



Supply Chain and Inventory Management Case Studies

Memorandum 709

Phone: 201-283-9000 · www.establishinc.com

New York · Boston · Greenville · Paris · Shanghai · Stockholm

Supply Chain and Inventory Management Case Studies

Over the past 20 years, the distribution-related business functions have grown from being responsible primarily for physical distribution; i.e., warehousing and transportation; to logistics, which encompasses customer service and finished goods inventory planning and management as well as physical distribution. Now, as a result of the emergence of a global customer-driven marketplace and the need to improve material and product flow, it has progressed to supply chain management. As each of these growth steps has occurred, more functions have been brought under the logistics function umbrella: customer service, forecasting, finished goods inventory planning and management, sourcing, supply chain partnerships, and even production planning.

So what's the difference with supply chain management? Supply chain management seeks first to integrate all of the internal activities necessary to supply product to the customer into a continuous, fast-flowing stream that will decrease costs and improve service by optimizing inventory and increasing its velocity and then, to further optimize supply by integrating directly with the supply chains of others, both suppliers and customers, through supply chain partnerships and information exchange. Sourcing now comes under the supply chain umbrella, also inventory planning and management, and production planning to the extent that it determines the best utilization of available capacity and material. Traditional internal organizational barriers are broken down to assure a smooth flow of information and material.

Note that the objectives of cost reduction and improved service are coequal. To flourish in today's customer-driven marketplace, a company must offer competitive pricing to its customers, provide excellent service, and show a good return to its shareholders.

Under the supply chain management concept, the product supply areas of the company are reengineered to a business process, rather than functional model. **The activities necessary to "Serve the Customer" are brought together in one process.** Once the internal integrated supply chain is operating smoothly, the supply chains of others can be brought into the picture through coordinated planning and electronic exchange of information on production, inventory status, and movement of materials and product.

...the objectives of cost reduction and improved service are coequal. To flourish in today's customer-driven marketplace, a company must offer competitive pricing to its customers, provide excellent service, and show a good return to its shareholders.

Case One – Investing to Improve

From the opening paragraphs, we can see that good supply chain management is partly a matter of balance. Cost versus service versus profitability versus proper utilization of assets. What happens when the pendulum swings too far in one direction? Here was a case where a company had cut to the bone and taken all of the easily achieved benefits, and in the process, caused itself some customer service difficulties. The “low-hanging fruit” was gone. There still were additional cost reductions to be gained in the physical distribution and inventory management areas, but each required an out-of-pocket investment, process changes, and a more intense style of management. As the old adage goes, “sometimes it takes money to make money.”

A process manufacturer of industrial materials had a management objective to manage the company to maximize shareholder value. The principal emphasis was profitability and asset utilization, a good-looking P&L and balance sheet. The company’s products were on the edge of being commodities, plenty of competition and not much product differentiation. The primary means of gaining and holding market share was quality and an ongoing customer engineering support program to get the company’s products engineered into customers’ formulas at design time. This helped assure some stability in sales as the customer would have to reengineer, retest and re-certify his process in order to make formula changes. However, though established customers tended to stay with products already in use, this company’s share of its markets was staying steady or shrinking, not growing.

Another interesting characteristic of the company was that it was vertically integrated or had limited sources of raw material in most of the major product lines. This meant that the company often had to enter into long-term contracts with vendors to ensure supply, or in several cases, actually build and operate facilities to capture byproducts from other industries’ processes to obtain material. So in a sense, upstream supply chain integration is already present by the force of circumstance.

In the continuing quest for increased profitability, the company had made drastic cuts in manpower and other aspects of almost every part of the company, including supply chain management. Management was now seeking additional reductions in the supply chain area and a project team was formed to find more ways to reduce costs. The team decided that an outside objective look was needed and retained us to perform a cost/ performance benchmark and find cost reduction opportunities.

...sometimes toward the end of a quarter, if inventories looked too high on the balance sheet, production would be stopped.



