the opportunity to benefit from its cost savings (Araujo et al., 1999; Jap, 2002). Instead, Interorganizational Cost Management (IOCM) techniques with the objective to manage costs outside the boundaries of the firm in collaboration with suppliers are more commonly used to reduce information asymmetry and costs in complex buyer-supplier relationships (Cooper & Slagmulder, 2004).

Even as relationships with first-tier suppliers within the automotive industry have become more comprehensive (Araujo et al., 1999), around 40 percent of all components in a vehicle are still non-critical or standardized and could therefore be bought in arm's length relationships (Pereira & Geiger, 2005). But as many automotive companies have chosen to limit the number of first-tier suppliers, a lot of these non-critical components are instead bought further up in the supply chain

through sub-tier suppliers (Araujo et al., 1999; Ford, Gadde, Håkansson & Snehota, 2003; Pereira et al., 2011). Seeing as the automotive industry strives to streamline its business through increased interactions with suppliers, E-auction is instead a tool that could be aimed at standardized products purchased in the industry by first-tier suppliers. Consequently, based on automotive companies' limited possibility to use the E-auction tool towards first-tier suppliers, the purpose of this study is to develop an understanding on the expectations for E-auction to be used in an interorganizational setting with the aim to target standardized, non-critical, subcomponents bought further up in the supply chain. Drawing on the theories of Transaction Cost Economics (TCE) and Industrial Network Approach (INA), the aim is to answer the following research question;

What are the expected types of inter-firm relationships and IOCM techniques that could enable the success of E-auction as a joint effort between a buyer and first-tier supplier in the automotive industry?

The research is built on a case study of an industrial customer and four first-tier suppliers from the automotive industry. Data is collected through interviews, observations and documents. My basic point of departure is that an organization's competitive advantage extends beyond the boundaries of the firm's own control and resources and that financial improvement can be achieved through the management of buyer-supplier interactions.

1.1 Structure of the paper

The remainder of this paper is structured as follows. In section 2, the theoretical framework is introduced and subsequently divided into three main areas, inter-firm relationships, IOCM and E-auction. The theoretical framework is then followed by the purpose of the study. In section 3, the case study is presented in detail together with the research design. Furthermore, the gathering of data and data analysis is explained, and the limitations and ethical considerations of the method are discussed as well as the impact of the COVID19 outbreak. The findings are then described and analyzed in section 4 where the empirical material for each of the four first-tier suppliers and the case company are presented separately. In section 5, the findings are discussed based on the theoretical framework and finally, the conclusion of the study is presented in section 6 together with suggestions for future research.

2. Theoretical framework

In the following sections, the fields of inter-firm relationships, IOCM and E-auction are introduced to provide the reader with the main concepts used to explain and discuss the empirical findings. The theory of transaction cost economics and industrial network approach are presented as part

of the theoretical framework used to analyze the empirical findings from the perspective of inter-firm relationships. Both theories are applied to understand and analyze how different types of business relationships impact the opportunity for interorganizational collaboration and the usage of E-auction. The areas of inter-firm relationships and IOCM are later combined to evaluate the prospect of E-auction as a mutual tool to improve cost.

2.1 Inter-firm relationships

2.1.1 Transaction Cost Economics

The theory of Transaction Cost Economics (TCE) focuses on how firms govern and organize operations to minimize transaction costs relating to monitoring, writing, adapting and enforcing contracts (Williamson, 1985, 1991). Economic transactions can be organized into three structures depending on the context of the exchange (Williamson, 1991). (1) market procurement takes place in a market with little or no inter-firm dependence; (2) internal procurement or vertical integration is based on hierarchical arrangements within the control of the company; (3) hybrid procurement is carried out within relationships containing features of both market and internal procurement. The concept of hybrid governance was particularly developed as a response to increased outsourcing and IOCM efforts (Cooper & Slagmulder, 2004). According to Williamson (2008), companies should not simply decide between market-based, hybrid or organizational hierarchies' transactions but view sourcing as a continuum where the complexity of the contract should steer the governance structure.

Different structures or combinations of structures are faced with different types of transaction costs, which can be divided into three critical variables, frequency, uncertainty and asset specificity (Williamson, 1985; Johanson & Mattsson, 1987; Dekker, 2004; Agndal & Nilsson, 2010). Frequency refers to the number of times the transaction occurs. If the frequency is low, no significant efforts will be put on control and coordination and therefore no reason for a company to integrate vertically when a product is rarely used (Johanson & Mattsson, 1987). Uncertainty originates from imperfect information about a transaction and its outcome (Johanson & Mattsson, 1987). Imperfect information can arise because of uncertainty in quality, delivery, price or quantity, and uncertainty is especially prominent when the goods are of strategic importance and when the main control lies with the supplier. Uncertainty is closely related to opportunistic behavior and costs associated with its management (Dekker, 2004). If it is difficult to predict and control how the counterpart will behave, a firm might consider producing in-house if the reduction in uncertainty exceeds the cost of vertical integration. Asset specificity refers to investments in assets, which are only, or most valuable in the context of a specific transaction (Williamson, 1985;

Johanson & Mattsson, 1987). If a transaction involves investments that are of high asset specificity, it is usually more profitable to integrate vertically compared to relying on the market.

As TCE can be used to explain and predict choices of governance and guide decisions for transaction costs minimization, it is a widely used theory within both purchasing and IOCM research (Dekker, 2004; Vosselman & Van der Meer-Kooistra, 2009; Agndal & Nilsson, 2010; Uddin, 2013). Within the purchasing literature, the governance structure is often divided into relational and transactional strategies relating to the hybrid procurement and the market procurement respectively (Axelsson & Wynstra, 2002). The distinction between transactional and relational purchasing does not follow a general consensus, but it is commonly determined by the level of uncertainty and asset specificity (Williamson, 1991). Furthermore, there is no strict line between the two categories of purchasing. A transaction can be a combination of both. Below, I will present the main characteristics of transactional and relational purchasing in more detail.

Transactional purchasing

Transactional purchasing, based on the market procurement, should be selected if it generates greater efficiencies compared to vertical integration or hybrid arrangements (Agndal & Nilsson, 2010). The main benefit with transactional purchasing is the simplicity (Vitasek, 2016). Companies can easily establish a reasonable price, switching suppliers is relatively effortless and the administrative costs are low. Furthermore, in transactional purchasing there is almost no asset specificity and there are no real benefits from close collaboration because the involved parties do not adapt their processes to each other's business (Williamson, 1985, 1991). Consequently, transactional purchasing is mainly characterized by arm's length relationships and independence (Agndal & Nilsson, 2010).

Transactional purchasing is also the better strategy when hybrid procurement does not sufficiently reduce behavior and environmental uncertainties to offset the benefits of market procurement (Williamson, 1985, 1991). If there are multiple alternative suppliers, the switching costs are low and the product has low level of complexity, the benefits of market transactions usually exceeds the reduction in uncertainty from hybrid purchasing (Axelsson & Wynstra, 2002). The purpose of transactional purchasing is to exploit the almost identical products produced by multiple suppliers to make short-term gains from competition, and since price usually varies due to externalities, the contracts are generally short-lived. Nonetheless, the buyer needs to do some preparatory work such as delivery and quality qualifications and search for reasonable pricing (Agndal & Nilsson, 2010).

Relational purchasing

Relational purchasing, relating to the hybrid procurement, is the preferred strategy when there are significant mutual advantages from collaboration and adaptation compared to market based transactions (Williamson, 1991). Relational purchasing is characterized by resources and activities that are combined and adjusted to better suit the specifications of the contract, resulting in a high level of asset specificity (Dekker, 2004). Investments can be made in both physical assets such as machineries and processes or in human capital. High level of buyer-supplier specific investments encourages long-term collaboration and information sharing and the aim is therefore to encourage IOCM efforts when the upfront costs of establishing the relationship are high (Cooper & Slagmulder, 1999).

Relational purchasing is also preferred when the goods are of strategic importance and there are few alternative suppliers (Williamson, 1991). Through mutual commitment, beyond mere contractual bonds, the uncertainty of losing access to a critical resource can be reduced (Williamson, 1991; Axelsson & Wynstra, 2002). If the relationship instead suffers from imbalance, trust becomes important for the management of relational uncertainties such as opportunistic behavior (Vosselman & Van Der Meer-Kooistra 2009). However, according to Williamson (1991) trust is no guarantee against opportunistic behavior but it is a significant factor in many strategic relationships in order to access highly valuable activities and resources which cannot be exclusively covered in a contractual agreement.

2.1.2 Industrial Network Approach

Within the theory of Industrial Network Approach (INA), companies are viewed to be heterogeneous, where buyers and suppliers are continuously interacting with counterparts to access the aggregated potential of the network (Gebert Persson, Mattsson & Öberg, 2015). The general understanding is that no modern organization can require and control all the resources needed to operate and it is therefore vital for firms to access resources and activities controlled by others (Lambert & Cooper, 2000; Ford et al., 2003). To manage these interactions, collaboration and social structures are usually put forward as best practices (Scholz & Zentes, 2006). Due to high degree of collaboration and interfirm dependence between manufacturers and their suppliers, organizations are no longer viewed to compete as individual entities but rather as a network of companies (Otley, 1994; Lambert & Cooper, 2000; Kähkönen & Lintukangas, 2012). Within these networks, different parties exchange activities and resources that shape direct and indirect connections between actors, and the more resources a company can access through these connections, the greater advantage the organization has (Ford et al., 2003).

According to Gadde and Håkansson (1993), there are four main characteristics of a network. Firstly, changes that take place in one relationship will affect others; secondly, firms' behavior will be viewed as reactions to the actions of others; thirdly, all relationships within a network will have elements of cooperation and conflicts; lastly, a network is never stable or in balance. The implication of direct and indirect relationships are further described by Håkansson and Snehota (2006) who wrote; "The performance and effectiveness of organizations operating in a network, by whatever criteria these are assessed, become dependent not only on how well the organization itself performs in interaction with its direct counterparts, but also on how these counterparts in turn manage their relationships with third parties. An organization's performance is therefore largely dependent on whom it interacts with" (p. 261). Hence, the theory of INA demonstrates that organizations need to consider both their direct relationships and indirect connections to fully grasp their surrounding environment and its impact on business.

Another important aspect of INA is the exchange of competence and knowledge to enable adaptation, collaboration and improvements (Johanson & Mattsson, 1987). In the interaction between two parties, they use each other's knowledge and capabilities to solve problems, meet different needs and develop jointly (Håkansson & Snehota, 2006). Consequently, the success of the network will depend on what is done within the own organization and what the organization can contribute in its relationship with others. Thus, the value of knowledge and capabilities in a network is partly determined by how it is perceived by counterparts. For example, one of the main success factors of Toyota was their ability to transfer productivity enhancing expertise throughout their network (Dyer & Nobeoka, 2000). Consequently, knowledge is not only shared to combine and adapt businesses but also to improve the competitive advantage of the entire network (Håkansson & Snehota, 2000).

2.1.3 TCE compared to INA

Due to some fundamental differences between TCE and INA, they are not combined into one framework but instead used as two separate theories. Firstly, TCE is used to describe the market characteristics of inter-firm relationships in order to evaluate the most optimal form of interactions from a transaction cost perspective. INA on the other hand, originates from the relational aspects between companies within the same supply chain. It can be used to describe how these relationships emerge and how they develop. Furthermore, TCE originally disregarded the role of relationships by simply focusing on either market or vertical transaction, but as Williamson (1991) introduced hybrid mode of governance, TCE has moved somewhat closer to the relationships describe by INA (Gebert Persson et al., 2015). Nonetheless, TCE still views companies as mainly

opportunistic (Williamson, 1979), and while INA focuses on the advantages with business-to-business interactions, TCE is primarily concerned about cost savings (Johanson & Mattsson, 1987).

