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## **Outsourcing of logistics activities in a complex supply chain: a case study from the Norwegian oil and gas industry**

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**Abstract:** This paper argues that the evolution of gradually more complex supply chains makes the logistics outsourcing decision more difficult and that a main reason for this is the increased number of interorganisational links that appear in complex supply chains.

A wider Supply Chain Management (SCM) consideration seems to be warranted and the dyadic approach frequently taken in the outsourcing literature is not sufficient to provide adequate decision support in outsourcing decisions.

The paper reviews the current literature on how interorganisational links should be regarded in an outsourcing decision process. A business case from the Norwegian oil and gas business is used to illustrate and analyse the broad problem scope and the complexity associated with the decision of possible outsourcing of the Supply Terminal Management (STM) within the framework of Transaction Cost Analysis (TCA) and SCM theory. The outcome of the empirical analysis shows that it is not beneficial to outsource the function when both economic and organisational factors are brought into consideration.

**Keywords:** oil industry; Supply Terminal Management; STM; outsourcing of logistics activities; Transaction Cost Analysis; TCA; Supply Chain Management; SCM; interorganisational links.

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## 1 Introduction

Decisions on which activities to perform in-house and which activities to outsource represent significant strategic options for business firms (Williamson, 1975) and the core competence concept has evoked great response both in theory and in practice (Kremic *et al.*, 2006). The basic idea is that it is preferable for companies to outsource activities and processes which are not considered 'core business'. A company's core business represents those activities and processes that really create unique value and should be kept as in-house activities (Quinn and Hilmer, 1994).

Motivated mainly by the core competence concept or by more traditional cost-benefit considerations, many companies have subcontracted their logistics activities to logistics providers (see literature reviews by ELA and Kearney, 1999; Boyson *et al.*, 1999; Laarhoven *et al.*, 2000; Langley *et al.*, 2006; Maloni and Carter, 2006).

Even though business firms tend to outsource more of their logistics activities, several theoretical contributions have drawn attention to the fact that outsourcing considerations represent very complex decisions and strategic issues (see Kremic *et al.*, 2006 for an extensive review). This is coherent with empirical findings showing that many logistics activities are still kept in-house, and that it is mainly traditional logistics services such as transportation, warehousing and customer clearance that become outsourced (Langley *et al.*, 2006). Only 10% of business firms have outsourced all their supply chain functions, according to Boyson *et al.* (1999), and the success of the fourth-party logistics concept seems to be limited.

Much research has been done on outsourcing decisions, and a recent study conducted by Kremic *et al.* (2006), reviewing 210 outsourcing studies, provides insight into the benefits, risks and decision problems that have been considered. A main conclusion from this research is that there already exist a large amount of literature and empirical findings about outsourcing and that a present challenge is to structure this abundance of information so that it becomes more suited for decision support. This view is supported by many other authors pointing to the need for more practical guidance for managers and researchers (Harland *et al.*, 1999; Lonsdale, 1999; McIvor, 2000; Maloni and Carter, 2006).

One important factor which contributes to the increasing need for practical guidance is that, together with several other prevailing business trends (Harland, 1996), outsourcing (logistics activities included) has resulted in a gradual evolution of more complex supply chains. As the supply chains increase both vertically and horizontally, business firms become members of several supply chains (Lambert and Cooper, 2000) which are linked into larger network structures (Harland, 1996). Hence, an increasing number of business firms find themselves as members of comprehensive and complex supply chains, which make the considerations and decisions on outsourcing even more complex.

This development implies that outsourcing analyses are getting more difficult and that a wide supply chain view is necessary to be able to make good decisions. The existing literature is frequently based on dyadic considerations (Sink and Langley, 1997; Boyson *et al.*, 1999; Lonsdale, 1999; McIvor, 2000; Bolumole, 2001; Kremic *et al.*, 2006). Hence, the main focus of this research represents only a small fraction of the supply chain structure and does not provide sufficiently adequate decision support for managers who are concerned about outsourcing of logistics activities with strong interdependencies. The main reason for this is that the dyadic approach does not pay enough attention to all of the relevant interorganisational links that exist in a complex supply chain. The purpose of this research is to demonstrate the importance of a broader supply chain view considering several relevant interorganisational links in an outsourcing decision process. This view represents the basis for our theoretical framework in the analysis of sourcing decisions in this research. We also regard the necessity of taking such a view as supported by the recent contributions of Bolumole *et al.* (2007) and Holcomb and Hitt (2007).

