

OPERATIONS PRACTICE

Building the supply chain of the future

Yogesh Malik, Alex Niemeyer, and Brian Ruwadi

Getting there means ditching today's monolithic model in favor of splintered supply chains that dismantle complexity, and using manufacturing networks to hedge uncertainty.

Many global supply chains are not equipped to cope with the world we are entering. Most were engineered, some brilliantly, to manage stable, high-volume production by capitalizing on labor-arbitrage opportunities available in China and other low-cost countries. But in a future when the relative attractiveness of manufacturing locations changes quickly—along with the ability to produce large volumes economically—such standard approaches can leave companies dangerously exposed.

That future, spurred by a rising tide of global uncertainty and business complexity, is coming sooner than many companies expect. Some of the challenges (turbulent trade and capital flows, for example) represent perennial supply chain worries turbocharged by the recent downturn. Yet other shifts, such as those associated with the developing world's rising wealth and the emergence of credible suppliers from these markets, will have supply chain implications for decades to come. The bottom line for would-be architects of manufacturing and supply chain strategies is a greater risk of making key decisions that become uneconomic as a result of forces beyond your control.

Against this backdrop, a few pioneering supply chain organizations are preparing themselves in two ways. First, they are “splintering” their traditional supply chains into smaller, nimbler ones better prepared to manage higher levels of complexity. Second, they are treating their supply chains as hedges against uncertainty by reconfiguring their manu-

facturing footprints to weather a range of potential outcomes. A look at how the leaders are preparing today offers insights for other companies hoping to get more from their supply chains in the years to come.

Twin challenges

The stakes couldn't be higher. "In our industry," says Jim Owens, the former chairman and CEO of construction-equipment maker Caterpillar, "the competitor that's best at managing the supply chain is probably going to be the most successful competitor over time. It's a condition of success."¹ Yet the legacy supply chains of many global companies are ill-prepared for the new environment's growing uncertainty and complexity.

A more uncertain world

Fully 68 percent of global executives responding to a recent McKinsey survey said that supply chain risk will increase in the coming five years.² And no wonder: the financial crisis of 2008 dramatically amplified perennial sources of supply chain uncertainty—notably the trajectory of trade and capital flows, as well as currency values—even as the crisis sparked broader worries about the stability of the financial system and the depth and duration of the resulting recession. While many of these sources of uncertainty persist, it's important to recognize that new, long-term shifts in the global economy will continue to pressure supply chains long after more robust growth returns.

The increasing importance of emerging markets tops the list of these uncertainties. Economic growth there will boost global energy consumption in the coming decade by about one-third. Meanwhile, the voracious appetite of China and other developing countries for such resources as iron ore and agricultural commodities is boosting global prices and making it trickier to configure supply chain assets. Worries about the environment are growing, too, along with uncertainty over the scope and direction of environmental regulation.

These long-term trends have knock-on effects that reinforce still other sources of uncertainty. Growth in developing countries contributes to volatility in global currency markets and to protectionist sentiment in the developed world, for example. What's more, different growth rates across various emerging markets mean that rising labor costs can

¹ Jim Owens made this remark in an interview conducted by Hans-Werner Kaas on September 20, 2010. For more with Jim Owens, see "McKinsey conversations with global leaders: Jim Owens of Caterpillar," mckinseyquarterly.com, November 2010.

² For more, see "The challenges ahead for supply chains: McKinsey Global Survey results," mckinseyquarterly.com, November 2010.

quickly change the relative attractiveness of manufacturing locations. This past summer in China, for example, labor disputes—and a spate of worker suicides—contributed to overnight wage increases of 20 percent or more in some Chinese cities. Bangladesh, Cambodia, and

Vietnam experienced similar wage-related strikes and walkouts.³ Finally, as companies in developing markets increasingly become credible suppliers, deciding which low-cost market to source from becomes more difficult.

Another uncertainty

Protectionism could change the economics of a supply chain at the stroke of a pen. Our research suggests, for example, that the total landed cost of making assembled mechanical products such as washing machines in a given low-cost country could plausibly swing up to 20 percent given different tariff scenarios.

Rising complexity

Manufacturing and supply chain planners must also deal with rising complexity. For many companies, this need means working harder to meet their customers' increasingly diverse requirements. Mobile-phone makers, for example, introduced 900 more

varieties of handsets in 2009 than they did in 2000. Proliferation also affects mature product categories: the number of variants in baked goods, beverages, cereal, and confectionery, for instance, all rose more than 25 percent a year between 2004 and 2006, and the number of SKUs⁴ at some large North American grocers exceeded 100,000 in 2009.