2.1.4 Buyer-supplier relationships

As mentioned by Lambert & Cooper, (2000) "One of the most significant paradigm shifts of modern business management is that individual businesses no longer compete as solely autonomous entities, but rather as supply chains." (p. 65). Outsourcing of non-core products, the establishment of supplier partnerships and the will to trim the number of first-tier suppliers have resulted in a shift from transactional to relational purchasing, emphasizing the importance of close collaboration with supplier (Araujo et al., 1999; Gadde & Snehota, 2000). Lambert and Enz (2016), who argue that the competitive advantage lies in the management of supplier relationships rather than in the supply chain itself, have further highlighted the value of buyer-supplier relationships from the perspective of INA.

In the management of these relationships, it is important to consider the context of the exchange (Araujo et al., 1999). Companies should adopt their strategy based on their suppliers' capabilities and on the characteristics of the outsourced product. Strategic goods normally need close collaboration while commodity goods can be bought in arm's length relationships (Agndal & Nilsson, 2010). Furthermore, some suppliers are active in the Research and Development (R&D) phase of product development while others are solely used for cost rationalization through economies of scale. Araujo et al. (1999) identified four types of buyer-supplier relationships based on different types of exchanges; (1) standardized interface; the interface and the product exchanged are standardized, (2) specified interface; the supplier produce a customized product and needs some degree of direction and specification from the buyer, (3) translation interface; the supplier must translate the functional characteristics given by the buyer into a product, (4) interactive interface; the supplier and buyer develop a product in collaboration. Araujo et al. (1999) found that none of the four interfaces performed better than the others and that the pros and cons are instead determined by the context in which they are used. The characteristics of a specific supplier interface will determine the type of resource the buyer can access and thus, the resource of interest should determine the characteristics of the relationship (Araujo et al., 1999).

Another way to look at different portfolios and supply management is through the Kraljic matrix (1983) (see figure 1). According to Kraljic (1983), the nature of the supply management for a specific portfolio should be decided by two main factors, profit impact and supply risk. The general idea is to categorize products to obtain a strategy that minimizes risk and exploit leverage (Padhi, Wagner & Aggarwal, 2012). The Kraljic matrix divides products into four categories (Caniëls &

Gelderman, 2005). (1) non-critical items; low risk and low impact on profitability. The items are standardized with several alternative suppliers. (2) leverage items; low risk but high impact on profitability. The buyer has the power and can exploit their leverage to get lower prices. The items are fairly standardized, and it is easy to change supplier. (3) bottleneck items; The risk is high, but the profitability is low. There are few alternative suppliers who can act in an oligopolistic manner to increase prices and buyers can therefore be forced to accept unfavorable deals. (4) strategic items; high risk and high impact on profitability. Suppliers delivering strategic items are critical for the business and thus it is important to build and maintain predictable relationships. Every contract and product are unique, and the focus is on shared gains through collaborative relationships.

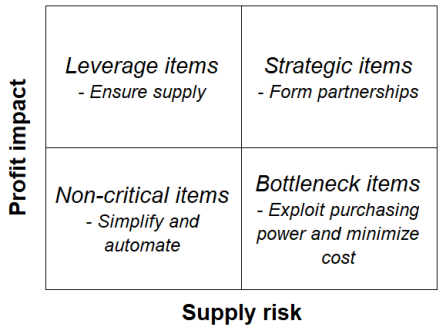

Figure 1: Supply management from the perspective of the Kraljic matrix (1983)

The benefits with buyer-supplier interactions from the INA perspective have gained a lot of attention in PSM research, but there are costs involved in the obtaining and maintaining of collaborative relationships (Araujo et al., 1999; Gadde & Snehota, 2000). To determine if outsourcing and interactive relationships are worthwhile, benefits received needs to exceed investments made (Gadde & Snehota, 2000). However, it is difficult to quantify transaction costs associated with buyer-supplier interactions which has led to qualitative costs from outsourcing to be systematically underestimated (Cooper & Slagmulder, 2004). Interactive relationships offer opportunities for innovation and efficiency benefits from collaboration, but they are complex to manage, and they require substantial investments (Araujo et al., 1999; Gadde & Snehota, 2000). As a result, companies need a variety of supplier interfaces to suit their product portfolio and considering the complexity and costs involved, firms can only maintain a limited number of successful interactive supplier relationships. In the automotive industry, the issue of coordinating many and complex supplier relationships is especially profound, and the solution has been to establish structured supplier hierarchies (Araujo et al., 1999; Ford et al., 2003; Pereira et al., 2011). "These structures are characterized by interactive interfaces between the customer and a limited number of first-tier suppliers, whereas specified and standardized interfaces are used further up the

supply chain" (Araujo et al., 1999, p. 505). This strategy is used to reduce the number of first-tier suppliers and instead increase each suppliers' responsibility.

2.2 Interorganizational Cost Management

Historically, interorganizational interactions have taken place between two or more autonomous companies engaging in arm's length transactions (Fayard, Lee, Leitch & Kettinger, 2012). However, as firms today outsource even significant items it is increasingly important to manage costs within the entire supply chain (Windolph & Moeller, 2012). Due to the emergence of so-called hybrid procurement (Williamson, 1991), different IOCM techniques started to appear to facilitate interorganizational synergies and to manage access to external resources (Cooper & Slagmulder, 2004; Fayard et al., 2012). IOCM can be described as buyer-supplier interactions with the purpose to 'identify opportunities for joint cost reduction', i.e. managing costs outside the boundaries of the individual firm in collaboration with suppliers (Cooper & Slagmulder, 2004; Agndal & Nilsson, 2009; Fayard et al., 2012; Uddin, 2013). There are three opportunities for cost savings through IOCM, during the R&D phase, during manufacturing and in the buyer-supplier interface (Windolph & Moeller, 2012). The IOCM domain consists of different methods and techniques, which can be categorized into three blocks; (1) target costing, (2) trade-off techniques and continuous improvement, and (3) techniques relating to suppliers' cost structure (Agndal & Nilsson, 2009).

(1) target costing (TC) is an arm's-length IOCM technique that uses the expected market price of the manufactured goods to identify at what cost it should be produced given a predetermined profit margin. To reach the target cost, detailed information down to component level is needed and this usually requires the involvement of suppliers. A typical characteristic for TC is that cost pressures are pushed further up in the supply chain. (2) trade-off techniques and continuous improvements refers to the balance between product features and costs together with combined improvement efforts between buyers and suppliers. These techniques and trade-offs revolve around three dimensions, quality, product functionality and target price. (3) techniques related to the cost structure of suppliers are concerned with extracting information about suppliers' costs to encourage joint efforts between the buyer and supplier to improve the performance of their combined supply chain. One example of the technique is open-book accounting that is used to help suppliers identify and improve lacking competencies (Agndal & Nilsson, 2008).

A limitation in the IOCM literature is the single-minded focus on the buyer (Agndal & Nilsson, 2008). The lack of research from the viewpoint of suppliers have overshadowed the importance of suppliers' willingness to engage in interorganizational collaboration due to inequality in power

relationships and opportunistic behavior (Lamming, Caldwell, Phillips & Harrison, 2005a; Agndal & Nilsson, 2010; Windolph & Moeller, 2012). Windolph and Moeller (2012) found, for example, that open-book accounting has a negative effect on supplier relationship satisfaction, indicating that it is used to exploit suppliers' profit margins. Hence, in uneven power relationships the supplier may expect that shared information for the enabling of efficiency gains, might be used for cost pressure (Cäker, 2008). Cooper and Slagmulder (2004) further emphasize the importance of mutual agreements and trust as they found transparency to be a key element for the success of IOCM techniques. On the other hand, Lamming, Zhang, Caldwell & Phillips, (2005b) found that trust is not as present in the practices of IOCM as suggested by Cooper and Slagmulder (2004) and that the lack of trust has undermined collaboration and left suppliers exposed for the benefit of the buyer. Previous experience from interorganizational collaboration could therefore affect suppliers' enthusiasm for future cooperation. Another issue as described by Cäker (2008) is the potential risk that an implemented technique or method, decided by a dominated buyer as best practice, will overshadow local concerns and processes of the supplier. Hence, buyers trying to control suppliers, even with the best intentions, might instead constrain the supply chain efficiency. Consequently, IOCM is preferred in buyer-supplier relationships characterized by trust, mutual dependency and commitment to discourage opportunistic behavior and to enable joint benefits (Van Der Meer-Kooistra & Vosselman, 2000).

2.3 E-auction

Reverse E-auction, referred to as E-auction in this thesis was first introduced in the middle of the 1990s (Tarazona_Bermudez, Bustelo, Martínez, Alvarez & Rojas, 2014). E-auction is defined by Carter, Kaufmann, Beall, Carter, Hendrick & Petersen, (2004) as an online and real time-based reversed auction between a buyer (manufacturer) and two or more sellers (suppliers), compared to a standard auction where there is only one seller but multiple buyers. The suppliers compete in real time to win the business of the buyer by lowering their price with regards to the online bids of their opponents. Suppliers can submit multiple online bids during a fixed period of time and depending on the auction being open or closed, suppliers will have different visibility of the electronic bids submitted by their competitors (Prescutti, 2003; Carter et al., 2004). The aim is to create a pure market with close to perfect information between buyer and suppliers where all parties are fully aware of the product being auctioned and, in some cases, the price of the latest bid.

As PSM has become the natural leader of organizations' supplier cost management initiatives (Zsidisin et al., 2003), strategic purchasing tools such as E-auction has gained a lot of attention for its cost saving potential (Prescutti, 2003). The popularity of E-auction can be attributed to three

main factors (Jap, 2002). The immediate financial savings from reduced purchase costs, the process efficiency in terms of reduced transaction costs, and the simplicity and low investment of the E-auction technology. The cost savings from E-auction has been found to be anywhere between 5 to 40 percent where the average savings are approximately 15 percent (Chon, 2000; Tully, 2000). Prescotti (2003) has further investigated the contribution of E-auction and he found that, besides lower transaction costs and reduced purchase price, E-auction enables a shorter sourcing cycle and shorter time-to-market. E-auction has quickly become a widely used outsourcing technique and according to Kaufmann & Carter (2004) the use of E-auction is expected to expand even further in the future. However, in many industries where the interaction with first-tier suppliers are not characterized by arm's length relationships, E-auction is usually too simple to provide any real benefits (Jap, 2002; Pereira et al., 2011). The conditions suitable for E-auction, are closely related to the characteristics of transactional purchasing as described by Williamson (1985, 1991). Meaning, low administrative costs, low supply risk, multiple alternative suppliers, and low cost of change (Pereira et al., 2011). And as for transactional purchasing, E-auction is preferred when there is little to gain from collaboration. As a result, E-auction can be viewed as an appropriate purchasing tool used when the market conditions resemble those of transactional purchasing.

The success and risk factors of E-auction

Smeltzer & Carr (2003) did a comprehensive interview study with 41 buyers to investigate motivations, success and risks factors of E-auction application. They found that the strongest motivations for E-auction for buyers are cost saving from dynamic pricing and reduced administrative costs from shorter transaction processes. The cost savings however will normally decrease as E-auction is used repeatedly on the same goods, but even as the cost reduction can be expected to diminish over time, it can still be used to stabilize current costs and avoid price increases (Jap, 2002). According to the buyers in the study of Smeltzer and Carr (2003), the strongest motivations for suppliers are the ability to access new business through improved market communication, market penetration possibilities due to price transparency, and reduced cycle time between bidding and winning the business.

