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# Supply Chain Information Systems: Putting the Process First

**James B. Ayers**

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*Organizations that adopt supply chain thinking find that it changes the design of their processes and their decision support needs. Those that do not may spend any amount of time and money to improve their supply chains without realizing any lasting benefits.*

**C**ompanies around the world spend billions on “solutions” to improve their supply chains. These billions include expenditures for capital equipment; launching new systems; and opening or closing plants, warehouses, or sales offices. With such large investments at stake, managers want the changes to “stick” (i.e., not wither away soon after the project is over). To the chagrin of many, organizations are like rubber bands — they quickly return to their original state once the pressure is off. Once the wave passes, business as usual returns.

Making change stick is particularly vexing when it comes to systems projects. That costly new integrated, enterprisewide system may hold a mountain of data but the data is often not in a form useful for supply chain decisionmakers. Promises from software purveyors to “mine” these databases for information nuggets are unconvincing without an understanding of the needs throughout the chain. What decisions must be supported? Who will make those decisions? What information do they require to make the decisions? The answers

to these questions require an understanding of supply chain processes, the organization, its people, their roles, and measures of their performance. A company is not ready to “mine” data until these issues have been resolved.

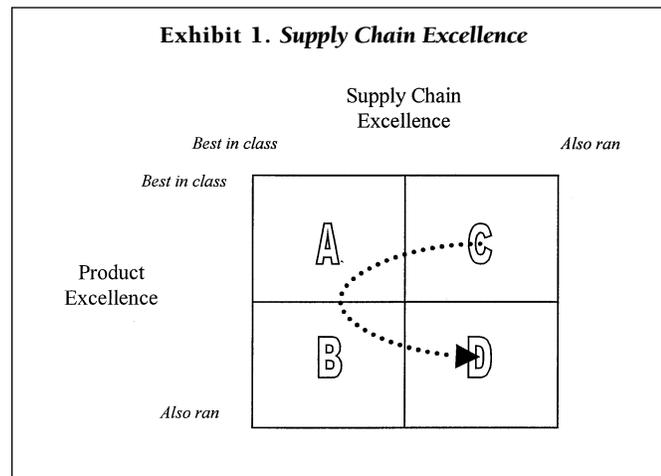
## **Strategy and supply chain design**

Supply chains have a profound affect on the way companies are organized. The traditional organization structure, the one that continues in most companies today, divides people according to their functions. Separate departments perform each function. The supply chain in a manufacturing company, for example, has the procurement department, the manufacturing department, and the distribution department. Decision-making becomes a functional mission, with too little overview of the total supply chain process.

In some situations, this arrangement makes sense, but these situations are becoming fewer and fewer. The obsolescence of the functional organization is driven by increased customer segmentation, resulting in tailored processes to meet the needs of those customers. The “one-size-fits-all” supply chain organization is probably doomed in most markets. So too is the one-size-fits-all enterprise system incorporating so-called best practices.

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**James B. Ayers** is a principal with CGR Management Consultants in Playa del Rey, California. He can be reached at [jimayers@cgrmc.com](mailto:jimayers@cgrmc.com).



Segmenting markets is something of an art form. This article describes that concept briefly, along with other marketing concepts. It is important to understand that segmenting and attacking markets with improved products and supply chain processes happens all around us in competitive markets. For any company, segmentation and focused supply chain design constitute a two-edged sword — both a threat and an opportunity. The threat is that a focused competitor can tailor a supply chain to the needs of a particular segment served by an entrenched company. If the competitor’s supply chain does a better job of meeting customer needs, market share will be lost. The opportunity, on the other hand, is that a focused company not now serving a market can use the same methods to bypass an entrenched competitor.

Supply chain process redesign including customer segmenting and decision support requirements should precede planning new systems. What follows are several concepts useful for designing the organization and its requirements for information support.

**Should there be a supply chain organization?**

With regard to organization, a company has two basic options. The first is to pursue or maintain a functional structure, as has been described. The second is to adopt a supply

chain structure, in which multiple focused supply chain-oriented structures exist side by side. Before proceeding with systems tasks like enterprise systems, decision support, and mining data, however, the question of should there be a supply chain organization must be answered.

