

A Leaner, Meaner Supply Chain

Design a simpler supply chain to
realize your strategic goals.



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Is complexity impairing your supply chain? You may not see it happening, but over time, various business activities—including globalization, restructuring, acquisitions, outsourcing, and new product introductions—add complexity that can prevent your supply chain from adequately supporting your strategic goals. For many companies, fighting complexity is a losing battle. Although they periodically try to simplify their supply chain configuration and structure through such one-off tactics as closing plants, rationalizing products, or changing suppliers, complexity continues to grow and performance continues to lag.

Some companies, however, are able to strip away accumulated complexity and maintain strategic focus in the face of a constantly changing business environment. How? By making supply chain design an integral part of the ongoing strategic planning process. In our experience, this means following three critical steps. First, develop a sim-

ple supply chain strategy; second, use analysis to design a supply chain configuration and structure that will support that strategy; and third, manage change with a simplification road map.

This approach is not easy, but well worth the effort. More coordinated decision-making, optimal production locations, and predictable delivery performance are just some of the improvements you'll see (Figure 1). As the sidebar describes, U.S. Gypsum is one company that has redesigned its supply chain successfully—yours can too.

Start With a Simple Supply Chain Strategy

A simplified supply chain starts with a simple, focused supply chain strategy. This may seem obvious, but many supply chain strategies we see lack focus and attempt to be everything to everyone. The most successful supply chain strategies are

Figure 1: Before and After

Redesigning the supply chain to optimize performance

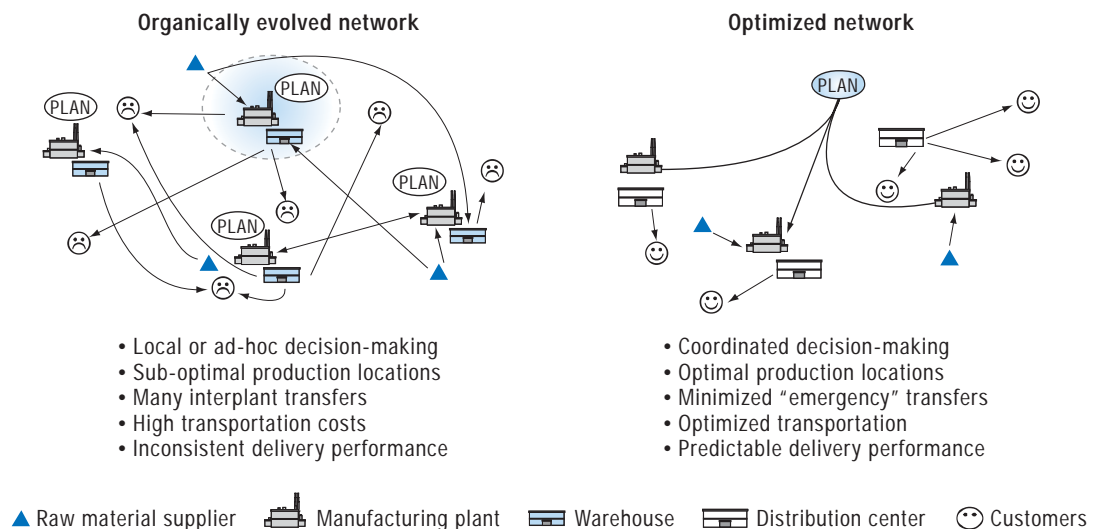


Figure 2: Design Tools

Modeling approach	Function	Decisions
Network optimization	Defines cost- or profit-optimizing structure of network	<ul style="list-style-type: none"> • Plant and distribution center locations • Product mix by location • Transportation modes and lanes
Inventory optimization	Defines cost or service optimizing inventory deployment	<ul style="list-style-type: none"> • Inventory strategies • Inventory locations and levels
Simulation	Imitates real-life supply chain	<ul style="list-style-type: none"> • Policies and rules • Service levels • Key supply chain and financial metrics

among the simplest—just think of Dell’s direct model, Wal-Mart’s supplier management approach, and Zara’s low-cost production method. A simple supply chain strategy helps minimize the potential for undesirable complexity and ensures that supply chain operations ultimately work to support your overall strategy.

The first step is to develop a clear understanding of your basis of competition, whether it’s innovation, cost, quality, or service. Then determine which characteristics of the supply chain support this—cost leadership, asset utilization, traceability, delivery performance, or flexibility and responsiveness. Only then can you clearly define which element/s of your supply chain will deliver superior performance—operations, outsourcing, channel, and/or asset network (S. Cohen and J. Roussel, *Strategic Supply Chain Management*, McGraw Hill, 2004).

Design a Simplified Supply Chain

Now you can begin designing the supply chain. First, determine what changes are needed to remove unwanted complexity and optimize the performance of your key supply chain elements. This, however, is a complex task. Why? Because even the simplest supply chain is inherently complex. Multiple suppliers in multiple tiers produce multiple products in multiple locations to support multiple customers with multiple changing demands—which translates into a nearly infinite number of possible permutations of supply chain costs, cycle times, and inventory options. Intuition alone is not enough—you need to conduct a detailed analysis. This applies to even common supply chain issues, such as where to make different products, which components to source, and whether to use distribution centers.