Even though there are benefits from the implementation of E-auction for both parties, there are risks involved when selecting suppliers on the mere basis of price (Jap, 2002; Hartley et al., 2004; Jap, 2007). For the buyer, there are risks of damaging long-term supplier relationships due to lack of trust, while lack of mutual commitment could result in suppliers unwilling to make the necessary investments needed to produce the product (Smeltzer and Carr, 2003). Furthermore, too few suppliers participating in the bidding process could lead to a non-competitive auction with little or

no cost savings and there is a risk of selecting suppliers incapable of delivering on factors other than price (Jap, 2002; Smeltzer and Carr, 2003). Suppliers on the other hand face the risk of being exposed to negotiation ploys if E-auction is used to get existing suppliers to lower their price with no intention to award the deal to the participants of the auction (Smeltzer and Carr, 2003). Suppliers might also be unable to deliver according to the agreement if they offer unrealistic prices to win the business. Tassabehji, Taylor, Beach & Wood, (2006), who examined the dilemma of E-auction from the viewpoint of suppliers, have further considered the negative effect on buyer-supplier relationships. Their results show that suppliers are reluctant to engage in E-auction due to opportunistic behavior, and that bad experience from buyer-supplier interactions could lead to retaliation in terms of refusing future cost sharing activities and collaboration.

Conditions for E-auction

The risks associated with E-auction could cause long-term consequences for both parties and it is therefore critical to evaluate the appropriate conditions for E-auction (Jap, 2002). For example, the open bid format of E-auction, revealing bids to competitors, could erode the bargain power of suppliers. It is therefore not an appropriate strategy when the supplier is of strategic importance (Jap, 2002). Furthermore, factors such as number of bidders, size of the contract and full or partial visibility of bids are elements affecting the level of trust in buyer-supplier relationships (Jap, 2007; Karabağ & Tan, 2019). According to Smeltzer and Carr (2003) there are four conditions that need to be reached to avoid the common pitfalls. Firstly, the specifications of the auctioned product need to be clearly stated to ensure a mutual understanding of what the price should entail. Details such as quality requirements, delivery lead-time, volume, locations, service issues and transportation requirements should be provided in the auction process. Secondly, the purchase volume must be large enough to enable suppliers to achieve production efficiency through economies of scale. Thirdly, the participating suppliers need to have spare production capacity and sufficient profit margins to take on additional business and afford to offer a competitive price. Finally, to effectively apply the E-auction tool, the buying firm needs skilled labor and the appropriate software technology.

Tassabehjii (2010) has further investigated factors influencing the motivation and attitude towards E-auction. Her findings show that in strategic procurement, the type of goods will influence the motivation and attitude for E-auction while in purely administrative procurement there is no such evidence. Within strategic procurement, buyers who are motivated by price reduction use E-auction on both strategic and commodity goods while buyers motivated by maintaining supplier relationships only use it for non-critical commodities. Moreover, the use of E-auction for price

reduction of commodity goods with focus on supplier relationship comes with a positive perception of E-auction meanwhile, the use of E-auction on strategic goods have the opposite result (Tassabehjii, 2010). To summarize, E-auction is best suited when the goods are standardized, when the volume is high and when there are multiple alternative suppliers (Jap, 2002; Smeltzer & Carr, 2003; Pereira et al., 2011; Tarazona_Bermudez et al., 2014).

2.4 E-auction as a complement to IOCM

The prospect of E-auction, used in an interorganizational setting, can be tied to IOCM research in general, seeing that IOCM is used as an umbrella term for the management of costs outside the boundaries of the individual firm in collaboration with suppliers (Cooper & Slagmulder, 2004; Agndal & Nilsson, 2009; Fayard et al., 2012; Uddin, 2013). E-auction as an interorganizational tool with the purpose to identify and execute cost improvements through collaboration. can in particular be associated with IOCM techniques related to the cost structure of suppliers (Agndal & Nilsson, 2009). The difference is that E-auction is expected to be implemented as a complement to existing IOCM activities that can enable the identification of cost savings opportunities. When an opportunity has been identified, E-auction can be used as a directed tool for the execution of the suggested improvement. Whether E-auction as a joint effort can provide a positive Net Present Value (NPV) is expected to depend on the characteristics of the relationships and the level of transparency like for other IOCM techniques (Van Der Meer-Kooistra & Vosselman, 2000).

2.5 Purpose of the study

E-auction has become an established purchasing tool with great cost saving potential at a low upfront cost. However, the application of E-auction has been constrained due to increased complexity in buyer-supplier interfaces. This is especially true for firms in the automotive industry with structured supplier hierarchies, where most buyer-supplier relationships are characterized by close collaboration and high complexity while standardized interfaces are used further up in the supply chain (Araujo et al., 1999). As a result, the opportunity to apply E-auction in direct terms is limited for many automotive companies. Due to this, I want to develop our understanding on how E-auction can be used as a complement to IOCM in the automotive industry. The aim is to recognize how different inter-firm relationships between a buyer and first-tier supplier, with various IOCM activities, are expected to enable or discourage E-auction as a joint effort in relation to the literature review describing the success and failures of E-auction. Hence, the purpose of the study is to understand the prospect for buyers in the automotive industry to implement E-auction in an interorganizational setting to reduce costs in supply chains that are built on both transactional and relational purchasing.

3. Method

Drawing on theories used in the theoretical framework, but treating them separately, the aim is to interpret the outcomes of the theories in the context of the purpose. And considering the novelty of the study and limited prior knowledge, I decided to take on an exploratory approach to answer the research question (Kaplan, 1986). As a result, I will conduct preliminary research with the intention to develop an understanding of E-auction's potential as a joint effort and at the same time encourage additional research of the topic. Seeing as I am interested to understand how types of relationships impact the possibility for collaboration, a study based on different buyer-supplier relationships was deemed appropriate (Eisenhardt, 1987). Thus, the case study is based on one large Original Equipment Manufacturer (OEM) player within the automotive industry, referred to as the case company, together with four of its first-tier suppliers. The automotive industry is typically known for having highly developed cost management techniques and complex first-tier supplier relationships (Agndal & Nilsson, 2008), making it a relevant industry for my study. In addition, the automotive industry has a wide network of suppliers delivering high volume products which is important for the use of E-auction (Smeltzer & Carr, 2003). Data has primarily been collected through semi-structured interviews with both the case company and the first-tier suppliers to capture both sides of the relationships. I have also gathered field notes and documents from my stay at the case company. Interviews were preferred over questionnaires to allow for a more in-depth knowledge about the interviewees' attitudes and opinions (Silverman, 2006).

The case company in question is a Swedish automotive OEM that operates globally. The company's purchasing expenses stand for approximately 70 percent of the total manufacturing cost and as a result of this, PSM has gained considerable attention in recent years as one of the company's core functions. The company shares the supplier hierarchy structure described in Araujo et al. (1999) and its application of E-auction has been limited due to the complexity of its first-tier supplier relationships. The purchasing department of focus is the air management team within powertrain, consisting of five segments and approximately 15 suppliers. The team was deemed appropriate since they are currently looking over alternative solutions for cost reduction for complex buyer-supplier relationships providing custom-made components and thus eager to support the study and provide contact information.

The four first-tier suppliers included in the study deliver components to combustion engines for the air management purchasing department at the case company. Initially, I had seven suppliers included in the study. One chose not to participate due to a sensitive ongoing project with the case company and the other two were unable to proceed with the interviews due to the COVID19

outbreak. The remaining four suppliers included in the study have a long-term relationship with the case company and they all provide customized products. Descriptive information of the selected four first-tier suppliers can be found in table 1. Supplier 3 and 4 are smaller than the case company in terms of turnover, however, they are considerably larger companies compared to supplier 1 and 2. The four buyer-supplier relationships have different levels of trust, collaboration and transparency and each product has its unique features and level of complexity. The differences between the four-first tier suppliers are used to understand the prospect of E-auction as a joint effort in relation to inter-firm characteristics. Consequently, the first-tier suppliers do not represent a random sample but are instead selected from a theoretical point of view.

Supplier	*Country*	*Number of years as supplier to the case company*	*The case company's share of turnover*	*Ongoing sourcing projects with the case company*	*Transparency level (1-5) 5 is the highest**	*Kraljic matrix (1983)*
Supplier 1	Germany	>15	4,00%	Yes	3	Leverage items
Supplier 2	USA	>15	12,00%	Yes	3	Bottleneck items
Supplier 3	USA	>15	0,05%	Yes	5	Bottleneck items
Supplier 4	USA	>15	1,00%	Yes	1	Strategic items

**The transparency level is assessed by the respective supplier host at the case company*

Table 1: Descriptive information of the selected first-tier suppliers.

3.1 Research design

The study took place at the case company's purchasing department for powertrain between the middle of January until the end of March. The initial plan was to stay at the case company until June but due to the COVID19 outbreak the length of the study was reduced. During my time at the case company, I spend approximately 30 hours a week at the powertrain purchasing department taking field notes, attending supplier meetings, interacting with employees within different functions as well as planning and conducting interviews. I was provided with a desk, a computer and an internal email address enabling me to contact employees of the case company and first-tier suppliers. Data was primarily collected through semi-structured interviews with four different groups. (1) buyers at the case company responsible for the four selected first-tier suppliers, (2) key account managers at the first-tier suppliers responsible for the interaction with the case company, (3) buyers at the first-tier suppliers and (4) employees at the case company ensuring quality, technical requirements, deliveries and risks of purchased goods (figure 2). Group 1 and 2 were selected to capture the dynamics of the buyer-supplier relationship and its characteristics. Group 3 was chosen to understand the current process for the selection and purchasing execution of sub-tier suppliers. Finally, group 4 represents a sample of employees within functions such as engineering, quality, logistics and legal to comprehend the challenges and opportunities of E-auction as a joint effort.

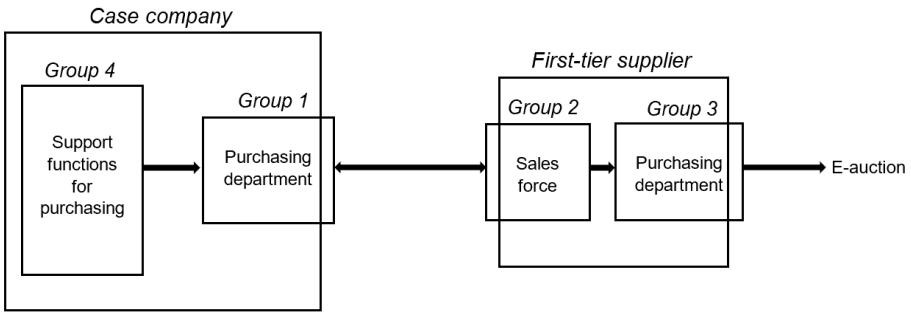

Figure 2: The four interview groups included in the study.

Besides the four groups, I conducted one interview with a consultant delivering the E-sourcing platform to the case company to gain information on the usage of the E-auction tool from a holistic point of view. In total, I conducted 25 interviews, 9 interviews with employees of suppliers, 15 interviews with employees of the case company and one interview with the consultant of the E-sourcing platform (Appendix 1).

