Cost management across firm boundaries
- a case study of MRO-procurement

Anna Dubois & Lars-Erik Gadde
Chalmers university of technology
SE-412 96 Gothenburg, Sweden
andu@mot.chalmers.se;laga@mot.chalmers.se
Phone: + 46 31 772 10 00
Fax: +46 31 772 35 83

Introduction

For most companies the costs of purchased goods and services have come to account for the main part of total costs. The primary driving force underlying this development is the increasing reliance on outsourcing, making efficient purchasing activities of crucial importance for the financial performance of companies. Therefore, Monczka and Morgan (2000) argue that there must be an 'absolute linkage of sourcing, purchasing, and the supply chain – to the financial plan' and thus the financial outcome of the operations of the firm. The authors conclude that increasing attention to cost management is the most important of six strategic factors of crucial importance for the future of purchasing and supply management. They also refer to numerous examples where companies have been able to reduce procurement costs. In most cases these efforts have concerned the direct purchasing costs, such as price, transportation costs, etc. However, sometimes the indirect costs associated with purchasing (for example costs of warehousing, administration of paper work, supplier handling costs, etc.), represent greater potential for rationalisation. The problem is that these costs are more difficult to affect because most of them can be tackled only through joint efforts with suppliers. Consequently these costs are often neglected and Monczka and Morgan conclude (p. 55):

> [And] regardless of all talk about strategic cost management, most companies are only at the tip of the iceberg in terms of actual practices - in terms of looking at where costs reside, looking at cost drivers, building cross-enterprise strategies and share the

> results. All of these practices are going to need to be refined. Cross-enterprise cost is, and will increasingly be, critical to a firm's success.

Evidence indicates that MRO-procurement (purchases of items for maintenance, repair and operations) is one of the areas where actions to reduce cross-enterprise costs are most evident (see for example Avery 1997, Bechtel and Patterson 1997, Le Seur and Dale 1998). A number of companies report considerable activities in making MRO-purchases more efficient (see for example Purchasing 2001, a,b,c,d). One example of what seems to be a common tendency is the characteristics of MRO-purchasing at the Boeing Co where it is concluded that it "is moving from a non-strategic, ad hoc, decentralised purchasing activity to a more strategic and virtually centralised purchasing practice" (Purchasing 2001,d).

This paper reports a case study of MRO-procurement with the ambition of dealing with the aspects of purchasing costs mentioned in the quote above. The objectives of the study is to identify 'where costs reside', to operationalise and measure actual costs, and to analyse the factors driving these costs. Finally, the attempts of the company to affect these costs have been conducted as joint efforts with suppliers, which makes the study represent 'cross-enterprise management' in the terms of Monczka and Morgan (2000).

In the first part of the paper we describe recent developments of MRO-procurement practice. We continue by developing a framework for analysing buyer-supplier costs across firm boundaries. Then follows the presentation and the analysis of the case study. We also describe the joint actions undertaken by the customer and its suppliers to affect the costs and present the results, followed by a concluding discussion.

Developments in MRO-procurement practice

The characteristics of MRO-procurement are dealt with in textbooks in purchasing such as Cavinato (1984) and van Weele (1994). There is no common definition of what is included in MRO – it covers a huge amount of different items. At the Boeing Co MRO-procurement entails the following (Purchasing 2001, d):

a) production support (abrasives, cutting tools, hand and portable power tools, lab and safety supplies, packaging, welding supplies)
b) office supplies and services (forms, office products, paper, printing, toner cartridges, medical supplies, video/audio, writing instruments)
c) facilities supplies and services (auto supplies and repair, chemicals, electrical, electricity, fuel, gas, hydraulic/pneumatic parts, janitorial, landscaping, security)

Boeing's perspective on what to include in MRO-items might be somewhat broader than many companies. Irrespective of that it is obvious that MRO spans a wide spectrum of products and services and accounts for a considerable portion of total costs of supply. However, the economic significance of MRO-procurement is even greater than its share of purchasing turnover because in this area indirect costs are substantial (Gadde and Håkansson 1993). For example, van Weele (1994) argues that MRO-items can make up 80% of a buyer's work, but account for less than 20% of the purchasing turnover.

