From vulnerable to valuable: how integrity can transform a supply chain*

Achieving operational excellence series

Table of contents

The heart of the matter

Supply chains are under unprecedented pressure. But smart companies are reaping the integrity dividend.

US businesses' increasing reliance on suppliers and sub-suppliers around the world has delivered on its promise of efficiencies and cost savings. But now these benefits are being tempered by a combination of forces: greater regulatory scrutiny in the US, an altered manufacturing landscape in China, the fluctuating dollar, shortages of raw materials, and volatility in energy prices.

Companies are responding, from tightening controls and overhauling packaging to relocating and restructuring. But such measures can be reactive and hasty, and can open the door to new and unanticipated risks. Every day companies are being forced to recall products, delay launches, and answer tough questions from regulators and consumers. Achieving supply chain integrity—which we define as balancing operational objectives with reputational risks—is a more complicated puzzle than ever.

Yet, solving it has become a business imperative. Today's supply chains are stressed because they must deliver the right product at the right place and time while responding to changing stakeholder demands around issues such as environment, quality, and safety. A few leading companies now rightly view the integrity of their supply chain as a source of competitive advantage. But even these companies are finding that today's tough economic climate is a barrier to modifying the traditional role of the supply chain as a reliable source of cost savings.

Anecdotal evidence suggests, but cannot prove, that companies that maintain the integrity of their supply chains are rewarded by stakeholders. It can, however, be proven that those that fail to do so are severely punished. PricewaterhouseCoopers' analysis of 600 companies that experienced supply chain disruptions shows that their average shareholder value plummeted when compared to their peers, their stock prices experienced greater volatility, and they suffered sharp declines in return on sales and return on assets.

For a vast majority of companies, the effects of the disruptions were still apparent a year after they were announced. Supply chain is not simply a system that delivers the final product or service to the end customer; it is also an expression of brand values. That is why companies must continuously balance operational objectives with reputational ones.

This is the view of global businesses that have designed their supply chains to support organizational objectives instead of simply wringing out costs. Senior executives in these companies have a shared understanding of how supply chain processes, risks, and transformational opportunities affect corporate goals. They are focusing less on historical data and more on understanding the evolving supply chain environment, and its impact on their future. They understand that turbulence is imminent, but integrity will be their insurance against financial loss from mishaps as well as a foundation for growth.

• TRIAL DEMOS
DVA
Issues
Demand

PricewaterhouseCoopers' analysis of 600 companies that experienced supply chain disruptions shows that their average shareholder value plummeted.

An in-depth discussion

Excessive belt tightening could cause a crash.

Revealed: the steep costs of supply chain disruptions

For beverage giant PepsiCo, water scarcity is both a crucial risk to its supply chain and a significant opportunity to grow market share. That's why in water-stressed India, PepsiCo intends to become a "positive water balance company." External auditors will be called in to verify the company's pledge to replenish more water than it is using, a fact that will be announced next year on the labels of the company's bottled water, Aquafina.[1]

Like PepsiCo, a few companies recognize that investments to enhance the integrity of supply chains are not only necessary to improve operations, but can also set one apart from the competition. General Electric, for example, became an early supporter of the US government's Foreign Corrupt Practices Act, scaling back from Nigeria and Russia in the 1990s. Since then, GE believes its ethical standards have helped to expand business in emerging economies where people regard corruption as a major problem.[2]

Such efforts, while admirable, are far from widespread. Most companies don't take this approach, because the traditional emphasis of supply chain management has been to squeeze out costs. It is one thing to demonstrate the financial benefits of cost-reduction activities, but far more difficult to make a business case for investments that improve the resilience of supply chains. It is hard to establish a direct link between supply chain integrity and competitive advantage. But there is clear evidence that companies with weak supply chains face harsh consequences better-managed companies avoid.

PricewaterhouseCoopers sponsored an analysis in which supply chain expert Dr. Vinod Singhal[3] estimated the financial impact of supply chain disruptions on public companies. We found companies that experienced supply chain breakdowns were far more prone to financial setbacks than a benchmark group of companies reporting no similar disruptions. As shown in Figures 1–4 on the following two pages, the affected companies suffered a loss in profitability, and sharp declines in shareholder value and public confidence. For many companies, the aftereffects lingered for at least a year.

[1] Ratna Bhushan, "Pepsi to Replace Packs of Aquafina with New Labels," *The Economic Times* (March 17, 2008).

[2] "Globalization: Oil, Politics and Corruption," *The Economist* (September 18, 2008).

[3] Dr. Singhal is Knoll Professor of Operations Management and Associate Dean for MBA programs at the College of Management, Georgia Institute of Technology. His work for PwC updated and confirmed an earlier study, *The Effect of Supply Chain Disruptions on Long-Term Shareholder Value, Profitability and Share Price Volatility*, in which Dr. Singhal and Dr. Kevin Hendricks of the Wilfrid Laurier University in Ontario, Canada, analyzed the financial impact of supply chain disruptions for 800 public companies between 1990 and 2000.

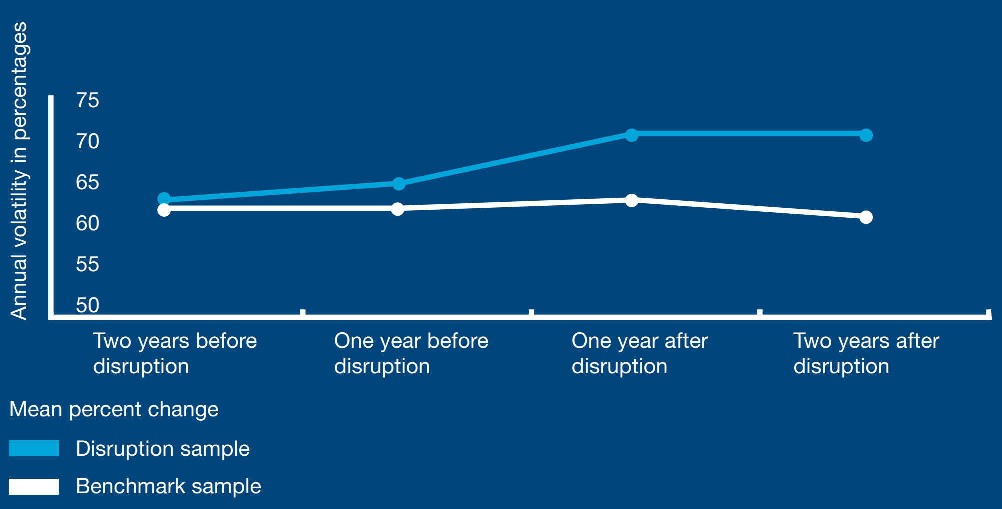
Supply chain disruptions destroy shareholder value and corporate profitability

The market is quick to punish companies that report supply chain disruptions. On average, affected companies' share prices dropped 9 percent below the benchmark group during the two-day announcement period (i.e., the day before and the day of the announcement).