Answering this question requires an understanding of the position of products relative to competitors and where they are in the product life cycle. An article in a previous issue of this journal<sup>1</sup> described the “product grid” shown in Exhibit 1. The article observed that company products occupied different quadrants on the grid and required strategies suited to the quadrant.

Companies in the A quadrant have the best of all worlds — an exceptional product delivered by an exceptional supply chain. Microsoft’s Windows and Office products are examples. They face little competition.

Quadrant B products are the ones consumers buy every day. Product features vary little from competitor to competitor. In the computer world, this “commoditization” has taken place over time. The competitive field is more likely to be determined by supply chain innovation than by innovation in the product itself. Accordingly, Dell could charge, at least for a time, a premium price in return for over-the-phone convenience and high-end customer service. Some observers refer to these amenities as the

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“extended” product. For Starbucks Coffee, it is less a matter of what is in the cup but more the surroundings in which it is served.

Customers eagerly seek quadrant C products. But, for whatever reason, the supply chain is not as developed as the product itself. However, the company can “do no wrong,” and efficiencies in the supply chain are a secondary concern. Xerox was such an organization in the early days of its copier technology. A breakthrough drug under patent may present a similar opportunity to a pharmaceutical company. Boeing reflected C quadrant status when it tried to increase production rates. Its supply chain could not respond. The company, in spite of having great products and a dominant market share, lost money and market share when it failed to make its committed deliveries.

A product in the D quadrant is in deep trouble. It cannot survive for long without moving to another quadrant.

The quadrants also track movement of products through what is called “the product life cycle.” Readers may know this as the “S” curve taught in marketing courses. The life cycle holds that products pass through four phases: an introduction phase, a growth phase, a mature phase, and a decline phase. Recognizing the life cycle is an important underpinning of product strategies and of supply chain organizations. For high-technology products, this life cycle is shortening dramatically. The dotted arrow in Exhibit 1 traces the life cycle phases on the product grid.

The products of a start-up business unit might be in the C quadrant. The company’s products may be in great demand and hold promise in a growing market. Product developers and marketing types probably rule the roost. Supply chain issues take a back seat to product development and marketing. The chief supply chain challenge is dealing with product changes and meeting demand. In some technology products, a particular challenge is finding suppliers with the capacity and technical capabilities needed.

As the product moves to quadrant A, the organization becomes of such a size that formal procedures are necessary. At this point, the functional structure starts to take shape in a new company. In a mature company, the new product may “transition” from the new product development team to the functional organization. Profits are still plush in the growth market, driven by the novelty of the product and growth in demand. The principal supply chain mission is to ensure that the demand is met. A danger is that needs of particular customer segments are neglected while growth is strong, and the company becomes vulnerable to losses in market share.

In quadrant B, competition stiffens and growth slows. Pricing is a dominant consideration. Competitive initiatives center on cost reduction across the supply chain. Innovation in the supply chain may lead to competitive advantage. Focused competitors, no longer able to ride growth in the overall market, look for ways to take business away from their competitors.

The product that has moved to quadrant D is in decline. The life cycle can possibly be extended by supply chain innovation (moving it back to quadrant B) or a new platform product (moving to quadrant C). Most quadrant D products are, however, discontinued or sold off to better positioned companies.

The organization that has been in business for a while may manage products in all the quadrants. It is likely to do this through a supporting functional supply chain structure. In effect, it has one “compromise” supply chain. This supply chain is not particularly suited to producing or delivering products and services in any of the quadrants. The organization is vulnerable to competitors with distinctly focused supply chains or is likely to break up into focused divisions or “spin-offs.”

### ***Choices for supply chain design***

Better management of supply chain evolution and associated decisionmaking pro-

**Exhibit 2. Alternatives to Supply Chain Organization for Acme Corp.**

Acme Corporation Product Lines	Product Grid Quadrant	Segment 1	Segment 2	Segment 3
Product line Alpha	B	\$\$\$	\$\$	
Product line Beta	D			\$
Product line Charlie	A		\$\$\$\$	
Product line Delta	C	\$\$		

cesses can sustain a product's profitability and shorten reaction time to competitive moves. Exhibit 2 illustrates the alternatives to supply chain organization in the Acme Corporation.

