

THE RESILIENT SUPPLY CHAIN

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“You can’t stop the rain from falling, but you can look for holes in your roof.”¹

Global business is at a crossroads. Volatility has emerged as a systemic condition, disruption occurs at any time, often with unprecedented magnitude, and there are no longer discrete sets of risk events with periods of stability in between. When disruptions occur, the global supply chain – now an intricately intertwined web – acts as a massive neural network, spreading impact instantly among all the connected parties. Effects cascade across the extended supply chain, and frequently gain intensity as they ripple outward from the epicenter.

In this environment, traditional supply chain management models begin to break down, bending under the strain of the unknown and the unexpected. Just-in-time, lean and other acknowledged best practices create highly efficient supply chains. As it turns out, however, these supply chains are also brittle and high risk.

To be resilient, global enterprises need new decision tools for supply chain risk assessment, monitoring and modeling. Cognizant of this, DHL has developed Resilience360, a web-based risk analytics software solution that maps a company’s supply chain risks, and identifies alternative options that either mitigate or eliminate risk entirely.



In the face of this realization, a new paradigm is emerging: The fast, lean and resilient supply chain. This hybrid tempers efficiency and cost management with rational and appropriate contingent capacity, scale and capability. The new resilient supply chain embodies what futurist Andrew Zolli refers to as the two defining aspects of resilience:²

- The ability to maintain a core purpose, or
- The ability to restore core purpose in the face of a disruption.

It goes one step further than that, however. The resilient supply chain not only reduces and recovers from risks but also anticipates, rapidly adjusts, and even capitalizes on unanticipated supply chain events or disruptions. To the latter point, by being able to respond, redirect resources, and shift to alternate strategies and tactics when a disruption occurs, resilient supply chains can capture sales and market share from companies that do not have this ability. Thus, true supply chain resiliency is about growth and competitive advantage – not just disruption avoidance and mitigation.

Effective supply chain risk management entails more than a simple, one-time gap assessment or prioritization exercise. It requires continuous monitoring and improvement that go beyond the company’s borders.³

The traditional approach to responding to supply chain risk follows this predictable pattern:

- Be prepared when events happen
- React – according to plan if possible
- Recover
- Wait for the next event to happen
- Start the cycle again.

¹ Richard Sharpe, CSCMP Workshop: Supply Chain Risk Management (SCRM) Not a Matter of If, But When, Competitive Insights October 2013, p. 55.

² Andrew Zolli, Resilience Strategies for a Volatile World, Harvard Business Review Interview <http://blogs.hbr.org/ideacast>, 2012/07.

³ Gary Lynch, Supply Chain Resiliency: How Prepared Is Your Organization? Marsh, Inc. April 2012, p. 11.

This kind of reactive response is no longer sufficient. Incremental risk management and cautious adaptation are no longer enough. “Playing not to lose”⁴ won’t cut it. Reducing risk is not the same as improving resiliency.

With the multifaceted nature of today’s supply chain risks, companies must take a more holistic approach. They must build resilient supply chains.⁵

This white paper discusses the state of the art in supply chain resiliency – today and in the future, across industries. It analyzes why resiliency – not just risk management – is important; it looks at how companies can achieve it.

⁴ Accenture, 2013 Global Consumer Pulse Survey Global & U.S. Key Findings. The Switching Economy.

⁵ Deloitte, The Ripple Effect. How manufacturing and retail executives view the growing challenge of supply chain risk, 2013, p. 3.



Why resiliency matters

Supply chain disruption comes in all forms, and usually produces cascading consequences, ranging from minor to severe. These can include financial loss, cost increases, market share declines, customer defection and damage to the brand.

The multiple natural disasters of 2011 were a wake-up call for global business. Insured losses for the year topped \$105 billion, with total economic losses (insured and uninsured) exceeding \$370 billion – the highest number ever recorded for a single year, according to a report by insurance giant Marsh.⁶

The two costliest events of 2011, the Japan earthquake, tsunami and nuclear event, and flooding in Thailand,

showed how an event in one part of the world can impact, and even shut down, supply chains halfway across the world. The Japan catastrophe stopped assembly lines in the automotive and high tech sectors; the Thailand floods hit the high tech sector particularly hard. “The market is quick to punish companies that report supply chain disruptions,” notes consulting firm PwC. “On average, affected companies’ share prices dropped nine percent below the benchmark group during the two-day announcement period (i.e. the day before and the day of the announcement).”⁷ See Figure 1.