Companies do not recover quickly from a supply chain disruption. Two-thirds of affected companies were lagging their peers in stock price performance a year after the disruption. The average stock return of those suffering from disruptions was almost 19 percentage points lower relative to the benchmark group over a two-year period (i.e., one year before to one year after the disruption announcement date).

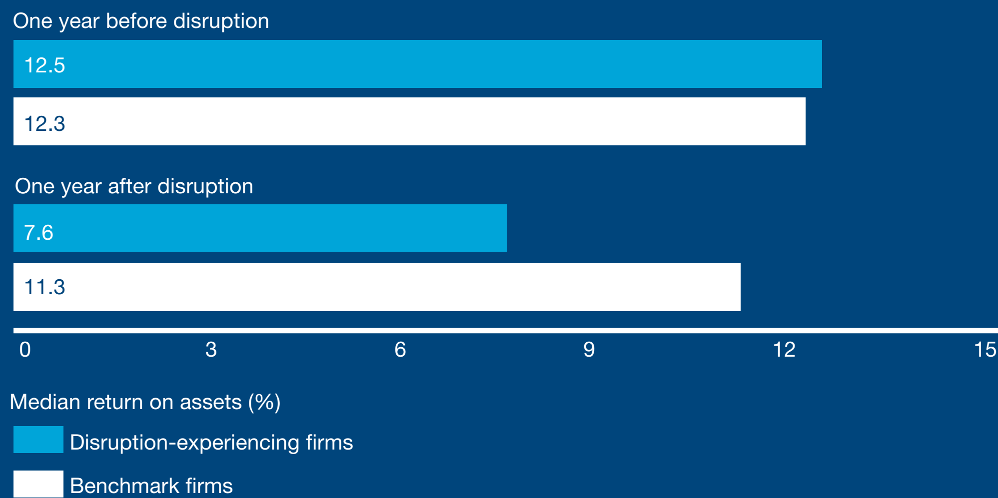
Figure 1. How supply chain disruptions affect stock prices

Figure 2. How supply chain disruptions affect share price volatility



The investment community views disruption-experiencing companies unfavorably, and this uneasiness is likely to spread to employees, consumers, and suppliers. Compared to benchmark stocks, more than half of the affected companies experienced greater volatility for at least two years—a sign of diminished confidence among stakeholders. After controlling for normal market movements, the share price volatility in the year after the disruption of affected firms was around 8 percentage points higher than the benchmark. Two years after the disruption, the affected firms were underperforming the benchmark by an even higher 10 percentage points.

Figure 3. How supply chain disruptions affect return on assets

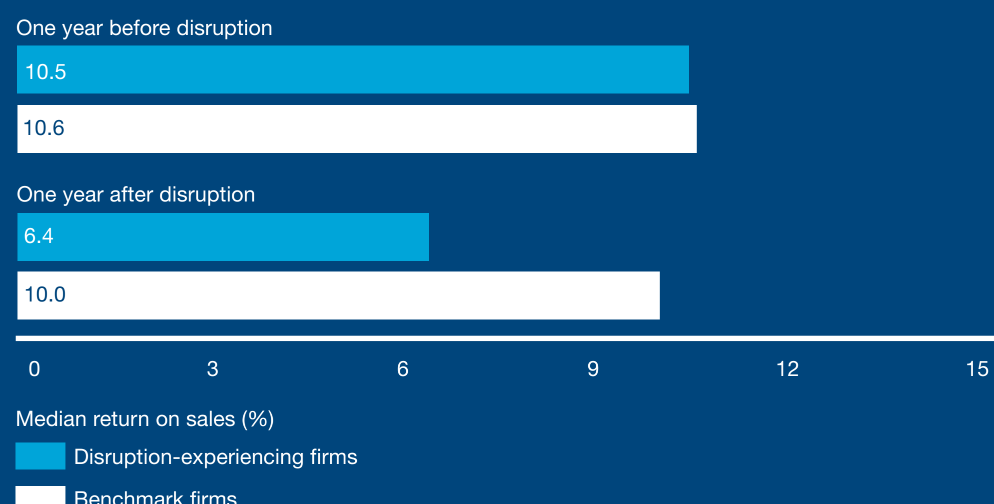


Disruptions take a significant toll on profitability as reported by standard accounting measures. More than 60 percent of affected firms experienced lower returns on assets and sales. After controlling for normal industry and economic effects, the average return on assets for disruption-experiencing firms was found to be down by 5 percentage points.

Return on sales suffered an average drop of four percentage points for companies that experienced disruptions.

On both measures, the returns of benchmark companies were stable over the two-year period while those of disrupted companies fell significantly.

Figure 4. How supply chain disruptions affect return on sales



These disruptions included numerous highly publicized instances of product recalls, delays in product launches for safety and quality concerns, and late deliveries because of part shortages and shipment problems. Dr. Singhal tracked the fortunes of 600 US public companies that announced such disruptions in *The Wall Street Journal* and via the Dow Jones News Service between 1998 and 2007. (For a discussion of the methodology, see page 42.)

The buck stops with the brand owner

In some instances companies in our analysis blamed suppliers for disruptions. But many realize that finger-pointing is not a winning strategy. As Dr. Singhal has said, “It does not matter who caused the disruption, what was the reason for the disruption, what industry the firm belonged to, or when the disruption happened—disruptions devastate corporate performance.” In the final analysis, it is the brand owner and not a remote supplier that is held responsible for the quality of the product and the reliability of its delivery.

Almost 40 percent of companies in our analysis took direct responsibility for failures. One example is Mattel. When the toymaker, renowned for its quality, was forced to recall millions of toys manufactured in China, it quickly accepted responsibility and apologized to stakeholders everywhere in the world, including China.[4]

These companies understand that consumers, regulators, and the global investment community all expect them to look after their entire value chains, especially where international outsourcing is involved. Increasingly, analysts are placing a premium on information provided about environmental, social, and governance issues, expecting greater visibility into the performance of supply chains. For example, the Carbon Disclosure Project (CDP), a group of 385 institutional investors managing assets of more than US$50 trillion, collects climate change data from large companies and their suppliers and provides that information to the global market.

[4] Nicholas Casey, Nicholas Zamiska, and Andy Pasztor, “Mattel Seeks to Placate China with Apology,” *The Wall Street Journal* (September 22, 2007).