Efforts to rationalise MRO-procurement have followed different tracks (Bechtel and Patterson (1997). First, purchases of MRO-items used to be based strictly on obtaining the best price. By chasing around for optimum conditions buying firms tried to lower purchasing costs. For example, in the past the car manufacturer Saturn treated MRO-purchasing 'as a purely transactional pricing relationship' (Purchasing 2001,b). However, after realising the substantial indirect costs accompanying this procurement orientation firms started to rationalise these purchases. In particular the huge amount of paperwork generated appeared to be a problem. By introducing blanket orders and system contracting the paper-flow can be reduced considerably. In this way buying firms made it possible to reduce the time spent on these purchases which were considered unimportant (Bechtel and Patterson 1997). A further improvement of purchasing routines was taken when procurement cards were introduced. By using these cards significant administrative processing savings were obtained, because purchasing requisitions and purchase orders could be eliminated. Avery (2001) reports the savings that were obtained by the Bayer Corp. when this company introduced procurement cards for purchasing of low-dollar items. However, making procurement easier caused other problems. Altogether 3,600 cards were used

in the organisation for purchases from 9,000 suppliers, which increased other costs. Similar conditions characterised many companies owing to a strong focus on decentralisation of purchasing responsibility in the 1980s and 1990s. However, when it comes to procurement in general companies have increasingly abandoned this philosophy favouring consolidation to fewer suppliers (Gadde and Håkansson 2001).

There is a similar centralisation trend in MRO-procurement. For example, up to 1997 each of Whirlpool's manufacturing divisions purchased the MRO-items they used. While there was commonality both among items purchased by different divisions and the suppliers they were using, there was no central operation to leverage buying. In 1997 Whirlpool created a centralised procurement organisation for MRO and other indirect materials. Following this reorganisation Whirlpool has consolidated its spending with national and regional suppliers. The new purchasing organisation has shown to be able to put good effective agreements in place with suppliers. According to the purchasing director "relationship with the right suppliers can help Whirlpool minimise its risk, be competitive, and set new expectations for performance" (Purchasing 2002,a). Other actions to improve MRO-procurement involved the implementation of e-procurement tools which streamlined processes, and standardised on policies and procedures across the operation. Between 1997 and 2001 Whirlpool reduced its procurement costs with 11% annually. Interestingly enough Sony Electronics Inc. in Pittsburgh reports the same yearly savings from MRO-procurement rationalisation programs. The main activities of Sony's program concern centralisation and consolidation to fewer suppliers. The benefits of the program are concerned with leveraging of buying but also to develop common standards and service requirements. Conducting efficient transactions required the development of an e-procurement tool enabling purchasers to place orders for goods and services with preferred suppliers (Purchasing 2002, b).

John Deere Inc. has applied a formalised strategic sourcing process to its MRO-procurement (Purchasing 2001, a). The first step in this process is to select a supplier for each commodity group. These suppliers are chosen on the basis of the capability to provide all of Deere's plants in North America with full services. To be able to attain significant improvements in service and technical support to the plants Deere realised they had to reduce the supplier base. Furthermore, it was necessary to assure

the different business units served that the suppliers selected would be delivering the equivalent, if not greater, service than previous suppliers had been providing. When the supplier was selected Deere organised purchasing teams to narrow the assortment within the commodity groups. The first task in this process is to agree on standards. For example, for safety supplies Deere put together a team of unit safety directors, supply managers and union representatives to analyse 1,800 different safety items. The analysis showed that there was a great deal of duplication across the operating units. Through great collaborative efforts the team was able to arrive at a standardised group of about 285 safety commodities. The strategic sourcing process includes two other important activities: supplier development programs and a formal supplier evaluation program.

These cases illustrate how MRO-procurement can be improved in various ways. The examples seem to be representative of a general development. In a survey of 1,000 US MRO-buyers 88% of respondents indicated that they were involved in strategic changes in the way they purchased maintenance items at their plants (Avery 1997). The preliminary findings showed that improvements were obtained in four dimensions. First, almost all respondents reported that they were making progress in supplier base rationalisation by actively consolidating purchases with a few key suppliers. Second, by reducing the supplier base the paperwork could be decreased substantially. Buyers now had fewer requisitions and purchasing orders to process. The administrative work was further improved through electronic commerce and the implementation of procurement cards. Third, procurement costs were reduced. For a strong majority (82% of respondents) this appeared the most important reason for taking action on MRO buying. The most obvious cost rationalisation concerned administrative costs. Buying firms that were developing closer relationships with a limited number of suppliers obtained cost savings also in other areas, such as commodity standardisation and inventory management. Finally, service levels were improved. Respondents buying from fewer suppliers discovered that by sharing information with suppliers on such things as usage helped to significantly improve service at a much lower cost.

