

Transaction Costs in Global Supply Chains of Manufacturing Companies

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ABSTRACT

Outsourcing has advanced to an important measure that is applied broadly in operations management. Nowadays, suppliers of manufacturing companies do not only provide direct material like raw material and operational supplements but offer components and advanced modules incurring many value-adding stages. Whereas in the past companies built up local supplier networks, they recently tend to search for global sources. However, not all companies reach their expectations towards the success of global sourcing projects. Important reasons for relocating manufacturing capacities back to local suppliers or in-house manufacturing are costs for unexpected coordination activities, limited flexibility and declined or fluctuating quality. The theory of Transaction Cost Economics postulates that transaction costs of the types information, communication and coordination determine the governance structure of a supply chain, i.e. market, hybrid or firm. The objective of this paper is to analyze the cause-and-effect chain of inter-firm transaction costs concerning global sourcing. The resulting qualitative model is based on explorative multiple-case study.

Keywords: Transaction cost economics, Operations management, Outsourcing, Global sourcing, Low-cost countries

1. INTRODUCTION

The decrease of the range of vertical integration in manufacturing companies has been an important shift in strategic management during the 80s and 90s. The depth of product structure levels manufactured in a company was redefined analyzing the make-or-buy decision for each product and component. Make means manufacturing of a product in-house in the own company; buy means sourcing from an external supplier. One of the most important criteria influencing this decision relates to the strategic alignment of a manufacturing company. Concentrating on core competencies is a strategy that operations manager have been pursuing for the reasons of strengthening competitiveness and preserving manufacturing capacities in high-wage countries [cf. 1].

Outsourcing has advanced to an important measure that is applied broadly in operations management. Nowadays, suppliers for manufacturing companies do not only provide direct material like raw material and operational supplements but offer components, modules and systems incurring many value-adding stages [2].

The question these days is not only about make-or-buy but as well about buying local-or-global. Whereas in the past companies built up local supplier networks, they recently tend to search for global or offshore sources mainly due to four reasons: cost reduction because of lower wages in emerging markets, access to new sales

markets, compliance of local content clauses and availability of manufacturing capacities and technical competencies [3]. This paper focuses on global sourcing for the reason of cost reductions. In this context, operations managers intend to find global sources from emerging markets as alternative to existing local suppliers in order to reach expected cost savings in purchasing. Large international corporations as well as small and mid-sized manufacturing companies started to increase their global sourcing activities. From a Western European perspective, Asia and Eastern Europe are important regions when thinking about sourcing from low-cost countries.

However, not all companies reach their expectations towards the success of global sourcing projects regarding the entrepreneurial objectives cost, quality, delivery and flexibility. Failed sourcing projects and the revision of outsourcing decisions are the results. Important reasons for relocating manufacturing capacities back to local suppliers or in-house manufacturing are, among others, costs for unexpected coordination activities, limited flexibility and declined or fluctuating quality [3].

Transaction Cost Economics

The theory of Transaction Cost Economics (TCE) has been elaborated by Williamson [cf. 4] based on former concepts developed by Coase [cf. 5]. As a branch of the New Institutional Economics, TCE essentially contributes to the question why firms are founded and how they are governed and structured hierarchically. A transaction is defined as the transfer of a pre-product or semi-manufactured product or service from an upstream to a downstream manufacturing stage [6]. A transaction causes costs of the types information, communication and coordination. Examples for these costs are the processes of searching, initiation, negotiation, execution, adaptation and controlling [6]. The theory's key hypothesis is that "transactions will be handled in such a way as to minimize the costs involved in carrying them out" [7]. This relates transaction costs to the transaction governance, in other words, the mode of vertical integration across value-adding stages. In general, two extreme modes of transaction governance are distinguished because of differing transaction costs characteristics: market and firm [8]. According to TCE, low transaction costs favor market exchange, i.e. intermediate products are purchased from suppliers; high transaction costs favor hierarchical governance structures, i.e. intermediate products are manufactured in-house in a firm [9].

In the multifaceted literature available about TCE, the discussion about what transaction costs actually encompass is not uniform. On the one hand, it is stated that transaction costs are the costs of carrying out an exchange [10]. On the other hand, transaction costs encompass both, direct managing costs in exchange relationships and opportunity costs of making inferior

governance decisions [4]. Furthermore, transaction costs may also integrate transaction risks that other parties break an engagement agreed upon [9]. In this paper, we consider transaction costs only as costs of the types information, communication and coordination. The costs can be measured as efforts of employees including travelling costs. For example, when a purchasing manager spends one week for supplier evaluation abroad, his labor costs and travelling expenses will be allocated to the transaction costs of the corresponding buyer-supplier relationship.

