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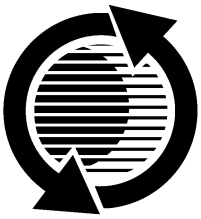

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ABSTRACT

Members of supply chains face many conflicts between the efficient operation of the individual unit and the demands of membership in the supply chain. What is good for the Link isn't always good for the Chain. This paper addresses the conflicts and suggests sharing both risks and profits as a breakthrough solution that integrates tactics (the method of operations of the link) with strategy (the method of operations of the chain). Additional elements necessary to achieve the success are also discussed.

INTRODUCTION

The APICS Dictionary defines supply chain as: "1) The processes from the initial raw materials to the ultimate consumption of the finished product linking across supplier-user companies. 2) The functions inside and outside a company that enable the value chain to make products and provide services to the consumer." A supply chain is collection of independent business units interacting in sequence to provide a finished product. None of the business units can provide the complete product by themselves. They combine to transform raw materials into a final product of value to the end consumer. The supply chain model applies to separate companies contracting with each other for component parts. It also fits large companies with separate business units. A captive shop can be considered one link in a supply chain.

TODAY'S DEMAND CONFLICTS

Supply chains deliver products to consumers. Consumers are becoming more and more demanding. Consumers want better products, faster delivery, and less expensive products. The final link of the chain, the link that delivers the final product to the consumer, feels the most pressure. That pressure is pushed back down the supply chain to the individual links. Most individual links are doing what they can to improve. That doesn't mean they can't get better, but they have improved to a point where additional improvements are quite difficult or costly. With little space for improvement on the links themselves, the improvement efforts have turned from the links to the linkages.

Consider the problem of forecasting. Each link tries to forecast both the expected sales (demand) for the component they produce and their raw material requirements. This can be very hard in a high variability system. In order to keep make sure they don't miss an order (make their customer unhappy and lose sales), they must hold a large inventory. On the other hand, to keep their costs low (so they can be profitable) they must limit themselves to a small inventory.

Consider the problem of pricing. The sales volume at the final link (sales to the consumer) is related to price. All links in the supply chain want higher volumes. To achieve the high volumes, everyone in the supply chain pressures everyone else to cut their prices so the final product costs less. The final link especially pressures the rest of the chain. On the other hand, for the individual links to stay in business, they can't lower their price much (they have already cut the fat from their link). The links want to raise their prices.

Consider the problem of delivery. Today's consumer wants things fast. For the supply chain to effectively move made-to-order things quickly through the chain the work-in-process levels must be very low. Keeping the work-in-process levels low means the individual link will suffer from inefficiencies. On the other hand, for the individual link to produce in a cost effective manner, the link must have high efficiencies.

Consider the element of risk. All businesses take risk. To profit when markets fluctuate in a positive direction (demand is up), the supply chain must have products ready (or near ready). In order to have products ready

the supply chain must take substantial risks (either with finished inventory in place or excessive production / delivery capability). On the other hand, for the supply chain to deliver products smoothly, individual links must be very dependable. In order to be very dependable, the links must not take substantial risks. Taking risks may be good for the whole chain but is rarely good for any link (especially if the risky link is supplying you).

These dilemmas can be summed up as one generic conflict. To have a successful supply chain, the chain must maximize the revenue of the entire chain. To maximize the revenue of the entire chain, members of the chain must make decisions in the interests of the chain. On the other hand, to have a successful supply chain, the chain must protect the interests of the links. To protect the interests of the links, the chain must make decisions in the interests of the links. And, decisions in the best interest of the links are often in conflict with the best interests of the whole chain. We have a dilemma (see 1).

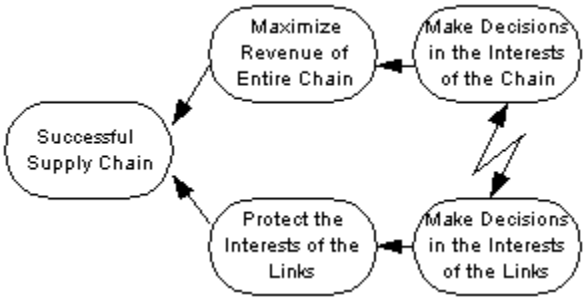

Figure 1. Generic Conflict

This serious conflict leads to links agreeing to one thing and doing another. The links are in a continual struggle to balance their obligations against what is good for them personally. The extent of the conflict shows as we examine the solutions attempted to resolve the conflict.