Conceptualisations of MRO-procurement

When price determined the choice of supplier the main effort was on identifying the vendor offering the lowest price. According to one purchasing director "we were spending a good deal of time bidding low dollar items" (Avery 1997:42). At Harley-Davidson MRO-purchasing has changed from an arm's length transactional process to 'a total lifecycle supply chain management philosophy'. A company representative argues that "the relationship between buyer and supplier has evolved into a collaborative arrangement with mutually beneficial goals" (Purchasing 2001,c). In these relationships the analysis of costs and benefits become more complex than in situations where price chasing is on top of the agenda. However, close relationships have to be monitored and evaluated in terms of the benefits and the costs they cause. It is always possible to improve operations through closer collaboration, but collaboration is always costly. Therefore, it is necessary to thoroughly evaluate the economic consequences of close relationships with MRO-suppliers, which requires a deep probing cost analysis. In this section we review some attempts to analyse cost structures and cost drivers in this particular type of purchasing.

Classification of costs

Ellram (1996) presents a Total Cost Model and argues that it is important to include the cost of doing business with a particular supplier for a particular item over the life of that item. The technique proposed considers the following costs:

- Costs before the transaction, such as investigating and qualifying a supplier
- Costs within the transaction, such as placing the order, receiving acknowledgement, and follow-up
- Post-transaction costs, such as the cost of defects, required service activities, and disposal costs.

However, it is questionable whether Ellram would recommend Total Cost Model analysis for MRO-procurement, because it tends to be fairly time-consuming to complete. Therefore, she concludes that "it generally is not worthwhile with low-value or low-impact items" (p. 16). Our view is different. There is a huge financial potential in MRO-procurement and we think Ellram's model is useful in this respect.

Bechtel and Patterson (1997) analysed how Betlehem Steel developed and implemented a new MRO-purchasing strategy, which achieved dramatic cost savings

through alliances with MRO-vendors. The starting point of this change was the mapping of MRO-costs as illustrated in Table 1.

Key cost areas	*Proportion of MRO-purchasing costs*
Receiving	28.0
Stocking	25.6
Distribution	18.5
Search time	24.5
Administration	3.4
	100

Table 1 Indirect costs in MRO-procurement

The main costs for Betlehem Steel thus were concerned with physical activities in terms of receiving, stocking and distribution, while administrative costs are surprisingly low. 'Search time' accounts for a substantial share of total cost which is explained by the difficulties in even finding MRO-items before the reorganisation started in the mid 1980s:

> Often, storage locations and containers were poorly labeled or hidden by other materials stored in the same location. Maintenance personnel often had to travel between buildings or into basement storage areas to search for replacement parts. (ibid. p. 20)

This quote is not made for fun. We think that it is a representative view of the way MRO-supplies have been handled in many companies. Because they represent low-value items they have not been given appropriate attention. In turn, this is the reason for the substantial financial benefits that now can be attained through rationalisation.

Smytka and Clemens (1993) presented a Total Cost Supplier Selection Model. We are interested in this model mainly because it provides an overview of what costs were considered important in the choice of supplier and thus - presumably – of relevance in a total cost perspective. On one hand the authors discuss factors that are relevant for supplier selection but difficult to measure. More important for us are the measurable factors, which are divided into external and internal costs (table 2).

External factors	*Internal factors*
Price	Inventory
Discount terms	Delivery expediting
Ordering costs	Production costs
Transportation	Non-conformance costs
Supplier visits	(The two costs above are due to
Tooling	defective supplier shipments)
Technical support	

Table 2 External and internal costs in purchasing

Eriksson and Åsberg (1994) and Ford et al (1998) increases the scope of cost analysis by introducing what is identified as *relationship costs* for the buyer. The direct procurement costs and the indirect costs that can be directly related to individual transactions are supplemented with costs that are less apparent. Some of these can be traced to a particular supplier and concern the costs associated with maintaining the relationship and the investment costs in terms of adaptations among the two parties. Further, there are *supply handling costs* which are common costs for the purchasing organisation as a whole and can be related neither to individual transactions nor to individual suppliers. Finally, Smith Ring (1999) extends the analysis by considering the dynamic costs of learning and change in *networked organisations*.