The first step was to benchmark supply chain costs to see how this company stacked up against other similar companies. The benchmark revealed that because of previous cost reductions, the company was already well below industry cost averages in most areas. The potential for large additional reductions was not there. Distribution administration costs were already down. Some significant dollars could be saved by more intensive management of global transportation costs, and there was some potential for reducing inventories by managing mix more intensively. The question became, "With costs this low, is customer service suffering?"

In some ways, the company had reached the point of diminishing returns in managing to the financial numbers. It was found that sometimes toward the end of a quarter, if inventories looked too high on the balance sheet, production would be stopped. Occasionally, customer production lines had been shut down because of lack of material from this vendor. So far, the client had been protected by its products having been designed into the customers' products; but, this close relationship and dependency was now in some cases hurting the customer rather than serving him. Over time, the customers could change that if the situation didn't improve. There was a need to back away from extreme financial management and to make some internal investment in processes, systems and people, and start to put customer service back into balance in the supply chain equation.

When a company is vertically integrated, or has to compete for material in a constrained marketplace, many of the negotiating opportunities in the upstream supply chain don't exist, so vendor price negotiations and seeking of large-scale, free, value-added services were not serious options. This was an inflexible supply environment. It appeared as well that there was some problem with mix in the company's finished goods inventories as a result of off-spec materials coming out of the processes. All of the inventory eventually was sold, but it took time to place it, and the margins were poor. So, in some locations, inventory carrying costs were high, turns were low, and overall margins were not as good as they should have been.

There were some inventory opportunities to be obtained by working smarter. To improve the inventory situation would require two things, an investment in improving the production processes to make them more reliable, some of which were already underway, and better inventory and production planning. Contrary to the strong drive toward operating cost reduction, both of these would require investment and possibly increased manpower. The latter would require design of better business processes, an investment in computer software, and probably increased headcount to plan and manage inventories better.



The primary recommendations were to establish effective demand forecasting functions in the divisions; develop documented procedures for forecasting, inventory planning and management, and production planning; implement adequate software tools; and staff to do the job well. It was estimated that these recommendations, coupled with process control improvements already planned, could result in reductions of inventory carrying costs of approximately \$1.5 million per year on an investment of approximately \$600,000. It was also recommended that the use of optimizer software to evaluate the mix of product planned for production be considered.

In warehousing and transportation, there were also still some savings available. Annual warehousing costs could be reduced by about \$300,000 for an investment of approximately \$100,000 for network modeling and warehouse redesign. Because of the global nature of the company, there were significant potentials for additional corporation-wide transportation savings, approximately \$2.5 million annually, including the company's share of savings shared with customers in supply chain partnership programs. The costs to realize these savings would be about \$300,000 to develop and implement business processes and for negotiation assistance, and there would be ongoing costs of about \$120,000 for entry of shipping data and outside freight bill payment services. These activities would provide the data necessary to properly manage freight expenditures.

To improve customer service, the most significant recommendation was to change the inventory management policy so that customers would receive continuous supply. There was a need in the largest division for a moderate investment in improving the customer service operation that would show little direct dollar return, but would improve the ability to serve the customers well. These recommendations included a customer survey to determine true service requirements, implementation of a customer service measurement system, redesign and reorganization of the customer service department, and installation of a state-of-the-art telephone system. The total cost was estimated at \$240,000. It was also estimated that one other division had the potential to save approximately \$200,000 in ongoing manpower costs by redesigning its customer service process and providing customer service training at a cost of \$75,000.

So, although the low-hanging fruit was gone, there were still some supply chain cost reductions to be achieved, but only with an investment. In addition, there were fences to be mended while investing to build a customer service attitude and infrastructure that preserve and expand the customer base. This was a case where too much of a good thing, in this case cost cutting, proved to cause problems from the big picture perspective.