Acme has three customer segments and four product lines. The number of "\$" symbols represents the profit earned in each segment by product line. For example, the table shows that Alpha's product line Charlie has the most profitable product/customer combination in segment 2. Beta products produce the lowest profits. Segment 3, the market for Beta, is the least profitable.

Each product is in a different quadrant of the product grid. Charlie, the most profitable, is in the A quadrant. Things are going well. But Acme must be wary that the "golden goose" is not stolen, particularly if market maturity is near at hand. Alpha products serve two mature market seg-

ments. One of the segments is shared with product Charlie. Delta is an innovative new product sold to customers in segment 1. Product Delta is the "dog" in the portfolio. It generates neither profit nor business for other products with its customer base in segment 3.

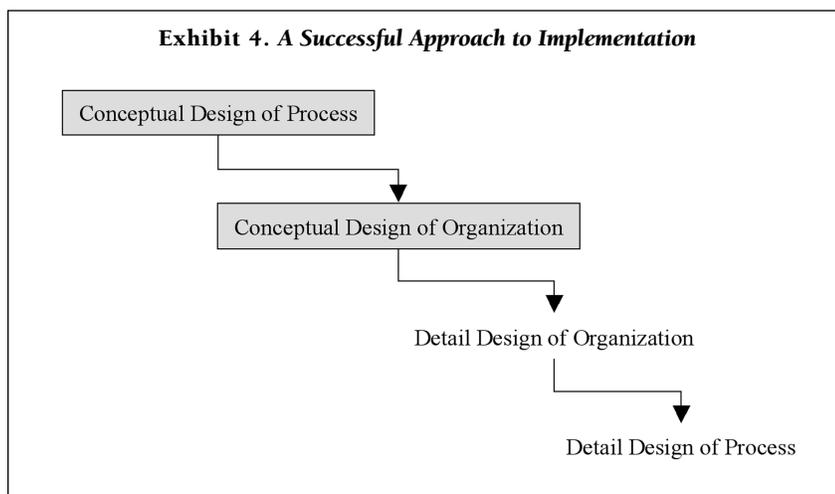
Acme has a functional organization. Its procedures dictate that each product line be sourced, produced, and distributed the same way. Traditional functional departments, such as procurement, operations, and distribution, make this happen. They use a common system for each customer/product combination. Inventory policies are the same. Lead times are the same. Acme is a company with a one-size-fits-all supply chain.

Unfortunately, Acme is very, very typical. Like many others, it plans a new enterprise resource planning (ERP) system. While

**Exhibit 3. Acme Corp.'s Market Factors**

Type of organization	Preferred in cases of:	Not preferred in cases where:
Functional	Narrow product line Small organization Mature business	Diverse product/customer base Speed is important in adjusting to changing conditions
Product-centric supply chain	Multiple products with differing production technologies Cost driven business (B on the product grid) Homogeneous customer base Capital intensive production technology	Varied customer base with differing requirements Relative low cost production technology Cost secondary to service in production decision
Customer-centric supply chain	When strategy calls for targeting attractive segments Style driven business requiring fast response (A and C on the product grid) Heterogeneous customer base/many segments	Too many segments to serve practically Lack of scale could cause loss of control or focus Price sensitive market

**Exhibit 4. A Successful Approach to Implementation**



implementing its ERP system, it will tailor, at considerable expense, the information generated to the perceived needs of the “as-is” structure.

If Acme were to shift to a supply chain structure, it has two basic alternatives to the functional supply chain. It can

- Form tailored supply chains according to products. This might result in one or more product lines sharing a distinct supply chain. The chains are “product-centric.”
- Form tailored supply chains according to market segments. There could be one or more supply chains organized around segments. The chains are “customer-centric.”

If Acme follows the first alternative, it might discontinue Beta and form one product-centric supply chain for Alpha, its mature business, and another for its growth businesses serving products Charlie and Delta. If Acme dropped Beta and selected a customer-centric approach, it would likely have supply chains for segments 1 and 2. The roles and information needs of decisionmakers would certainly be different under the two scenarios.