Meanwhile, globalization brings complexities as rising incomes in developing countries make them extremely desirable as markets, not just manufacturing hubs. Efficient distribution in emerging markets requires creativity, since retail formats typically range from modern hypermarkets to subscale mom-and-pop stores. In Brazil, for example, Nestlé is experimenting with the use of supermarket barges to sell directly to low-income customers along two tributaries of the Amazon River.⁵

Meeting the challenge

In such a world, the idea that companies can optimize their supply chains once—and for all circumstances and customers—is a fantasy. Recognizing this, a few forward-looking companies are preparing in two ways. First, they are splintering their traditional monolithic supply chains into smaller and more flexible ones. While these new supply chains may rely on the same assets and network resources as the old,

³Tim Johnston, "Striking Cambodian workers reflect Asia trend," *Financial Times*, September 13, 2010.

⁴Stock-keeping units.

⁵Tom Muiler and Iuri Dantas, "Nestlé to sail Amazon Rivers to reach emerging-market consumers," *Bloomberg News*, June 17, 2010.

they use information very differently—helping companies to embrace complexity while better serving customers.

Second, leading companies treat their supply chains as dynamic hedges against uncertainty by actively and regularly examining—even reconfiguring—their broader supply networks with an eye toward economic conditions five or ten years ahead. In doing so, these companies are building diverse and more resilient portfolios of supply chain assets that will be better suited to thrive in a more uncertain world.

From one to many

Splintering monolithic supply chains into smaller, nimbler ones can help tame complexity, save money, and serve customers better. Let's look at an example.

Splintering supply chains: A case study

A US-based consumer durables manufacturer was losing ground to competitors because of problems with its legacy supply chain. Years before, the company—like many global manufacturers—had sent the lion's share of its production to China while maintaining a much smaller presence in North America to stay close to the majority of its customers. One legacy of the move: all of its plants, relying on a unified production-planning process, essentially manufactured the full range of its thousands of products and their many components.

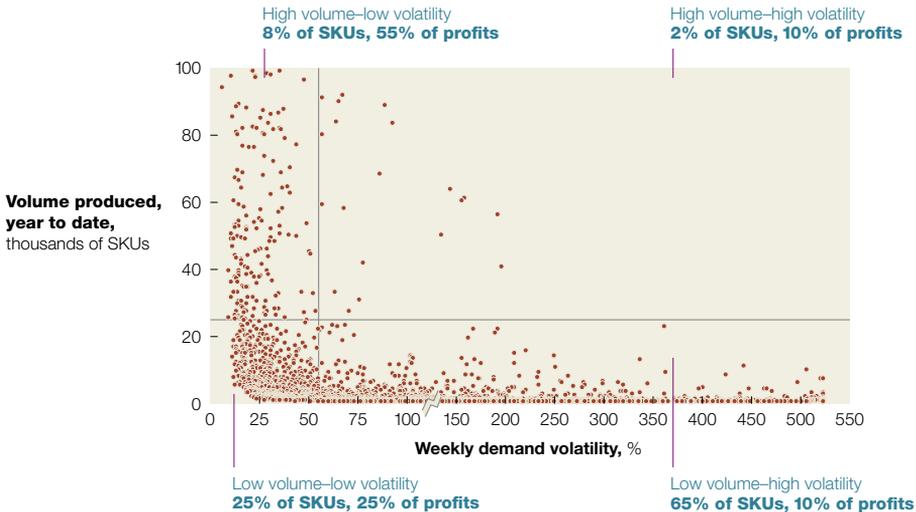
Now, however, increasingly volatile patterns of customer demand, coupled with product proliferation in the form of hundreds of new SKUs each year, were straining the company's supply chain to the point where forecasting- and service-related problems were dissatisfying key customers.

In response, the company examined its portfolio of products and components along two dimensions: the volatility of demand for each SKU it sold and the overall volume of SKUs produced per week. Armed with the resulting matrix, the company began rethinking its supply chain configuration.

Ultimately, the company decided to split its one-size-fits-all supply chain into four distinct splinters. For high-volume products with relatively stable demand (less than 10 percent of SKUs but representing the majority of revenues), the company kept the sourcing and production in China. Meanwhile, the facilities in North America became

Grouping products by demand volatility and overall volume can shed light on how to optimize the supply chain.