The crumbling wall between operations and reputation

Companies are participating in initiatives like the CDP because they understand that a combination of factors affecting supply chains can make—or break—reputations and fortunes. Automobile and aerospace companies with highly dispersed supply chains have been forced to delay product launches for reasons ranging from design and technology lapses in far-off plants to striking workers here at home. In the pharmaceutical industry, supply chains must address issues such as product safety, traceability, consumer perception, and legislation. Companies are struggling to cope with delays caused by contamination concerns and by regulatory authorities demanding detailed data before they allow clinical testing.

The impact is especially significant on big-brand retail and consumer companies that face the challenges of supply chain interruptions while being held increasingly accountable for environmental impact, employee health and safety, and other corporate social responsibilities. Wal-Mart, for example, requires that its 200 largest Chinese suppliers adhere to a strict social and environmental code of conduct, enhancing energy efficiency and disclosing information about every factory involved in the production process. Addressing suppliers in Beijing, Wal-Mart CEO Lee Scott said: "A company that cheats on overtime and on the age of its labor, that dumps its scraps and its chemicals in our rivers, that does not pay its taxes or honor its contracts will ultimately cheat on the quality of its products."[5]

A close analysis of the research, together with our firm's experience, suggests that disruptions and quality control issues are often caused not by a single factor, but by the convergence of many. Indeed, it is not always easy to distinguish between operational and reputational reasons for supply chain disruptions. Importing consumer products containing lead, for example, is an operational error with profound reputational consequences. To go beyond product safety, it is increasingly apparent that today's consumers are likely to reject the products of companies whose operational decisions are seen as harming the environment or exploiting farm and factory workers, whether at home or in far-flung

[5] Tom Mitchell and Jonathan Birchall, "Wal-Mart Orders Chinese Suppliers to Lift Standards," *The Financial Times* (October 23, 2008).

Consumers, regulators, and the global investment community all expect companies to look after their entire value chains.

locations. In the minds of the public, the operational has become synonymous with the reputational.

The good news for companies is that operational and reputational overlap extends beyond risks to also offer opportunities. Optimizing the balance between the two is not easy. For example, energy efficiency is an important operational objective with potential reputational benefits to the brand. Going green certainly helps to win over a growing class of consumers. But some companies moving toward environment-friendly materials and fuel-efficient technologies are also facing parts and skills shortages in the short term. Although the initial costs of greening a business are usually recouped, these companies are sometimes forced to announce delays in production and delivery.

Increasingly, companies have to consider all aspects of integrity and strike the appropriate balance when managing their supply chains. This leads to greater operational discipline and increases the likelihood of actually realizing the cost savings that were sought in the first place. Such an approach has long been desirable, but dramatic changes in the business environment have now made it an absolute necessity.

Supply chain integrity must encompass both operational and reputational dimensions. Operational integrity refers to the ability of the supply chain to meet objectives for quality, productivity, and financial performance. Reputational integrity refers to the ability of the supply chain to protect and enhance the brand, respond to customer and investor concerns, and comply with the growing burden of legislation.

Supply chains are stressed

Global supply chains, intricately woven over time, are swirling in a tide of change. They are vulnerable in part because they have never been as extended as they are today. But they are also being buffeted by profound shifts in the global economy and new governmental policies in China, the US, and other countries.

The tenuous nature of many supply chains was illustrated dramatically by the recent instance of contaminated milk products originating in China. Milk that sickened thousands of Chinese children was also used as ingredient in candy consumed in the US and other countries. Companies with major brand names and reputations buy not only raw materials from scattered farms but also processed ingredients that flow through separate manufacturing points before being absorbed into the final product.

"We've always bought commodities from every corner of the world, but the sourcing of refined food ingredients is a relatively new development. Suddenly we're sourcing carbohydrates and protein," said a senior food company executive interviewed for this publication.[6] A pharmaceutical industry veteran concurred: "Now everything from the active pharmaceutical ingredient to the finished product can be outsourced. It is hard to control everything, especially if the technical expertise is located far from the manufacturing base. The risk has increased tremendously."[7]

According to some estimates, more than 4,000 product recalls were administered by regulatory agencies in 2007, with the US Consumer Product Safety Commission (CPSC) and the US Food and Drug Administration being particularly active. In 2000, these agencies had announced fewer than 500 recalls.[8] The CPSC said that most of its 2007 recalls were of imported products and that "the large majority" came from China.

6 PricewaterhouseCoopers interview (June 2008).

7 PricewaterhouseCoopers interview (June 2008).

8 Lucy P. Allen, Dr. Renzo Comolli, Dr. Simona Heumann, *China Product Recalls: What's at Stake and What's Next*, National Economic Research Associates, Inc. (February 2008).

Stringent new regulation in the US and abroad raises the stakes

As a result of the 2007 recalls, Congress passed the sweeping new Consumer Product Safety Improvement Act of 2008. It increases the CPSC budget, imposes sharply higher penalties for violations, mandates a variety of pre-marketing testing procedures, and establishes a national database through which the public can report grievances. State attorneys general also have new powers to enforce these regulations.[9] This new legislation both heightens the risks to companies of a quality failure and increases the reputational damage that will result. Major US retailers are especially sensitive about these matters and now require that suppliers meet their own standards for product quality, testing, and safety.

The US and other Western countries are not the only ones implementing new laws and policies that directly affect supply chains. In a monumental about-face, China has instituted a host of new regulations designed to discourage low-cost, labor-intensive manufacturing and attract investment in industries that are cleaner, pay higher wages, and require skilled labor. For example, China's new corporate income tax law raises the effective tax rate for foreign-owned manufacturing operations from an average of 15 percent to 25 percent. Simultaneously, many legacy manufacturing incentives have been replaced with new, technology-based incentives that encourage investment in R&D, energy-saving equipment, and the like.

For large companies that are placing big bets on growth in emerging economies, this is an opportunity to invest in profitable high-tech areas in China. For other companies, however, costs are increasing and margins are getting squeezed. Thousands of small and medium-sized enterprises have gone out of business in export-oriented coastal China. Many others

9 Melanie Trottman, "Lawmakers Clinch Deal to Overhaul Product Safety," *The Wall Street Journal* (July 29, 2008).

are now eyeing regions where labor costs are lower, such as Vietnam and Cambodia, and the Chinese interior.

Such moves are expensive and risky, as the infrastructure in many emerging economies does not match up to that of coastal China. Nevertheless, Credit Suisse has forecast that one-third of all export-oriented factories in China could close within three years.[10] One senior executive who led his company's relocation of brewing operations from China to Vietnam said: "China was pricing itself out of our business. In my opinion it's best to go somewhere else first and wait for the infrastructure to catch up."[11]

Supply chains are facing a more volatile business environment

Rising costs in China are far from the only reason for companies to consider relocating their operations. In summer 2008, as companies confronted the debilitating combination of a weaker US dollar and higher transportation costs, some began to reevaluate the cost-benefit equation associated with outsourcing. Since then, oil prices have dropped and the dollar has partially recovered its value. But economists warn that companies can neither count on the resilience of the dollar nor on a letup in the demand for oil and other commodities.