In choosing an alternative, Acme should consider several market factors. Exhibit 3 describes them. Acme’s selection will depend on a reading of these factors. It is not uncommon to mix these basic models. For example, incoming generic commodity

items are increasingly sourced centrally and bought locally. This makes sense for copier toner, paper, forms, and so forth. These items have little effect on competitive position, and purchasing them in greater quantities may yield savings.

In determining decision support needs for Acme, the choice of supply chain designs will be vital. Overlaying new technology on the existing function organization may result in incremental improvement, but large increases in sales and profits call for a different approach.

#### **Timing the implementation of organizational change**

An aggressive supply chain transformation will rattle an organization. How should the design and implementation phases be sequenced for the greatest effectiveness? The question often arises regarding shifting from one supply chain focus to another, whether it is functional to a product-centric or customer-centric focus. The sequence shown in Exhibit 4 is a successful approach that has been used in several situations.

The shaded activities produce the supply chain design — which includes processes and organization — at a conceptual level. These are all the activities needed to compete effectively. They are functional, product-centric, or customer-centric depending on business needs. The organization design

includes roles, responsibilities, and measures for decisionmakers in the organization. These, in turn, define high-level decision support needs.

Once the conceptual design is complete, the actual organization that will execute processes should pursue detail. This should start with the organization and proceed to detailed process design. Out of the detailed process design will come the information requirements for decision support. The capability of new systems enables information to be provided “proactively.” An article in a previous issue described this approach.<sup>2</sup> Such systems “push” needed information to decisionmakers in a timely way.

### Staying on track: performance measures

Unless supply chain designs include the appropriate measures, changes will not last. In the mature organization, new measures may challenge decades of precedent. Also, if the financial management decisions are not consistent with the new direction, needed changes will lag for want of funding.

Kaplan and Norton have introduced a tool for measurement that applies well to supply chain management.<sup>3</sup> The authors call their tool the “balanced scorecard.” The balanced scorecard has value in locking in supply chain changes. The scorecards also evaluate whether changes are having the desired affect.

The approach takes broad corporatewide goals and cascades them down into meaningful measures for departments, groups, or individuals. The “balanced” aspect of the technique comes from the breadth of the measures. Rather than limiting measurement to financial information, the approach is fourfold:

1. Financial perspective — the traditional viewpoint including owner value.
2. Customer perspective — how the organization measures up to customer requirements and expectations.
3. Internal business perspective — what the organization must excel at to be successful.
4. Innovation and learning perspective — how the organization can improve and create value.

All four areas are susceptible to enhancement through supply chain innovations. Some common examples are shown in Exhibit 5.

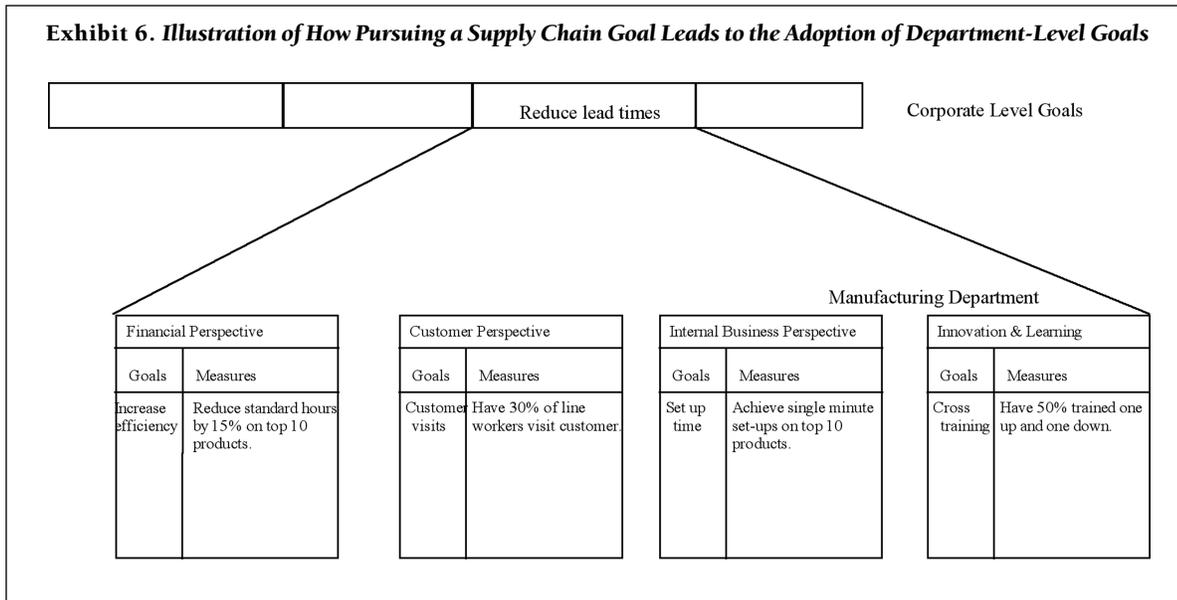
The authors recommend developing lower-level measures to match strategies. For example, if lead-time reduction is a supply chain initiative, specific goals for each element of lead time should be assigned to the appropriate group or department that has the job of making the goal a reality.