The rest of this paper is organised as follows: In Section 2, we review how the current literature considers interorganisational links in the outsourcing decision processes. Section 3 focuses on our research objectives and the applied methodology of this research, and Section 4 presents our case study. Section 5 presents our analysis of the case study. Discussions, conclusions and implications are presented in the last section.

## 2 Theoretical frameworks

Transaction Cost Analysis (TCA) is an important theoretical framework applied in the analyses of outsourcing decisions. TCA's unit of analysis is the individual transaction and the theory has provided significant contributions to the knowledge about the attributes and coordination of interorganisational links and how those should be regarded in the outsourcing process (Williamson, 1985).

TCA is traditionally applied within a more narrow empirical setting (dyadic level) than the Supply Chain Management (SCM) framework. However, in 1996, Harland argued for greater research efforts that regard the coherence between the supply chain level and the dyadic relationships within supply chains (Harland, 1996). Croom *et al.* (2000) claimed that TCA and SCM are not completely different theoretical directions and should be regarded as complementary. Recently, Bolumole *et al.* (2007) have followed this direction and thoroughly elaborated how different theoretical frameworks can function as complements in outsourcing decisions.

We will in the following two subsections elaborate the contributions from both TCA and SCM.

### 2.1 Transaction cost analysis

The main focus in TCA concerns how business transactions should be governed. The alternative governance forms regarded in the theory are *market*, *hybrid* and *hierarchy*, where the latter corresponds to the in-house production of an activity or process (Williamson, 1985). An outsourcing decision can be viewed as a question about whether it is preferable for a company to change the preferred governance form from a hierarchy to hybrid governance or a market transaction.

The starting point for exploring whether it is sensible to change the governance form for an activity is usually based on an underlying economic motivation. A transportation task can be considered outsourced because it is believed that a third-party transport provider could obtain economic scale advantages and therefore be able to do the job at a lower cost. Several such possible economical motivations for outsourcing decisions are described by Panayides and Cullinane (2002), Ellram and Billington (2001) and Ellram *et al.* (2007).

The role of TCA is to verify whether the initial motivation still holds as an argument when all the costs related to the governance of economic transactions are accounted for (Williamson, 1991). According to Rindfleisch and Heide (1997, p.31), one of the initial propositions in TCA is that “under certain conditions, the cost of conducting economic exchange in a market may exceed the cost of organizing the exchange within a firm”.

These conditions are particularly interesting in an outsourcing evaluation process since they could generate transaction costs, which might make it preferable not to outsource. The three basic kinds of transaction costs are adaptation costs, performance evaluation costs and safeguarding costs (Rindfleisch and Heide, 1997).

*Adaptation costs* will appear because decision makers are limited by bounded rationality when they enter a relationship. Decision makers are not able to account for all conditions associated with, for example, environmental uncertainty and product complexity. Unforeseen environmental changes often make it necessary to modify contracts, something that usually induces ex post adaptation costs.

*Performance evaluation costs* will appear when the conditions of trade make it difficult to determine whether sufficient compliance with the established agreement has occurred. The gathering of information, monitoring, performance measuring, *etc.*, will be necessary to reveal a party's true level of performance.

*Safeguarding costs* usually appear as a consequence of handling, or trying to prevent, opportunistic behaviour in a relationship between companies. Situations with high specific assets, asymmetrical information or a lack of availability of substitutes could

provide an opportunity for opportunistic behaviour (Williamson, 1985). As specific assets have limited or no value outside of the specific relationship, they create interfirm dependencies which one part can exploit opportunistically. All efforts to hinder opportunistic behaviour when entering or participating in a relationship are regarded as safeguarding costs. (See Amaral *et al.* (2004) and Amaral *et al.* (2006) for examples of areas where opportunistic behaviour could appear in outsourcing situations).

The decision about how to govern business-to-business transactions should be based on possible economical benefits related to a more efficient production, or improved value adding for the company, and the significance of the above-described transaction cost elements (Williamson, 1991).