Case Two – The Impact of Business Change

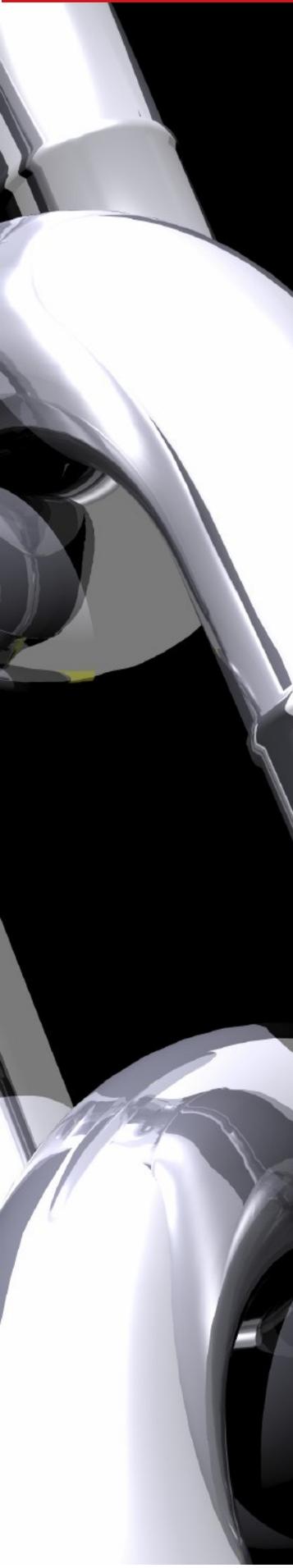
The markets and products of an established old-line company were changing radically. The company needed to completely revamp its inventory, manufacturing and product support policies, procedures and practices to reflect basic changes in its product line from large, long lead-time, expensive long-lived engineered systems to relatively low-value, standalone, near-consumer-product class units that support personal computers. It also needed to face up to the need to take the profit hit resulting from disposing of obsolete inventory if it wanted to get the balance sheet into shape and institute a program to prevent the buildup of obsolete inventories by disposing of slow movers on a regular basis.

This medium-sized manufacturer of computer peripheral devices was seeking to improve its balance sheet and P&L by reducing inventory and the associated carrying costs, while improving customer service. Often, a cost/performance benchmark can help to pinpoint areas of difficulty. Then, if costs are out of line in an area, a comparison to Best Practices may highlight the business processes that are the basis for the problem.

This company was in the later stages of a transition from relying on the main-frame computer market for most of its sales to a small systems (PC) related market. The small systems business was growing while the large systems were holding steady or declining. A logistics cost/performance benchmark showed that corporate logistics costs were almost 7 percent of sales. In dollar costs, they were several times greater than costs of the upper quartile of all industry cost comparison groups.

Transportation costs were below average or in the lowest quartile for all divisions. Warehousing and order processing costs were average or below in all divisions except the one with the highest inventory, and administration costs were about average in two divisions and higher than average in two. The division with the highest inventory had order processing costs one half to ten times higher than the comparison groups. In all divisions, inventory carrying costs were over half of the total logistics costs, an extremely high number. In the benchmark industry comparison groups, inventory carrying costs were typically about 25 percent of total logistics cost. So, while there was room for some improvement in supply chain administration and warehousing costs, the bulk of the problem was in inventory management.

The division with the highest inventory carrying costs was a service and spare parts operation, so it might be expected that inventory and order processing costs would be high, but they were high even against a service parts comparison group. Order processing costs were one half to ten times higher, and inventory carrying costs were almost five times as much as the upper quartile companies of that group. The service division was at 10 percent of the average turns of its comparison group.



Despite the high inventory, order entry and administration costs, order cycle time was twice the spare parts comparison group and line fill rate was significantly lower. This indicates product mix problems and the likelihood of large amounts of obsolete and slow-moving inventory.