CURRENT SOLUTION EFFORTS

Sole Source – Japanese firms are very inventory conscious. Just-in-Time pressures on inventory reduction soon lead to 'sole source' relationships between links in the supply chain. Womak and others advocating lean manufacturing hope to improve forecast accuracy, reduce inventory and balance productive capacity between the links. If these things could be done, they would reduce operating costs. However, sole source agreements also put the links at risk. Problems with any supplier and jeopardize production. Balanced systems can't react to rapid growth in demand. And all members suffer in a market slump. Cox illustrates how a simple change at any link quickly degrades the system optimum. The benefits gained by the sole source agreement generate an adversarial relationship as changes require unwanted actions and incur excessive costs from one link on to another.

Shared Data – The advent of Internet and Intranet systems opens the opportunity for supply chain links to easily share data with each other. There are great time advantages by automating information transfer. This time advantage can shorten flow times, reduce inventory and decrease costs. There are often concerns about what proprietary information can be shared and how accurate the data are from other links. Hicks points out data sharing is only a minor gain. "Automating a process doesn't improve it, it just makes it automated." The conflict between links and the chain still exists. Links question each other. They are often more demanding of the accuracy of other's data than they are of their own. Knowledge of key data also escalates the marketing pressure between buyer and seller as they lobby for bargaining positions. Usually, the bargaining focuses on price alone versus quality, delivery and service. Once the data are out, links have little room to maneuver. Since links can rarely sell components outside the chain. They are stuck.

Massive Optimization – Noble advocates extensive communication and strategy sharing between links. Sharing operational information as well as inventory / order information allows for computational optimization of supply chain linkages. The optimum pricing, operation levels, delivery dates and so on can be calculated. It is hard to challenge 'optimum' calculations. However, these massive calculations have very short life times. The world changes about as fast as it takes to make complete the computationally intensive optimization (demand changes, inventory changes, capacities change, normal variability occurs, extra-normal accidents occur, new supplier and buyers enter the chain). Again, individual links are placed at risk. Only this time, instead of just blaming other links, they can also blame a computer algorithm that they don't trust.

NEW DIRECTION FOR THE SOLUTION

Each of these current methods offers part of the needed solution. Communication, data sharing and optimization can help. But, they do not resolve the basic conflict, only mitigate it. What is needed is a solution that allows the individual links to focus on their own needs and at the same time act in ways that benefit the whole supply chain. The direction of the solution must be to create a single strategy that governs both the needs of the whole chain with a workable tactic to meet the day-to-day decisions of the individual links. The tactics and the strategy must be the same.

The new 'strategy equals tactics' solution must meet the needs of the supply chain and the links. Some of the desirable elements of the new strategy must include:

- Minimizes Inventory
- Provides rapid response to the final consumer

- Improves the product offering to the consumer
- Offers the link an opportunity to effect the profit.
- Maximizes profits for the chain
- Rewards local improvements locally
- Frees the links from total dependence upon each other
- Gives each link a chance to improve the supply chain offering.
- Provide an honest and open relationship between links

DEFINING THE BREAKTHROUGH INJECTION

To biggest obstacle to achieving the desired result is the assumption that decisions in the interest of the supply chain are different than decisions in the interest of the individual links. Why are they different? They are different because individual links are small players in a big system. Is it possible that each individual link could be responsible for the profitability of the chain? Could each individual link take its share of the risk of the chain?

Define the breakthrough injection as:

> Each member of the supply chain shares in the profit and the risk of the supply chain.

How can this injection be achieved? And if we could do it, is it sufficient to achieve all the desirable results?

