Increasing operational efficiency through improved customer service – a case from the process maintenance business

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Abstract

In this paper we illustrate how new service concepts in which product suppliers get more involved in their customers’ operations enable suppliers to arrange their own supply chains more efficiently, while simultaneously providing better service to the customer. Through a case study of a process equipment supplier and one of its customers, we illustrate how the company’s new value-added maintenance services, such as planning of the customer’s maintenance operations or inventory management of the customer’s spare parts, can help the supplier to improve its operational efficiency. It is, however, clear that the proposed benefits such as increased planning possibilities, improved planning accuracy and reduced SKU’s to be controlled are not gained automatically. Instead, high requirements are set for the operations planning competencies for both the customer and the supplier company.

Key words: supply chain management, demand – supply chains, operational efficiency, customer service, value offering point, order penetration point, maintenance, spare parts.

Introduction

The ultimate purpose of a logistics system is to satisfy a customer demand, i.e. to make a product or service available to a buyer. Traditionally, in a transactional business setting where the customer orders products or services as they are needed, there is a trade-off between the service level and the cost of service; the better the service, the more it costs to offer it to a customer. If, for example, a supplier must be able to offer high availability for spare parts to be able to be competitive, there are extra costs due to additional inventory required to protect from against unexpected demand peaks. (Christopher, 1992 pp.37-56).

Product suppliers are increasingly offering supplementary services related to the tangible products they supply (Lovelock, 1994). At the same time they are moving away from the transactional business logic and offering more integrated and value-adding services to their customers (Matthyssens et al.1998). By integrated services we mean services that are based on co-operative agreements between a supplier and a customer, where the customer transfers defined operational responsibility to the supplier. The customer can now better focus on its core competencies and utilise the supplier’s expertise in a particular filed. From the customer’s viewpoint this is a new approach to outsourcing, which is no longer about just buying single functions or parts and components from outside suppliers; it is about reconfiguring whole processes in new ways. This change affects logistics in particular, where process integration often calls for new ways to share responsibilities among supply chain partners. Vendor-managed inventory (VMI) is a good example of this kind of arrangements (Waller et al., 1999). Recently this approach has been developed further in the machinery business, where suppliers have taken increased responsibility of the performance of their products during their entire life cycle.

By offering value-adding services to its customers, the supplier becomes a co-producer of value together with the customer (Holmström et al. 1999). In this paper we argue that this new role creates an opportunity to increase the supplier’s own operational efficiency, while simultaneously providing better service to the customer. Recent studies of Heikkilä (2002) support the existence of this kind of mechanism. In his in-depth research of six cases in the mobile telecommunication industry he concluded that good relationship characteristics contribute to reliable information flows, which in turn contribute to high efficiency. Combined with understanding the customer situation and need it also contributes to high customer satisfaction (Heikkilä 2002). We will develop these ideas further and propose managerial actions for improving operational efficiency and customer service simultaneously.

The proposed actions are based on observations in a case company, which is a supplier in the process maintenance business. The company is currently in a transition phase. It is moving away from the traditional way of doing business, i.e. selling equipment, spare parts and repair services and
instead building long-term partnerships with its customers and taking greater responsibility for the customers’ processes by offering inventory management of spare parts, preventive maintenance, planning of maintenance operations and, for example, remote monitoring of the customer’s process equipment.

The demand-supply chain framework

As we are looking at the changes in the value offering it is important to look at the demand and the supply simultaneously. The demand chain transfers demand from markets to suppliers (Vollman et al., 1996). For example, a retailer’s demand chain would consist of merchandising, inventory management and purchasing. The supply is the process where value is created. The demand chain is linked to supply in two places: the value offering point (VOP) and the order penetration point (OPP) as described in the demand – supply chain model developed by Holmström et al. (1999). Figure 1 illustrates the linkage points. In this paper we have selected to use Holmström’s conceptual model as a framework to analyse the case company’s new service models and the opportunities for improved operational efficiency they offer.

Figure 1: Value offering point and order penetration point (Holmström et al., 1999)

The most important concept in the demand – supply chain framework is the value offering point (VOP) (Holmström et al., 1999). The VOP is the point in the customer’s demand chain where the supplier fulfils the customer’s demand. In a typical buyer – seller relationship, the VOP is located in the customer’s purchasing function where the buyer selects which supplier to use. However, the VOP can also be located earlier in the customer’s demand chain. The supplier can, for example, participate in the customer’s inventory management function through a vendor-managed inventory arrangement. Moving the VOP changes the economics of the customer. Typically, moving the VOP from the purchasing function to an earlier phase of the demand chain benefits the customer and requires the supplier to do more work (Collin, 2002).