Each respondent was approached over email where I introduced myself as a master thesis student from Gothenburg University together with the overall scope of the topic. I contacted 33 individuals and 25 agreed to participate. Four people within group 4 declined and referred to others who they thought could provide better knowledge. The other three who declined belonged to the three suppliers that were not able to participate in the study. The average interview was 30 minutes and the aim were to have no interview exceeding 40 minutes to maintain a good focus throughout the sessions and enable a high level of participation. The interviews were conducted in both English and Swedish, depending on the native tongue of the respondents to minimize language barriers and enable spontaneous responses. Furthermore, all interviews were recorded with the permission of the respondent and anonymity was given to all companies and interviewees to allow for an open dialogue and to avoid distorted answers. After each session, the interviews were transcribed as well as translated if conducted in Swedish. The translation, however, has limitations considering that the respondents' answers are objects for interpretation when translating and the cultural aspects embedded in the language are difficult to account for.

I started each interview by asking the respondent about his or her current position, background and number of years with the company to get a good picture of the interviewee in order to adjust the remaining questions and to set a comfortable atmosphere for the rest of the session. The interviews were semi-structured to ensure that no important topics were overlooked but without sticking to a structured list of questions. For group 1-3, I used three different interview guides with topics targeting each specific group. For group 4 and the consultant, I created separate guides for

each interview to better capture each respondent and its respective function. Five of the sessions were face-to-face while the rest were audio meetings that took place over several different media such as Skype, Webex, Zoom, Teams or phone. I chose to do audio meetings without video since that is the industry standard and thus, what the respondents expected. The reason why only 20 percent of the interviews were face-to-face was due to the geographic distance between me and some of the participants but also because of the COVID19 outbreak.

Besides the interviews, I made daily observations which were written down in a logbook. These observations were from meetings, lunch and coffee breaks and from interactions with employees of the case company. In addition, I gathered documents that contained the case company's process in the selection of suppliers, their information about second-tier suppliers and the level of cost and component transparency they received from suppliers. The interview transcripts, the logbook and documents were then coded in the software program Nvivo 12 to manage and structure the data. The codes were generated from the theoretical framework to allow for an efficient analysis of the gathered information in order to answer the research question. In total, 27 codes were used and grouped into the following six categories, relationships, knowledge & resources, transparency, cost savings, collaboration, and E-auction. The text connected to each code, group and company were then analyzed to bring forward the empirical findings.

3.2 Ethical aspects

The topics that were discussed during the interviews were not of sensitive nature but there were topics leading to answers containing sensitive information. Considering that I investigated the characteristics and dynamics of business relationships that are subject to cost pressure and negotiations, there is information that buyers and sellers do not want to share with each other in order to maintain integrity and power. To diminish the issues of sharing sensitive information I followed the research principles of Silverman (2017); voluntary participation, consent for recording, protect and respect the integrity of participants and avoid doing harm and deceive. Furthermore, to ensure that sensitive information cannot be tracked back to a specific respondent or company, all participants were given full anonymity. Another important ethical aspect is the asymmetrical power relationship between the interviewer and the respondent (Kvale, 2006). As explained by Kvale (2006), an interview is not a mutual conversation, instead the interviewer is asking the questions with a specific underlying objective for its own benefit. It was therefore important to respect the trust that was created and be aware of the power relationship. In addition, since I was located at the case company during the field study, it was central to distance myself from the interest of the case company when conducting the interviews and in the handling of the

provided answers to uphold integrity and respect of all participants. Consequently, no answers or information were shared between different companies.

3.3 Limitation

Each of the four first-tier suppliers included in the study, view the case company as an important customer. Thus, the dependency and power relationship between the suppliers and the case company might have affected the suppliers' answers. This is especially the case if the respondents viewed me as a representative for the case company or if they thought that their answers could be used in an opportunistic manner. I tried to mitigate this limitation by clearly explaining the purpose of the research, my role and the management of information. Another limitation of the research design is the predominated number of interviews conducted at the case company. Originally, seven first-tier suppliers were included in the study which would have balanced the number of interviews between the case company and suppliers. However, since three suppliers were unable to participate, the distribution of interviews became skewed. Furthermore, the findings need to be viewed and evaluated from its context. I have interviewed four suppliers and one key account manager and one commodity buyer at each supplier. The respondents can therefore not represent their companies' entire sales force or purchasing organization. As a result, the findings are likely to represent individual perceptions and thoughts while other aspects of the companies' strategies and processes are overlooked.

3.3.1 Impact due to the COVID19 outbreak

Due to the COVID19 outbreak, the case company was closed from the end of March. This caused a disruption in my field study and it was a contributing factor to a lower selection of first-tier suppliers and the predominant use of audio interviews compared to face-to-face meetings. This disruption also reduced the possibility to conduct follow up interviews and it diminished the number of daily observations made.

4. Empirical findings and analysis

The empirical findings cover the inter-firm relationship and IOCM activities between the case company and the four first-tier suppliers together with each suppliers' purchasing process. The section ends with the participants' E-auction experiences and opinions.

4.1 The case company's purchasing process and IOCM efforts

The case company is constantly developing new generations of engines to implement the latest technology and meet the forthcoming emission regulations. As a result, the complexity of the

engines and their functions are increasing and so does the pressure on supplier performance. The case company is persistently working together with suppliers to improve quality, technology and deliveries but also to keep cost down, seeing as purchasing stands for approximately 70 percent of cost of goods sold. The first-tier suppliers producing products for the air management department all provide customized and complete solutions and there is almost daily contact between the case company and their suppliers to maintain and develop the relationship. Currently, there are also ongoing projects with the four first-tier suppliers to improve fuel efficiency and performance to reach the new emission regulations. The supplier relationships within the air management department are generally long-term and built on trust as it is complex and time consuming to reward new suppliers and the products need mutual collaboration.

Each segment within the air management team is categorized according to the Kraljic matrix (1983) to identify product characteristics in order to develop efficient purchasing strategies. The majority of the purchased goods are characterized as bottlenecks (Kraljic, 1983) with few alternative suppliers and where existing suppliers have great negotiation power. As a result, the main challenges for the commodity buyers are to maintain competitive supplier relationships and to find alternative suppliers that have excellent knowledge within combustion technology that can also provide competitive prices. Besides the Kraljic categorization, existing suppliers are also divided into four Supplier Involvement in Product Development levels (SIPD). The overall purpose with the SIPD categorization is to increase the product development output by combining the resources available internally with suppliers' development resources. SIPD 4 is used on suppliers who independently run product development projects while SIPD 1 is used on suppliers where product development is performed internally by the case company. Suppliers delivering to the air management team are usually within SIPD 4 or 3, meaning that the case company to a large extent relies on the knowledge and capabilities of their suppliers.

The case company uses various IOCM techniques, but the aim is to further increase transparency in their buyer-supplier relationships and become even better at identifying areas of improvement. In sourcing projects, the case company uses TC to evaluate the offers from suppliers by comparing them to estimated market prices produced by cost engineers. This enables the case company to identify areas of improvement and put specific cost pressures where there the gap between the offered price and the market price is too big given a certain profit margin (Agndal & Nilsson, 2009). In the process of rewarding new businesses, the case company also asks suppliers to provide a cost breakdown, specifying cost drivers. The cost breakdown can be compared to IOCM techniques relating to the cost structure of suppliers such as open-book accounting, with the purpose to identify and improve lacking competencies (Agndal & Nilsson, 2009). However, not every supplier

provides a cost breakdown and it has been difficult for the case company to convince suppliers about the mutual benefits with a high level of transparency. The case company requires their supplier to continuously improve and reduce costs, but without a complete cost breakdown or an open dialog it has been difficult to evaluate changes. It has been noticed that some suppliers simply cut their profit margins to offer a better price while others try to improve internally. For the case company, the survival of their suppliers is of highest importance and thus, cost reductions need to originate from improvements and not from profit cuts. Another issue for the case company is how to mitigate price increases from suppliers providing no or little transparency. Without an open dialog, it is difficult to lessen cost increases through design modifications, technical adjustments or other form or collaboration. The case company must therefore accept the new price or search for alternative suppliers. The engineers at the case company also have the need for close collaboration and openness with suppliers as there is a limit of how much that can be interpreted from a technical specification.

For existing suppliers, the case company works with a tool called Product or Process Change Notification (PPCN). It is an industry standard tool used to ensure the functionality and quality of delivered parts during ongoing production. If a supplier wants to change its process or switch sub-tier suppliers, it needs to be reported through a PPCN and then approved by the case company before the change can be carried out. PPCN is a requirement for all suppliers and all delivered products, and unreported changes can lead to penalties. The case company has found that many quality issues can be traced back to unregistered PPCN and they are therefore contemplative on how to improve the process to better ensure quality. Other companies within the automotive industry have decided that standardized products, with limited supply risk, do not have to comply under the PPCN requirement. The case company, however, has a history of significant quality issues related to unreported changes of fairly standardized products and are therefore more conservative of their PPCN process.

4.2 Description of each buyer-supplier relationship and IOCM efforts

Supplier 1

Supplier 1 has been a supplier to case company for more than 15 years. They are currently delivering two types of valves for the engine where the volume for one of the valves has drastically decreased. All research and product development for the valves are performed independently by supplier 1 and this level of supplier development is categorized within SIPD 4 by the case company. SIPD 4 signifies that all product development is performed by the supplier with limited input from the case company. Moreover, the case company categorizes the products purchased from supplier 1 as

leverage items in the Kraljic matrix (1983) seeing that the product complexity is low even as the products are customized. Based on the development and product attributes, the buyer-supplier relationship is best described by the specified interface of Araujo et al. (1999) where suppliers produce customized products and need some degree of direction and specification from the buyer. There are several alternative suppliers for the products delivered by supplier 1, however, the case company strives for a continued long-term relationship seeing that they are in need of collaboration to reach the new emission regulations.

Supplier 1 is the smallest of the four suppliers in turnover and their dependency to the case company is high for their vehicle business. Both the case company and supplier 1 perceive that their relationship has improved in the last two years but nonetheless, supplier 1 wants to be perceived as a merely transactional supplier. In addition, Supplier 1 is highly concerned with protecting its integrity and intellectual properties and has therefore not agreed to the cost breakdown asked for by the case company. Instead, supplier 1 presents how they calculate the price for their products but without specifying the cost of each subcomponent.

Supplier 1 has experienced that information shared has been used in an opportunistic manner. For example, they mentioned customers exploiting their product portfolio, cherry picking parts where they have superior cost structure or parts where the customer sees an opportunity for cost pressures. Even as supplier 1 is dubious of sharing business-related data, they acknowledge that there are certain areas where collaboration of commercial information leads to mutual benefits. For example, the case company supports supplier 1 in the purchase of fasteners for the fixation of the valves, and as the case company has better leverage, the products can be purchased to a significant lower price.

The market conditions of the inter-firm relationship between the case company and supplier 1 can best be described by the market procurement or transactional purchasing presented by Williamson (1985, 1991). The inter-firm dependency is low as the product is developed independently by supplier 1. Furthermore, the products have a low level of complexity which reduce the transaction uncertainty between the parties. As a result, the market conditions can be compared to those of arm's length relationships, but nonetheless, the case company is working for closer collaboration through IOCM activities in new sourcing projects.

Supplier 1 and its purchasing process

The global supply chain director interviewed at supplier 1 purchase both customized and off-the-shelf products. Castings are examples of mutually developed products that are created based on

the design of supplier 1 and where specific tooling needed for production is financed either by supplier 1 or the end customer. They have a balanced and competitive market for customized products with several alternative suppliers, and for off-the-shelf parts, there is an even higher market competition. For all customer-specific products, the aim for supplier 1 is to conduct dual sourcing, however, for tooling related products double investments limits the possibility. For machine parts it is easier to switch from one supplier to another and consequently, less costly to commit to dual sourcing. Furthermore, supplier 1 has a clear understanding of the annual volumes as they have been fairly stable, but that was before the COVID19 outbreak.