Companies must make strategic and operational adjustments—most significantly to their supply chains—to adapt to a period of volatility and uncertainty about the costs of doing business. For example, locking in favorable exchange rates has become a popular hedge against global market volatility. But in today's interconnected global economy, companies should hedge their operations as well—by shifting manufacturing activities closer to where revenues are earned. Rather than representing a slowdown in global economic integration, this kind

[10] David Barboza, "China's Industrial Ambition Soars to High-Tech," *The New York Times* (August 1, 2008).

[11] PricewaterhouseCoopers interview (June 2008).

of shift shows the pure pragmatism of moving operations to markets that make the most sense. IBM, for example, is investing in emerging economies with big information-technology infrastructure projects. Within five years, it expects to earn almost a third of its revenues from these countries.[12] Meanwhile, India-based Wipro Technologies is establishing a design center in Atlanta that it expects will better understand the needs of the US market.[13]

Like Wipro, those marketing to American corporate and household buyers are beginning to find the US an attractive investment destination—a development that could set off a mini-reindustrialization of America. For example, La-Z-Boy has announced it will manufacture its new line of furniture in North Carolina.[14] Tesla Motors, a manufacturer of electric cars, recently transferred its battery assembly operations from Thailand to a location near its headquarters in California. The company calculated that lower Asian wages would not offset higher shipping costs.[15]

Companies face tough choices…

Such shifts in manufacturing activity are neither quick nor easy. For some, the choices are very difficult. Ducati North America, for example, assembles high-end motorcycles at its headquarters in Bologna, Italy, sourcing mostly from a close-knit group of suppliers based in the same region. The company's manufacturing costs, incurred in euros, have been increasing even as its North American market has been expanding. Opening a plant in the US or finding suppliers in Asia are both options, but either move could tarnish Ducati's valuable "Made in Italy" appeal.[16]

[12] Richard Waters, "Emerging Markets Let IBM Ride Out Turbulence," *The Financial Times* (July 20, 2008).

[13] Peter Pae, "US Companies Are Finding Savings They Used to Seek Overseas," *Los Angeles Times* (October 28, 2007).

[14] Larry Rohter, "Shipping Costs Start to Crimp Globalization," *The New York Times* (August 3, 2008).

[15] Pete Engardio, "Can the U.S. Bring Jobs Back from China?" *BusinessWeek* (June 19, 2008).

[16] PricewaterhouseCoopers interview (June 2008).

While a few companies are cautiously passing on some costs to consumers, many others are hesitating. Michael Lock, CEO of Ducati North America, explained the company has been holding its prices unchanged in the US because otherwise “we would have shrunk in size, not grown.”

Companies across industries are confronting cost increases and the difficult decision to raise prices. To avoid passing along price increases to consumers, some are searching for further efficiencies in their supply chains. This is a drive that presents both opportunities and risks. A retail industry executive described the challenge: “When the focus sharpens on costs, you know that more chances are going to be taken. There are companies that will narrow the assortment to make their supply chains less costly and more manageable. But when such steps are taken, it is the consumer who suffers.”[17]

…while being presented with new opportunities

In other instances, however, companies are benefiting from modifying their supply chains. For example, volatile energy prices have forced many companies to examine their transportation expenses. General Mills is among the companies that are reconfiguring their product packaging so more goods can be loaded on trucks.[18] Tom Forsythe, vice president of corporate communications at General Mills, said, “If you are delivering more goods with the same amount of fuel, that’s sustainability in action, but it is also productivity.”[19]

[17] PricewaterhouseCoopers interview (June 2008).

[18] PricewaterhouseCoopers interview, first reported in the PwC-GMA report *The Food, Beverage, and Consumer Products Industry: Achieving Superior Financial Performance in a Challenging Economy—2008* (June 2008).

[19] Ibid.

Such measures are important not only for the cost savings but also because the global investment community and other stakeholders demand them. The World Resources Institute and the World Business Council on Sustainable Development (WBCSD) have launched an initiative to develop internationally accepted standards for greenhouse gas accounting and reporting for the entire value chain of the organization. This work builds upon their Greenhouse Gas Protocol, a well-known international accounting tool designed to help companies manage their emissions.[20]

Increasingly, stakeholders wish to understand the ecological footprint of companies and what that says about the company's exposure to related risks and opportunities. PricewaterhouseCoopers has analyzed the environmental performance of S&P 500 global companies through our work with the Carbon Disclosure Project, which we describe on page 10. In all, CDP has requested 3,000 global companies to measure and disclose their greenhouse gas emissions and report on their strategy for managing the issue of climate change. CDP puts a special focus on the supply chain by collecting emissions data directly from the suppliers.[21]

These are important endeavors, as we describe in "Digging into a supply chain's carbon footprint" on page 22. Figure 5 on page 23 shows how every step in the supply chain has costs, including generation of carbon emissions. Measurement of these costs provides the platform for sustainable reduction.

Companies now recognize that reducing their carbon footprint has become a business imperative. For example, Unilever now evaluates the expected carbon emissions of products under development. It has a Web-based system that gives product developers key indicators for evaluating environmental performance, along with such traditional factors as cost, quality, and technical and regulatory standards.[22]

[20] www.ghgprotocol.org.

[21] Press release: *PricewaterhouseCoopers Appointed Global Adviser and Report Writer to Carbon Disclosure Project* (June 24, 2008).

[22] PricewaterhouseCoopers, Lean & Green, *Balancing Financial Cost and Environmental Impact* (2008).

While the growing sense of urgency around environmental issues is palpable, stakeholders are also monitoring other ways that companies engage the communities where they choose to do business. Some companies are collaborating to establish labor and other social standards in their global supply chains. For example, retail and consumer goods companies such as Cadbury, Office Depot, Mars, and PepsiCo are working with Europe-based Supplier Ethical Data Exchange (Sedex) to establish consistent labor standards and efficiencies throughout global production sites.[23]

[23] www.sedex.org.uk.