Volume and demand volatility by finished-good SKU,¹ example of US-based consumer-durables company



¹ Stock-keeping unit.

responsible for producing the rest of the company's SKUs, including high- and low-volume ones with volatile demand (assigned to the United States) and low-volume, low-demand-volatility SKUs (divided between the United States and Mexico). Ramping up production in a higher-cost country such as the United States made economic sense even for the low-volume products because the company could get them to market much faster, minimize lost sales, and keep inventories down for many low-volume SKUs. Moreover, the products tended to require more specialized manufacturing processes (in which the highly skilled US workforce excelled) and thus gave the company a chance to differentiate itself in a crowded market.

However, the company didn't just reallocate production resources. In tandem, it changed its information and planning processes significantly. For the portfolio's most volatile SKUs (the ones now produced in the United States), the company no longer tried to predict customer demand at all, choosing instead to manufacture directly to customer orders. Meanwhile, managers at these US plants created a radically simplified forecasting process to account for the remaining products—those with low production runs but more stable demand.

For overseas operations, the company continued to have its Chinese plants produce finished goods on the basis of long-run forecasts, as they had done before. The forecasts were now better, though, because

planners were no longer trying to account in their models for the “noise” caused by the products with highly volatile demand.

Together, the changes helped the company reduce its sourcing and manufacturing complexity and to lower its cost of goods sold by about 15 percent. Meanwhile, it improved its service levels and shortened lead times to three days, from an average of ten. Quality also improved across the company’s full range of products.

How many splinters?

The first question for organizations exploring multiple supply chains is how many are needed. Answering it requires a close look at the way the supply chain assets that a company uses to manufacture and distribute its products matches up against the strategic aspirations it has for those products and their customers.

This requirement seems obvious, but in practice most companies examine only the second half of the equation in a sophisticated way; they can, for example, readily identify which products they see as leaders on cost, service, innovation, or (most likely) some combination of these. Fewer companies seriously examine the operational trade-offs implicit in such choices, let alone make network decisions based on those trade-offs.

Oftentimes, a good place to start is to analyze the volatility of customer demand for a given product line against historical production volumes and to compare the results against the total landed cost for different production locations. This information provides a rough sense of the speed-versus-cost trade-offs and can even suggest locations where supply chain splinters might ultimately be located. A global consumer-packaged-goods maker, for example, quickly saw that two-thirds of the demand associated with a key product line (about 40 percent of the company’s product portfolio) could be moved from a higher-cost country to a lower-cost one without hurting customer service.

Of course, companies must carefully check these broad-brush analyses against customer needs. The consumer goods company, for instance, found that packaging innovation was a differentiator for some of its products and thus configured a single production line in the new, lower-cost location to make packaging for several markets quickly. By contrast, in automotive and other assembly-based industries, we find that the customers’ responsiveness and the complexity of individual products are important inputs that help determine where supply chains might be splintered.

Second-order benefits

While dividing a supply chain into splinters may seem complicated, in fact this approach allows companies to reduce complexity and manage it better because operational assets can be focused on tasks they're best equipped to handle. At the same time, the added visibility that a splintered approach offers into the guts of a supply chain helps senior managers more effectively employ traditional improvement tools that would have been too overwhelming to tackle before.

After the consumer durables maker divided its supply chain into smaller ones, for example, it was able to use formerly impractical postponement approaches (producing closer in time to demand to keep holding costs low). The company's US plants now combined various SKUs into semifinished components that could quickly be assembled into products to meet customer orders. Indeed, the lower inventory costs this move generated partially offset the higher labor costs of the US factories.

Likewise, the global consumer-packaged-goods maker found that after splintering its supply chain, it was more successful at applying lean-management techniques in its plants. Among the benefits: much faster changeover times in higher-cost production locations, enabling them to handle product-related complexity more effectively.



For more on how to develop scenarios in light of demographic, technological, macroeconomic, and other global trends, see "Applying global trends: A look at China's auto industry," on mckinseyquarterly.com.