An important contribution to the body of outsourcing literature based on the TCA framework is the Total Cost of Ownership (TCO). Ellram and Siferd (1998) describe TCO as “the tool and philosophy to support the theory of transaction cost analysis”. Maltz and Ellram (1997) illustrate the differences between outsourcing of components and logistics functions, and the importance of enlarging the activity scope when addressing the outsourcing of logistics activities. Logistics activities usually have multiple interfaces and concern both the interface between logistics providers and their customers (alternatively, the interface between the suppliers and a logistics provider) and the interfaces between the many logistics service suppliers, which often exist within a supply chain.

The main point is that if a logistics provider is not able to maintain and follow up relationships with the customers in a good way, the risk of losing customers could be high. There are also other possible negative consequences of letting a logistics provider carry out the daily contact with the customers, and this concerns the complementary tasks and possible loss of important information associated with the outsourcing of activities:

“What happens, for example, when a driver-sales force is replaced by third-party transportation? Who scans the shelves for competitor inroads, makes certain that promotions are carried out, works with receiving to insure product rotation, *etc.*?” Maltz and Ellram (1997, p.53)

The learning from Maltz and Ellram’s TCO founded approach is that logistics activities have multiple interfaces; something which requires that logistics providers are able to serve the customers with a broad set of interrelated and tailored activities. Furthermore, Maltz and Ellram pinpoint that there exists some types of information which have a value on its own that can be extracted only from the execution of a broad set of logistics activities on the customer/supplier side. Such information is easier to gather and possess by in-house responsibility and production, and more difficult to get access to if the logistics activity is outsourced.

## 2.2 *Supply chain management theory*

The goal of SCM is to improve the long-term performance of the individual companies and the supply chain as a whole (Mentzer *et al.*, 2001). To obtain this, the theory states that a holistic supply chain perspective is necessary.

A holistic supply chain view requires an overview of the supply chain structure, where the links are an important and central component in respect of their function of binding the supply chain structure together (Lambert *et al.*, 1998). The basis for having

links is that numerous activities which belong to different business processes are executed. Those business processes cross organisational boundaries between members of the supply chain and the links express the existence of relationships between the members of the supply chain.

An important issue in the SCM theory is the identification of *key business processes* which are believed to be necessary to manage and integrate in order to obtain a successful supply chain coordination (e.g., order fulfilment and supplier relationships) (Lambert *et al.*, 1998).

For the purpose of managing and integrating the key business processes, the SCM theory proposes that *fundamental management components* should be used. Those fundamental management components should be common across all business processes and members of the supply chain (Cooper *et al.*, 1997).

According to the SCM theory, the outsourcing of a transportation task implies adding a new member to the supply chain and linking from this member to other actors outside the present structure. Furthermore, a new link between the transport provider and the company which outsourced the activity must be set up. Another consequence is that all the links between the outsourcing company and the suppliers are partly or completely taken over by the new transport provider. Accordingly, those links usually change form from managed to, for instance, monitored or not-monitored links. Such a change in a link can have consequences for the transaction costs related to the coordination of that link. According to SCM, a change in a supply chain link could make it urgent to reassess the content of the fundamental management components used to govern that link.

Taken together, outsourcing decisions usually induce a comprehensive reorganisation of the supply chain structure and it is important to be attentive to this and clarify all the organisation and management challenges in the supply chain associated with outsourcing decisions.

### **3 Research objectives and methodology**

The main objective of our research is to explore some challenges of outsourcing decisions with TCA and SCM theory as our theoretical framework.

Our research design is explorative and is based on a case study methodology (Yin, 1994) with a focus on an investigation of a contemporary phenomenon observed within a real-life context. We found that a holistic, in-depth investigation was necessary to obtain a good understanding of this phenomenon. We gave focus to gaining a best possible understanding of one single case in order to address our research issue. We have reviewed the current literature to clarify the theoretical fundament for our research and at the same time carried out comprehensive investigations of the case company.

The research method is based on onsite observations and the analyses of internal company documents such as governing documents, policy documents, *etc.* The outcome of this data collection provided an initial knowledge base, which provided a useful guideline for in-depth interviews with key personnel in the company in the next stage of the data collection.

In-depth and semistructured interviews were carried out with senior managers who had a strong influence in figuring out the sourcing policy and the outsourcing decision processes of the company. These key informants were asked to explain the background of the selection of the current sourcing policy and to state the arguments which the company believes count for or against an outsourcing strategy.

Several interview rounds with the key respondents were carried out in order to get sufficient clarifications of these complex issues.