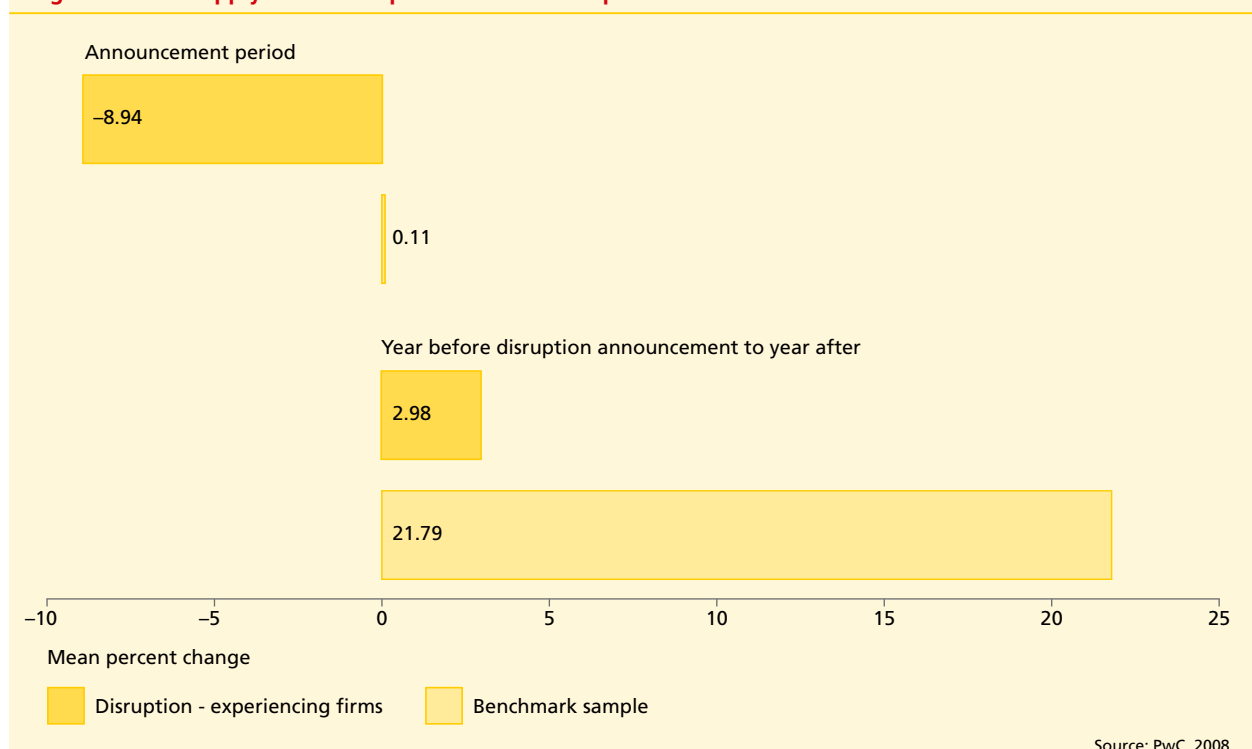
Additionally, the PwC research shows companies do not recover quickly from a supply chain disruption. “Two-thirds of affected companies were lagging their peers in stock price performance a year after the disruption.”⁸

⁶ Lynch, p. 2.

⁷ PwC, *From Vulnerable to Valuable: How Integrity Can Transform a Supply Chain*, 2008, p. 8.

⁸ *Ibid*, p. 8.

Figure 1: How supply chain disruptions affect stock prices



Despite these statistics, most companies have been slow to tackle building a more resilient supply chain. According to a survey by the Business Continuity Institute:⁹

- 75% of respondents still do not have full visibility of the level of disruption in their supply chains. Only 25% coordinate and report to gain an enterprise-wide view of disruption
- 75% of respondents experienced at least one incident that caused disruption

- 42% of disruptions originated below the tier one supplier level, an increase from 2012
- 15% of respondents experienced disruptions that cost in excess of €1M, and 9% experienced a single event disruption that cost in excess of €1M.