DEVELOPING THE FULL SOLUTION

SHARING THE PROFIT – Currently, suppliers and buyers bargain with each other, both trying to make local profits. The cumulated cost passed on to the final link in the supply chain leaves little room for movement. What would happen if the cost of the product at the final link was not fixed? The final link would then have room to work with the consumer to deliver quality, service and value at a cost appropriate to the consumer. The individual links would not charge a fixed cost for their component contribution. They would agree to a percentage of the final selling price. In this manner, if the final selling price is high, each member of the chain receives a little more. If the final selling price is low, all links receive a little less. There is a potential here for abuse by the final link. The final link may choose to sell at too low a price. To protect the individual links, the individual links offer their component at a percentage of the selling price as long as it is above a minimum amount (a floor). For example, a link sells a component to the next link for 2.5% of the final selling price or $7.00 which ever is greater. The next link in the supply chain would roll up the price of all its suppliers and it's own costs in it's offer to the next link in the chain. If there were three suppliers all at 2.5% and the link itself needs 10% then the offer to the next link would be 2.5% + 2.5% + 2.5% + 10% equaling 17.5% of the final selling price or $49.00 which ever is greater.

SHARING IN THE RISK – Currently, supply chain members purchase components from each other and pay each other (usually not immediately but normally within 90 days). The risk, if any is shared only with adjacent links. What would happen if the links in the chain were not paid until the final product was sold? (A producer of automobile axles doesn't really sell a product until the car is sold.) Such a policy put the individual links more at risk. If the final product did not sell, no links would get paid. This would encourage every member of the supply chain to contribute more in line with what the final consumer wanted. And, it would also encourage the supply chain (especially those at the front or beginning of the chain) to provide rapid movement of inventory through the chain. In most cases, its possible to go from raw material to finished goods in less than 90 days. If each link in the chain was paid at the moment of the sale (easily possible with ERP software), then most of the time, members of the chain would be paid earlier than they are now.

EFFECTS ON INVENTORY – Supply chain members who agree to share both risk and profit change the nature and location of their inventory. It is no longer desirable to hold any work in progress inventory at the local link. Profits only occur when the final product is sold. It is best to position all inventories as finished products right near the consumer. The reduced inventory in the links greatly reduces inventory queues and speeds up process flows. As the products are sold, additional products are 'pulled' on demand through the chain to replenish the finished goods inventory as rapidly as possible. The risk of producing the wrong component is greatly reduced.

EFFECTS ON BUYER-SUPPLIER RELATIONS – By purchasing parts as a percentage of the final sales price, links are encouraged to work together as a team--a relay race team. Consumer sales are communicated immediately to the beginning of the supply chain and to each link. Links rapidly produce to actual demand. In such a system, component quality becomes more important. Deliver and service become paramount. Each supplier can bid on the delivery of a component based not only on price but speed of delivery, quality and service. Links can share limited data without sharing confidential data.

Not all link members may choose to share profit and risk with the chain. There is nothing that prevents traditional link member from participating in their normal way at the same time as other links share profits and risk. Any number of links can share profit and risk in a subset of a larger supply chain.

Each buyer should open competition on supplies. Each supplier can be rated on the things that are important to the supply chain (speed of delivery, quality, service and % of sale price desired) The buyer should have at least three suppliers for each component. Award the best provider the largest volume of the orders, say 60%. The next best supplier gets 30% and the poorest supplier

10%. Each supplier knows their competitors ratings. They know they can increase their volume if they improve their ratings above their competition.

Each supplier should also support many buyers. Try not to have too many components sold to a single buyer. Otherwise, a supplier is put at the risk of the buyer. By segmenting resources according to capability rather than product, suppliers can provide components to many markets that do not all fluctuate at the same time. This greatly reduces supplier risk. It also protects the chain as a whole. With many component suppliers and many buyers, the chain (and links) can surge quickly or easily shift market segments.

CONCLUSION

Sharing profits and risk is a viable injection to the generic systemic conflict. This injection aligns the strategy of the chain and the tactics of the individual links.

Links can participate in the chain as much as they desire without severe outside pressures. Each link can contribute to the competitiveness of the supply chain. At the same time, individual links become more independent and can take more control over their own future. Local improvement not only benefits locally, but also benefits the whole chain. Benefits of the whole chain also benefit the individual links.

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