In the selection of new suppliers, supplier 1 tries to find out if there is a mutual understanding of quality, language, performance and price together with a reasonable level of dependency to ensure leverage. Supplier 1 prefers to work with suppliers that has a maximum turnover of 20 up to 40-50 million euro per year in order to reach a position of importance. In addition, they favor face-to-face meetings to determine the suitability of suppliers as it is important to consider other aspects than price. Furthermore. the buyers at supplier 1 will always ask for a cost breakdown for strategic products to identify improvements.

"Not every supplier is fulfilling the cost breakdown, but I really like to see the cost and I really like to see the difference between suppliers. And we also like to do cost calculations activities to see where the differences are and where we can support with our network behind." (Global Supply Chain Director, supplier 1, Mars 24, 2020)

Besides the cost breakdown, supplier 1 uses self-assessment templates and for all new suppliers, a general audit is conducted. The results are then shared with their suppliers to encourage improvements. The buyers will not dictate how their suppliers conduct their own business and they are aware that suppliers need to have a certain profit margin, but it must be within a reasonable range. With this honest approach, supplier 1 believes to enable an open-minded discussion with their own suppliers, identifying discrepancies and working towards mutual benefits. One example of this was a cost calculation that was done together with a Swedish supplier. During the cost calculation it was discovered that the impregnation cost for the parts were unusually high. Supplier 1 then contacted a company working with surface treatment that could do it for 1/10 of the cost which significantly lowered the purchase price.

"So in this case we were able to save a lot on the cost side of the part but not because of negotiation or putting pressure on suppliers to keep the business, but just by reorganizing the material flow within Europe in order to take advantage of certain local differences in costs." (Global Supply Chain Director, Supplier 1, Mars 24, 2020)

Similar to supplier 1's efforts to improve the cost structure of their suppliers, they have experienced customers wanting to interfere in their relationships with sub-tier suppliers. The global supply chain director mentioned a German customer insisting to visit a second-tier supplier, but he distinctly refused the request. As stated by supplier 1, they are responsible for the products produced by second-tier suppliers and thus, their customers are not allowed to make those types of requests.

Supplier 2

Supplier 2 has had a long relationship with the case company and been delivering products since the 60-70's, and the dependency to the case company is high as it is one of their top 10 most important customers. All products delivered are customized and they are categorized as bottleneck items (Kraljic, 1983) by the case company. From the beginning, the products were developed in mutual collaboration but with time and with improved competence, supplier 2 is now capable of driving development projects more independently. Supplier 2's product development is therefore defined by SIPD 3, i.e. the supplier leads the development, but specifications are refined together with the case company. The current level of collaboration between supplier 2 and the case company can therefore be related to the translation interface described by Araujo et al. (1999), where the supplier must translate the functional characteristics given by the buyer into a product. Even as supplier 2 has become more independent, the case company has made efforts to improve the supply chain of supplier 2 based on what they believe to be superior knowledge.

Supplier 2 view themselves as transparent, however, they only provide information that they perceive as relevant for the features of their products. Information concerning their intellectual properties and proprietary information is not shared. There is no open-book accounting in place, but it is something the case company is working towards, especially considering that supplier 2 is more expensive than other suppliers producing similar products. The case company has good technical understanding of the different subcomponents, but they lack insight into the supply chain of supplier 2 in order to identify improvements. Supplier 2's apprehensiveness towards commercial transparency can be related to opportunistic behavior as there have been incidences where their quotes and proposals have been shared with competitors. However, the key account manager stated that standardized procedures, non-disclosure agreements and a general protection of integrity discourage the exploitation of information.

Based on the market characteristics of the inter-firm relationship between the case company and supplier 2, the interaction is best described by relational purchasing or hybrid procurement (Williamson, 1991). The products are customized with a high level of engineering and are therefore

in need of joint development to enable the best performance of the products. In addition, there are few alternative suppliers in the market which forces the case company to secure supply through long-term commitment.

Supplier 2 and its purchasing process

The procurement manager at supplier 2 is responsible for the purchase of direct materials where 90-95 percent of the components have certain aspects of customization. The market for direct materials is highly competitive with multiple alternative suppliers. According to the purchasers at supplier 2, the volumes for automotive parts are stable which allow them to make reliable forecasts.

For new businesses, supplier 2 uses an E-sourcing software from which their suppliers receive all information. They have a list of globally approved suppliers that has been visited by supplier quality and only approved suppliers can be invited to quote. The only exceptions are directed buys from customers, meaning there is a direct recommendation or requirement to purchase from a specific supplier. Recently, supplier 2 received a directed buy from the case company for a specific second-tier casting supplier. According to the case company the casting supplier has a good reputation and they believe that supplier 2 will be able to reduce their cost with the help of the new supplier. After the first selection procedure, directed or approved suppliers receive a Request for Quotation (RFQ) that contains information on design, technical specifications, volumes and timing of deliveries together with a cost breakdown sheet. The cost breakdown is a definite requirement and the quote cannot be submitted without it. In the last few years, supplier 2 has made additional effort to reduce cost and in this process, the cost breakdown sheet was extended to cover every aspect of the offering. When the quotes are submitted, they will contact suppliers for price negotiations if their quotes are considered too high. The most competitive offers will then be selected to participate in the Supplier Team Feasibility Concept meeting (STFC) which is basically a readiness review together with engineering, supplier quality and commodity buyers before rewarding the business. TC is not currently used but it is an ongoing project. Moreover, the purchasing process is almost the same for both standardized and customized products. However, for less complex products, the STFC meeting is sometimes considered unnecessary as the supply risk is relatively low and occasionally supplier 2 purchases off-the-shelf parts from catalogue distributors.

Supplier 3

The relationship between supplier 3 and the case company has improved in the last years and the air management team view supplier 3 as one of their key strategic suppliers for future development projects. At the moment, they deliver one category of products to the air management team but

there are many ongoing projects between the two parties and supplier 3 recently won new businesses from 2022. The current delivery of supplier 3 is within the bottleneck category of the Kraljic matrix (1983) while the new business from 2022 will be within the strategic segment. Supplier 3 is the second largest of the four first-tier suppliers in terms of turnover and they have one of the most diversified product portfolios. They could theoretically deliver products to all segments for the air management team. On top of that, the product development of supplier 3 is categorized within SIPD 3, meaning that they are the development leader with support from the case company. The collaboration for recent and future purchasing projects is best described by the interactive interface of Araujo et al. (1999) seeing that supplier 3 and the case company are working together in partnership to make the best use of each other's knowledge and capabilities.

The philosophy of supplier 3 is to be generous with information, both commercial and technical, and have close contact with customers. And according to the case company, supplier 3 provides a satisfying level of transparency through open-book accounting where they can identify whom supplier 3 buys subcomponents from and what their margins are. Since supplier 3 has a high level of transparency and is considered a strategic supplier for future development projects, the case company has put more effort into this relationship compared to the other suppliers. Supplier 3 explains that the reasons for their openness are to enable long-term strategic relationships and to allow for mutual improvements through cost saving efforts. And contrary to many other suppliers in the automotive industry, opportunistic behavior is not a concern for supplier 3.

In summary, the market characteristics of the relationship between supplier 3 and the case company can be explained by the hybrid procurement or relational purchasing as defined by Williamson (1991). The supply risk is high, and close collaboration can significantly reduce uncertainty. For new sourcing projects, the inter-firm relationship can best be described by the INA approach, seeing as the exchange of capabilities and knowledge define the collaboration.

Supplier 3 and its purchasing process

Most of the products bought by the interviewed purchaser at supplier 3 are customized and the level of interaction with suppliers depends on the product complexity. In most cases, supplier 3 sends a first draft of the product to its supplier and then the product is developed together. When specific tooling is needed to produce the parts, either the end customer or supplier 3 will finance it. The volumes for the products bought by supplier 3 have been fluctuating due to the gradual transition from combustion engines to electric engines. The volumes for combustion parts have declined while components for electrical engines have increased. The market for the products

bought by supplier 3 is highly competitive and there are several alternative suppliers for most components. Dual sourcing is used most of the time, especially if the volumes are big, and businesses are also bundled together to get competitive prices through increased volumes.

Supplier 3 has developed an internal database for sourcing from which RFQs are sent out. In the database is a list of all approved suppliers and the purchasers are only allowed to reward businesses to suppliers on the list. When selecting new suppliers, they use a scorecard, rating suppliers based on quality, delivery and cost. The supplier is then graded from A-D where D is the lowest. The target is to have all suppliers rated A or B. Besides the scorecard, supplier 3 also looks at financial risk and ISO certifications. In terms of transparency, supplier 3 requires that all sub-tier suppliers provide a cost breakdown for both product and tooling to identify improvements and negotiate price. However, the purchase process can differ depending on the end customer. A few customers of supplier 3 want to dictate and control what sub-tier suppliers they use for specific products. In those cases, supplier 3 receives a list of pre-approved suppliers which they need to choose from. Seeing that suppliers are directly nominated by their customers, it is more difficult for supplier 3 to negotiate prices and require transparency.

Supplier 4

Supplier 4 has been providing the same product to the case company for many years, and their product segment is within the strategic box of the Kraljic matrix (1983). However, recently they lost business for a new generation of engines which will affect their volumes from 2022. According to the key account manager at supplier 4 this is an experience they have learned from and he believes that the relationship has improved as a result of this. For example, for the first time in history, supplier 4 received one of the case company's engines, enabling them to conduct tests for new developments in order to become even more relevant for the new engine updates in 2025. Supplier 4 is eager to continue improving the relationship and the goal is to reach to the point where they are considered a part of the case company, merely based in a remote office. They are particularly interested in obtaining a close collaboration regarding the technical aspects of the delivered products.

For the update of products, supplier 4 oversees the technical development based on requirements and parameters provided by the case company and hence, they are categorized within supplier product development, SIPD 3. SIPD 3 is also closely related to the translation interface of Araujo et al. (1999). Furthermore, as supplier 4 is the largest of the four first-tier suppliers, with great knowledge and capabilities within their field, it is easy for the key account managers at supplier 4

to handle and fulfil the case company's requirements. However, supplier 4 does not work with open-book accounting or cost breakdown as they want to protect and benefit from investments in intellectual properties. Nonetheless, supplier 4 is open for collaboration and willing to make the case company understand their cost structure without submitting a cost breakdown. One way this has been done was through inviting the case company for a cost workshop. In the workshop, the product delivered to the case company was disassembled and put in front of the invited guests. They then explained the manufacturing process and what specifications the case company has on each of the subcomponents. The case company on the other hand wishes for more commercial transparency, especially as they are comparing supplier 4 with supplier 3 who produce similar products. The distinct difference between technical and commercial transparency in the relationship with supplier 4, aligns with the case company's general view of their supplier relationships, where profit driven organizations rarely share commercial information.

"Generally, we have a good relationship with our suppliers. More problems in the commercial aspects compared to the more technical part. That is my general experience. You will always struggle commercially. It goes without saying." (February 21, 2020)

Nevertheless, opportunistic behavior does not worry supplier 4 and it is not used as an argument for their commercial integrity. They believe that their customer will use the information that they provide for the right purposes. Supplier 4 further mentioned that the case company has provided them with an engine and that it would be unethical if they would share that information with other customers. Subsequently, supplier 4 feels that there is a mutual trust between the two parties.

