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Next-Generation
Supply Chains
*Bigger Steps,
Smaller Footprints*



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EXECUTIVE SUMMARY

Major shifts in global business conditions are radically altering input costs and risk. In response, companies must realign their supply chains around new assumptions to meet the multidimensional challenges of today's marketplace. That effort must include rethinking product formulation and packaging, restructuring the supply chain network and footprint, and realigning the role of suppliers and third parties. While the right answers will vary by company, they will generally require bigger steps than recent improvement initiatives, resulting in smaller product and network footprints. These changes will improve efficiency, resiliency, and sustainability, while allowing for more responsive supply chains with greater flexibility to support growth.

NEW CONDITIONS CHALLENGE PAST STRATEGIES

Just when it seemed safe to follow orthodox, tried-and-true supply chain strategies based on some very simple and consistent ideas, major shifts in global business conditions have rendered invalid some of our most critical assumptions, especially those related to input costs and risk. Now companies must realign their supply chains around new assumptions to meet the multidimensional challenges of today's marketplace.

Over the past few decades, manufacturers have built longer and more complex supply chains, driven by the notion that certain conditions are immutable: low energy and transportation costs, cheap labor and scarce

environmental regulations in developing nations, relatively inexpensive raw materials, and advantageous currency exchange rates in established markets.

Manufacturers found they could save significant amounts of money by consolidating and shelving plants in the West while expanding supply networks deeper into low-cost countries, mainly in Asia and eastern Europe—farther and farther from the demand in developed markets. In many cases, they moved production offshore completely. They did all this without seriously considering that these longer supply chains might someday increase costs or create unmanageable risks to product supply, quality, and safety.

But recent, unexpected, and volatile shifts in input costs have called into question—and in some cases already invalidated—the wisdom of these strategies. As a result, major supply chain realignment is fast becoming a necessity for many manufacturers.

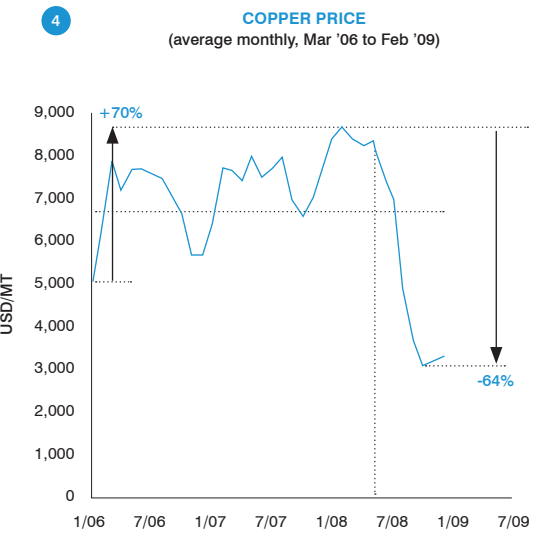
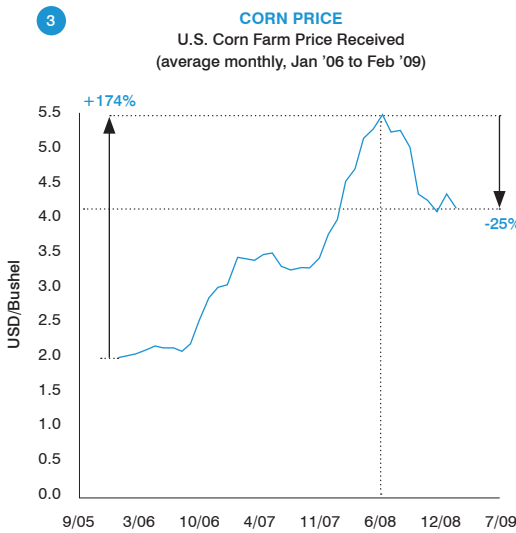
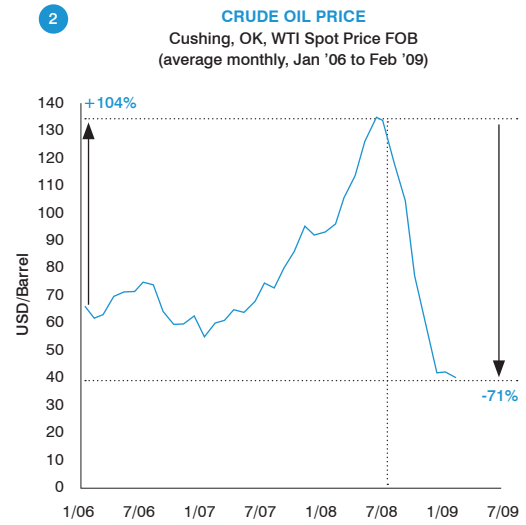
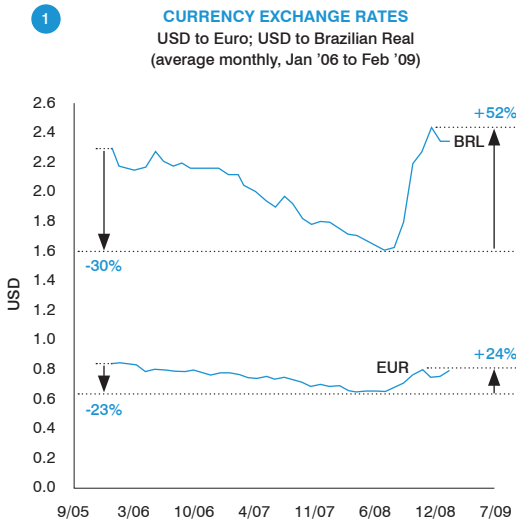
The most widespread impacts have come from the dramatic increase and subsequent fall in the price of oil and