The comparison to best policies and practices indicated that there were issues in purchasing, materials management, inventory planning and management, and manufacturing operations. A good deal of purchasing was done on consignment, but with a requirement to buy a specified quantity each quarter. Parts were often purchased in large quantities to obtain price breaks. Also, custom parts were often used when a product might have been designed with off-the-shelf parts. This required buying large quantities to make it worthwhile for the supplier to tool up to produce the custom items, a high-risk practice in a rapidly evolving high-tech business. Many inventory management and service policies appeared to be carried over from the time when the main-frame-related products were dominant, and the business was building and servicing larger, more complex, specialized, and costly units with a long life. End of product life spares procedures, management of engineering changes, field support practices, and product repair and parts availability policies were all based on a line of large, costly, long-life products.

Manufacturing's performance was judged on lowest unit cost and high overhead absorption, a practice that often leads to overproduction and incorrect product mix. Also, routine, but essentially unplanned, heavy promotions and "spiffs" by the sales department to "make the numbers" at every month and quarter end had destroyed any normal customer demand pattern that might have existed. The customers were waiting for the promotions that they knew would come before they ordered. These promotions didn't even necessarily involve products known to be in oversupply, or even in stock. It was just whatever sales decided to promote. The adverse effect of this on production, parts availability, and material and capacity planning, and on the inventories of non-promoted product in stock can easily be seen.

An inventory analysis by division showed that across the board in all divisions, raw materials and purchased parts, finished goods and other (obsolete and slow-moving) inventories were high and turns were low. A set of recommendations for short-term inventory reduction and long-term business process and policy changes were prepared and presented to management.

In purchasing and materials management, it was recommended that the total purchasing power of the corporation be leveraged to obtain more favorable purchasing and consignment agreements by centralizing the purchasing function. At the same time, local materials management functions would be strengthened to improve requisitioning and materials usage and upstream supply chain partnerships would be established to improve material flow and reduce purchased parts inventories.



In inventory planning and management, a centralized logistics function was recommended. This organization would own all finished goods inventory and have responsibility for its distribution. Logistics would also develop written policies and procedures for inventory planning, management and reporting; implement an integrated forecasting and inventory planning business process and information system; and perform the forecasting and inventory planning process. All inventories would be managed more intensively to avoid excess and obsolete, and active inventories would be deployed and re-deployed based on the forecast requirements.

There also was a need to get the promotion process under control to avoid sudden unanticipated demand on the plants and to move the slow-moving product. Even if the process of period-end promotions were to be continued, they needed to be planned. Planning the promotions even four to six weeks ahead, instead of springing them on the manufacturing plants at mid-month for month-end delivery, would produce a vast improvement. Changing manufacturing performance criteria from lowest unit cost and high absorption to meeting the schedule in time and quantity also needed to be done to ensure proper inventory control and improved service levels.

In service parts and repair, the support policies and practices on small (PC) systems needed to be reevaluated. For instance, given the downward trend of cost versus performance in electronic products, it might be more economical to replace an old unit with a new unit of comparable performance at a flat charge, rather than store and supply spare parts and provide repair services for discontinued models. It was also recommended to work down spare parts inventories as quickly as possible and improve management of field service parts supplies.

A company that had been high tech before high tech was even a common term was failing to recognize the acceleration of change in its market, and the true nature of new markets that it was now in more or less by default. In a time of rapid technological change, it's essential to recognize the impact of that change on supply chain management policies and practices, and its potential impact on the financial fortunes of the company.

Case Three – Quick-Fix Payoff

Relatively simple ad-hoc procedures and intensive, manual, detailed management of inventory and purchases can achieve substantial inventory reductions in the short term. Keeping a dedicated intensive manual process going on a broad basis for the long run may not be practical, but in this case, the result was a quick 30 percent reduction of actual inventory and a 70 percent reduction from what inventories were projected to have been without a remedial program. This was done without additional staff and with limited systems effort. Intensive attention to the basics of good inventory management can be effective, even without elaborate information systems.