For our purpose it is important to extend the scope even further. In recent years the 'total cost concept' has received increasing attention in purchasing – see for example Degeave and Roodhooft (1998), Kelle and Miller (1998) and Larsson and Kulchitsky (1998). However, a common feature of these views of total cost management is that all of them (in different ways) focus on the costs of the buying firm. In this paper we explore how the total costs of exchange can be dealt with when both buyer and supplier are involved, i.e. how costs can be managed across the boundaries of firms.

Cost drivers and opportunities for rationalisation

Improving performance of MRO-procurement requires an analysis of which factors that drive costs. In the study of Betlehem Steel, Bechtel & Patterson found that 20 to

30 percent of the MRO-parts ordered were the wrong items owing to incorrect orders, in turn causing substantial problems. A second driver of MRO costs was the lack of materials management expertise. The authors argue that when a firm is not proficient at receiving, stocking, distributing and searching, there may be considerable waste in these processes. The waste is manifested in "multiple counting, excessive paperwork, inability to keep consumables stocked excessive inventories, and stock out emergencies" (p.21). Furthermore, severe problems occurred because three different company functions were involved in the handling of MRO-items: maintenance, purchasing and storage. The three functions were associated with different goals and reward structures. Maintenance personnel were mostly concerned with planned maintenance and getting emergency problems fixed. They were not concerned with inventory levels, only with spare parts availability. Purchasing personnel were primarily concerned with unit price and often bought large quantities in favour of lower prices, in turn causing large inventory carrying costs. Storage personnel, finally, gave priority to accuracy and levels of inventory, but were not concerned with part price. While each function strives to effectively manage its own area of responsibility, the result is often a mismanaged MRO-operation characterised by unnecessary costs.

The review of MRO-procurement practice showed that reduction of the supplier base was a common goal for MRO-buyers, because the number of suppliers is a cost driver. Reducing the supplier base thus is a potential for improving performance. However, potential improvements are not gained automatically. Cousins (1999) analysed the efforts of UK buying firms in consolidation of the supplier base. In many cases the attempts to improve conditions failed. The main reason was that the buying firm used a too narrow focus in the cost analysis. Cousins found that the general customer "was demanding price decreases and was not taking a total cost focus, leaving no incentive for the supplier to reciprocate" (ibid. p. 153). Reduction of the supplier base thus has to be accompanied by changing buyer-supplier relationships to secure successful cost rationalisation across firm boundaries. It is through the joint identification of cost drivers and the common implementation of appropriate procedures that operational performance can be improved. In particular, reorganisation of activity structures has proven an important means of increasing efficiency (Gadde and Hakansson 2001).

Attaining the potential benefits from rationalisation across the boundaries of firms require some common view of the total costs based on a classification in line with the discussion in the above section. Furthermore, these costs must be estimated in some way. The first prerequisite is that the parties share the information about the internal costs on the two sides. McIvor (1999) discuss two options in this respect: open book costing and cost transparency. His study revealed that these techniques are not easily implemented, because the usage of different accounting systems limits the feasibility of open book negotiation and cost transparency. Furthermore, suppliers were suspicious of the motives of the customer when requesting cost information. Finally, some suppliers may not have been confident enough of the accuracy of their costing structures to share them with customers.

The second – and most important – step then is to analyse 'total cost of ownership' where McIvor relies on the definition by Ellram (1996). The analysis of this cost essentially works at the interfaces between the supplier and the buying organisation. It includes the costs incurred by the buying organisation in doing business with the specific supplier – costs due to special services and inefficiencies. It also looks at how the buying organisation's requirements for special handling drive the supplier's cost. Based on this assessment, the organisations can make rational decisions regarding whether adaptations are worth the additional cost or should be avoided. The parties can also work together to reduce costs that are being incurred owing to inefficiencies.

It should come as no surprise that McIvor found even more problems in applying joint buyer-supplier cost reduction than in using open book costing and cost transparency. In most cases the parties did not provide dedicated resources enough to identify areas for cost reduction. Furthermore, the different cultures in the two organisations were considerable barriers in achieving the potential savings. The problems identified by Bechtel and Patterson (1997) within the buying organisation can easily multiply when two organisations are involved.