We also interviewed the employees working with operational logistics planning activities to reveal arguments for and against outsourcing which might not have been emphasised by management or by internal documents. A part of this effort was to carry out classroom discussions with employees working on an operational level. This was done as an exercise in a logistics course given by one of the authors during 2006. Several employees from other units within the company participated in this course, making a total of 100 participants. This collection of arguments and ideas proved to be a broad and useful data set for the research.

The whole data collection process was guided by one of the authors, who had been collaborating with the company for many years.

#### 4 Description of the case

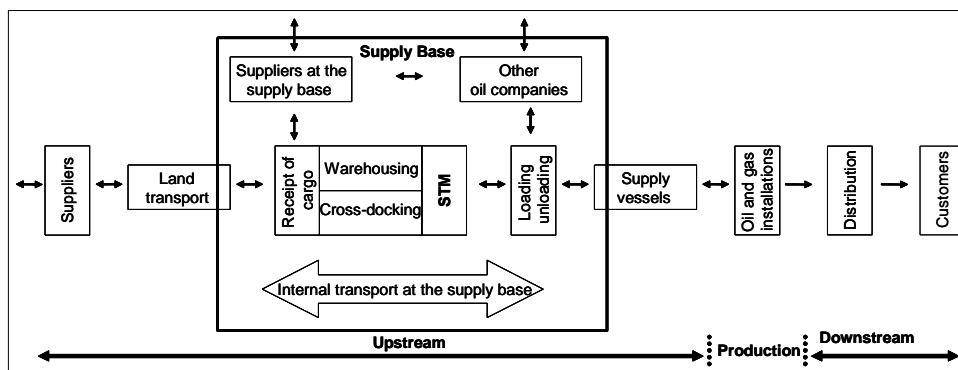
##### 4.1 The oil and gas industry in Norway

Oil and gas production is of utmost importance to the Norwegian economy and the petroleum sector is now Norway's largest industry. In 2005, the sale of crude oil, natural gas and pipeline services accounted for 52% of the value of Norway's export (The Norwegian Petroleum Directorate, 2006).

Obviously, ensuring a continuous production of oil and gas is very important to the country as well as to the oil companies, and this makes business logistics very important to this industry.

Bringing oil and gas from the installations to onshore customers is defined as 'downstream logistics' in this industry, while supplying the installations with needed supplies is defined as 'upstream logistics' (see Figure 1). The subjects considered in this article fall under upstream logistics and, more specifically, the case considered is the oil and gas company Statoil's transportation of supplies to its offshore oil and gas installations in the Norwegian Sea.

Figure 1 The supply base



The Norwegian Sea is a part of the North Atlantic Ocean northwest of Norway, situated between the North Sea (*i.e.*, north of Scotland) and the Greenland Sea. The production of oil and gas from the Norwegian Sea started in 1993. It is Norway's second-largest field for the production of oil and gas with nine offshore installations.

#### *4.2 The case company Statoil ASA*

Statoil is a partly state-owned public limited company established in 1972, well known for, among others, its use of innovative technology and focus on sustainable development. Statoil is the world's third-largest net seller of crude oil and sells two-thirds of all Norwegian gas to European customers. The company is represented in 36 countries worldwide, and has more than 25 000 employees. It is the largest oil and gas company in Norway, as well as the largest operator in the Norwegian Sea.<sup>1</sup>

The company's offshore production is an around-the-clock activity and the supply of the offshore installations is an urgent and challenging task which requires that many logistics tasks must be executed without mistakes to avoid accidents, production stoppage or delayed drilling operations.

Supplies to all the installations in the Norwegian Sea are carried out by the use of supply vessels, which is the only way of transporting most of the supplies owing to the size and the weight of the cargo. The supplies are collected at the onshore supply base *Vestbase*, which is an industrial site where approximately 60 different suppliers, logistics providers and miscellaneous service providers are located. Everything transported to the installations must pass through the supply base, which therefore represents a bottleneck in the supply chain.

#### *4.3 Supply terminal management in Statoil ASA*

Statoil's upstream logistics chain consists of many actors performing several different logistics tasks. The unit which will be in focus in this article is the Supply Terminal, which is responsible for carrying out the Supply Terminal Management (STM).

The STM is executed today by about 20 Statoil employees physically located at the supply base and the supply terminal is positioned in the supply chain as shown in Figure 1.