Transaction costs are one part of the total cost of ownership (TCO) of a purchased good. In general, the TCO consist of the purchase price, costs for transport and logistics, transaction costs, costs of capital lockup and depreciations, and risk costs. Risks in terms of supply chain management relate to unpredictable outcomes of performance indicators and occur with certain probabilities. Predictable outcomes of performance indicators are not considered as risks but measured in the other mentioned parts of the TCO (see Figure 1).

For example, changing from a local supplier in Switzerland to an offshore supplier in China, the delivery lead time might increase from one week to an expected value of five weeks (sea freight). The lead time of five weeks is related to subsequent capital lockup costs for higher safety stocks and increased value of goods-in-transit. However, in the case of damaged shipments, lead time might increase to 15 weeks which can be considered by quantifying associated risk costs for the unpredicted incident.

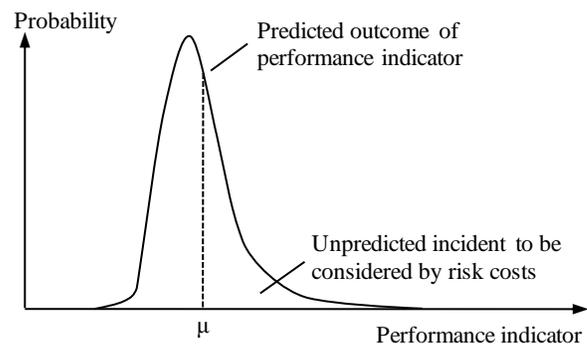


Figure 1: Supply chain risks as unpredicted events

TCE and global sourcing

From a TCE point of view, companies purchase intermediate products from suppliers if the transaction costs are low. Under certain conditions, the transaction costs of purchasing in a market exceed the costs of keeping the transfer within a firm. In other words, transaction costs determine the governance structure of a supply chain. In addition to the two extremes, market and hierarchy, hybrid transaction mechanisms exist as well. The hybrid mechanisms introduced by Williamson [cf. 11] are specified more precisely as supply management,

supply chain management and virtual enterprise (see Table 1).

Transaction governance	Characteristics
Market	Supply contracts of short duration Low intensity of cooperation
Supply management	Long-term supply contracts Low intensity of cooperation
Supply chain management	Long-term supply contracts High intensity of cooperation
Virtual enterprise	Cooperation of legally independent co-makers Act towards third party as single organization
Hierarchy	Internal organization

Table 1: Different modes of transaction governance (cf. [12])

Global sourcing can be defined as “proactively integrating and coordinating common items and materials, processes, designs, technologies, and suppliers across worldwide purchasing, engineering, and operating locations” [13]. In this paper, global sourcing is used in the sense of sourcing from low-cost countries or emerging markets. The transaction costs of global sourcing projects are generally higher compared to sourcing projects from local suppliers because of more efforts for searching and initiation, negotiation, execution, adaptation and controlling. Reasons are the long geographical and cultural distance between buyer and supplier, differences in languages, diverse technical norms and unlike business conducts. Following the theory of TCE, high transaction costs imply hierarchical governance structures. In the case of global sourcing, governance structures are quite loose and resemble market exchange rather than internal organization. This is a contradiction to TCE that can be dissolved taking into account other potential determinants of vertical coordination like economies of scale, capital investment requirements, additional risks, taxation and customs regulations [10]. Presumed cost savings because of lower labor costs in emerging markets are the key criterion when selecting materials for global sourcing aiming at reduced purchasing costs. In the past, managers only considered lower costs for labor-intensive products neglecting additional expenditures, opportunity costs and risks. The concept of total cost of ownership [cf. 14] changed this behavior and nowadays, companies apply more comprehensive approaches analyzing procurement costs [15]. As interviews with purchasing managers in Switzerland revealed, companies usually consider additional costs for logistics like transportation, insurance and customs but still ignore transaction costs, capital lockup, depreciations and risks.

2. OBJECTIVES

The objective of this paper is to analyze the cause-and-effect chain of inter-firm transaction costs concerning global sourcing from low-cost countries. The research questions are defined in the following:

- a) What are the characteristics of global supply chains resulting in high and unexpected transaction costs (causes of transaction costs)?
- b) What are the consequences of transaction costs on the supply chain performance (effects of transaction costs)?

Reaching these objectives operations manager can estimate ex-ante to what extent they will have to face transaction costs and what kind of governance structure shall be set up. This will help them improving their decision-making processes for global sourcing due to two reasons. First, efficient exchange relationships can only be established if the governance structure matches the characteristics of the exchange environment [16, 17]. Second, following TCE prescriptions positively influences the overall performance of a company [18].

3. METHODOLOGY

The base of this paper is a short literature review about the topic of TCE. Subsequently, a model is developed to trace back the causes of transaction costs in global sourcing projects. The model is based on explorative multiple-case study research in three manufacturing companies in Switzerland [19].