Digging into a supply chain's carbon footprint

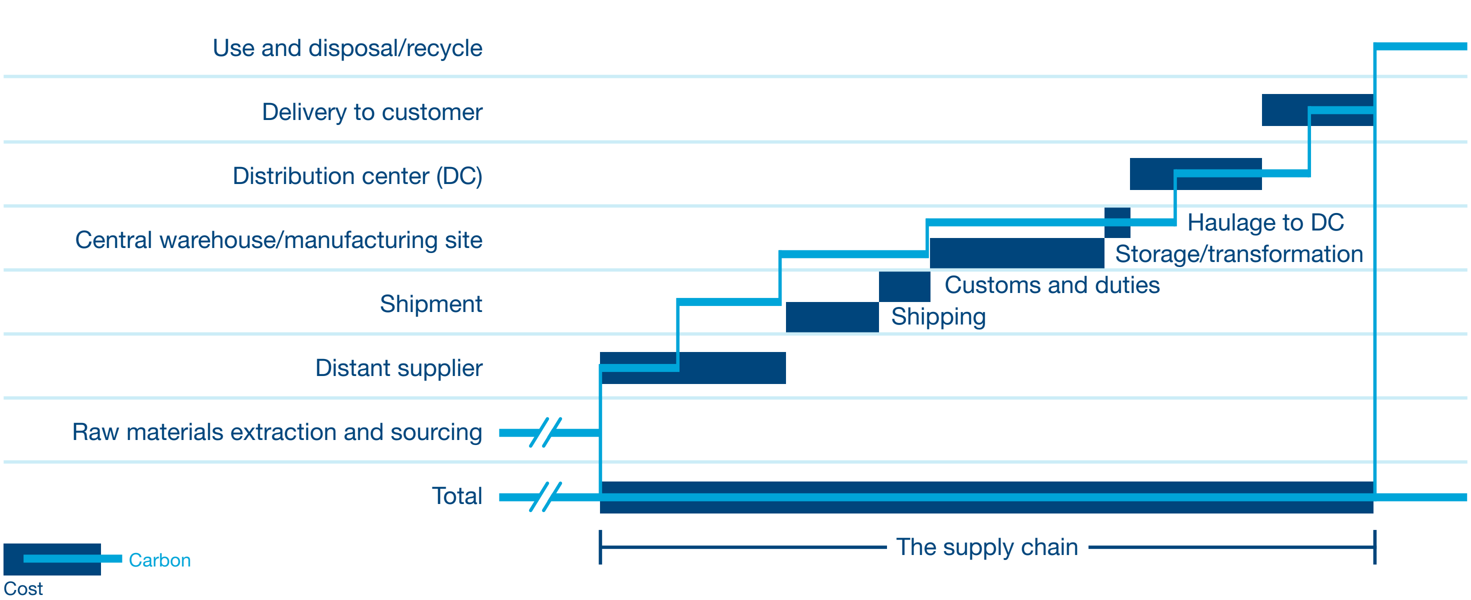
Consider the simple potato. Dug from the garden, carried to the kitchen, washed in the sink, and baked in the oven, this humble homegrown tuber crop still leaves a carbon footprint. Now magnify this footprint about a billion times for potatoes needed for processed foods like potato chips and dehydrated mashed potatoes.

A major food processing company wanted to examine just that. It calculated the cost generated by its potato supply chain, in both dollars and carbon. It made a startling discovery: since potatoes are sold by weight, farmers often used energy-intensive humidifiers to increase the water content in their potatoes, which required the company to use even more energy to fry the water *out* of them. By eliminating these practices, the company saved nearly $3 million and reduced its supply chain emissions by 8 percent.

Every step in the supply chain—from moving raw materials to creating and packaging the product and delivering it to the customer—has a cost in both money and carbon emissions, and both can be measured. Companies are increasingly examining their supply chains in this way. Some are motivated by new regulations, others believe they can gain a competitive advantage by going green, and still others are simply looking to save money.

All these reasons are valid, and all can produce results. Analyzing a supply chain to measure its costs and carbon is not a simple process, but it can be done. And many companies stepping up to the challenge will find it's possible to be lean and green at the same time.

Figure 5. Costs and carbon emissions are incurred while products are made, distributed, and used



- Every single step of the supply chain generates cost
- These costs are highly dependent on a number of variables
- The real impact on the profitability of the product/customer/market is not simple to quantify and often not understood

- Similarly carbon emissions are generated in the supply chain at every stage
- Carbon emissions are also generated when the product is used and disposed of or when raw materials are extracted and processed

Source: PricewaterhouseCoopers, Lean & Green, *Balancing Financial Cost and Environmental Impact* (2008).


VERA VOLOSHINA

Companies must make strategic and operational adjustments to adapt to a period of volatility and uncertainty about the costs of doing business.

Supply chain managers are uneasy

Companies are aware that their extended global supply chains are vulnerable to risks. But how well are companies *prepared* to manage those risks? Research shows that supply chain managers are uneasy about the future.

Recently PricewaterhouseCoopers surveyed supply chain managers from 59 global consumer and retail companies, large brand-owners particularly sensitive to both the reputational and operational risks of supply chains.[24] Figures 6 and 7 on the facing page show that more than two-thirds of all respondents believe product safety is the greatest risk to supply chain integrity but less than half are "very confident" of their company's controls to manage this risk. Even fewer are very confident about their companies' ability to manage risks around business ethics, working conditions, carbon emissions, and local economic development.

Even though the principal objective of most chains was to lower costs, many of the managers were unable to quantify the real savings generated. Almost three-quarters of respondents said that reducing costs was the main reason for sourcing globally, yet one-fourth of the companies did not know what their savings were, and half could not measure the hidden costs caused by monitoring suppliers, and complying with social and environmental standards. Significantly, only one-third of the managers said that their compensation programs required meeting goals related to corporate social responsibility.

Clearly, despite the high cost of failure, most companies have not fully linked supply chain integrity to overall corporate strategy.

[24] PricewaterhouseCoopers, *Global Sourcing: Shifting Strategies, Survey of Retail and Consumer Companies* (2008).

Figure 6. Supply chain executives are keenly aware of risks to supply chain integrity

Question:
In relation to supply chain integrity, which of the following issues do you believe represent the most significant risk to your business?

Figure 7. But they are far less certain of their ability to manage these risks

Question:
In relation to supply chain integrity, please rank the degree of confidence you have in your company's existing controls for managing these risks.

What this means for your business

Invest in the ostensibly invisible.

Link supply chain directly to corporate strategy

Supply chain managers cannot assure supply chain integrity in isolation. The knowledge of supply chain risks and opportunities resides across the organization—in marketing, finance, operations, procurement, logistics, and information technology. Yet, rarely do these groups collaborate to execute a comprehensive supply chain strategy.