Exhibit 6 shows how a supply chain goal like “Reduced lead time” can “peel” down into lower-level objectives. In the case of Acme discussed subsequently, a corporate goal is translated into balanced goals for the manufacturing department.

**Exhibit 5. Common Examples of Supply Chain Innovations**

Balanced Scorecard Measures	Supply Chain Examples
Financial perspective	Supply chain changes should improve balance sheets and cash flow. Sales and profits should increase from providing targeted premium services.
Customer perspective	Shifts to customer-centric supply chains will better take into account customer requirements.
Internal business perspective	Restructuring to supply chain organizations produces fundamentally different ways of doing business. Processes are linked to competitive realities.
Innovation and learning perspective	Redefined roles in product or organization-centric supply chains will call on a broader range of skills than a functionally organized enterprise.

**Exhibit 6. Illustration of How Pursuing a Supply Chain Goal Leads to the Adoption of Department-Level Goals**



The exhibit shows that Acme wants to reduce lead times for one or all of its products. This is one of many goals as indicated by the band of “Corporate Level Goals.” The manufacturing department has four goals, accompanied by measures to support lead-time reduction. A strength of the balanced scorecard is that measures in all four areas support the goal. Current practice in most companies for a goal like lead-time reduction does not include the measures for each perspective.

Acme recognizes that set-up times are a principal contributor to longer lead times. It wants to shorten these to make smaller runs more feasible from an operating point of view. So management sets a goal of training workers on upstream and downstream jobs, which will add flexibility in the light of fluctuating demand.

Acme assesses that an understanding of where products are used by customers will increase awareness of the importance of response time. So management plans visits by front-line workers to customer operating sites. Because the measures should decrease costs, it also sets the goal of removing hours from budgeted labor levels.

### Conclusion

Innovation in supply chain management principles and techniques puts new demands on information system implementers. Companies implementing major systems such as ERP have or soon will have an important enabler that can lead to improved competitiveness. But many will apply their new capability to outmoded supply chain processes. Putting technology ahead of competitive position and operational requirements is a frequent shortcoming of many management teams.

New process design based on the competitive and life cycle positions of products should drive supply chain design. A candid self-assessment, a conscientious redesign, and careful implementation will reap competitive benefits. ▲

### Notes

1. Ayers, James B., “Supply Chain Strategies,” *Information Strategy: The Executives Journal*, (Winter 1999), pp. 2–10.
2. Lewin, Marsha; Kennedy, Keith; and Ayers, Jim; “Transformation Through Proactive Systems: A Case Study,” *Information Strategy: The Executive’s Journal*, (Spring 1996), pp. 29–35.
3. Kaplan, Robert S. and Norton, David P., “The Balanced Scorecard — Measures that Drive Performance,” *Harvard Business Review* (Jan.–Feb. 1992), pp. 71–79.