Use your network as a hedge

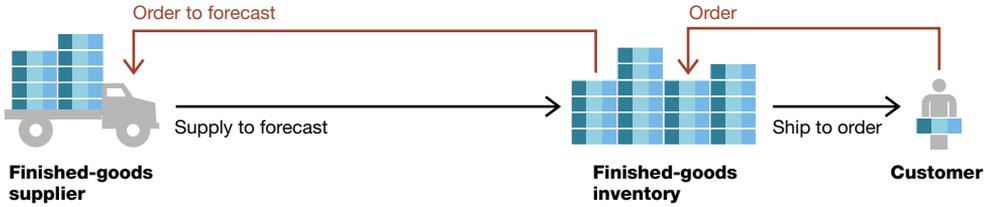
The advantages that multiple supply chains confer are most valuable if companies view them dynamically, with an eye toward the resiliency of the overall supply chain under a variety of circumstances. Will the various strands of a particular global supply network, for example, still make sense if China's currency appreciates by 20 percent, oil costs \$90 a barrel, and shipping lanes have 25 percent excess capacity? It's critical for organizations to determine which of the many questions like these are right to ask and to invest energy in understanding the global trends underpinning them. Some companies are already thinking in this way. Nike, for example, long a leader in emerging-market production, manufactured more shoes in Vietnam than in China for the first time in 2010.⁶

⁶ Fiscal year.

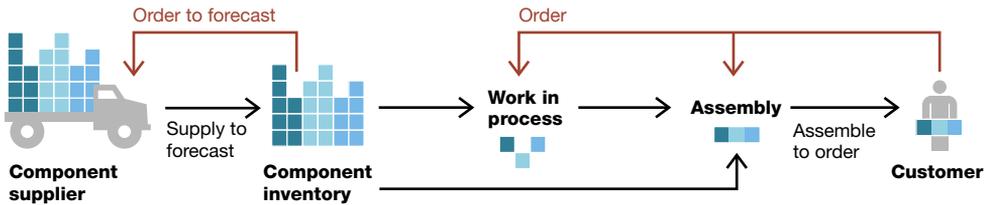
With better visibility into supply chain operations, companies can achieve bigger efficiency gains.

Example: a consumer durables maker lowers its inventory costs by moving production closer to customer demand

Before



After



In fact, we believe that the ability of supply chains to withstand a variety of different scenarios could influence the profitability and even the viability of organizations in the not-too-distant future. In light of this, companies should design their portfolios of manufacturing and supplier networks to minimize the total landed-cost risk under different scenarios. The goal should be identifying a resilient manufacturing and sourcing footprint—even when it's not necessarily the lowest-cost one today. This approach calls for a significant mind-set shift not just from operations leaders but also from CEOs and executives across the C-suite.

At the consumer durables manufacturer, for example, senior executives worried that its reliance on China as a hub could become a liability if conditions changed quickly. Consequently, the company's senior team looked at its cost structure and how that might change over the next five to ten years under a range of global wage- and currency-rate conditions. They also considered how the company could be affected by factors such as swinging commodity prices and logistics costs.

While China remained the most attractive manufacturing option in the short term, Mexico was preferable under several plausible scenarios.

The company determined that while China remained the most attractive manufacturing option in the short term, the risks associated with wage inflation and currency-rate changes were real enough to make Mexico a preferable alternative under several plausible scenarios. Consequently, the company has begun quietly building its supplier base there in anticipation of ramping up its manufacturing presence so that it can quickly flex production between China and Mexico should conditions so dictate.

Similarly, the global consumer-packaged-goods manufacturer is examining where dormant capacity in alternative low-cost countries might help it hedge against a range of labor cost, tariff, tax, and exchange-rate scenarios. The company is also factoring in unexpected supply disruptions, including fires, earthquakes, and labor-related strife.

A North American industrial manufacturer chose to broaden its footprint in Brazil and Mexico to hedge against swings in foreign-exchange rates. In particular, the company invested in spare capacity to make several innovative, high-end components that it had formerly produced only in Europe and the United States because of the advanced machining and engineering required. The investment is helping the company hedge against currency swings by quickly transferring production of the components across its global network to match economic conditions. Moreover, the arrangement helps it better support its supply partners as they serve important growth markets.



Making these kinds of moves isn't easy, of course, since any alterations to a company's supply chain have far-ranging implications throughout the organization. For starters, such changes require much more cooperation and information sharing across business units than many companies are accustomed to. Indeed, the organizational challenges are so significant that for many companies, a hands-on effort

by the CEO and others across the C-suite is needed for success (for more, see “Is your top team undermining your supply chain?” on mckinseyquarterly.com).

Nonetheless, the rewards are worthwhile. By creating more resilient and focused supply chains that can thrive amid heightened uncertainty and complexity, companies will gain significant advantages in the coming years. ○

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Yogesh Malik and **Brian Ruwadi** are principals in McKinsey’s Cleveland office; **Alex Niemeyer** is a director in the Miami office.