The case study

The case study was conducted in co-operation with the Swedish subsidiary of a large multinational company, and involved in particular a local service unit (LSU). The

LSU provides a number of business units located at the same plant with various services. LSU is responsible for MRO-procurement for the business units. LSU also buys MRO-items for the technical service activities they provide to the business units. The purchasing team consists of about seven buyers, but also other employees are involved in procurement activities. Three years ago LSU initiated a project aiming at rationalisation of indirect purchasing costs. The direct costs of MRO-supplies amounted at MSEK 40 while the indirect costs were estimated to be 32. The indirect costs thus represented 80% of direct cost, which was substantially higher than for other types of procurement. For example, for raw materials this proportion was only 0.3 %. It seemed thus to be a substantial potential for cost rationalisation when the project was initiated.

Costs and cost drivers

The first assignment for the project group was to conduct a process mapping study of the procurement operations. LSU's purchases were typically frequent and characterised by low value per transaction. The activities relating to purchasing were divided into five main types with the following cost distribution:

• procurement	8 MSEK
• orders and call-offs	4,5
• receiving goods	4
• payment of invoices	7
• inventory	8,5
Total	32

The second task was to identify the drivers of these indirect costs. The analysis of the costs and cost structures revealed the following primary cost drivers. First, the number of firms in the company's supplier ledger amounted at more than 10,000. Second, the total number of deliveries per year showed to be about 33,000. Third, the number of invoices was estimated to 40,000 per year. Fourth, the buyer used a huge number of internal cost accounts (there were more than 500 permanent cost accounts and about 1800 temporary, project based). Fifth, the LSU operated no less than 37 inventories, most of which were unmanned. In addition, nearly 10,000 different products were found to be kept in stock.

Discussions revealed that these cost drivers were interrelated and also in various ways related to other concerns of the company. For instance, although the great number of internal cost accounts obviously impacted negatively on administrative costs in general, these accounts were considered necessary for achieving a fair distribution of costs among the business units served. In terms of indirect purchasing costs the many cost accounts had several effects. First, they called for internal transactions for products kept in stock and entailed separate orders and invoices for the rest of the products. The total number of transactions was difficult to estimate but according to a separate study, made by the inventory manager, the number of external and internal transactions of less than SEK 100 amounted at around 60,000 per year. Second, the cost accounting principles implied that someone was made responsible for each particular account. This, in turn, made the account managers particularly concerned with the costs for which they were responsible. Therefore they put in lots of efforts in finding the cheapest source for each purchase. This buying behaviour was found to be one of the main explanations for the great number of suppliers. Obviously, it also impacted on the number of products, deliveries and invoices.

Two cost drivers were found to impact on all five processes. First, as discussed above, internal cost accounting affected the other cost drivers. Second, the analysis indicated that the five processes were not always conducted in the most efficient way. For instance, it was found that about 2% of all invoices caused problems owing to insufficient or incorrect information. Often it was unclear who had ordered the product(s), which initiated a process of finding the responsible person. The workload caused by these invoices was estimated to be about 30% of the total time spent on invoices. Similar patterns were found for the other activities.

Owing to the interaction between the different cost drivers it was difficult to attribute clear-cut cost-drivers for the five main activities identified in the process mapping. After lots of discussions the project group agreed on the following main causes (table 3):

Activity	**Cost driver(s)**
Procurement	Number of suppliers

Orders and call-offs	Number of external transactions
Goods receiving	Number of deliveries
Payment	Number of invoices
Inventory	Number and value of products Number of transactions (external and internal)

Table 3: Activities and cost drivers

The cost analysis revealed that *the number of suppliers* was the main cost driver since:

(1) It had a direct impact on procurement activities, i.e. finding, negotiating and making contracts with suppliers.

(2) It was found to have an indirect effect on virtually all the other cost drivers. As long as the number of suppliers remained the same it was difficult to reduce the number of products, orders, deliveries and invoices. In addition, educating the suppliers in order to improve the administrative processes to reduce the amount of incomplete or incorrect documents would be impossible if the number remained on the current level.

Putting it differently, it was concluded that almost nothing could be done to reduce costs unless the number of suppliers was dramatically reduced.