At the Davos CEO Summit in 2012, a startling 93% of the leaders of the world's top companies said they were unprepared for supply chain disruptions.¹⁰

⁹ Business Continuity Institute, Supply Chain Resilience 2013, November 2013, p. 1.

¹⁰ World Economic Forum Davos CEO Summit, 2012.



Part 1: Current state and driving trends

To develop a truly resilient supply chain, companies must understand the driving forces at work in global business, and how they impact supply chains. While a myriad of factors affect supply chains, we've identified four major trends:

- Consumerism and boundary bleed
- Fast, lean and risky
- Emerging markets
- The rise of regionalism.

Consumerism and boundary bleed

Traditionally, industry sectors were largely self-contained. Meaning that they were affected by, and had to respond to, dynamics within the boundaries of their industry. Consumer goods was impacted by the consumer goods environment; life sciences affected by the life sciences environment, and so on.

Not any longer.

Thanks to global interconnectedness made possible by technology, a singular phenomenon is emerging in business. We call it boundary bleed. Meaning what happens in one sector shows up in an entirely different, seemingly unrelated sector. Perhaps not right away; not necessarily identically. But unquestionably, and with enough force to have an impact, cause disruption and change the status quo. Boundary bleed is a product of consumerism.

What do we mean by that? The term refers to the buying behaviors and expectations of the anywhere, anytime, globally connected, geographically dispersed, always-in-the-channel consumer. A consumer whose expectations for service, price and performance continually escalate, as a recent study by Accenture found.¹¹ This expectation set is now permeating behaviors in all business relationships..

The rise of consumerism has fragmented sales channels, escalated service demands, shortened product lifecycles, splintered demand, ratcheted up cost and margin pressures, created delivery challenges and complicated production management and inventory deployment.

With boundary bleed, no industry or organization is immune from consumerism and the competition it spawns – competition that comes from anywhere, at any time. This means it is only a matter of time before the expectations for near-instant service, product innovation, competitive price and personalization, so characteristic of the high tech and consumer/retail sectors, spread into lumbering, old line industries like heavy equipment manufacturing. With some modifications, of course, but bleed-over just the same.

¹¹ Accenture 2013 Global Consumer Pulse Survey Global & U.S. Key Findings, The Switching Economy, pp. 10 and 27.