Thanks to the latest generation of supply chain analytical tools, you can evaluate supply chain alternatives more precisely than ever before. We’ve found the best way to address the complex interactions of production, inventory, distribution, and service is to use three different modeling approaches: network optimization, inventory optimization, and simulation (Figure 2). Individually, each approach helps answer a specific set of supply chain design questions; used together, they enable comprehensive and objective analysis of a large variety of supply chain alternatives with relative ease. Be aware, however, that ease of use can often lead to ease of misuse—data accuracy, validation of assumptions and outputs, sensitivity analysis, and statistical rigor are as important in designing supply chains as they are in designing products.

When developing a design for a simplified supply chain configuration and structure, start with a “clean sheet” model of the overall supply chain network. This “ideal state” view considers only true physical constraints and not policy or current-state constraints such as number and location of operations. The ideal state picture provides valuable insight into the key characteristics of the simplest and most optimal supply chain configuration. It also serves as an important benchmark as you introduce policies and practical limitations into the analysis. By comparing practical alternatives against the ideal benchmark, you can determine the true “cost of constraints” and use it to challenge, refine, and stretch deep-rooted limitations that may no longer be applicable.

One of our clients, a large diversified manufacturer, learned the value of supply chain modeling firsthand. The company was convinced it needed to consolidate its multinational operations into a single facility to reduce inventories and shorten customer lead times—an expensive capital proj-

ect—because intuitively this seemed like the right solution. The manufacturer, however, had a change of mind, thanks in large part to network optimization modeling, which highlighted other structural simplifications and operational improvements they could make to meet their strategic goals without undertaking significant capital investment.

Manage Change With a Road Map

However clear the strategy or comprehensive the analysis and design, implementation of the new design introduces opportunities for complexity to creep back into your supply chain—and undo what you've accomplished so far. Why?

To begin with, the implementation phase raises a number of additional issues that need to be dealt with—issues such as facility construction and closure, labor negotiation, hiring and training, and product relocation. Often they involve significant structural change, which must be implemented in stages rather than all at once. But a staged or phased approach increases the likelihood that the newly implemented change will stray from the original intent of your supply chain strategy and design. Add to this the fact that the overall business and competitive environment is also changing. The net result is an overwhelming tendency for companies to lose their way over the course of implementation and revert to narrow, intuition-driven decisions. To prevent this from happening, you need a road map to help guide the implementation and prevent complexity from creeping back in.

We've found a good road map has two key characteristics. First, it divides implementation activities into manageable, yet meaningful stages while maintaining fidelity to your overall strategy and design. Implementing significant change in a particular region or on a narrow set of products will help you validate the overall design and ensure the success of a broader deployment.

Second, the road map should balance specific implementation actions with a general ability to adapt to changes. That is, it needs to include the specific changes that the strategy and design call

for. At the same time, though, it needs to include criteria that can guide changes that are difficult to anticipate. For instance, one large industrial manufacturer's road map identified the need for up to four new manufacturing facilities over a 10-year period. Modeling helped identify potential ideal site location alternatives, but final site selection was to be based on pending legislation that would affect the availability of a major bulk raw material. Instead of specifying the exact sites, the road map defined key criteria that allowed for flexibility in the face of changing local regulations, transportation costs, raw material availability and costs, and competitive behavior.

Both the supply chain design and the implementation road map are living plans that need to be reviewed and refined iteratively to ensure they consistently support your company's strategic focus. We've found it helpful to incorporate this activity into the sales and operations planning (S&OP) process. As tactical planning has become more automated and information more accessible, many best-practice S&OP process models now take a strategic role in supply chain management. Regular use of an executive-level, strategic S&OP session as the forum for road map review, decision-making, and refinement ensures that the road map is an integral element of ongoing business process and mid- to long-term supply chain planning.

Supply chain complexity accumulated over the years can put a stranglehold on your ability to realize your strategic goals. By shedding this undesirable complexity and developing an ongoing simplification plan, you'll be best prepared to dominate in an increasingly competitive environment.

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U.S. Gypsum: Designing a Simpler Supply Chain

Founded in 1902, U.S. Gypsum Company, a subsidiary of USG Corporation, is a leading manufacturer of building materials and systems, including SHEETROCK® brand gypsum wallboard. With revenues of over \$4.8 billion, USG is the largest North American producer of gypsum wallboard, producing and shipping more than a third of the over 30 billion square feet of wallboard sold annually in the United States and Canada. USG built its leadership position through decades of providing low-cost, high-quality products by manufacturing with process innovation and world-class execution.

A Changing Industry

But the building materials industry was changing rapidly, motivating U.S. Gypsum to explore new ways to maintain its leadership position. Many of the company's customers, such as The Home Depot and Lowes, were growing rapidly—and along with that growth came higher customer expectations, especially in the areas of product availability and delivery information. As customer requirements increased, U.S. Gypsum's competitors were also making service and quality improvements that were beginning to threaten its leadership position in those areas.