Moving the VOP often enables the supplier to move its order penetration point (OPP) and in this way increase its operational efficiency (Holmström et al., 1999). The OPP is the point where the product or service is allocated to a specific customer (Sharman, 1984). For example, by moving the VOP to inventory management, the supplier can get access to earlier demand information from the customer, enabling the supplier to shift from make-to-stock to make-to-order production without increasing the need for capacity buffers (Holmström et al., 1999).

Description of the case

The case company is a supplier of production equipment to process industry such as chemical manufacturing and paper and pulp mills. It offers both standard and tailor made equipment to its global customer base as well as spare parts and maintenance services to the equipment supplied. In recent years its products have matured and the market for new products and equipment is not growing as rapidly as before. As the supplier has extensive knowledge of and competence in their customers’ production processes and an extensive installed equipment base, it has been able to create industrial service concepts that allow its customers to outsource for example maintenance operations to the supplier. Hence, as many other suppliers in mature industries, the supplier is currently in a transition phase. It is moving away from the traditional way of doing business, i.e. selling equipment, spare parts
and repair services. Instead it is building long-term partnerships with its customers and taking greater responsibility for the customers' processes.

In this paper we look at the co-operative service agreement between the case supplier and one of its customers. The customer has a green field plant that started its commercial operations in the late 1990’s. This plant is one of the most modern operation units in its field in the world. The plant’s business strategy is to concentrate on its core competence, i.e. manufacturing. It purchases necessary support services from dedicated service suppliers. The situation is similar to the automobile industry, where new plants often do without maintenance department altogether, and the care of the complete plant infrastructure is entrusted to an external party.

The change in value offering

Transactional situation:

Before the co-operative service agreement was in place the customer ordered both spare parts and different types of maintenance related services from the supplier as they were needed. The transactional customer demand in our case setting consisted of three different types of demand. 1) The customer had an unexpected problem with the process machinery and needed spare parts and / or maintenance work immediately. 2) The customer had a planned shut down at the process plant, when various maintenance operations were being done and the customer placed an order for spare parts and maintenance work related to a shut down well in advance to guarantee the availability of products and services, as they were needed. 3) The third situation was when the customer needed replenishment orders of spare parts to its warehouse.

The demand impulse came from the production process. If it was a planned shut down for pre-planned maintenance operations or an unexpected problem with the production machinery the need was forwarded to the maintenance organisation. It was their responsibility to decide, what was actually needed and when. If maintenance services were needed from outside service providers, they were contacted or if the necessary spare parts were not available at the warehouse the purchase department was contacted in order to place an order with the right supplier. The demand impulse could come also from the warehouse operations, when replenishments of various spare parts were needed.

In the transactional situation the order penetration point (OPP) was primarily located at the local service center close to the customer (Figure 2), where the product or service was allocated to the customer. In this way the supplier could guarantee competitive delivery times to the customer. However, for some of the spare part replenishment orders to the customer’s warehouse, it was possible to have the OPP at the regional supply center, if the customer ordered the spare parts in due time.

**Figure 2:** Customer interface before the co-operative service agreement
In the process industry the financial losses of unplanned production shutdowns are immense compared to the price of spare parts. Therefore, the customer kept a large inventory of spare parts at its own warehouse to be able to react immediately to unforeseen problems. The customer also expected short delivery times (24 hours) from the supplier for the spare parts and measures such as short lead-time, flexible delivery etc. were used to evaluate the performance of the supplier. The supplier’s lead times for manufacturing the various spare parts are quite long. For standard units it is about a week, but for so called engineered to order products it can be up to 20 weeks. Thus, also the supplier needed large inventory levels at the local service center to be able to serve the customer competitively.