Reducing the supplier base

Reducing the number of suppliers turned out to be quite a complicated matter since the variety of products and suppliers was substantial. Without making proper justice to all efforts, the main principles of the process are described below. First, a limited number of commodity groups were identified with as wide assortments as possible. Furthermore, each one of these assortments should be possible to purchase from a single source, which was to become a key supplier, rewarded with a three-year contract. However, since the purchases had previously been distributed over a large number of vendors the structure was fragmented. Owing to this the decisions concerning the content of each commodity group had to be postponed to the next phase of the project and be taken in interaction with the potential suppliers. Five product groups were eventually selected, together representing a purchase value of about SEK 15 millions, 13,000 invoices and several thousands of suppliers (the exact number was difficult to assess). In each of the commodity groups 5-10 main suppliers

were used frequently and a "tail" of 100-1000 suppliers only used occasionally. During the second phase of the project three to five potential suppliers were asked for quotations for each of the commodity groups. The buyer's initial ideas of what products should be included provided a starting point for discussions with the potential suppliers. The assortments of the suppliers were partly overlapping and partly different. Therefore, straight comparisons of the suppliers were difficult to make. Typically, the suppliers covered around 80% of the requested assortment, while the remaining 20% were not currently part of their business. The suppliers offered to take on some of these missing products while for the rest they suggested substitution by other products. On several occasions the suppliers also proposed extensions of the assortment requested by the buyer.

The suppliers who offered the best quotations had the following characteristics:

(1) They were already used as suppliers.
(2) Some of their other main customers were characterised by needs in terms of products, delivery conditions etc. that were similar to those of the LSU.
(3) They demonstrated a willingness to make adjustments to the buyer's needs including participation (and even taking on a leading role) in the commodity teams that were also including internal users and purchasers.

The five key suppliers appointed were all distributors. The cost structures of these firms differed from LSU's. For distributors the main cost driver is the number of order lines, which makes the sales volume per order line a key issue. Further, the turnover rate of different products is of crucial importance for the financial outcome. The turnover rate is also a determinant of the service level offered by the supplier.

Rationalisation effects

The direct effects of concentrating the purchases to the five key suppliers turned out to be extensive. First, prices were reduced by 7-15% as a direct consequence of cost reductions exploited by the suppliers. Second, when the supplier base was structured the buyer became one of the most important customers to the remaining suppliers from having previously been 'one among many'. Therefore, the LSU was given priority by the suppliers and there was also a general willingness among the key suppliers to make adjustments of various kinds.

The joint efforts to reduce "total cost of exchange" took various directions. Some of the activities of the buyer could be conducted in more efficient ways by the supplier. In other cases performance was improved through increasing buyer-supplier co-ordination. Finally, adjustments among the firms reduced internal costs for both parties. Some of the main initial rationalisation are shown in Table 4.

Activities that could be taken on by the key supplier	**Activities that could be carried out more efficiently through improved co-ordination**	**Adjustments that could reduce internal costs for both parties**
- Administration of certificates - Waste handling - Stock keeping	- Transportation - Administration of orders, invoices and payments	- Assortment adjustments - Bar code communication - Extranet

Table 4. Rationalisation effects through close co-operation with key suppliers.

Transportation costs typically amounted at a proportion of 2-15% of the cost from the suppliers' perspective. However, transportation is always included in the prices offered to customers. Hence, when the buyer concentrated its purchases the costs of the supplier were distributed on a larger volume and the gains could be shared between the two parties. Order administration costs are driven by the number of orders in addition to the number of customers. However, if ordering routines are simplified and orders transmitted through an extranet solution these costs can be brought to a minimum for both firms. Thereby the main part of these costs was transformed to a relationship cost instead of being driven by the number of orders.

Purchases of technically critical parts require the buyer to administer specific certificates. One person was engaged in these activities on full time. When these purchases were concentrated to one key source, the supplier could take on these activities (most of which they already did for other customers and for their own needs) and thus perform them more efficiently. The suppliers also took on waste handling and their trucks could be used for all returning goods. Internal stock keeping was reduced to a minimum, and even eliminated for some parts of the assortments,

since each of the selected suppliers guaranteed frequent deliveries and adjustments of its stock keeping close to the customer.