"International business is like the Olympic rings; everything circles into something else," said one senior executive who has managed the global supply chain operations at large companies for two decades. "Yet too often, sales, marketing, and financial considerations take the forefront. In a global organization, supply chain must have an equal seat at the table."[25]

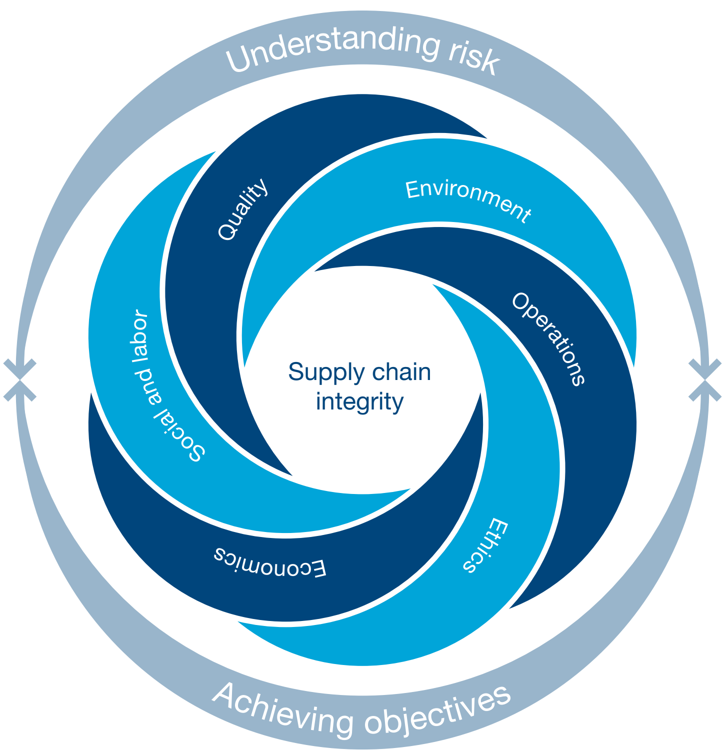
PricewaterhouseCoopers agrees. Supply chain strategy must reflect and support the executive view of the organization's future. Accordingly, management must be involved in identifying and assessing operational and reputational risks to supply chains that may prevent the business from achieving its objectives. Figure 8 on the next page illustrates this strategic view of supply chain integrity.

A direct link to organizational objectives makes supply chain risk management forward-looking. Instead of focusing excessively on historical data, companies can start monitoring changes in the business environment and analyzing their implications for corporate goals. With an eye on the future, companies are better able to evaluate the adequacy of existing controls and deploy the right resources to address gaps before they become major problems.

Often, companies are looking ahead for innovative practices to make supply chains more efficient and lean, but their risk mitigation activities remain backward looking, based on events they have already experienced. This risk management approach is lagging in nature and

[25] PricewaterhouseCoopers interview (June 2008).

Figure 8. A strategic view of supply chain integrity



Operational integrity:

Quality
Reliability of end product sold as well as the ability to identify and remedy problems that may arise anywhere from source to shelf. Issues include product recall, safety, traceability, and consumer perception.

Operations
Core processes, from ideation and R&D through distribution and logistics, and associated service requirements

Economics
The mutual business case for transacting parties captured in the contractual arrangement

Reputational integrity:

Social and labor
Practices and standards address the impact on the health and welfare of farm and factory workers and surrounding communities.

Environment
Practices and standards address the importance of environmental preservation through safe handling of hazardous materials, responsible sourcing, and carbon footprint management in distribution and logistics.

Ethics
Practices and standards include compliance with applicable laws and regulations as well as overall processes by which to monitor and enforce business partners' commitments. Issues include bribery and corruption, export/import compliance, and conflicts of interest.

almost ensures that new risks will be spotted only when they become serious issues. Realizing this, a few companies have started making organizational changes that underscore the importance of supply chain performance to business success. A senior operations professional described his experience with a *Fortune* 500 food and beverage company: "We asked ourselves around what priorities should we build world-class capabilities? Number one was revenue management. Second was sales and customer service. And third was supply chain," he noted, adding that supply chain activities were being "woven into the fabric of the entire organization."[26]

One example of forward thinking is evaluating the effect of the supply chain on a company's tax bill. Most companies don't consult their tax departments when planning procurement and sourcing. This is a mistake because there are many hidden costs to moving goods through the global supply chain, and the "indirect tax bill" represents a significant component. Indirect taxes are costs incurred while moving goods across borders, such as customs duties, value-added tax (VAT), customs processing fees, and port charges. These taxes are especially widespread in developing countries where large portions of supply chains reside. On the following page, we discuss how companies can make indirect taxes visible and manageable.

Companies that view supply chain as a direct contributor to the strategic goals of their entire business are more likely to deploy cross-functional teams of executives, truly in a position to understand the evolving operational and reputational aspects of supply chain integrity. Key performance indicators (KPIs) identified within functional components are necessary and useful for understanding the current level of performance in terms of cost, quality, and reliability. But the lagging nature of typical KPIs such as net inventory, customer lead time, and customer complaints does not allow management to mount an early response to the risks on the horizon. A more forward-looking approach is needed.

[26] PricewaterhouseCoopers interview (June 2008).

Make indirect taxes visible and manageable[27]

Indirect taxes are often overlooked because they aren't classified as income tax and therefore aren't captured in the corporate effective tax rate, the most frequently used metric to analyze the impact of taxes on financial results. But companies should pay attention to their exposure to indirect taxes—an area where both opportunities and risks increase as companies expand their cross-border activities through global supply chains.

Indirect tax considerations are important because in many emerging markets, customs, tariffs, and other cross-border transactional taxes can drive overall landed costs up by as much as 50 cents for each dollar imported. In fact, while customs duties on imported goods average 15 percent globally, they can go as high as 300 percent in some places, depending on the commodity, its destination, and its purpose. In addition, as more countries implement the value-added tax (VAT), indirect taxes will account for a larger slice of the tax liability pie for many companies.

Managing indirect taxes can be frustrating for executives. Being both far-flung and dependent on the vagaries of daily business transactions, indirect taxes are famously hard to track. The real key to making these costs more visible and measurable is up-front planning for international procurement and sourcing. But that is a discussion that often leaves out tax experts. As Kellogg's chief financial officer, John Bryant said, "Unfortunately, indirect taxes are not yet a strategic internal function, but the company realizes the potential benefits and issues out there."[27]

[27] PricewaterhouseCoopers, *The Food, Beverage, and Consumer Products Industry: Achieving Superior Financial Performance in a Challenging Economy—2008* (June 2008).

While it might seem odd to have tax professionals involved in early supply chain discussions, creating indirect tax scenarios and strategies can demystify the costs of moving assets about from place to place. For example, a new plant in Asia will affect production and purchasing cycles, altering an entity's indirect tax profile. By understanding this fact early, the company can make adjustments in sourcing or transportation and enjoy significant savings. In just one instance, a major manufacturer that created a central team of customs and international trade specialists saved tens of millions of dollars when the team executed a single—but crucial—global customs classification initiative.