The market characteristics of the inter-firm relationship between supplier 4 and the case company are best described by the hybrid procurement or relational purchasing (Williamson, 1991). The products have high supply risk, they are of strategic importance both for engine performance and emissions levels and there are few alternative suppliers in the market. Furthermore, the relationship between the engineers at both firms can also be described by the INA approach where both supplier 3 and the case company want to exchange knowledge and capabilities to enable optimal technical modifications.

Supplier 4 and its purchasing process

The product buyer at supplier 4 purchases products for many different segments such as foundries, machine shops and stampings. Even as most of these products have low level of complexity, supplier 4 creates the design for the majority of the purchased parts and thus, few of the products bought by the buyer are considered off-the-shelf. According to supplier 4 they are trying to work

closely in collaboration with suppliers when deciding on design and production in order to reduce costs. For many of these products, the volumes are rather stable and hence, supplier 4 can make fair predicaments. In addition, the markets for most of their components are competitive and there are usually several alternative suppliers. Moreover, nuts and bolts are classified as off-the shelf parts by supplier 4. These products are low value and low spend parts that require less collaboration with suppliers and thus, the purchasing strategy is partly different. Nonetheless, supplier 4 clearly states that the piece price is only one factor determining the selection of new suppliers.

Supplier 4 works with Total Cost of Ownership (TCO) as a definite requirement for all suppliers to identify and improve costs drivers. According to the project buyer, suppliers are more accommodating when there are opportunities for new businesses, and it is therefore easier for supplier 4 to get the information needed for TCO in new purchasing projects. In TCO, supplier 4 looks at aspects such as account logistics, previous performance, financial health, supplier risk and dependency towards industry and customer. According to the project buyer, the purpose of TCO is not just cost pressure, it is also a way to monitor the suppliers and ensure that they make reasonable profits to secure future deliveries.

"I always want a supplier to make an acceptable margin, that way, they make money in order to reinvest in the company and they want to continue making our parts. If a supplier gets a very little margin on our products, then they are going to be less inclined to help if there is a problem and there is a risk that they always find more or better work for their machines." (Project Buyer, supplier 4, April 16, 2020)

Moreover, supplier 4 does not want their business with suppliers to exceed 35-40 percent of the suppliers' turnover. Nor do they want their business to be less than 5 percent to ensure that suppliers are committed. This is especially important in bad times like the present COVID19 outbreak, where there are material shortages forcing suppliers to prioritize deliveries. Supplier 4 is also trying to work with dual sourcing in order to weigh one supplier against the other and secure deliveries against supply risks. Dual sourcing is however only used in a limited number of cases due to costs.

4.3 E-auction

E-auction from the perspective of the case company

The case company does not currently use E-auction. However, they have bought a new E-sourcing tool that includes the E-auction function. This new sourcing platform has recently been introduced and they are now running a pilot to ensure a successful implementation. E-auction is not the main

priority, but the company will look over the possibility to use this tool for commodity goods with low complexity.

According to the respondent working for the E-sourcing platform purchased by the case company, the use of E-auction has decreased in the last years. This is partly due to the business cycle where E-auction tends to be used more frequently in an economic downturn when the pressure to reduce cost is higher. It has also become more popular to talk about collaborative sourcing where collaboration and synergies are preferred over cost pressure (Araujo et al., 1999; Gadde & Snehota, 2000). According to the consultant of the E-sourcing platform, what really discourages people from using E-auction is ignorance. Buyers want to be able to select suppliers based on other factors than merely price but what most do not know is that other parameters can be included in E-auctions. In the selection of parameters, you can pick different attributes such as quality, delivery, sustainability and certificates which can also be weighted based on their importance. Consequently, the E-auction tool does not have to be limited to products where price is the only significant factor.

One of the respondents at the case company mentioned that he used to work with E-auction at his previous company and that they were very successful. The E-auction tool worked perfect for parts that were relatively simple, where they had many suppliers and high competition. Besides reduced purchase prices, cost was also saved from shorter and more efficient purchasing processes.

"It was quite interesting to run it because as a buyer, you do not have to have these tiresome runs back and forth with suppliers. You just start the clock running and the lowest price finds its way." (Business Improvement Leader, Case company, February 11, 2020)

Even as E-auction has the potential to deliver the best price, it does not necessarily deliver the best total cost of ownership according to the business improvement leader. You might get 10-15 percent on price reduction but only if you have a simple product portfolio. For parts of higher complexity, there is a risk in using E-auction if price reduction is the only motivator (Jap, 2002; Smeltzer and Carr, 2003).

"The supplier with the lowest price does not necessarily mean that the other conditions are as good. You need to compare all your apples with all of your apples. Things like payment terms, quality performance and on time delivery are not tangible, they are intangibles as well as the openness and the responsiveness they offer." (Business Improvement Leader, Case company, February 11, 2020)

According to commodity buyers at the case company, most of their purchased products are too complex for an E-auction and in many cases, there are only one or two alternative suppliers.

However, they estimate that around 30-50 percent of the subcomponents in the purchased products could be used in an E-auction without imposing additional risk. The four-first tier suppliers are therefore all presumed to have great opportunity to save costs on purchased subcomponents using E-auction.

Commodity buyers at the case company argue that E-auction as a joint effort should be of interest for many of their suppliers since there is a constant pressure to reduce cost in an already competitive industry. For example, the case company has noticed that local suppliers tend to have less advanced supply chains and more expensive subcomponents compared to global suppliers, but without transparency it is difficult to identify improvements and carry them out. The challenge will be to convince suppliers to see the opportunity for a win-win situation and how it is perceived by suppliers will depend on how it is presented. The case company can for example propose E-auction as a service to tier-one suppliers and support the process through their own sourcing platform, splitting the cost savings 50/50. Or it can be presented as a requirement, but the case company is hesitant when it comes to dictating how their suppliers should conduct business and they doubt that their suppliers would approve of this course of action.

The interviewed engineers at the case company stated that the success of E-auction as a joint effort will depend on the nature of the collaboration, the complexity of subcomponents and the trustworthiness and overall quality of the first-tier supplier. The engineers acknowledged that even for simple products, one needs to be careful with comparing apples to apples in an E-auction. The same goes for the requirements stated in the auction because there is a risk they will be interpreted differently (Smeltzer & Carr, 2003). Consequently, even if a subcomponent is suited for E-auction, it is the first-tier supplier who conducts the purchase and it is therefore important that the case company can trust their judgment. Another risk with E-auction as a joint effort, according to the case company, is the question of responsibility. If there is an issue with a supplier selected through an E-auction, the first-tier suppliers might try to shift the responsibility over to the case company and avoid warranty claims. This could especially be the case if they have felt forced to use the E-auction tool. A challenge for the first-tier suppliers on the other hand is the demand for PPCN. It makes the switch of suppliers more complex and time-consuming but for the case company it ensures that they are fully informed of the change and the impact on the delivered products.

E-auction from the perspective of the four suppliers

Two out of the four first-tier suppliers have been on the receiving end of E-auctions and only one has conducted E-auctions. The key account manager at supplier 1, who has participated in E-auctions as a seller, calls it a waste of time and energy.

> *"I think it is understandable for commodity parts like fasteners, bolts and nuts, everything which is off the shelf, high volume, high running products which need no engineering or development efforts. If you buy milk, groceries or oranges then you can use an auction, but we are not supplying those components so in that case we do not see any benefits with participating." (Key Account Manager, supplier 1, Mars 10, 2020).*

The key account manager at supplier 3 has also been at the receiving end of E-auctions and agrees that it is a difficulty tool to use for customized products. However, the E-auctions that supplier 3 participated in were only used in the beginning of sourcing as a means for the customer to reduce the number of potential suppliers. After the E-auction process, the customer went on with one-on-one negotiations.

Only supplier 1 out of the four first-tier suppliers uses the E-auction tool for their own selection of suppliers. They use the same e-sourcing platform as the one purchased by the case company and it is through this platform, they access the E-auction tool. According to supplier 1, it is an efficient tool, but it puts a lot of pressure on their suppliers. They have noticed that many of their existing suppliers do not want to participate in E-auctions as they only submit one initial offer without engaging in the bidding process against their competitors. Consequently, most of their existing suppliers lost the business and, in many cases, it was transferred to suppliers with previous experience of E-auction. An issue that arose from some of the E-auction rounds was that the rewarded suppliers did not read or comprehend all the product specifications, leading to misunderstandings (Jap, 2002; Smeltzer & Carr 2003). In some cases, supplier 1 was forced to go back to its original suppliers and pay a certain amount of money on top of the old price to secure deliveries. Nonetheless, for segments, where the parts are fairly simple, there are a number of suppliers with proven high-quality and no tooling cost, then supplier 1 is trying to use the E-auction tool as much as possible to cut costs. Their average saving on E-auction has been around 10-15 percent.

According to supplier 3, they use a similar approach to E-auction through their own e-sourcing platform. It is through this platform that their suppliers receive and send back the RFQs together with an extensive cost breakdown. In the RFQ, the target costs, the volumes and technical specifications are stated. After receiving the RFQ, suppliers have 2-3 weeks to provide an answer.

In between, the suppliers can call or have meetings with supplier 3 to clarify technical issues which will allow them to provide a more accurate quote. Once the time period has expired, supplier 3 reviews all quotes and the suppliers with the best prospects will be asked to review their offer and submit new RFQs. Supplier 2 has a similar approach as supplier 3, however, they do not compare it to an E-auction process, but when asked about the potential to implement E-auction, the procurement manager at supplier 2 was optimistic.

"An E-auction process would be helpful and would probably be the next level of consideration. E-auction could shift us to getting a better price at the very beginning. In other words, instead of going back and getting cost reduction from current business with suppliers, if we are successful in the front end then we do not have to go back and try to get cost reductions later on." (Procurement Project Manager, Supplier 2, April 25, 2020)

5. Discussion

The purpose of the interorganizational use of E-auction is to improve first-tier suppliers' purchase of standardized goods to minimize transaction costs and purchase prices for the benefit of both the first-tier suppliers and the end customer. The question, however, is not if it can be used in an interorganizational setting but how it can be applied to save costs. Any buyer can encourage their suppliers to conduct E-auction, but the difficulties are determining in what type of interorganizational relationship it could provide value, at what point in time, and what information is needed to make it successful.

The discussion is divided into two main sections. The first section discusses the expectations of implementing E-auction in an interorganizational setting that enables mutual collaboration. Here, aspects of existing IOCM techniques and inter-firm characteristics are brought forward together with opportunistic behavior to shed a light on the prospect of its application. The second section is focused on the expected contributions of E-auction as a joint effort. Transparency, attitudes, transaction costs and knowledge sharing are some of the topics covered to discuss potential benefits of E-auction as a complement to IOCM.