Today all the logistics activities at the supply base (except from land and sea transport) are executed by the same logistics provider. Owing to its partial ownership of the supply base's land area, this logistics provider has a monopoly on performing internal transport and the loading and unloading of the supply vessels at the supply base. For other logistics activities, there are several competing logistics providers in the market.

The activities which all together make up the STM can be sorted into the following categories:

- routing of supply vessels
- daily coordinating of the flow of supplies
- performance evaluation of suppliers and logistics providers
- problem solving and conflict negotiation
- influencing and improving the supply chain.



Statoil has clearly stated that its core businesses are the exploration and production of oil and gas and even though the supply of the installations is an important task, logistics is not defined as a core business. The consequence of this strategy is that the company has been outsourcing many logistics activities and today, only one activity is still kept in-house: the STM. Statoil has not outsourced the STM at any of its supply bases, and the fact that this is the only major logistics task remaining as an in-house activity in the upstream chains makes it particularly interesting to explore this issue further.

## **5 Analysis of the pros and cons of outsourcing the STM**

An assessment of whether it is beneficial to outsource the STM must be based on a comparison between the value adding, production costs and transaction costs for all the current, internal activities in the STM and the performance of possible logistics providers along the same dimensions.

We will in the following sections explore the company's arguments for keeping the STM in-house and discuss how these arguments can be interpreted along the line of our theoretical frameworks.

### *5.1 The possible advantages of outsourcing the STM function*

The interviews and on-site observations at the supply base revealed that the possibility to save cost or/and the possibility to obtain a better quality related to the two activities 'routing of supply vessels' and 'daily coordinating of the flow of supplies' are the main motivations for an outsourcing of the STM.

#### *5.1.1 Routing of supply vessels*

The routing of the supply vessels is the main operational activity associated with the STM and is an activity which mainly consists of solving very difficult instances of the class of optimisation problem called 'Vehicle Routing Problems' (see Toth and Vigo (2002) for a general description of the VRP and Aas *et al.* (2007) for a specific description of the VRP for the Norwegian Sea).

Whether a better routing of the supply vessels is obtainable or not depends on current performance and how well a logistics provider could do the job. To evaluate the current practice and determine the potential improvements by letting a logistics provider do the job is not easy and until this date, the company has made limited effort into elaborating those issues.

The main reason for this is the complexity of the routing problem, which makes it difficult to evaluate. The consequences of a good or bad STM could appear in several points in the entire supply chain, such that cause-effect association is difficult to predict with acceptable precision. This difficulty was emphasised by the managers interviewed. Another reason is that the company believes that there are other important arguments for keeping the STM in-house, which has made it less relevant to explore this issue further. We will elaborate on those arguments in Section 5.2.

The cost of renting and operating a normal supply vessel for a year amounts to approximately 8 mill € (R.S. Platou Offshore a.s, 2006) and Statoil is at present using three vessels to serve the installations in the Norwegian Sea. Accordingly, owing

to the large amount of money involved, it is obvious that even a small increase in the utilisation of these vessels can represent an added value for the company, either by reducing the total need for transport capacity or by rendering possible improved transportation services.

Significant improvements seem possible to obtain, according to a recently conducted internal survey, which states that the formal logistics competence of the employees executing the STM today is rather low. This is true if compared both to other professional groups within the company and to logistics employees in professional logistics companies solving similar problems in terms of complexity, risk and amount of money involved. Furthermore, the decision support tools used in the STM are far simpler than those used by many professional logistics providers.

The main reasons for this situation are that the logistics discipline in the company for many years has been given low priority (not a core activity), and the high complexity of the routing problem makes it impossible to solve by simple means. Taken together, this has resulted in a 'logistics culture' which lags behind.

Building and maintaining several business subcultures which are effective for solving a great variety of activities could be very challenging and costly. In particular, internal production may generate significant negative externalities if a distinct corporate culture, which is dysfunctional with the rest of the organisation, is needed to execute an activity well (Camerer and Vepsäläinen, 1988). This is an example of diseconomies of scope which, according to the core activity concept, is a main argument for outsourcing (Quinn and Hilmer, 1994).

Another indication of the possibility of obtainable improvements is the fact that the STM in the company today has a poorly developed performance indication system, which in particular, according to our interviewees, provides insufficient support on an operational level. This concerns the problem of suboptimising, where internal production units tend to act like monopolists with reduced efficiency as a result (Williamson, 1975).

