SUPPLY CHAIN MANAGEMENT

1. Introduction

The demands imposed on quality are forever increasing while the customer is becoming forever less and less prepared to pay more for extra functionalities. This pressure has caused many firms to try to increase the efficiency of supplier firms through interorganisational cost management systems. These systems have emerged because it is no longer sufficient to be the most effective firm, it is necessary to be part of the most efficient supply chain. To achieve this objective, many firms blur their organisational boundaries (1). Furthermore, taking into account that 80% of the product costs are designed in the conceptual phase, it makes good sense to suggest that cost control be calculated at a very early phase in the development stage and that indeed such cost control initiatives also be extended beyond the boundaries of one’s own company.

Inspired by the successful approach to relationships with suppliers as evidenced by Japanese car manufacturers, Western enterprises too have decided to reassess and re-evaluate their own relationships with suppliers. In this paper, a number of possible avenues for cost control, and their applicability, are scrutinised in the light of attendant possibilities and restrictions. Also the concept of total cost of ownership, another important component of cost control in the supply chain will be addressed. This concept has the aim to quantify the entire range of costs related to the purchase of products or services.

2. Various mechanisms for cost control beyond the company boundaries

A number of techniques with their characteristics and applicability will be addressed in this paragraph.

TARGET COSTING
The target cost is a financial goal for the full cost of a product, derived from estimates of selling price and desired profit. In a target-costing framework, product selling price is constrained by the marketplace and is determined by analysis along the entire industry value chain and across all functions in the firm. Top management sets the desired level of profit on the basis of firm strategy and financial goals (3). In many cases, the target profitability is based on desired return on assets or return on sales (4). In contrast with cost-based pricing, product cost does not drive the estimated selling price. Instead, the target cost is the goal that a firm must achieve to meet its strategic objectives (3). The Consortium for Advanced Manufacturing International defines the concept as follows: “Target Costing represents a set of management tools and methods designed to direct design and planning activities for new products, provide a basis for controlling subsequent operational phases, and ensure that products achieve a given profitability targets throughout their life cycle” (5). The belief that target costing must be applied early in the product life cycle is based, in part, on the proposition that costs are fixed after a product is in manufacturing (3). Moreover, several authors argue that up to 80 percent of a product’s cost is fixed once it leaves product design (6).

When target costing is used during the manufacturing stage, this technique is called Kaizen costing. Kaizen costing focuses on continuous improvement. In contrast with target costing, kaizen costing does not explicitly focus on market prices or planned...
profitability, but is internally focused on continual incremental product cost improvements (3).

While target costing may be more easily applied early in the production life cycle, there is no conceptual reason the methodology cannot be applied to existing products (3). Target costing is believed to be applied at the manufacturing stage of the product life cycle as well. Several researchers see target costing broadly, suggesting that it can be applied throughout the full production life cycle (3). According to Kato e.g. target costing is not a cost-quantification technique but rather a complete cost-reduction program (7). Target costing is not a simple cost-reduction technique but a complete strategic profit system. Horvath writes that target costing is just a part of the cost management function for a product throughout its life cycle. The cost target set must then be achieved, while meeting customer requirements using various methods designed to identify cost reduction potentials (5).

**Chained Target Costing**
Chained target costing systems are created when the output of a buyer’s target costing system becomes an input to a supplier’s target costing system (8). The primary benefit of this technique lies in the ability to transmit the competitive pressure faced by the firm at the top of the chain to the firms further down the chain (8).

**Functionality-Price-Quality Trade-offs**
As long as the firms in the target costing chain are able to meet the target costs set by their buyers’ target costing systems, no special interactions between the product development teams of the different firms are initiated. However, when one or more firms find that they cannot achieve their target cost, it is the product development teams’ responsibility to initiate the appropriate enabling mechanism to find joint ways to reduce the costs (8). One way to get out of this impasse is through the Functionality-Price-Quality Trade-offs technique (2). The development teams of both supplier and customer are brought together (at the request of the supplier) with the objective to find a solution where the fixed target price can be reached by a redefinition of functionality and quality (2). The aim of this collaboration is to create a component with a lower functionality and quality than originally requested, without however compromising the functionality and the quality of the end product itself. This reduction in functionality and quality happens in most instances where a component has become over-specified by the customer. If, for instance, a component is meant to be mounted inside a device, in a spot that will remain quite out of sight of the end consumer, there tends to be some room for relaxing the visual requirements for that particular component.

**Interorganisational Cost Investigations**
A disadvantage inherent to the technique of Functionality-Price-Quality Trade-offs is, on the one hand, the restrictive character of possible changes (indeed, only limited alterations in the specifications are possible) while, on the other, this technique is introduced at a relatively late stage in the developmental process.

The following method attempts to find a solution to these limitations. Interorganisational Cost Investigations (2) differs from Functionality-Price-Quality Trade-offs in the sense that here consultation is being carried out by engineers of more than two firms. By involving a number of parties in the development process, it becomes possible to intervene on a more fundamental level in holding down costs. Application of this technique demands a strong exchange of costing information across and beyond company boundaries. More drastic changes early in the design
phase are possible but do require an intense collaboration and exchange of costing data (2). Likewise, one must remain alert to the possible power plays that could manifest themselves as a result. There exists the real risk that the more powerful players along the chain may turn this cost information to their personal advantage (2).