Inter-firm relationship	*IOCM with the case company*	*IOCM with suppliers*	*E-auction*	*Kraljic matrix (1983)*	*SIPD*	*Araujo et al. (1999)*	*TCE*	*INA*
Supplier 1	Target costing, partial cost breakdown and trade-off techniques relating to technical specifications	Cost calculations, cost breakdowns and self-assessment templates,	E-auction is used on all products which are deemed appropriate by the supplier	The products have high impact on profitability but relatively low supply risk and therefore categorized as leverage items	Supplier 1 is driving product development with limited input from the case company (SIPD 4)	The specified interface can best describe the interaction considering that the products are customized based on the case company's requirements	The market characteristics are described by market procurement or transactional purchasing	The relationship from the perspective of the case company show effort for mutual commitment
Supplier 2	Target costing, partial cost breakdown, directed buys and trade-off techniques relating to technical specifications	Cost breakdowns, STFC meeting and company visits	E-auction is not used, but supplier 2 is interested in the E-auction tool to further reduce cost	The products have high supply risk but low impact on profitability. There are also few alternative suppliers. Thus, the products are categorized as bottleneck items.	Supplier 2 is the leader of product development with the support of the case company (SIPD 3)	The translation interface can describe the relationship as the technical specifications are developed together	The market characteristics are best described by hybrid procurement or relational purchasing	The relationship from the perspective of the case company show effort for mutual commitment
Supplier 3	Target costing, complete cost breakdown, trade-off techniques relating to technical development for existing and future products	Cost breakdowns, scorecards and joint product development for complex parts	A similar purchasing strategy to E-auction is used where the negotiation period is a few weeks and during this period supplier are able to ask questions to provide a relevant offer. Suppliers can submit their offer more than once.	The current products are classified as bottleneck items but the new products from 2022 are categorized as strategic items. The supply risk is high in both cases but only the strategic products have a high impact on profitability	Supplier 3 is the leader of product development with the support of the case company (SIPD 3)	The interactive interface can best describe the exchange seeing that supplier 3 and the case company develop products in collaboration	The market characteristics are best described by hybrid procurement or relational purchasing	The relationship has mutual dependency and benefits based on the effort of both parties
Supplier 4	Target costing, partial cost breakdown, cost workshop and trade-off techniques relating to technical specifications	TCO and joint product development for complex parts	E-auction is not used, and it will not be implemented in the near future	The products are classified as strategic items and supplier 3 delivers the products with the highest impact on fuel efficiency and power together with the biggest impact on profitability	Supplier 4 is the leader of product development with the support of the case company (SIPD 3)	The translation interface can describe the relationship as the technical specifications are developed together	The market characteristics are best described by hybrid procurement or relational purchasing	The relationship has mutual dependency and benefits for technical resources and development

Table 2: Summary of the studied inter-firm relationships

5.1 Expectations of implementation

Transparency and IOCM efforts

In table 2, the characteristics of each buyer-supplier relationship and its respective products are presented. It illustrates the similarities and differences between the four suppliers and together, they cover a wide spectrum of inter-firm transactions. From market procurement in supplier 1, to relational purchasing in supplier 2 and 4, and all the way to characteristics best explained by the INA framework in supplier 3. Given the spread of the buyer-supplier relationships, the four suppliers perceive and engage in IOCM activities differently. Even as the case company has a unified course of action for supply management, each supplier relationship has its individual characteristics and separate level of collaboration and transparency. Cost breakdowns are required from all suppliers in sourcing projects, but they are submitted with various results. Supplier 3 has in most cases met and exceeded the expectations of the case company's IOCM efforts while supplier 2 and 4 have provided only a fraction of the required details. Supplier 1 has also submitted inadequate cost breakdowns as they do not feel obligated to share more than the minimum amount of information given their transactional based relationship with the case company. For supplier 2 and 4, it is important that shared information is product-relevant which normally concerns technical specifications and product details. Commercial information on the other hand is more sensitive for the suppliers and the fear of opportunistic behavior is stronger, which discourages IOCM efforts (Van Der Meer-Kooistra & Vosselman, 2000).

In many of the product segments, the case company is locked into long-term supplier relationships to gain the expertise and capabilities needed for production of customized components. Naturally, the main focus in these relationships is collaboration concerning technical aspects. What seems to have been lacking are the commercial matters and a mutual discussion of cost improvements. For example, given the attitude of supplier 1, 2 and 4 they would probably hesitate to engage in a joint use of E-auction as it targets costs and not technical enhancements. The same conclusion can be drawn from the suppliers' experience of customers interfering in their purchasing process and limiting their freedom. Supplier 3 however, already provide detailed cost breakdowns, which suggest that they would be more perceptive for cost reduction collaboration. Nonetheless, like the other suppliers, they are hesitant about customers trying to impact the way they conduct business.

Market characteristics from the perspective of IOCM

Besides the current IOCM activities, the opportunity for inter-firm collaboration can also be derived from the market characteristics of the transactions based on TCE (Dekker, 2004;

Vosselman & Van der Meer-Kooistra, 2009; Agndal & Nilsson, 2010; Uddin, 2013). As known from Williamson (1991) the higher transaction uncertainty, the larger the benefits of cooperation. Frequency and asset specificity, which are also mentioned as key drivers of transaction costs, are less relevant for the case company's supplier relationships as the product volumes are generally high and specific assets for production are financed by the case company and not their supplier. Cooperation with supplier 1 from the perspective of TCE is not expected to generate greater efficiencies compared to market-based arrangements due to low product complexity and the existence of alternative suppliers (Araujo et al., 1999). For supplier 2, 3 and 4, the market characteristics are more aligned with relational purchasing where collaboration and IOCM activities has the possibility to generate efficiency through reduced supply risk (Williamson 1991; Axelsson & Wynstra, 2002). Based on the findings and the theoretical framework, the success of an interorganizational use of E-auction is expected to follow the market characteristics of relational purchasing and be subordinated to the same challenges and prerequisites as for IOCM techniques in general. Hence, arm's length relationships characterized by transactional purchasing will probably hamper the possibility to utilize E-auction in an interorganizational setting. But even as the market characteristics of supplier 2, 3 and 4 are best described by relational or hybrid procurement (Williamson, 1991) where the circumstances are beneficial for IOCM, it is not necessarily aligned with their opinion and attitude as shown in some of the buyer-supplier relationships.

Power balance and opportunistic behavior

As IOCM research has mainly focused on the buyer's perspective, it has underestimated the willingness of suppliers to participate (Lamming et al., 2005a; Agndal & Nilsson, 2010; Windolph & Moeller, 2012). This dilemma can also be found in the case company's IOCM efforts where their suppliers' distrust and attitude have discouraged collaboration across borders. The case company is larger than the four suppliers included in this study and considering that the suppliers perceive the case company as one of their most important customers, this could lead to unbalance in the power relationship. This unbalance might cause suppliers to expect that shared information will be used for cost pressure (Cäker, 2008; Windolph & Moeller, 2012) which could explain the suppliers' unwillingness to provide cost breakdowns. The unbalance of the relationships with supplier 2, 3 and 4 are evened out by the fact that there is a limited number of alternative suppliers for the case company to purchase from, but not necessarily enough for the suppliers to disregard opportunistic behavior. Due to IOCM constraints from the fear of opportunistic behavior, Van Der Meer-Kooistra and Vosselman (2000) argue that trust and mutual commitment are prerequisites for a successful IOCM. However, E-auction as a joint effort would only require commercial details for

non-strategic goods that can be defined as off-the-shelf parts or standardized products (Pereira et al., 2011). Subsequently, it should be easier to encourage transparency for low level engineered products suitable for E-auction compared to information concerning intellectual properties which has been one of the main oppositions for supplier 4. Hence, the information needed should not to the same extent be obstructed due to fear of opportunistic behavior.

5.2 Expectations of contributions

Based on the experiences of the respondents, the average saving from E-auctions is between 10-15 percent for standardized goods and these figures conform with the findings of Chon (2000) and Tully (2000). Furthermore, as found by Jap (2002) and Prescotti (2003) the speed and simplicity of the E-auction process has provided the respondents and their companies with additional benefits from reduced transaction costs. E-auction in itself, as presented in the theoretical framework, has demonstrated benefits, but the question is when E-auction could be identified as a means for improving first-tier suppliers purchasing of standardized goods. It might be that the cost of conducting E-auction as a joint effort is bigger than the potential benefits. It comes down to the product, the supplier, the administrative costs and the increased supply risk in order to evaluate the benefits of E-auction as a joint effort.

Abilities to identify the NPV

E-auction as stated in the theoretical framework is closely related to the market characteristics of market procurement or transactional purchasing (Pereira et al., 2011). For the success of a joint E-auction, it becomes essential that the first-tier suppliers purchase subcomponents suitable for E-auction through transactions characterized by arm's length relationship (Jap 2002). Based on the findings, the case company has, in most cases, the information needed to assess whether subcomponents purchased from a first-tier supplier are suited for E-auction without imposing unwanted risk from a technical point of view. What they lack in their buyer-supplier relationships, with the exception of supplier 3, is open-book accounting via cost breakdowns. Through completed cost breakdowns, the case company can identify current purchase prices and second-tier suppliers for each subcomponent, but without the cost breakdown, the case company cannot accurately estimate if E-auction will lead to cost savings. It might be that E-auction, as a joint effort, ends up dominating local concerns and successful processes of suppliers as found in the study of Cäker (2008). Meaning, that for supplier 1, 2 and 4, the case company cannot, based on the existing information, identify if their suppliers already purchase subcomponents at a competitive price. And after reviewing each of the supplier's purchasing processes, it seems as if they have established and systematic processes in place for the selection and evaluation of suppliers. For example, supplier 3

works with leverage by bundling products together to gain better prices and supplier 1 already practices E-auction and uses other forms of IOCM such as cost calculations with suppliers. Furthermore, the four first-tier suppliers in this study are relatively large companies with more than 2 400 million sek in turnover and they are part of global supply chains. Hence, they should be able to purchase standardized subcomponents to reasonable prices. And considering that the case company is not familiar with the purchase processes of their suppliers, there are obvious obstacles to apply E-auction as a joint effort. Because in the same way transactional purchasing is the better strategy when hybrid procurement does not sufficiently reduce uncertainties to offset the benefits (Williamson, 1985, 1991), E-auction needs to outperform existing purchasing operations and provide greater cost savings than the increased risk. Consequently, before pushing for E-auction, the case company needs information about their suppliers' purchasing procedures and cost structure to ensure a positive result.

Given the challenges of implementing E-auction as a complement to non-existing or limited IOCM activities, an alternative solution would be to examine the opportunity to implement it in the rewarding of new businesses. Firstly, in sourcing projects, the case company uses TC, which are estimates of market prices, used to compare each specific detail of the suppliers' offer to identify cost improvements (Agndal & Nilsson, 2009). Subcomponents that are far off from the cost targets could therefore be identified as products with E-auction potential. Secondly, it is during negotiation rounds where the buyer and seller in a natural setting are trying to figure out ways to lower the cost of the product which further enables the E-auction discussion. Thirdly, in sourcing projects, the testing and the securing of product quality are extensive which also ensure the quality of subcomponents purchased through E-auction. Hence, the supply risk that originates from E-auction (Jap, 2002; Smeltzer and Carr, 2003) can be mitigated. Lastly, when there is a potential to win a new business, suppliers tend to be more accommodating and as a result, the case company has the opportunity to require the information needed to evaluate the benefits of a joint E-auction.

E-auction and reduced transaction costs

Even if the cost saving potential in terms of purchase prices for the four first-tier suppliers included in this study is expected to be limited, there is an opportunity for E-auction to reduce cost through shorter transaction periods and through simpler negotiation terms (Jap, 2002; Prescotti, 2003). Supplier 2 and 3 use similar purchasing processes no matter the complexity of the products and consequently they might be able to reduce their transaction costs for the purchase of standardized goods with the support of the E-auction tool. The idea is that standardized products that can fulfill the conditions of Smeltzer and Carr (2003) do not need the same extensive purchasing processes as strategic or critical goods. And if E-auction through its simplicity can significantly reduce

transaction costs, it could also motivate the utilization of E-auction for dual sourcing which is otherwise discouraged among many of the suppliers due to the cost of rewarding businesses. Furthermore, E-auction, as mentioned in the findings, does not have to be used for the entire purchasing process if the challenges or risks are too high. It could be used in the beginning of sourcing to efficiently narrow down the selection of suppliers, as was the case for the key account manager at supplier 3. Or E-auction can be used in the last stages of negotiations to select between a number of already approved suppliers. However, similar to the discussion of E-auction and NPV, the case company has to be informed about their suppliers' purchasing procedures to identify opportunities to reduce transaction cost.