4. REVIEW OF RELEVANT LITERATURE

The following literature review shortly introduces the topic of TCE. More extensive reviews are available in various publications [cf. 20, 21].

In the TCE literature, researchers try to find empirical proof for the standard construct originally developed by Williamson [cf. 4]. Independent variables are the transactional dimensions asset specificity, uncertainty and frequency. They are based on three main behavioral assumptions: opportunism, bounded rationality and risk neutrality. The transactional dimensions influence the dependent variable transaction governance [9] (see Table 2).

Asset specificity relates to the “transferability of assets that support a given transaction” [9]. In other publications, this aspect is referred to as buyer’s specific investment [16]. There are different types of asset specificity: human and physical assets, product, site and firm [7].

Uncertainty relates to “unanticipated changes in circumstances surrounding a transaction” [9].

Environmental uncertainty encompasses unpredicted changes in environment, markets and technology. Renegotiations of agreements and contracts may be necessary to adapt to changing circumstances. Behavioral uncertainty refers to performance evaluation problems and difficulties in verifying compliance of established agreements [21].

Behavioral assumption	Transactional dimension	Dependent variable
Opportunism	Asset specificity	Transaction costs
Bounded rationality	Uncertainty	Transaction governance
(Risk neutrality)	(Frequency)	

Table 2: Standard construct of Transaction Cost Economics

The third transactional dimension, the frequency with which transactions recur, is of less importance and therefore less considered in research [4, 8]. In the following, only asset specificity and uncertainty will be considered as transactional dimensions

There are three behavioral assumptions justifying the transactional dimensions: opportunism, bounded rationality and risk neutrality. Opportunism accounts for the circumstance that businesses and individuals seek to exploit a situation to their own advantage [4]. Bounded rationality relates to the condition that decision makers have limited capabilities concerning their cognitive abilities and rationality [8]. Their capacity to evaluate decision alternatives is physically limited [22]. Risk neutrality is a less investigated behavioral assumption. It refers to a characterization in the field of decision theory distinguishing risk averse, risk neutral and risk seeking behavior. Considering a situation of constant transaction costs, risk averse decision makers decide for internal organization whereas risk seeking decision makers prefer market exchange [23].

The theory of TCE has been supported by many empirical studies [21]. However, there are also critical voices asking for theory adaptation rather than sticking to the original construct [20]. A recurrent criticism is that transaction costs have seldom been measured explicitly [9, 10].

5. MODEL DESCRIPTION

The following results relate to an explorative multiple-case study with three companies based in Switzerland. The three companies source intermediate and finished products from China for final assembly and sales mainly in Western Europe. In these companies, the engineering is based in Switzerland and manufacturing at an external supplier in China. The analysis of transaction costs was initiated due to high efforts for managing global supply

chains [24]. In an extended group of 14 industry partners, the results of the multiple-case study were analyzed concerning both, causes and effects of transaction costs.

The basic constructs of the proposed model are similar to the original model developed by Williamson as mentioned above (see Figure 2). However, global sourcing involves special circumstances compared to other applications of TCE and the impact on governance structures. Cost advantages can be quite large compared to quotations from local sources coming along with larger transaction costs. In the proposed model, asset specificity and uncertainty are independent variables with influence on the dependent variable of transaction costs. The analysis of behavioral assumptions is excluded for reasons of simplification. Transaction costs affect the governance structure. In the case of global sourcing, it is expected that the governance structures are not aligned to the actual transaction costs in case of bad performance measures. The performance of the selected governance structure is investigated analyzing the supply chain performance.