A fast-growing utility company engaged in constructing communications networks and leasing communications services was experiencing inventory control problems. Typically, every city in which there was a network installed or to be installed maintained a stockroom of high-value parts used in the construction and maintenance of the systems. The value of the inventory of parts was growing out of proportion to the growth in business. If inventory continued to grow at its current rate as the business grew, it would soon become a serious financial issue.

An analysis of the make up of the inventory and of inventory management policies and procedures revealed several issues:

- Because of a lack of visibility to inventory status, particularly to items on order, additional quantities were often being ordered even though a part was in stock.
- Parts for a job were often ordered on a rush basis even though parts were in stock, but were committed to a job that had been planned, but was not yet due for actual construction.
- City inventories were sacrosanct and additional parts were often ordered in one city even when they were in stock in another city and not likely to be used.
- Because of the high-tech nature of the parts and the potential for obsolescence as a result of technical change, in-stock parts were becoming both unusable and unreturnable.
- Systems were often not constructed exactly as designed. This resulted in not using parts that were acquired for a job and using parts that were acquired for other purposes. Also, the true makeup of systems was not being properly recorded for fixed assets record keeping purposes.
- Inventory accuracy was poor.

- Because of a lack of visibility to inventory status, particularly to items on order, additional quantities were often being ordered even though a part was in stock.
- All parts were bought as a result of a specific need. There was no process for forecasting parts requirements either for use as maintenance spares or in construction.
- Even though there was a great degree of commonality of parts across projects, rather than using a pool of available parts, parts ordered for a project were held for that project even if its start was in the future, and additional parts were ordered for projects that had an earlier start date.
- There were no supply chain partnership programs in place.

The long-range solution to these issues was to install an integrated computerized provisioning system to manage and track work orders and to plan, purchase, receive, and issue the parts. Business processes were designed, software functionality requirements were developed, software was acquired, and the implementation process began.

However, the new processes and system were a permanent long-term solution that would take many months to implement. There was a need for some quick fixes to start bringing the inventory under control immediately.

The following short-term measures to control inventory were recommended and implemented:

- Take a complete physical inventory immediately and institute a program of relatively frequent physicals until a new system that supports cycle counting is installed.
- Institute manual stockroom procedures for improved inventory control and accuracy.
- The physical inventory combined with improved inventory accuracy resulting from the new stockroom procedures surfaced more excess items, so known inventory first went up, then down as additional disciplines were introduced.
- An analysis report of item usage incorporating a forecast with a simple model based on the last nine months' usage and showing excess parts by city based on the forecast was developed.
- Ordering parts shown to be in excess was stopped.
- Parts were transferred from cities with excess inventory rather than buying more in the city needing them.

- A simple min/max system was instituted for all parts.
- A second-round analysis of existing inventory was performed using the min/maxes. This indicated more excess inventory which now entered the "work it down" cycle.
- Gradual write-offs of excess inventory, oldest first, were begun.
- The "maxes" in the min/max system were tightened down.
- Vendors were pressed to reduce lead-time.
- Large vendors agreed to use a forecast from the client and stock to deliver with a seven-day lead-time.
- Low-value consumables, such as nuts, bolts and connectors, were taken out of inventory and expensed immediately, but their buying was still controlled through purchase orders. This gave sufficient control, removed their value from the balance sheet, and reduced the number of low-value detailed inventory transactions to be processed in the stockrooms.

Substantial inventory reductions were achieved nearly right now with almost no investment and successfully maintained until completion of the long-term solution, the "big system." Taking care of business always pays off.

In these cases, we've seen that a review of supply chain management practices and costs, some attention to business, and some redesign of business processes can lead to smoother, higher-velocity inventory flow; reduced inventories; reduced supply chain costs; and better service to customers. Today's financial market-driven business climate coupled with the customer-driven marketplace make these kinds of supply chain programs, not frills, but essentials.