Based on these considerations, we find strong arguments supporting a solution where professional logistics providers should be able to perform the routing of the supply vessels in a fashion that would create higher value for the company. This conclusion was also supported in interviews with the management of the oil company.

### *5.1.2 Daily coordinating of the flow of supplies*

The daily coordinating of the flow of supplies is an activity strongly related to the routing of the supply vessels. The aim is to satisfy the customers offshore by getting the right supplies on the right supply vessel. This activity is time consuming and implies a tracking of the supplies moving through the upstream supply chain. Daily contact with the suppliers and the logistics providers is an essential part of this job.

The company uses about 20 employees to carry out all the five activities belonging to the STM and knows what it costs to make this administration in-house. To reveal exactly what the cost would be if the STM becomes outsourced is more difficult, and modest effort has been put into this estimation. Today, most of the other logistics activities at the supply base are outsourced to one particular logistics provider, which is also a likely bidder on the STM.

If this company had taken over the STM, a more efficient bundling of logistics activities is likely to be obtained (Rabinovich *et al.*, 1999). The increased efficiency is believed to be achieved mainly by obtaining a more efficient administration of personnel

(scale advantages), and a better internal communication and flow of information at the supply base. The latter is in particular related to a more efficient execution of the daily coordinating of the flow of supply activities. Interviews with key personnel indicate that a cost reduction in the region of 15%–20%, corresponding to 250.000–350.000 € per year, could be a realistic saving potential by sourcing out this activity.

The transaction costs related to an outsourcing of the activities described in Sections 5.1.1 and 5.1.2 are estimated to be rather modest. Some performance evaluation costs will be added, but these activities will be rather easy to monitor owing to Statoil's presence at the offshore installations. Furthermore, Statoil perceives these activities as rather straightforward to specify and regulate by contracts owing to the operational character of these activities. Finally, the oil and gas industry in general has become very skilled and clever in designing contracts which function well for the purpose of economising on safeguarding costs.

## *5.2 The possible disadvantages of outsourcing the STM function*

So far, there are many arguments in favour of outsourcing the STM function, and we will now explore some arguments in disfavour of an outsourcing decision. These arguments are based on the arguments collected through the interviews and are related to the remaining three activities and their respective value adding, production costs and transaction costs. We will start by describing the activities and then discuss the expected economical consequences of outsourcing these activities.

### *5.2.1 Performance evaluation of suppliers and logistics providers*

A significant purpose of the STM is to carry out performance evaluation of suppliers and logistics providers, and in particular those located at the supply base. In order to understand the value of performing this activity well, we need to explore its importance for the company and how the STM executes these activities.

In 2006, Statoil purchased products and equipment for the installations in the Norwegian Sea for approximately one billion euros (Statoil, 2007). This makes the purchasing function represent one of Statoil's largest cost elements, and it is very important for the company to control and economise on this function by carrying out effective performance measurements in the supplier market.

The STM acts as the offshore installations' dedicated administration, where the inspection of incoming supplies is an important issue. This practice makes it possible to collect reliable information about the suppliers' performance and hence improve the product control of daily deliveries offshore.

The evaluation of the performance of logistics providers is generally more difficult than the evaluation of the suppliers' performance (Maltz and Ellram, 1997). Statoil ensures a close follow-up of its logistics providers at the supply base by placing the responsibility for such activities on the manager of the STM. A consequence of this practice is that a close on-site relationship with the logistics providers is attained, which contributes to a comprehensive monitoring and evaluation of the logistics processes carried out by the logistics providers.

One group of performance parameters which is of utmost importance to Statoil is related to Health, Safety and Environment (HSE) issues. HSE is of significant importance to the company from both an ethical and economic point of view. In Norway, oil

companies are very dependent on political support to be allowed to develop new oil and gas fields, and health, safety and environment are important criteria for getting such support. Therefore, it is important to minimise the risk of getting a bad reputation associated with inferior HSE practices. Statoil has also been granted the Dow Jones award for the third time in a row for being the world's most sustainable oil company (Sam Group, 2006). This 'best in class' position in the industry is of great value to the company, but it will be difficult to uphold without a careful evaluation and monitoring of suppliers and logistics providers. Logistics concerns the moving and transporting of heavy physical objects, and several incidents in the company's history have occurred in the upstream supply chain. One basic HSE parameter controlled by the STM is to check that all load carriers used to transport cargo offshore are in accordance with the requirements. Cargo destined for offshore installations on poor load carriers are stopped, and the suppliers in charge are held responsible for the delay.