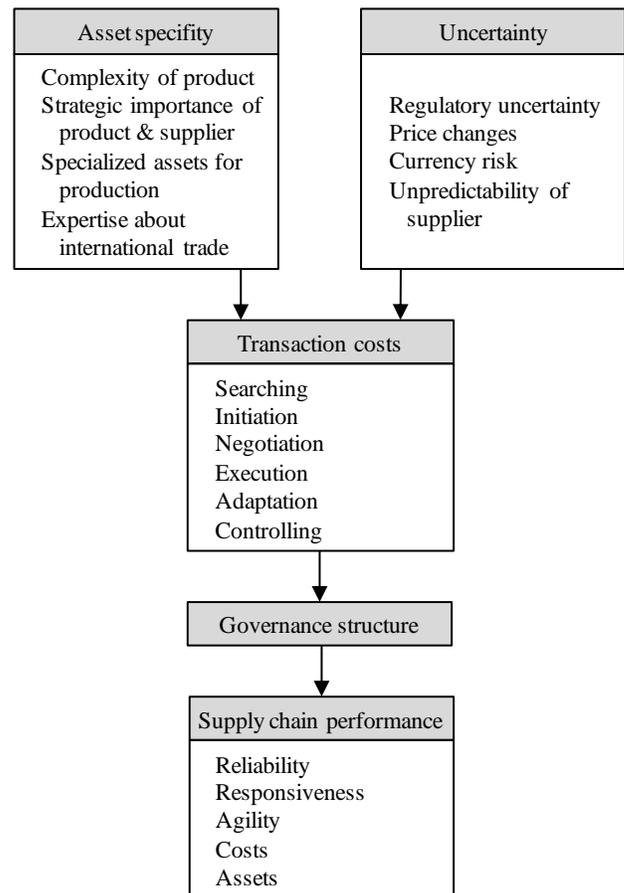


Figure 2: TCE model for global sourcing

Asset specificity

The construct asset specificity is proposed to be measured by four variables. First, the consideration of the product complexity relates to the circumstance that simple parts

are commonly purchased successfully from emerging market suppliers whereas complex components, modules and finished products require intensive coaching, attentive supplier development and time-consuming knowledge transfer. Second, the strategic importance of product and supplier is measured as cause of transaction costs. If a product or supplier is of importance to a buyer, the buyer attempts to strengthen the buyer-supplier relationship. Strategic importance can be related to single-source situations, special technical competency of supplier and special requirements concerning the product's availability because of downstream manufacturing processes in case of intermediate products or delivery due date in case of finished products. Third, specialized assets for production provided by the buyer determine transaction costs. The more a buyer invests in supplier-specific machines, auxiliary parts and tools, the more transaction costs are generated. Fourth, expertise about international trade influences the efficient managing of global supply chain. This variable also relates to the size of the company and the existence of local sourcing hubs in considered procurement markets. Especially global supply chains initiated by small and medium size buyers managed from long distance may generate large additional efforts.

Uncertainty

The second independent construct, uncertainty, encompasses four different variables. First, regulatory uncertainty relates to the condition that regulations influencing global supply chains may change very sudden. One example is the permanently changing regulations for refunds of value-added taxes in China. Local dependencies facilitate better and faster sources of information. Second, price changes influence transaction costs. Most significant are the aspects labor and raw material that may be reasons for renegotiations. Third, currency risks have a big impact on transaction costs. Currently, the fluctuation of currencies is quite high due to the economic crisis. Fourth, the unpredictability of supplier is the last variable affecting transaction costs. In the case of emerging markets, especially fast growing companies may suddenly cancel business relations because of changing strategic alignments. The first three variables belong to environmental uncertainty, the latter to behavioral uncertainty. Cultural distance can be integrated as additional uncertainty affecting transaction costs in global supply chains. However, a recent study about the cultural distance found out that the influence is not significant [25].

Transaction costs

As revealed in the literature review the quantification of transaction costs is a challenge in science and industry. Only few researchers measured transaction costs directly. Two exemplary measurements of transaction costs are presented in the following. First, it is proposed to measure product design and production processes, verification of product performance and costs,

coordination of relationship and negotiations [26]. The second example comprises developing relationship, monitoring, addressing problems and likelihood of supplier taking advantage [9]. This paper suggests a simple measurement of the transaction costs referring to the different processes searching, initiation, negotiation, execution, adaptation and controlling [6]. For each category, efforts in strategic and operative procurement are measured as well as business trips to suppliers' sites. Searching refers to the process of procurement market research, i.e. finding potential suppliers. Initiation is related to supplier selection. Negotiation refers to contract and terms negotiations for single purchasing projects and blanket purchase orders. Execution refers to supplier development and operational sourcing. Adaptation measures the expenditures for design changes and the last variable, controlling, takes account of all supplier controlling necessities like monitoring of delivery due dates and quality control.

Performance of supply chain

According to TCE, transaction costs affect governance structure. In the case of global sourcing projects, decision makers may favor market structures because of presumed cost savings mainly due to low labor costs. Therefore, transaction costs should affect the performance of sourcing activities and subsequently, result in adjustments of the governance structure. An adjustment of the government structure in this context means relocating supply chains to other more suitable regions or even in-house integration. The performance of sourcing is measured by standard performance indicators. One possibility for performance indicators is related to the entrepreneurial objectives quality, costs, delivery, and flexibility [12]. Furthermore, performance indicators can be taken from the SCOR model: reliability, responsiveness, agility, costs and assets [27]. The first three indicators are customer-faced performance attributes, the last two internal-faced.

The presented qualitative model based on explorative multiple-case study research will be validated in a survey among Swiss manufacturing companies in the future.

6. CONCLUSIONS

Unexpected transaction costs may result in failed sourcing projects in global supply chains of manufacturing companies. The characterization of global supply chains applying the identified causes of transaction costs supports manufacturing companies to improve planning their expenditures and to substantiate their make-or-buy decisions. A better understanding of transactions costs and a better awareness of risks is expected to increase the performance of global sourcing activities.

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