Motivations and attitudes of the first-tier suppliers

Another aspect which is brought forward in the findings is the attitudes and motivations of the first-tier suppliers regarding their purchasing strategies. In most of their supplier relationships, the aim is not to reduce the profit margin of their suppliers to a minimum, but to obtain a competitive price and at the same time ensure the survival of their suppliers. This is in particular the approach used for customized goods, but as described by the four first-tier suppliers, even simpler components can have some level of adaptation. The business improvement leader at the case company also sees a potential risk in the selection of suppliers on the mere basis of price as there are many intangible features in a buyer-supplier relationship that cannot be sufficiently managed in an E-auction. The simplicity of the E-auction tool and the increased supply risk it entails (Jap, 2002, Smeltzer & Carr, 2003) are especially brought forward in the wake of the COVID19 outbreak. For example, when suppliers suffer from material shortage as a consequence of the present pandemic it becomes important to be a prioritized customer with a good relationship to one's supplier to ensure deliveries even in difficult times. E-auction puts a lot of pressure on suppliers, similar to TC (Agndal & Nilsson, 2009), and in critical buyer-supplier relationships it could backfire when or if the supplier becomes less dependent on you as a customer.

The exchange of knowledge and capabilities

The final consideration of the research question is perhaps the most central. In the theory of INA, the success of the network will depend on what is done within the own organization and what the organization can contribute in its relationship with others (Johanson & Mattsson, 1987). Hence, the value of specific knowledge and capabilities are determined by how it is perceived by counterparts (Håkansson & Snehota, 2006). Drawing on INA, for E-auction as a joint effort to enable cost savings, the case company needs to share knowledge and capabilities that can add value to their suppliers and support them to improve. This becomes difficult when the purchasing

abilities of suppliers are unknown and when the case company themselves are in the beginning of their own E-auction journey with limited knowledge of the tool itself. Supplier 1 for example already uses the E-auction tool, and even as supplier 2, 3 and 4 have no or little experience of E-auction, it is unlikely that the case company, at this point in time, can provide value to their suppliers through E-auction experience and knowledge. On the other hand, they have the opportunity to share their E-auction platform when it is up and running and through this platform support their first-tier suppliers in the administration of E-auction. Consequently, the E-auction platform could be a resource useful for suppliers without this access. And if the case company can provide additional resources in terms of their wide network of suppliers, like in the directed buy of supplier 2, it might contribute to cost savings for their first-tier suppliers. The central issue however is not knowing the knowledge and capabilities of one's supplier since you are at risk of doing more harm than good (Cäker, 2008).

5.3 Evaluation of the study

I wanted to explore opportunities for an extended IOCM approach where cost improvements outside the boundaries of the individual firm are not only identified but executed with the support of E-auction. And in order to understand the expectations and benefits of implementing E-auction as a joint effort it is essential to reflect upon the role of suppliers. It was therefore unfortunately that more material was collected from the case company than the four suppliers combined. Three more suppliers were expected to be included in the study but due to external circumstances they could not participate. The selection of suppliers where supposed to enable a diverse sample of suppliers with different inter-firm relationships and IOCM activities. But since two of the smallest suppliers, in terms of turnover, were lost due to the COVID19 outbreak the selection became more concentrated around larger companies. In the beginning of the study, my point of departure was that the closer the relationship between the case company and the supplier, the better opportunity for E-auction as a joint effort. What became clear however was that the benefits could not be measured in the relationship as such but in the purchasing process of the supplier. The suppliers with great purchasing skills will not necessarily be less encouraged to collaborate but the NPV of the E-auction tool will be less prominent as it must outperform existing processes to provide value. Thus, the loss of the two smallest suppliers was unfortunate since it could have added an interesting comparison to the global actors.

6. Conclusion

The role of PSM has gained considerable attention in recent years as one of the key functions to impact company performance (Zsidisin et al., 2003; Kähkönen & Lintukangas, 2012). And considering that purchasing is today the single largest expenditure for the majority of organizations (Dyer & Nobeoka, 2000; Agndal & Nilsson, 2009) it is interesting to expand the idea of IOCM and explore how companies can work even closer with their suppliers to impact inter-firm transactions further up in supply chains. Consequently, the aim of the study is to develop an understanding of E-auction as a potential complement to IOCM to save cost in the purchase process of first-tier suppliers. By drawing on the theoretical framework in the context of the empirical findings, the study contributes to the field of IOCM by developing an understanding of the dynamics in inter-firm relationships from the viewpoint of both buyer and supplier. The study also stretches the boundaries of IOCM by looking into how a typical purchasing tool, such as E-auction can be expanded into the field of interorganizational relationships. Based on the findings, E-auction as a complement to IOCM has the potential to save costs, however, the expected application and contributions of E-auction as a joint effort are dependent on the characteristics of the inter-firm relationship and on the knowledge and capabilities of suppliers.

First of all, E-auction as a joint effort, similar to other IOCM techniques, must be compatible with the inter-firm relationship in which it will be implemented. IOCM is preferred in buyer-supplier relationships characterized by trust and mutual dependency (Van Der Meer-Kooistra & Vosselman, 2000) and thus, for E-auction to be successfully implemented in an interorganizational setting it should preferably provide opportunities for joint benefits. In addition, the findings show that for E-auction to succeed, a buyer must be able to identify subcomponents purchased by first-tier suppliers with E-auction potential in line with the conditions described by Smeltzer and Carr (2003). Hence, E-auction as an interorganizational tool is expected to be dependent on existing IOCM activities and should therefore be viewed as a complement to IOCM. Furthermore, based on the findings, both technical transparency and commercial information are needed to identify which subcomponents have limited supply risk and the greatest opportunity for cost improvements. However, obtaining commercial information from suppliers has been proven difficult due to fear of opportunistic behavior in line with the findings of Cooper and Slagmulder (2004). And due to the lack of existing IOCM activities, where current purchase prices or technical information are missing, the NPV of E-auction as a joint effort cannot be estimated.

Secondly, it is found that for E-auction to be beneficial as a complement to IOCM, the buyer must have knowledge about their suppliers purchasing strategies and processes. The study shows that

through open-book accounting, E-auction possibilities can be targeted but the outcome of such arrangement cannot be accounted for without understanding the process in which the products are purchased. A supplier might have local concerns or strategies that creates better efficiencies compared to E-auction and in the selection of suppliers, other factors than cost savings might be prioritized and valued. Thus, in the same way transactional purchasing is the better strategy when hybrid procurement does not sufficiently reduce uncertainties to offset the benefits (Williamson, 1985, 1991), E-auction needs to outperform existing purchasing operations and provide greater cost savings than the increased risk. Because, if the purchase process of one's suppliers is not carefully considered, E-auction as a complement to IOCM could do more harm than good which can be related to the discussion in Cäker (2008).

Thirdly, based on the INA approach and the studied inter-firm relationships, actors within the same network use each other's knowledge and capabilities to solve problems and develop in collaboration (Håkansson & Snehota, 2006). Thus, the value of knowledge and capabilities of an organization is impacted by how it is perceived by counterparts (Johanson & Mattsson, 1987). Subsequently, E-auction as a joint effort should preferably provide value for first-tier suppliers by contributing with knowledge or resources that suppliers are currently lacking. However, considering the simplicity and the low upfront investment of the E-auction tool (Jap, 2002), it should be reasonable to assume that established and global suppliers, as the ones included in the study, have the possibility to introduce E-auction into their own organizations and keep any potential cost savings for themselves. Still, according to the findings, suppliers could gain valuable competences if a large OEM supports the E-auction process together with their general purchasing experiences and network of suppliers.

By conducting a study based on inter-firm relationships from the perspective of first-tier suppliers and their purchasing processes, I am contributing to the limited amount of research that highlights the standpoint of suppliers within the field of IOCM (Agndal & Nilsson, 2008). The contribution to the field is further emphasized seeing that there are even fewer studies conducted that consider the viewpoint or the impact of suppliers' purchasing organizations in IOCM research. Moreover, for practitioners, the study can contribute with guidance for future interorganizational initiatives seeing as it underlines the importance of knowing the competences and capabilities of one's suppliers to understand if and how a specific form of collaboration could add value. For example, the competence within the purchasing organization of suppliers will impact the NPV of buyers' initiatives aiming to reduce suppliers purchase prices. Furthermore, the study demonstrates the risk of implementing IOCM activities without enough information about the exchange and its characteristics. With insufficient commercial and technical transparency of purchased products,

cost improvement efforts from a buyer could overshadow local concerns and processes of suppliers and potentially constrain supply chain efficiency instead of improving it. Finally, the study highlights that practitioners could focus on aspects where their company has superior knowledge and competences when aiming to obtain cost savings through IOCM activities. Therefore, it becomes important to understand in what supplier relationships a company's resources can have the greatest impact and thus, it is not recommended to use the same collaborative efforts in all buyer-supplier relationships.

Future research

This study is a first attempt to extend the application of E-auction into the field of IOCM. And naturally, the study leaves us with unresolved questions such as how potential administrative expenses and cost savings should be divided and who bears responsibility for the E-auction outcome. Hence, these questions would need to be addressed in future research with a more practical approach. Furthermore, it might be interesting to conduct a study from the perspective of smaller suppliers, operating more locally, with less advanced supply chains, seeing as the possibilities for E-auction as a complement to IOCM to generate cost savings relate to the knowledge and capabilities of suppliers' purchasing organizations. Finally, it could be worth looking into other opportunities that could emerge from gaining insight into suppliers' purchasing processes. Apart from E-auction, other tools or resources might have the potential to add even more value for specific inter-firm relationships if they can be identified.

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Appendices

Appendix 1

Participant	*Group*	*Years at the company*	*Position*	*Type of interview*	*Length of interview (min)*
Case company	1	18	Commodity Buyer	Skype	35
Case company	1	8	Commodity Buyer and Segment Leader	Face to face	40
Case company	1	2,5	Commodity buyer	Face to face	25
Case company	1	18	Commodity buyer	Skype	35
Supplier 1	2	3	Key account manager	Webex	25
Supplier 1	2	3	Key account manager	Webex	25
Supplier 2	2	8	Key account manager	Webex	25
Supplier 3	2	4	Key account manager	Skype	20
Supplier 4	2	5	Key account manager	Zoom	35
Supplier 1	3	12	Global Supply Chain Director	Phone	40
Supplier 2	3	27	Procurement Program Manager	Teams	40
Supplier 3	3	2	Program Launch Buyer	Phone	30
Supplier 4	3	22	Project Buyer	Skype	25
Case company	4	37	Business Office	Face to face	40
Case company	4	37	Business Office	Skype	35
Case company	4	16	Logistic Management Sourcing	Skype	20
Case company	4	0,5	Commodity Buyer	Face to face	30
Case company	4	3,5	Business Improvement Leader	Skype	30
Case company	4	8	Supplier Quality Engineer	Skype	30
Case company	4	20	System Chef Engineer	Skype	30
Case company	4	16	Directory Logistic Purchasing Developer	Skype	30
Case company	4	8	Global Component Responsible	Face to Face	30
Case company	4	0,5	Global Component Responsible	Skype	26
Case company	4	6	Business Improvement Leader	Phone	30
E-soursing platfrom	Consultant	2	Key Account Manager	Skype	25

Appendix 1: List of all the participants.