Through joint input into assortment decisions both the buyer's and the suppliers' cost drivers were incorporated into the analysis. This analysis sometimes involved the demands of the suppliers' other customers (and the possibilities of influencing these needs). Thereby the definition of the total cost of exchange became extended even beyond the boundaries of the two firms. Furthermore, agreements on how to mark goods with bar codes and equipment to facilitate identification of goods and internal customers made physical handling more efficient. Administration of invoices and payments, including the division of costs on all internal accounts, could be simplified through adapted routines and extranet communication.

The cost reduction sources were partly different for the five commodity groups. However, the working principles for the various teams were quite similar and focused on the common goal of reducing 'the total cost of exchange' by 5% over a two-year period. What should be included in these costs differed among the teams as did the cost structures.

Concluding discussion

The case study shows how the buying firm through structuring its set of suppliers was able to reduce its procurement costs. The point of departure of the change process was the redefinition of what was actually purchased, which in turn changed the unit of analysis. The previous focus on the individual transaction was replaced by a wider scope. The scope was extended in two dimensions. First, the buying firm started to consider each MRO-transaction as one transaction in a series of similar transactions, because MRO-items are purchased frequently. Instead of chasing for the lowest price in each transaction the buying firm implemented measures to reduce long-term costs of doing business with one and the same supplier. When the focus was on individual transactions the products that were the objects of these transactions were seen as "given". Furthermore, the transactions were only considered from the buyer's perspective, which also made the internal, or indirect, purchasing costs a fixed

parameter. Hence, when chasing for the lowest price for each transaction neither the internal nor the external costs were fully considered.

When the supplier base was reduced and the buyer developed close relationships with the key suppliers, the unit of analysis changed. Instead of considering the products as "given", the relationships with the key suppliers became more or less fixed. This also made the content of the exchange with these appointed key suppliers subject of their interaction. This interaction in turn made it possible to consider both firms' cost structures when deciding what products should be exchanged and how the transactions should be organised. The analysis of the economic consequences of the purchase of a particular product might turn out quite differently when considering the cost structures of both firms. Reaping the benefits of joint efforts thus required an extended unit of analysis in the time dimension. The short-term focus on single transactions was replaced by developing favourable conditions for long-term performance. A prerequisite for these effects was a changing view of suppliers and relationships.

Once these relationships started to develop they opened up for the second expansion of the unit of analysis. What is bought from one supplier is used in combination with supplies from other firms. For a buying company the costs of handling suppliers are considerable. Therefore, substantial cost reductions may occur if one supplier integrates activities that are spread among many vendors. The increasing reliance on system suppliers in procurement for assembly operations follows from the benefits that system sourcing provides in comparison with component purchasing. As illustrated in the case, similar improvements may be gained in MRO-procurement. This extension of the unit of analysis is thus related to broadening the perspective of what one and the same supplier can offer. When single transactions are focused the potential contributions of individual suppliers are considered given. However, if relationships are perceived as given then the scope of the supplier’s activities and efforts can be widened.

Expanding the unit of analysis in the two dimensions provides the buyer with substantial opportunities for rationalisation. However, moving from a focus on transactions to relationships and taking the measures suggested is not necessarily the

limit of improvements. Co-operation in a network setting can be made a 'never ending story'. There are always opportunities for further benefits by involving other relationships connected to either buyer or supplier (or both). In the changes implemented in the LSU-case it was important to take into consideration the impact on, and the contributions from, third parties in the form of other buyers and suppliers, as well as suppliers of the supplier and customers of the buyer. Therefore, in this process it becomes necessary to extend the analysis beyond the dyad – a network perspective is required. Considering the substantial efforts of the project group in the LSU-case it is obvious that analysing the prerequisites for efficiency improvements is resource demanding. Therefore, the most appropriate means of approaching potential rationalisations is to start working with existing suppliers in order to identify opportunities jointly (Gadde and Håkansson 2001). In these efforts the exchange of information among potential collaborators in the network is of crucial importance Smith-Ring (1999). He argues that identifying potential partners and opportunities for improvements requires ongoing exchanges of information. Extensive interaction among firms can have the effect of opening-up channels of information "from a greater variety of external environments; generally far more than would be available to any one of the individual firms" (ibid. p. 250).