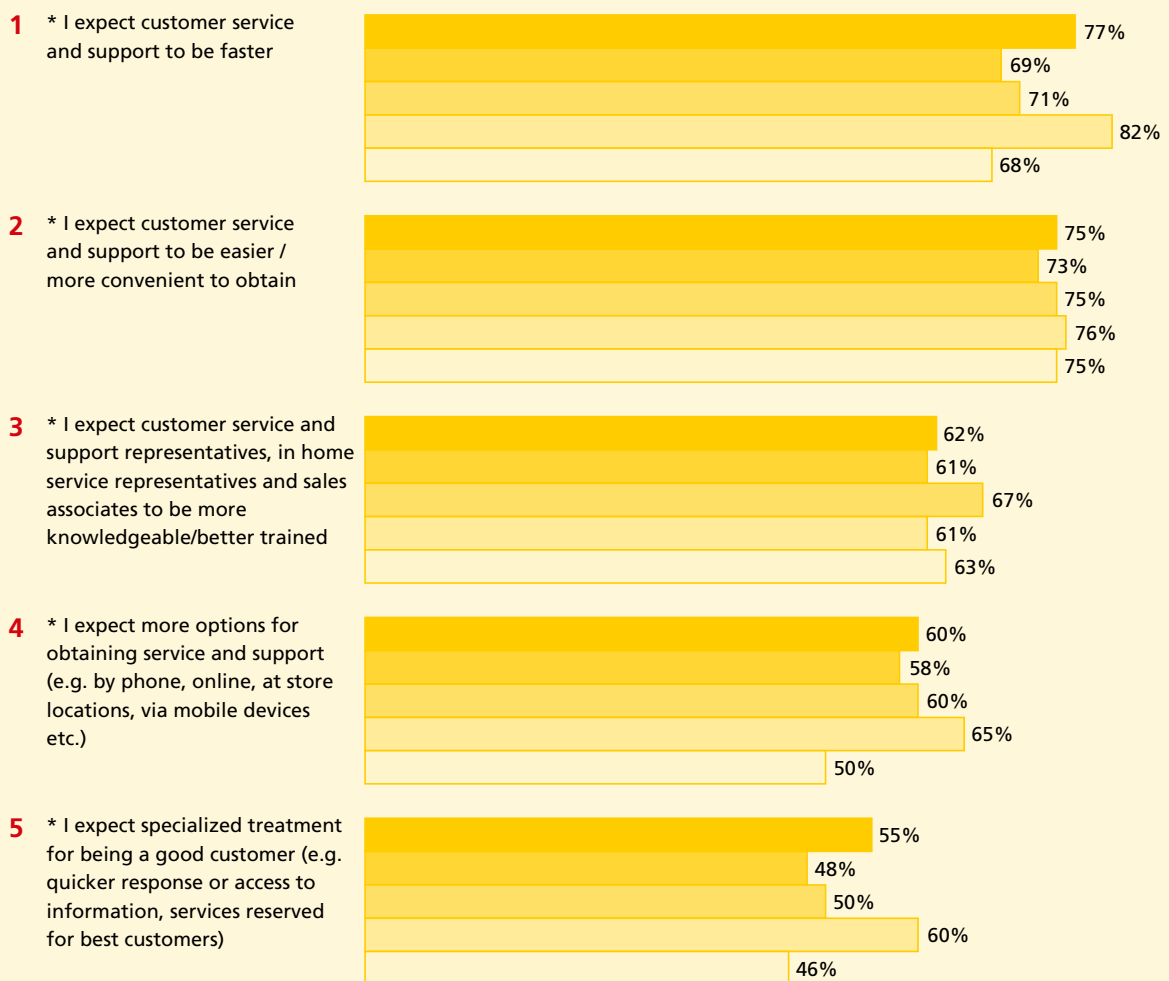


Figure 2: Service expectations on the rise

Globally, expectations have increased across the board, compared to 2012. The most common customer service areas for which expectations have risen are those related to easier/more convenient service and faster service experiences. It is interesting to note that responses for questions 1 and 5 showed a marked increase in service expectations for consumers in emerging markets. This supports the discussion about the impact of the Internet on global buying behavior.

Customer service factors for which expectations have increased

2012 – 2013 Global



Global 2013
 Global 2012
 Global 2011
 2013 Emerging markets
 2013 Mature markets

* Slight word changes in 2013

Base size: respondents whose customer service and support expectations have increased within the past year.

Life sciences and healthcare (LSH) is a perfect example. Thanks to the Internet and information access – and the power it conveys to people – doctors and healthcare providers are no longer directing the show. Instead, consumerism – the shopping behaviors and expectations consumers have learned from the online retail sector – has taken hold and is driving profound change. It is injecting competition and fueling transparency, data-supported performance reporting and accountability for patient outcomes.

Fast, lean and risky

Mounting volatility and uncertainty “is not an accident of time, but a consequence of how the basic conditions for doing business around the world have changed. Firstly, the speed of everything is accelerating. Secondly, the scale of interconnection is increasing profoundly. The dense web of Internet connections now provides instantaneous and near-ubiquitous global access to information, which flows to and from everywhere. At the same time, the growth of logistics capability has

produced a physical network that extends worldwide.”¹² This network supports and enables the business of interconnected commerce.

“All of this has created a system that is highly complex, intertwined, and fast – and which generates enormous risk and volatility in the marketplace.”¹³

This volatility ecosystem is made up of three basic tiers of volatility sources that affect supply chains. These tiers can be depicted as concentric rings (Figure 3). The first, and outermost ring represents macro or systemic forces at work, such as interest rates, trade patterns, political stability and the like. The second ring incorporates enterprise/organization/business volatility – e.g. product success, company health. The third, innermost ring represents supply chain volatility, which incorporates the two outer rings, as well as its own set of values. These can be anything from supplier failure, extreme demand variability, inventory shortages, to a product recall.