Understanding indirect taxes also helps to mitigate the risk of non-compliance with disparate regulatory regimes around the world. A tier 1 automotive parts supplier faced huge penalties when China's customs challenged its import pricing structure. PricewaterhouseCoopers worked with the company on a customs compliance program by understanding its export-import processes and their link to corporate goals. The company now has better understanding of its existing and potential tax risks and has devised mitigation strategies consistent with its operational realities.

Indirect taxes remain hidden for most companies until it is too late. But with adequate focus and planning, companies can bring them out into the daylight, measure them, manage them, and be more profitable for it.


DANZAS
DOUANES
ZOLL

Establish an "early warning system"

The focus of today's companies should be on developing leading risk indicators, derived from continuously monitoring and analyzing changing conditions. For example, some companies have started paying close attention to the financial risk exposure of their suppliers. "Can our suppliers maintain the price and quality they committed to in a contract signed three years ago without going belly-up?" asked a senior executive we interviewed, pointing to the current environment of resource shortages and high oil prices.[28]

Public sources such as analysts' reports on large tier 1 suppliers as well as news and data provided by governmental agencies provide a wealth of information from which to discern and address emerging risks. In July 2007, the California Department of Pesticide Regulation found unacceptable levels of pesticide in fresh ginger imported from China. California-headquartered retailer Trader Joe's quickly announced its decision to discontinue nationwide sales of food from China, even though it was not directly involved in the ginger recall.[29]

Ultimately though, the best sources of information reside within the supply chain itself. Leading companies recognize that they are inextricably tied to their suppliers. They work with their suppliers to establish a common set of objectives and goals, so they can collaboratively identify risks to their mutual objectives. Linking with suppliers' objectives provides a "front line of defense" and an "early warning system" that can expose possible threats to their supply chain.

In one instance, a global automotive manufacturer experienced large losses because some of its suppliers went bankrupt and others delivered products of poor quality or were unreliable about meeting deadlines. In response, it began paying more attention to the business environment in which its suppliers operated. It identified leading risks its suppliers

[28] PricewaterhouseCoopers interview (June 2008).

[29] Nicholas Zamiska and David Kesmodel, "Tainted Ginger's Long Trip from China to U.S. Stores," *The Wall Street Journal* (November 19, 2007).

faced and conducted risk-adjusted evaluations of its suppliers' pricing proposals. As it turned out, the lowest bidder did not generate the most savings once the bid was adjusted for risk. The manufacturer now makes more informed decisions related to supplier selection and is able to identify troubled suppliers quickly and take early corrective action. Intimate knowledge of suppliers is necessary because ad hoc inspections cannot provide full visibility into the extended supply chain.

How can leading risk indicators be spotted? Examples of such indicators range from sudden management changes at the supplier to process instability. The one commonality is that leading risk indicators are anticipatory in nature. That's why they are ideal for determining the risk tolerance levels of organizations, providing a reliable basis for assessing internal controls, and setting the performance standards in supply chains. Boeing, for example, is cooperating with its key suppliers to develop a platform for sharing and analyzing leading quantitative risk indicators. John Harnagel, director of supplier program management at Boeing Integrated Defense Systems, said this will help the company identify predictive indicators of problems in processes—and prevent issues from materializing at the end delivery to Boeing or its customers.[30]

For some companies, leading indicators have also surfaced new opportunities, as exemplified by Wal-Mart's use of its massive supply chain for coordinating disaster relief in New Orleans after Hurricane Katrina. Carefully tracking the movement of the storm, the company was ready with 45 trucks full of critical supplies at its distribution center in Brookhaven, Mississippi. It set up mini-stores throughout the area, secured access to gas stations to keep employees on the move, and worked with the police to deliver ice and water to the city.[31] All these efforts won the company high praise—and boosted its reputation. The company's preparedness for the more recent Hurricane Gustav was even more meticulous. It used a sophisticated software program to estimate

[30] PricewaterhouseCoopers interview (October 2008).

[31] Michael Barbaro and Justin Gillis, "Wal-Mart at Forefront of Hurricane Relief," *The Washington Post* (September 6, 2005).

how the storm could affect individual Wal-Mart facilities and used the information to prepare for emergency services and mitigate its own merchandise losses.[32]

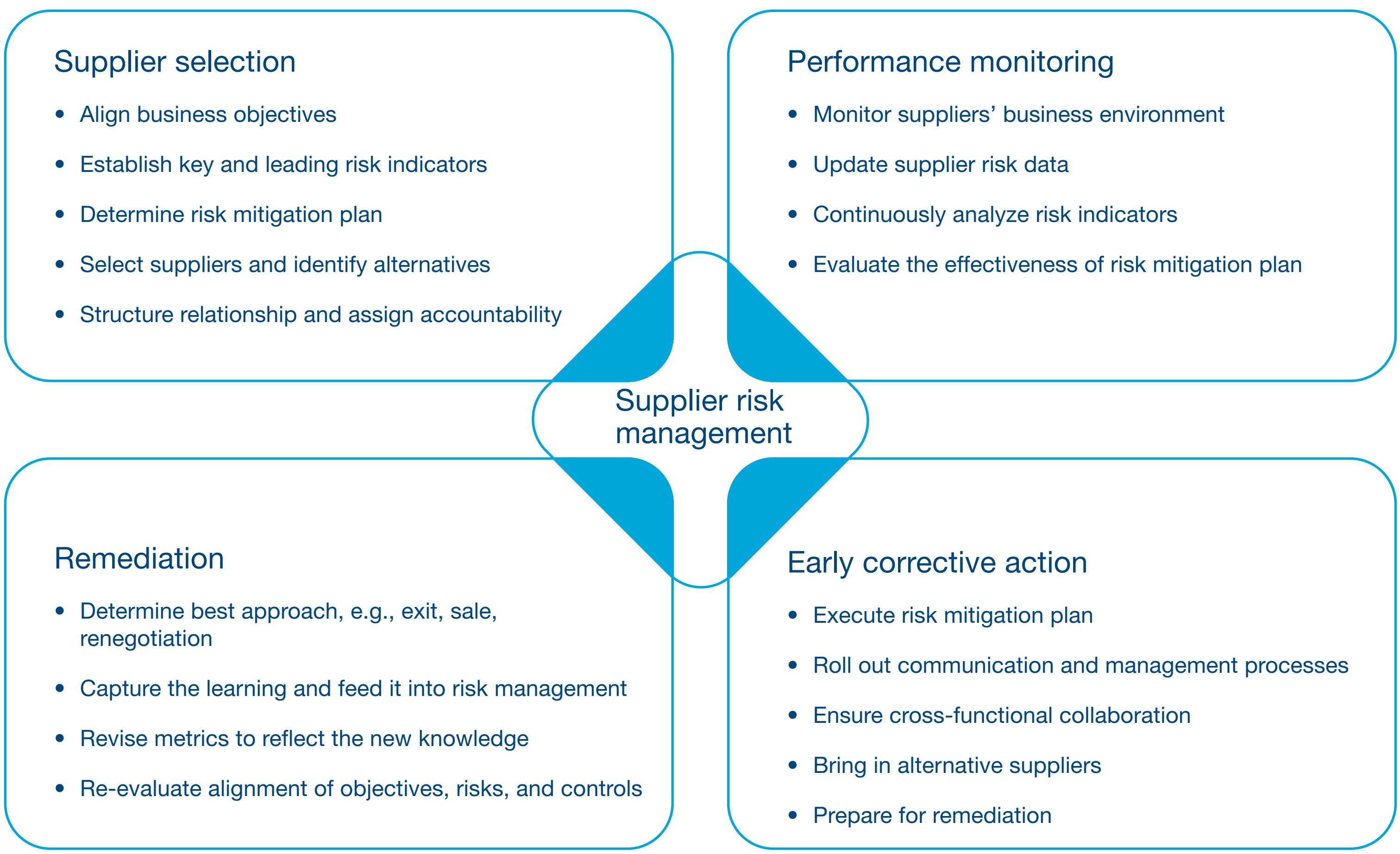
If hurricanes are a leading risk for companies on the Gulf Coast, environmental degradation is a major concern for many others. Ikea, the home furnishings retailer, sources from 1,600 suppliers in 55 countries. The company requires its furniture makers to take steps to assure that the wood they use was legally harvested and not sourced from protected forests. This is just one aspect of Ikea's broad supplier code of conduct, known as IWAY (or the Ikea Way on Purchasing Home Furnishings Products), that establishes a host of quality, safety, environmental, forestry, and social standards throughout its supply chain. The company has developed an extensive auditing process, including third-party auditors, in which monitoring groups regularly visit suppliers and large sub-suppliers.[33] In 2006, the company said, it stopped working with 27 suppliers, in part due to non-compliance with its supply chain standards.