its derivatives. Simultaneous strengthening and then erosion of currencies such as the euro and real have magnified these impacts for key producers and markets. U.S. commodity prices rose 174 percent between January 2006 and June 2008 before falling by 25 percent in the second half of 2008. Commodities from copper to corn show a similar pattern and high volatility (*see Exhibit 1*).

Variability in demand coupled with the volatility of the inputs has had a tremendous impact on supply chain costs and performance. This is particularly true for companies that have farmed out more and more manufacturing to third parties and, in so doing, ceded control of the purchasing process (including negotiating prices) for raw materials.

Not as conspicuous but just as disruptive are recent increases in other costs, such as labor and packaging—especially in developing economies, where large changes in consumer demand drive inflation or volatility for exchange rates, material prices, and wages. And just when almost

Exhibit 1
Exchange Rates and Energy and Commodity Prices Drive Volatile Supply Costs



Sources: FXHistory; Energy Information Administration; University of Illinois; U.S. Federal Reserve Statistical Release, Dec. 11, 2008; LPL Financial; IHS Global Insight; Booz & Company analysis

everything costs more, manufacturers can no longer expect to save money by taking advantage of lax regulations in emerging nations. New and sometimes expensive environmental protection rules are increasingly being adopted to curtail carbon emissions, protect water supplies, and dispose of waste.

These changes reflect fundamental shifts in supply and demand, exacerbated by continuing volatility in the market, as well as intractable alterations in regulatory, social, and cultural conditions. Hence, they have long-term implications for the future of supply chain alignment and strategies. For example, the recent run-up in oil prices reflected growth in global demand, and a supply that was relatively inelastic and vulnerable to disruptions. However, per-barrel costs have plummeted amid economic turmoil as demand adjusted downward in response to slowdowns in economic growth. But it is highly likely that the cost of oil will increase again once economic recovery begins. The \$30-a-barrel price assump-

tion underpinning current supply chain structures will be inadequate. Similarly, population growth and economic development will propel raw material and other manufacturing costs higher in emerging markets, and environmental concerns will thrust on producers the costs of keeping their “neighborhoods” clean and their operations green.

Simply put, these changes will require manufacturers to make broad adjustments in their products and processes and set in motion aggressive initiatives to realign supply chains. Incremental efforts toward supply chain efficiency, so routine in the past, will not be enough to offset the rising costs of inputs—or deliver the essential capabilities that will be required for long-term competitiveness. Difficult questions will have to be addressed: To what extent do price changes represent a temporary or cyclical condition—and when should they be viewed as a new normal, reflecting fundamental shifts in supply and demand? Should we realign our supply chain assuming the price of

oil at \$30 per barrel or \$150? How do we best meet expanding demands for growth and customer service while realigning supply chains to increase efficiency, sustainability, and resilience? Where should we put our factories? Should we make or should we buy? Which costs will be the most volatile in the next five to 10 years? What will conditions be like in developing nations such as China a decade from now? What major steps are critical to ensure essential advantage?

In our view, while these are tough strategic questions—and uncertain issues—manufacturers can best address the underlying challenges with three efforts focused on realigning their products and supply chains for the new realities.

- Rethink product formulation and packaging.
- Restructure the supply chain network and footprint.
- Realign the role of suppliers and third parties.

RETHINK PRODUCT FORMULATION AND PACKAGING

First, companies should consider their choices in product design and process technology—the inherent drivers of cost, sustainability, and risk. What ingredients are used, how much packaging is required for the finished product, and what changes in material choice or manufacturing process would reduce material and energy usage? It is important to understand the economics of product and process choices before considering other supply chain changes. Small changes to such inherent factors can create large market and cost impacts.