Statoil has experienced that ensuring HSE issues through contracts is very difficult (DuPont, 2003). This problem has received increased attention in the offshore business as large oil companies have outsourced more of their activities (Osmundsen *et al.*, 2005). One reason for these difficulties is that even though accidents could give serious consequences to the ones involved, they occur rarely, so that it is difficult to prove that incentives formulated in a contract work as assumed (Osmundsen *et al.*, 2005). As long as the HSE contracts are incomplete (DuPont, 2003), complementary ways to ensure HSE performance become more necessary. Past experience has shown that physical presence is sometimes required to discover that unfortunate practices are evolving. The daily contact with the many suppliers and logistics providers through the in-house execution of the STM activities makes it easier to increase both the extent and frequency of this type of control mission. This circumstance was particularly emphasised by the employees working at the supply bases.

### *5.2.2 Problem solving and conflict negotiation*

Problem solving and conflict negotiation is another important administration issue carried out by the STM. Practical experience gained from running the STM activities over time has demonstrated that smaller problems are solved very smoothly by the use of personnel with local knowledge about these problems and the actors involved. The STM employees participate frequently in inspection teams for the purpose of handling complaints and disagreements on product quality issues.

Some interviewees working at the supply base told about the STM employees' role in problem solving, and conflict negotiation is frequently mentioned by external supply chain actors as very advantageous. Even when more serious supply chain conflicts are treated on a higher organisational level, the STM employees are engaged to present a reliable picture of the situation.

To let a logistics provider take the responsibility for problem solving and conflict negotiation is likely to be an inefficient solution since these problems primarily concern the relationship between Statoil, as the end customer (the installations), and the particular supplier. Therefore, both parties will in any case be involved in the problem solving and the approval of the final solution. To involve a third party is not likely to add considerable value to the process, but rather will make the process more complex. Furthermore, to accurately specify and control the performance of such an activity would be very difficult and therefore would imply significant transaction costs.

### 5.2.3 *Influencing and improving the supply chain*

The STM plays an important role for the company in the development and improvement of the entire supply chain, and Statoil takes advantage of its capabilities, power and resources to influence the design of its supply chain.

By executing operational activities in the upstream supply chain with daily contact and cooperation with other members of the supply chain, Statoil has obtained good knowledge about the working processes in the supply chain. This information creates the foundation for being able to reach a higher level of efficiency by reallocating resources and exercising decision influence in the supply chain. The importance of this point was strongly emphasised by those we interviewed. Additionally, as long as such process knowledge is kept in-house, it is readily available and easily transferable to the supply bases in other locations.

Statoil's ability to influence and develop the supply chain is also important for reaching the goal of HSE. In order to maintain the company's corporate social responsibility policy, it is necessary that the other companies in the supply chain support and act according to Statoil's HSE policy. Therefore, it is of utmost importance for the company to be able to influence and further develop the HSE culture in the supply chain. We will argue that the HSE policy matches the genuine ideas behind the SCM because the HSE activities represent a considerable part of the activities taking place in a wide range of business processes in the upstream supply chain, and particularly in the oil and gas business worldwide.

It is difficult to change or influence organisational cultures by contractual governance because the creation of norms, values and attitudes incorporated in a business culture is strongly related to intrafirm socialisation and the development of routines over time. In-house production based on hierarchical governance makes it easier to communicate the company's HSE values in the framework of an established business culture.

## **6 Discussion and implications**

### *6.1 Discussion*

For the purpose of identifying the economical consequences of outsourcing the activities described, a comparative analysis of the value-adding effects, production costs and transaction costs was carried out.

As argued in Section 5.1, we expect outsourcing of Activity 1 (routing of supply vessels) to result in better route scheduling, and an outsourcing of Activity 2 (coordination of the flow of supplies) to render more efficient administration and economic scale advantages. Taken together, these advantages provide the main motivation for an outsourcing of the STM function.

In accordance with TCA considerations and the arguments advocated by Statoil, the transaction costs associated with the outsourcing of Activities 3, 4 and 5 (performance evaluation, problem and conflict solving, and improvements of the supply chain) are expected to increase significantly because those activities will be very difficult to specify and regulate by contracts.