**CONCURRENT COST MANAGEMENT**

While the above-mentioned technique already has a significant impact on lowering costs, such impact can be increased still further by the technique of Concurrent Cost Management (2). This entails that the customer contracts out the whole R&D of a defined module or of its functionality to his supplier. A first possible form of this method is *parallel engineering*, where the customer provides his supplier with all of the necessary specifications. The supplier then designs the module or its functionality independent of the customer and may, where necessary, apply changes to the design, as long as such changes do not alter the end specifications for the functionality of the assigned module. In this way, the supplier is already from an early stage in the process working independent of the customer, which allows him more time and offers more opportunities for cost reduction (2).

The second form of Concurrent Cost Management is *simultaneous engineering*: this technique takes the process still one step further — or just back to the design process: both parties involved can bring changes to the design (2). Together they deliberate over the design of the module that will be developed by the supplier as well as over the design of the end product, the responsibility of the customer. Both parties can propose recommendations and changes with regard to functionality and the final product. As this form of collaboration comes into play even earlier in the design process, the method does offer the greatest possibilities for cost reduction and cost avoidance. But there is a reverse side to it that demands a continuous interaction between the development team of the client and that of the supplier, entailing significant additional costs (2).

Both Concurrent Cost Management techniques offer to the supplier the opportunity for an early impact upon the development and thus present a number of opportunities for cost reduction. In addition, new generation products benefit from a shorter *time-to-market* since the development process is not tied to a supplier/client link and needs not follow sequential stages. Because of this very close interaction, however, the client may possibly find himself in a somewhat less than comfortable position, he has become to a large degree dependent on the technology developed by his supplier, who may also be working with the competition …

3. **Total Cost of Ownership**

Another element in cost management is total cost of ownership. Total cost of ownership requires a purchaser to identify and measure costs beyond the standard unit price, transportation, and tooling when evaluating purchase proposals or supplier performance (9). Formally, total cost of ownership is defined as the sum of all expenses and costs associated with the purchase and use of equipment, materials and services (10). To use a total cost approach, a firm must define and measure purchased item’s major cost components. Firms that accurately measure the total cost of ownership have the ability to identify cost variances from planned results and can take corrective action to reduce future problems (9). The total cost of ownership (TCO) concept extends beyond purchasing. Moreover, TCO can be viewed as an extension of cost-driven accounting systems such as Activity Based Costing (ABC), which strive to allocate cost to appropriate drivers according to their value-added
component. In this respect, TCO extends ABC to not only external sources of supply, but also to other value-adding activities both up- and downstream from the organisation (11). Total cost of ownership measurement is increasingly important as purchasing strives to select the lowest total cost sources of supply (not the lowest prices). Total cost of ownership applies not only to items sourced from external suppliers but also to internally manufactured items (9). A total cost of ownership allows a firm to (9):

- Select supply sources based on total cost considerations, including not only the evaluation of external suppliers but also comparisons to internal manufacturing capabilities. The total cost approach directly supports make-or-buy analysis.
- Increase supplier performance by identifying areas of non-performance along with responsibility for corrective action. The tool also helps identify cost savings opportunities.
- Clearly define performance expectations and communicate those expectations to suppliers. Suppliers often complain that poor communication between firms is a leading reason for poor performance.
- Increase supplier accountability and control. Total cost requires purchasing to develop an awareness of most significant non-price factors under the jurisdiction of suppliers that contribute to total cost.
- Select preferred suppliers based on performance merit. Total cost data allows a firm to rank suppliers and select only the best suppliers.
- Introduce measurement discipline throughout the organisation by relying upon an equitable and consistent evaluation tool.

Total cost information can be used in a number of managerial activities. The data provides the ability to quantify and communicate to supplier's areas of non-performance to concentrate supplier performance improvement efforts (9). Buyers can also use total cost information during negotiations with suppliers to specify areas requiring contractual performance improvement. The information also assists in the overall supplier selection process by providing historical performance data and a means to rank supplier performance, which is especially useful if a firm is reducing its supply base and needs to identify suppliers for elimination or retention (9). Finally, a structured approach to total cost may allow a buying company to recoup non-performance costs through charge-backs to non-performing suppliers. A well-developed total cost system can also be used by other functions within the firm e.g. manufacturing, finance or marketing (9).

4. Conclusion

To survive in today’s highly competitive environment, firms must develop low-cost, high-quality products with the functionality that their customers demand. When firms outsource a larger percentage of the value-added of their products and associated product development, they can only achieve this by linking their cost management systems with equivalent systems of their suppliers and customers (or interorganisational cost management). In particular costing systems applied during the product development stage involve close interactions between the design teams of buyer and supplier to help identify opportunities for joint cost reduction based on design synergies across the firms (8).

However, recognising this fact, and moving from a traditional channel and a traditional costing system to a point where the firm’s costing system is congruent with the supply chain relationships require a new costing capability (12). At the heart of interorganisational cost management during product development lies target costing. By chaining the target costing systems of multiple firms this discipline can be extended to the entire supplier network. A number of enabling mechanisms can help the product design teams of firms in the supplier network to co-ordinate their
activities. Techniques such as functionality-price-quality trade-offs, interorganisational cost investigations and concurrent cost management, enable the design teams of buyers and suppliers to pool their knowledge in order to identify new ways to reduce costs while maintaining (if not increasing) overall quality and functionality (8). The choice of the technique is determined by the cost-benefit trade-off between the cost establishing sophisticated buyer-supplier interactions and the potential benefits of cost reduction through joint product development (8). The concept of total cost of ownership, when applied can lead to a substantial contribution to the profitability of the firm, more accurate information on the performance of the different suppliers and their influence on the profitability.

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