Through changing needs of the partners, and mutual adjustments undertaken, the foundation for relationships will constantly change in one direction or another, which impacts on what the parties may do together. This parallels the continuous learning about the counterparts which enable them to constantly redefine what is to be included in the analysis of the costs of their exchange. The most important function of this interaction is that the parameters can be dealt with recognising both parties' cost structures which are also affected by the exchange with relevant third parties - the set of which also changes over time.

Our case study illustrates the importance of extending the unit of analysis from a focus on single transactions to involve the cost structures of buyer, supplier, and relevant third parties. It is thus important to expand the scope of what costs to involve. However, the case study shows that the recommendations of applying a 'total cost perspective' might be problematic. When cost management becomes subject to interaction between buyer and supplier it is very difficult to identify the total cost. Our

main finding is that the scope of a transaction must be expanded in two dimensions. One is the time dimension, which makes 'the total cost of exchange' process oriented. The second expansion is to consider each transaction in relation to other transactions, which in turn makes it less fruitful to set limits for this analysis. Therefore, the total cost concept is not only problematic to apply - it might even be misleading. The notion of a 'total cost' might unnecessarily restrict the opportunities for cost rationalisations. In fact, it is the changes in the perceptions of what costs to consider that provides the foundation for interaction and improvements.

References

Avery, S. (1997) MRO: The common foe – COST. Purchasing, February 13, 41-44.

Avery, S. (2001) Bayer Corp. beefs up its procurement card program. Purchasing, 13 December.

Bechtel, C. and Patterson, J. (1997) MRO-partnerships: A Case study. International Journal of Purchasing and Material Management, Summer, 18-23

Cavinato, J. (1984) Purchasing and Materials Management. St Paul:West Publishing.

Cousins, P. (1999) Supply base rationalisation: myth or reality ? European Journal of Purchasing & Supply Management, 5, 143-155

Degraeve, Z. and Roodhooft, F. (1998) Determining sourcing strategies: a decision model based on activity and cost driver information. Journal of the Operational Research 49 (8): 781-789.

Ellram, L. (1996) A Structured Method for Applying Purchasing Cost Management Tools. International Journal of Purchasing and Materials Management, Winter, 11-19

Eriksson, A.-K. and Åsberg, M. (1994) Kostnadseffekter av affärsrelationer. Licentiate thesis. Department of Business Studies, Uppsala University.

Ford, D. (et al) (1998) Managing Business Relationships. Chichester:Wiley.

Gadde, L-E and Håkansson, H. (1993) Professional purchasing. London: Routledge.

Gadde, L-E and Håkansson, H. (2001) Supply Network Strategies. Chichester:Wiley.

Kelle, P. and Miller, P.A. (1998) Transitions to just-in-time purchasing - Handling uncertain deliveries with vendor-purchaser co-operation. International Journal of Operations & Production Management 18 (1-2): 53-60.

Larsson, P.D. and Kulchitsky, J.D. (1998) Single sourcing and supplier certification - performance and relationship implications. Industrial Marketing Management 27 (1): 73-81.

Le Sueur, M. and Dale, B.G. (1998) The procurement of maintenance, repair and operating supplies: a study of the key problems. European Journal of Purchasing & Supply Management, 4, 247-255

McIvor, R. (2001) Lean supply: the design and cost reduction dimensions. European Journal of Purchasing & Supply Management, 7, 227-242

Monczka, R. and Morgan, J. (2000) Competitive Supply Strategies for the 21st Century. Purchasing, January 13. 48-59

Purchasing (2001) See http://manufacturing.net/purchasing. Purchasing, 7 June.

a) Supplier involvement is absolutely critical.

b) Suppliers make a strong commitment to the process.

c) Technology can reinforce purchasing strategy

d) Technology: A tool to help consolidate MRO-buy

Purchasing (2002) See http://manufacturing.net/purchasing. Purchasing, 7 March.

a) Whirlpool transforms its MRO-buy to strategic

b) Sony Buyers Council helps consolidate MRO-purchasing

Smith Ring, P. (1999) The Costs of Networked Organisations. In Grandori, A. (ed) Interfirm Networks. Organisation and industrial competitiveness. London: Routledge.

Smythka, D. and Clemens, M. (1993) Total Cost Supplier Selection Model: A Case Study. International Journal of Purchasing and Materials Management, Winter, 43-49.

Van Weele, A. (1994) Purchasing Management. London: Chapman & Hall.