An outsourcing of these activities demands comprehensive contracting based on contingency plans with successive renegotiations and respecifications of contractual terms as unfolding events and external disturbances occur (Williamson, 1991). The

transaction costs associated with such disturbances are generally substantial and will often rule out the advantages associated with outsourcing decisions (Williamson, 1991). We find this to be particularly relevant regarding Activity 5 (the improvement of the supply chain) since numerous subactivities with wide diversity and complexity are incorporated in this category.

Basic TCA considerations state that high asset specificity could motivate opportunistic behaviour and comprehensive transaction costs (Williamson, 1985; Williamson, 1991). In our case study, asset specificity is related to the transfer of activity-specific knowledge and specific knowledge about the upstream chain. Without participation in the upstream supply chain, such specific knowledge will vanish in time. The possession of such information by an external logistics provider will enforce the dependency on this actor and will make it easier for the actor to exercise opportunistic behaviour.

Owing to their nature, Activities 3 to 5 could easily be exposed to opportunistic behaviour since Statoil would face many difficulties in monitoring the efforts and quality associated with the execution of these activities by an external logistics provider. Furthermore, a replacement of a logistics provider executing these activities is associated with high switching cost owing to the specific knowledge associated with the execution of these activities. This knowledge is rather unique compared to, for instance, 'routing knowledge', which is common knowledge among most professional logistics providers.

In order to prevent and unveil possible opportunistic behaviour and mal-adaptation, intensive monitoring and performance evaluations, together with safeguarding efforts, must be accounted for. These activities represent transaction costs which are significant for Activities 3–5. The expected changes in value adding, production costs and transaction costs are illustrated in Table 1.

**Table 1** Expected consequences of the possible outsourcing of the STM function

<i>Activity</i>	<i>Value adding/ administration efficiency</i>	<i>Transaction costs</i>
1 Routing of supply vessels	Significantly improved value adding	Increase modestly
2 Daily coordinating of the flow of supplies	Modestly improved administration efficiency	Increase modestly
3 Performance evaluation of suppliers and logistics providers	Modestly aggravated value adding	Increase significantly
4 Problem solving and conflict negotiation	Modestly aggravated value adding	Increase significantly
5 Influencing and improving the supply chain	Modestly aggravated value adding	Increase strongly

The empirical finding from the case study demonstrates that outsourcing decisions concern the economising of value-adding effects, production costs and transaction costs (Williamson, 1985). Even if external logistics providers offer some potential cost savings associated with the coordination of the flow of supplies and some value adding and quality improvements in vessel routing, the transaction costs associated with the reorganisation and governance of an outsourced STM function seem to rule out these advantages.

Statoil has taken the consequence of this and kept the STM in-house. Furthermore, as a consequence of keeping the STM in-house, the company has instead started work on improving the in-house production quality of Activities 1 and 2.

## 6.2 Implications and conclusion

The main reason for keeping the STM function in-house is that an outsourcing decision creates both a transaction-specific loss of information and a reduction of the company's ability to exercise influence in the supply chain.

Owing to its location in the supply chain, the STM can be regarded as an organisational intersection in the supply chain where several important activities are linked to relationships with many surrounding supply chain members. The value of performing those activities well and their respective transaction costs associated with outsourcing is difficult to grasp in an outsourcing decision process. We will therefore propose two terms for purposes of analysis:

- 1 'a transaction-specific loss of an information source'
- 2 'a transaction-specific loss of influence'.

The outsourcing of an activity will generally reduce a company's access to important information about what is going on in the supply chain and hence represents a transaction-specific loss of an information source.

Similarly, the outsourcing of an activity will usually reduce the ability to influence the supply chain and thus represent a transaction-specific loss of a power base, or point of influence, which is necessary in designing and operating supply chain processes efficiently.

This article has focused on how outsourcing decisions concern a wide range of linked activities. The importance of this issue is related to the complexity of supply chains. The development of more complex supply chain structures implies that companies are considering the outsourcing of main activities, which can be regarded as organisational intersections with links to several supply chain members. This implies that as long as many linked activities are tied to a main activity, an outsourcing of this main activity might be less beneficial because the cost of coordinating the large number of related and linked activities through a logistics provider might exceed what could be saved on a more efficient execution of the main activity on its own.

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## Note

- 1 See [www.statoil.com](http://www.statoil.com) for more information.