Co-operative service agreement in place:

We will now look at the situation after the supplier and the customer have agreed on a co-operative service agreement. The service agreement is based on an analysis of the customer’s production process and its spare part and maintenance requirements. The analysis was conducted in cooperation with the customer, because mutual agreement was needed to specify duties and responsibilities. According to the service agreement the customer has outsourced the planning and implementation of maintenance operations at the process plant to the supplier. The supplier has two men full time at the customer’s process plant and they co-ordinate the various operations related to daily and preventive maintenance programs at the plant. Actual maintenance work is conducted either by the customer’s personnel, the supplier’s experts or by a third party depending on the situation, but the supplier has the responsibility to plan and make sure that the right operation is done at the right time. As the supplier has accumulated history related to the maintenance needs of different process equipment in different environments, the supplier’s added value to the co-operation comes especially from its expertise in planning and implementing more accurate preventive maintenance programs.

The supplier has also offered inventory management services to the customer and could in the future be responsible of the availability (i.e. timely replenishment) of the spare parts related to the equipment it has supplied. At the moment the supplier has visibility to the spare part inventory at the plant through the customer’s ERP system, but is not involved in the warehouse operations.

The implementation of the co-operative service agreement has changed the role of the supplier towards its customer. The supplier is now a partner that helps the customer to run a competitive manufacturing process by keeping the production machinery up and running. Of course the old demand situations are still present. The plant still has unexpected problems with the process machinery and needs spare parts and / or maintenance work immediately. The plant still has planned shutdowns, when various maintenance operations are being done. And there still needs to be replenishment orders of spare parts to its warehouse. But in the new situation the supplier reacts to the maintenance or spare part demand without waiting for an order from the customer. Now the supplier’s performance is no longer measured through the same instruments as in transactional business, where the main measures were delivery reliability, delivery time and order accuracy. Instead, the performance is measured for example through the number of unplanned shutdowns of the process machinery, which in our case have gone down significantly due to the successful preventive maintenance programs in place. The customer is no more interested in the details of how spare parts or a maintenance services are supplied, as long as its production process functions as planned.

We will now apply the demand – supply chain framework to the situation when the co-operative maintenance agreement is in place. Figure 3 illustrates the changed value offering point (VOP). The supplier is now offering a partnership program that includes planning of preventive and daily maintenance operations, ordering of maintenance work and spare parts as they are needed and potentially in the future taking care of the spare part replenishments on behalf of the customer. The VOP is moved from purchasing function to maintenance management. If the supplier succeeds in offering inventory management services to the customer the responsibility for warehouse management and acquiring products would also move from the customer to the supplier. As can be seen from the Figure 3., the OPP is still at the local service center.
Moving the value offering point change the economics of the customer (Holmström et al., 1999) as the supplier shares the objective of minimizing lost production time and spare part consumption with the customer. In our case situation it has been noticed that through the co-operation the number of unplanned production shutdowns has diminished as well as the consumption of the spare parts during the first year of the co-operation, i.e. the customer has benefited from the expertise of the supplier in planning the preventive maintenance programs. The economics of the customer is now the trade-off between improved reliability of the production machinery and the cost of integrating with the supplier.

But what does this new co-operation mean from the supplier’s point of view? Of course the supplier’s earning potential has increased as it can now not only charge its customer for spare parts and service operations, but also because it can now leverage its knowledge of the life cycle performance of the equipment it has supplied by offering more accurate maintenance programs to the customer. However, in this paper we argue that if the supplier is satisfied only with the above it does not fully exploit its new role as a co-producer of value. The new role creates a potential to increase the supplier’s own operational efficiency, while simultaneously providing better service to the customer. In following chapter we will look at the new opportunities found in our case setting in more detail.

New opportunities

The first opportunity is related to the order penetration point (OPP) that is the second link in the demand-supply chain model (Figure 4.). Moving the OPP changes the economics of the supplier, that is the cost to serve a customer (Holmström et al., 1999).

The new value offering creates an opportunity to move the OPP. By offering maintenance and inventory management services, the supplier gains access to demand information from the customer, such as maintenance plans rather than spare part orders. In practice this means earlier access to demand information. If this information is used effectively, the supplier can get more time to react to the customer’s needs (e.g. already in the maintenance planning phase rather than when the spare parts are actually needed) and it can arrange its own operations more efficiently. There are two elements to this. First, the supplier can minimise the spare part inventories at the local service center as it has enough time to serve the customer from the centralised supply center. As can be seen from Figure 4 the order penetration point can now be pushed further up in the supply chain. However, as our case customer operates in the process industry where some equipment is more critical to the process than other (for some equipment you simply must have the spare part available immediately), the supplier is currently analysing the criteria that have an influence on the optimal location of a specific spare part. The preliminary results of this analysis have revealed that it is possible to use more centralised spare part inventories and still offer competitive delivery lead times to the customer. The second element related to the earlier access to the demand information and to the possibility to
move OPP is that it will be possible for the supplier to manufacture more spare parts in a make to order fashion than in the transactional situation where the supplier did not have such visibility to the demand.