At first, the company tried to address these challenges in the ways that had historically proven successful—driving performance improvement at the plant-level by upgrading older lines, increasing focus on plant-level delivery performance, and more aggressively attacking sources of waste and delay. But this localized approach did not provide the improvement in customer service the company was looking for. The manufacturing network had reached the point of diminishing returns in its ability to improve delivery performance while maintaining strong cost performance. Stepping back from the problem, U.S. Gypsum's supply chain leaders realized that their supply chain had evolved over decades of growth into a large, complex network of plants, process technologies, and products. Complexity in the management of the overall network—not individual plant operational per-

formance—was now the largest factor limiting cost and service performance.

What was called for, the company realized, was a fundamental change in its business and supply chain strategies. Cost and quality could not be sacrificed, of course, but they had become “table stakes” in the industry. Customer-facing supply chain performance—precise, timely, and reliable delivery of products and information—were the new success factors. But how would the supply chain need to change to achieve this new strategic focus?

To answer this question, U.S. Gypsum did a full strategic assessment of its supply chain performance. Supply chain benchmarking validated U.S. Gypsum's best-in-class inventory and cost performance and highlighted an opportunity to improve performance in on-time delivery, especially in comparison to retail industry norms. But simply adding inventory to improve delivery performance was not the answer. The complexity of products, transportation constraints, plant capabilities and costs, and customer ordering patterns meant that additional inventory would result in more of the “wrong products in the wrong places.” Instead, they needed a supply chain strategy that would provide the best of both worlds—maintaining the company's strong cost, inventory, and quality position while providing best-in-class service performance. The solution? Moving from a local/regional operations focus to a coordinated and optimized worldwide network that utilized its extensive manufacturing and distribution assets to the fullest advantage.

Analyzing the Supply Chain

Conducting a detailed analysis and design of its current supply chain structure and operations, U.S. Gypsum determined that the network was performing at near-optimum cost levels, but that both cost and service performance tended to drop significantly when faced with disruptions in supply or demand. In short, the complexity of the network was manageable as long as things went generally according to plan, but unplanned downtime, demand surges due to hurricanes or wildfires, and

other disruptions unraveled the best laid plans and led to locally-driven, uncoordinated responses that had negative ripple effects on cost and service across the entire supply chain.

With the help of network optimization and simulation modeling, the company defined critical changes to move to a “network optimized” operating model. Specifically, planning optimization provided the foundation for coordination of network execution by simplifying and centralizing forecasting, integrating supply chain planning and plant-level planning, and implementing policies for plant adherence to the supply chain plans. Production optimization lowered costs and improved inventory utility by realigning product mixes and volumes and by consolidating the production of low-volume products. Distribution optimization added flexibility to the network by streamlining distribution flows and by adding distribution centers that would respond more cost-effectively to demand and supply variations. These changes would enable U.S. Gypsum to more effectively leverage its broad geographic presence to improve customer service at lower cost, with far less sensitivity to supply or demand disruptions.

Implementing the New Design

Implementation of these solutions, however, posed some significant challenges. The company would need to add new distribution locations and capacity, transition products to different plants, and rationale product variations. It would also need to transition long-standing plant/customer relationships to other locations, change internal and customer-facing policies, and add new processes and information technology capabilities. At the same time, U. S. Gypsum and the industry as a whole were facing capacity shortages that put significant pressure on plant utilization and product availability. This meant there were fewer options for implementing change and greater risk that product and capacity transitions could further complicate existing challenges with customer deliveries and relationships. There was no room for

error—changes needed to be managed precisely and methodically.

To manage and mitigate implementation risk, U.S. Gypsum developed a time-phased implementation plan. First, the company made forecasting and planning process and policy improvements to establish the foundation for network-wide planning. A new distribution center was added in a capacity-constrained region, providing supply flexibility that allowed for piloting both of product mix changes and of consolidation of low-volume products. The company also developed a long-range capacity plan to add new capacity that would satisfy demand growth and to replace older plants in unfavorable locations.

To monitor the impact of these improvements on its supply chain network, U.S. Gypsum introduced new metrics, including total delivered cost and “deviation from optimal”—the difference between actual manufacturing and distribution costs and the optimal costs defined by their “ideal” supply chain model. The company also incorporated design guidelines and modeling and analysis into the capacity planning processes so there’d be a consistent analytical basis for any adaptation of the road map that might be required. Management of the implementation road map was made an integral part of the company’s monthly sales and operations planning process, providing a clear and regular management venue for review, adjustment, and decision-making.

The pilot implementations of U.S. Gypsum’s newly simplified supply chain have begun to produce real results. Product delivery reliability is improving, as is overall product availability. The planning, policy, and distribution improvements are increasing the supply chain’s ability to respond to spikes in demand and lack of supply with less adverse impact on cost and service. Service levels and “deviation from optimal” costs are holding steady or improving, even as overall demand continues to exceed supply. As the supply chain changes are deployed across the network and the new processes become codified in U. S. Gypsum’s new supply chain management systems, the benefits are expected to multiply.

—Brad Householder