For example, Procter & Gamble and Unilever PLC have both launched lines of concentrated products in smaller packages that can be made faster and

more efficiently, be distributed more cheaply, and reduce shelf space at the retail level. In addition, P&G has begun a campaign to attract environmentally conscious consumers by selling products like Tide Coldwater that minimize carbon emissions. The company argues that if every U.S. household were to use cold water for laundry, the energy savings would be 70 billion to 90 billion kilowatt-hours per year, or 3 percent of the nation's total household energy consumption. Consumers would release into the air 34 million fewer tons of carbon dioxide—nearly 8 percent of the U.S. target under the Kyoto Protocol—and save about \$63 per year on their utility bills, enough to cover the higher cost of Tide Coldwater.

Such initiatives require a broad understanding of the trade-offs across the supply chain, which like much of supply chain realignment involves reconsidering the validity of old assumptions. As an illustration, it is generally believed that recycled paper is better for the environment than virgin paper. But a study conducted for U.K. newspaper publisher Trinity Mirror by the Carbon Trust,

a U.K.-based research and advisory company, came to a different conclusion. The Carbon Trust found that 80 percent of the carbon emissions from purchased paper could be blamed on energy used in the production process. Delving deeper, the company concluded aptly, if a bit counterintuitively, that a supplier offering virgin paper produced through the use of hydroelectric power would generate lower carbon emissions during manufacturing—and, hence, be a greener partner—than a supplier that used 50 percent recycled paper in its product but whose factories ran on traditional carbon energy sources.

The household goods company S.C. Johnson & Son Inc. similarly went against the grain recently when it shifted to plastic pallets across its supply chain. The company claims that its new pallets are 100 percent recyclable and average more than 80 uses in a lifetime, compared with only seven uses for wood pallets. This effort reduces waste and weight—the new pallets are 20 pounds lighter—and S.C. Johnson posits that the company will require 900 fewer trucks and burn 80,000 fewer gallons of diesel per year.

Manufacturers must understand the economics of product and process choices before considering supply changes.

RESTRUCTURE THE SUPPLY CHAIN NETWORK AND FOOTPRINT

Once product and process choices have been reconsidered, the supply network needs to be realigned to balance cost, service, risk, and sustainability in meeting market demand. (See “*The Supply Chain in 5-D.*”) A prime example is Craftmaster Furniture Inc. in Taylorsville, N.C. The company, bought in 2006 by a Chinese firm, once intended to shift 40 percent of its U.S. production to China within two years. But in early 2008, with the move only about half-way completed, Craftmaster halted the exodus. A year earlier, the furniture maker had saved 15 percent by assembling sofas in North Carolina using kits of fabric that had been precut in China. However, the savings had fallen soon thereafter to only about 8 percent, making it harder to justify having the initial work done in distant Chinese factories, from which it can take more than 12 weeks for deliveries to reach the United States.

The challenge for manufacturers is to make the right footprint trade-offs not only for today but also for an uncertain tomorrow. Successful companies will build more flexibility and adaptability into their networks with investments in technologies and assets that can react to changes in demand as well as variability in factors like labor costs and energy use. For example, in 2008, Honda Motor Co. was the only carmaker able to rapidly match—within a threshold—its production volume to changing demand, primarily because the Japanese automaker had figured out how to make the Civic, its compact car, on the same assembly line as the Acura MDX, its midsize SUV. As demand for the larger vehicles flagged, Honda seamlessly and with little lost time adjusted the production mix in its plants in favor of smaller cars. However, there is a limit to what such flexibility can support—as vehicle

The 5 Dimensions of Supply Chain Performance

Supply chain realignment must be based on a series of strategic and integrated decisions. To build a competitive advantage through the supply chain in today's environment, we recommend that companies assess their current ability to perform across five dimensions—to develop what we call “5-D supply chain capabilities.” Evaluating current performance across these dimensions should identify gaps and trade-offs to focus the organization's efforts on enhancing supply chain performance and skills. The five dimensions are the following:

Growth: The supply chain must be flexible enough to support the company's overall growth strategy. This could mean, for instance, having the adaptability and skills to open and close factories or develop relationships with suppliers in new markets or geographies. Or it could involve having the capability to quickly and inexpensively develop new product lines to meet changing customer demographics and needs.

Cost: The supply chain must be able to deliver products at competitive costs. This may entail achieving low-cost producer status in categories or markets driven by price competition. Alternatively, companies may develop capabilities to minimize the costs of increasing complexity in their product lines or differentiating customer requirements.