Companies across all industries must identify leading risk indicators and continuously update and analyze this data for monitoring supplier performance. Those that understand risk interdependencies and consider risk mitigation throughout the life cycle of supply chain activities will be more successful than others at assuring supply chain integrity. Figure 9 on the opposite page illustrates this approach in the area of supplier risk management.

[32] Ann Zimmerman, "Wal-Mart's Emergency-Relief Team Girds for Hurricane Gustav," *The Wall Street Journal* (August 30, 2008).

[33] PricewaterhouseCoopers, "Ikea: A Case Study": www.pwc.com/extweb/newcoatwork.nsf/docid/2b0202ab2146bfa085256dc00077b480

Figure 9. A leading approach to supplier risk management



Such a focus on early intervention rather than crisis management should be incorporated throughout the risk management structure. That encompasses not only policies, procedures, and governance but also the risk culture of the entire organization. Some essential characteristics of this approach are:

- Risk assessment begins by aggregating and prioritizing leading risks and estimating their probabilities and impact.
- Risk response is based on comparing this knowledge of risk to tolerance levels.
- Risk monitoring involves evaluating the performance of risk mitigation plans continuously as new information becomes available.
- Improvement is driven by identifying performance gaps and executing plans to address them.

Now is the time to invest

Supply chains are remarkably intricate and productive webs that have been woven over a long, relatively stable period of global economic integration. But now, economic and regulatory change is afoot. Organizations that want to assure supply chain's integrity can no longer afford to focus solely on cost reduction initiatives. Companies must invest in making supply chains more reliable and responsive. Such investments are, at once, a company's insurance against financial loss, a shield for corporate reputation, and a platform for future growth. Companies that view their supply chains as integral to their corporate strategy are making such investments and in so doing, differentiating themselves within their markets.

Methodology

Estimating the performance effects of supply chain disruptions

The idea in estimating the performance effects of supply chain disruptions is to estimate abnormal performance for a sample of firms that have experienced disruptions. Abnormal performance is the difference between the performance of the disruption-experiencing firm and the performance of an appropriate benchmark, where the benchmark is chosen to control for factors that are known to explain normal performance. After controlling for the known factors, whatever remains unexplained is deemed as abnormal and can be attributed to disruptions.

To estimate the stock price effects of disruptions, each disruption-experiencing firm is matched to a portfolio of firms that are similar to the disruption-experiencing firm in size, market-to-book ratio of equity, and prior performance. Size is measured as the market value of equity: share price times the number of shares outstanding. The market-to-book ratio is the ratio of market value of equity and the book value of equity. Prior performance is the buy-and-hold return in the year before the disruption announcement.

The buy-and-hold returns for each disruption-experiencing firm and each firm in the matched portfolio of firms are computed over the same time period. Abnormal performance is the difference between the return to the disruption-experiencing firm and the return to its matched portfolio.

The effect of supply chain disruptions on share price volatility is estimated by comparing the standard deviations of stock returns before and after the disruption announcement date. Abnormal volatility changes are estimated by comparing the disruption-experiencing firm's volatility changes against the volatility changes of an appropriately chosen benchmark firm. Benchmarks are identified by matching on prior volatility, industry, and size.

The effect of supply chain disruptions on return on assets and return on sales is estimated by comparing the change in performance of each disruption-experiencing firm with the change in performance of a sample of firms that are matched to the disruption-experiencing firm on total assets, industry (based on Standard Industrial Classification), and prior performance.

PricewaterhouseCoopers supply chain integrity community of interest:

Leaders
Alan Chu
Christopher Michaelson

Senior research fellow and author
Deepali S. Sussman

Subject-matter specialists
Robert Barrett
Brian Bilsback
Melissa Carrington
Teresa Fabian
Peter Frank
Brian Kinman
Barbara Kipp
Lisa Reshaur
Nick Shufro
Beatrijs Van Liedekerke
Andreas Wettstein

Knowledge management
Bob Farricker

External support
Fred Cohen
Dan Kellams
Dr. Vinod Singhal

Design
Isabella Piestrzynska

pwc.com/us/advisory

To have a deeper conversation about how this subject may affect your business, please contact:

Dave Pittman
US Advisory Operations Leader
312.298.3114
dave.pittman@us.pwc.com

Joseph Atkinson
US Advisory Risk Leader
267.330.2494
joseph.atkinson@us.pwc.com

Tell us how you like *From vulnerable to valuable: how integrity can transform a supply chain* and what topics you would like to hear more about from PwC. Please visit www.pwc.com/supplychainintegrity.

This publication is printed on Mohawk Options PC. It is a Forest Stewardship Council (FSC) certified stock using 100% post-consumer waste (PCW) fiber and manufactured with renewable, non-polluting, wind-generated electricity.

Recycled paper