Figure 4: Moving the OPP

The second new opportunity to increase own effectiveness comes from the increased quality of demand information. The new co-operation enables the supplier to have more accurate demand information. Now when the supplier is present in the situation when the demand is realised through its expertise it is possible to identify the demand correctly and the order is more accurate. The right spare part or service is ordered and it results in less waste both of material and time. As the sales manager of the supplier said: “After we sent our own man to the customer’s plant, the accuracy of the spare part orders has increased significantly. They are now always ordering the right spare part to the right place and as we can trust the order being correct we save time in checking the order. And it is not only the accuracy in spare parts, the same is happening with the service work they order from us.”

The supplier’s possibility to influence to the demand creation rather than just fulfilling the demand is the third opportunity we were able to identify. As the preventive maintenance program is a crucial part of the new co-operation and the supplier has the responsibility to plan the preventive maintenance programs on customer’s behalf, the supplier can specify what type of spare parts will be used at the plant. For example in our case setting the supplier has been able to minimize the variety of the equipment used in the customer’s process and promote the use of more standardised equipment when ever possible.

Conclusions

In this paper we argue that the supplier’s new role as a co-producer of value together with the customer creates a potential to increase the supplier’s own operational efficiency, while simultaneously providing better service to the customer. We have showed that it is possible to move away from the typical trade-off between service level and cost of services (the better the service, the more it costs to offer it to a customer) and move the VOP to create a potential to increase supplier’s own operational efficiency. By offering value-adding services to the customer, the supplier has a new role that allows it to have a better visibility of customer demand. As a partner the supplier has access to such information that could be used to plan its own operations more effectively.

It is, however, clear that the proposed benefits from shifting the VOP backwards are not gained automatically. Instead, they set high requirements for the operations planning competencies for both customer and supplier company. The supplier must be able to utilize earlier, more precise information and increased planning freedom in its planning processes. Figure 5 illustrates the findings in the form of management actions needed to be able to benefit from the changed VOP.
Figure 5: New value offerings enable increased efficiency and improved customer service

1. When the VOP is moved backwards, for example from purchasing to inventory management or to shutdown management, the supplier’s performance measures must be changed. Instead of delivery time and preciseness, the supplier’s performance is now measured through availability, number of shutdowns, or through the performance level of the customer’s production. The further back the VOP is moved in the customer’s demand chain, the more possibilities the supplier has to plan its operations. The supplier has the responsibility and the freedom to decide the exact timing and quantity of its deliveries in the frame of the new performance requirements. The supplier should build competence in operations planning to be able to use this freedom to better optimise its processes. This would then lead to both improved efficiency and customer service.

2. Moving the VOP backwards also means that the supplier has earlier access to its customer’s demand information. The supplier needs to realise this and capture the earlier demand information to be able to benefit from increased reaction time that can be used for optimising production and deliveries. Because the supplier has more time to react, it has better possibilities to reach the performance targets that the customer has set while serving the customer from centralised inventories.

3. When the VOP is moved backwards, the supplier gets closer to the origin of the customer’s need. This decreases the errors and distortion of demand information that is created by the customer company’s information processing. Better information quality enables more accurate planning, which in turn has positive effect on both effectiveness and customer service.

4. When the supplier is involved in its customer’s planning process in an early phase, it can better influence both the content and timing of the customer’s purchases. Supplier should, for example, guide the customer to use more standard components, which decreases the number of SKU’s that the supplier has to control. This in turn decreases the complexity of operations planning, which leads to better effectiveness and enables improved customer service.
Our results present the value of reversing the traditional relationship between logistics and customer service – logistics as an enabler of excellent customer service – and looking at it from a new point of view – customer service as an enabler of logistical efficiency. As we used the demand – supply chain model of Holmström et al. (1999) as framework to analyse the case company’s new service models and the opportunities for improved operational efficiency they offer, the paper also concludes that the demand – supply chain framework appears to be a working tool for analysing the opportunities to benefit from new customer services operationally.

References


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