Service: Historically, service capabilities meant filling most orders with limited case cuts and on-time delivery, given several days of lead time. Increasingly, however, service performance requires not only meeting delivery deadlines but also having the ability to manage rapid replenishment or late-stage product differentiation.

Risk: The supply chain needs to be resilient—built to avoid undue risk of supply disruption or product failure. This could involve having flex capacity for unpredictable surges in demand, or having contingency plans for critical suppliers, materials, facilities, or equipment. It could also include the ability to audit product safety and track products to limit exposure from potential recalls.

Sustainability: This, the newest critical dimension for performance, requires capabilities to reduce carbon emissions, increase the use of renewable energy sources and recycled materials, and improve energy efficiency and material yields. Sustainability performance is measured across the entire value chain, from raw material source and other inputs, to consumer use and disposal of the product.

volumes have continued to decline by 30 to 50 percent, even Honda has had to temporarily idle plants.

In addition, flexibility should extend to creating more regional manufacturing networks to serve local markets with the lowest possible cost exposure. Volkswagen has taken this tack with its recent decision to open a manufacturing plant in Chattanooga, Tenn., by 2011, nearly 15 years after it closed its last U.S. plant, in Pittsburgh, Ohio. VW sees the Chattanooga facility, which will make cars for the American market, as a hedge against exchange rate fluctuations.

Similarly, in 2007, Dell Inc. opened plants in Brazil and India to be closer to what it perceives as its new growth markets. From its \$30 million Indian plant, Dell primarily serves its increasing number of large corporate clients in the country and avoids the taxes and import fees that would be incurred if it were shipping the computers in from elsewhere.

REALIGN THE ROLE OF SUPPLIERS AND THIRD PARTIES

In an environment of increased uncertainty, close collaboration between supply chain partners has become more important than ever. Pressures felt by manufacturers—higher material costs, sustainability requirements, supply–demand imbalances, product safety issues, resilience and environmental concerns—are shared by suppliers. Certainly, it is not uncommon to see suppliers passing on higher prices to their customers. But in many instances, even higher prices are not enough to maintain supply as demand outpaces supply and new uses compete for the same resources. For example, it may seem that biofuel incentives would scarcely impact the beverages market. But increased use of ethanol-based fuel leads to an increase in corn production rates. That leads to greater demand for fertilizers, which translates into higher consumption of phosphates. And that places severe limits on the availability of phosphoric acid—traditionally a mass-produced low-cost material—which the beverages industry needs as an acidifier.

Today, the role played by suppliers has gone well beyond merely providing

raw materials. Now suppliers routinely provide a broad set of materials and services. They also participate in product development efforts by sharing ideas as well as making investments in new processes and technologies. In one such case, Sony Electronics Inc. partnered with its waste disposal supplier, Waste Management Inc., to establish a “take back” program, which lets consumers recycle Sony products for free at centers across the United States. And in another case, Virgin Atlantic Airways Ltd., General Electric Company, and Boeing Company are collaborating to produce biofuel systems for aircraft. Indeed, since 50 to 70 percent of the cost base for manufactured products consists of procured materials, a comprehensive approach with suppliers is absolutely necessary.

The increasingly collaborative nature of supplier relationships allows more visibility into sourcing decisions and makes it easier to define mutually beneficial goals. For instance, DuPont Packaging & Industrial Polymers announced in 2007 that it was joining with Plantic Technologies Ltd., an Australian bioplastics company, to develop polymers based on corn starches that could be used for cosmetics and food packaging. The partnership offered advantages to both companies: It broadened Plantic’s market reach, and it brought DuPont closer to its goal of growing revenues from nondepletable resources to \$8 billion by 2015 from \$4 million in 2007—a goal the company says it can achieve only by supplementing its own research and development with that of strategic partners.

Anheuser-Busch Companies Inc. provides another good example of how strong relationships with suppliers can offer advantages that cannot be developed single-handedly. In a joint effort with its suppliers, Anheuser-Busch reduced the lid diameter for four types of cans, saving 17.5 million pounds of aluminum in 2006, which not only reduced the amount of energy needed to produce, transport, and recycle the cans, but cut manufacturing costs as well.

Some of the dramatic changes that so significantly affect supply chain strategies will continue to evolve as manufacturing environments are changed by cycles of supply and demand, the depletion of resources, and the development of new technologies. But one thing is certain: Manufacturers will not be able to stand pat. They will have to become more flexible and adaptable—better able to foresee and respond to future conditions in order to adjust their supply networks to meet evolving input costs and constraints. While the appropriate strategies will vary by company, they will generally require big steps that will tend to result in smaller footprints and significant changes to products and supplier relationships. These changes will improve efficiency, resiliency, and sustainability—as well as enable more responsive supply chains with greater flexibility to support growth.

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