¹² Delivering Tomorrow, Logistics 2050, A Scenario Study, Deutsche Post AG, February 2012, p. 27.

¹³ Ibid, p. 27.

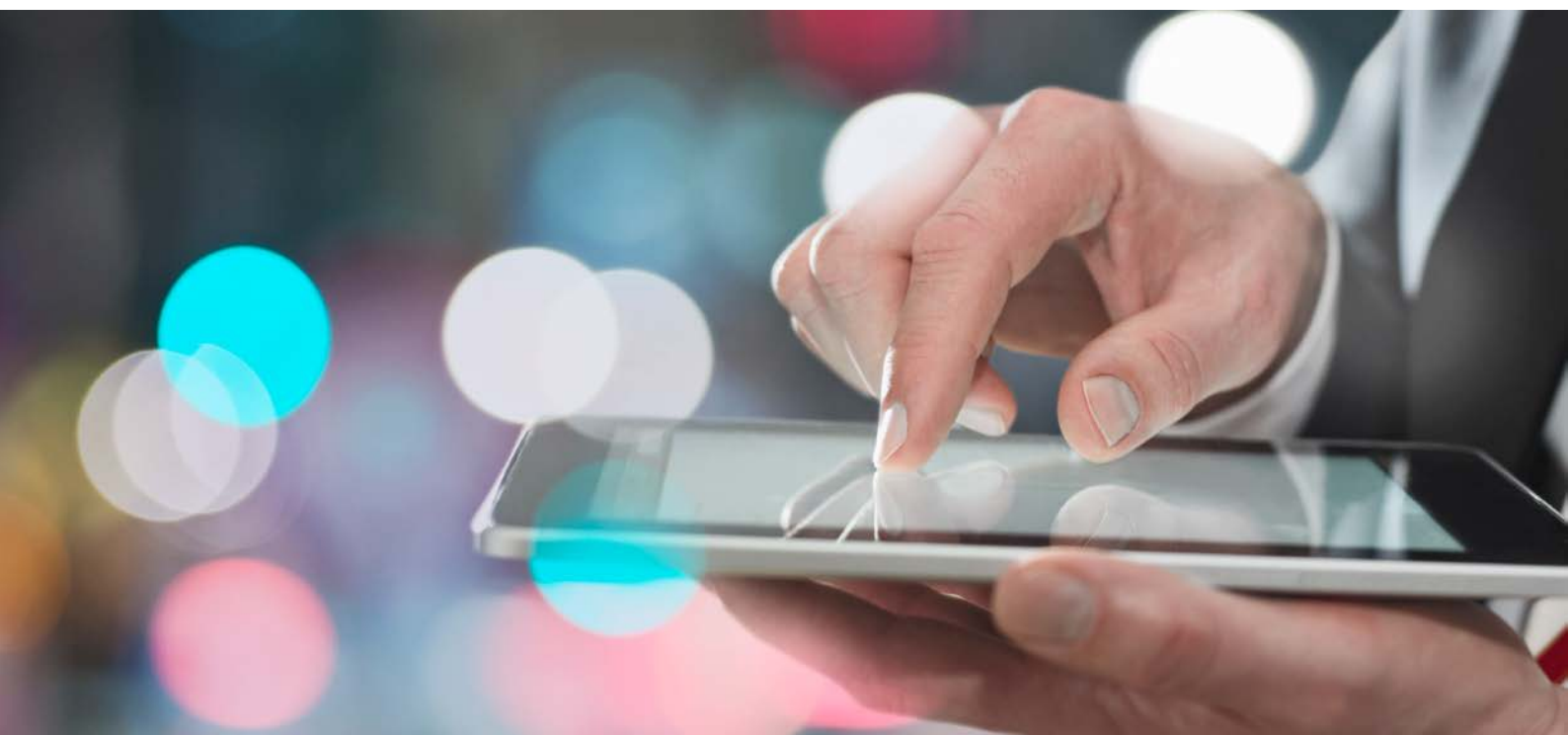
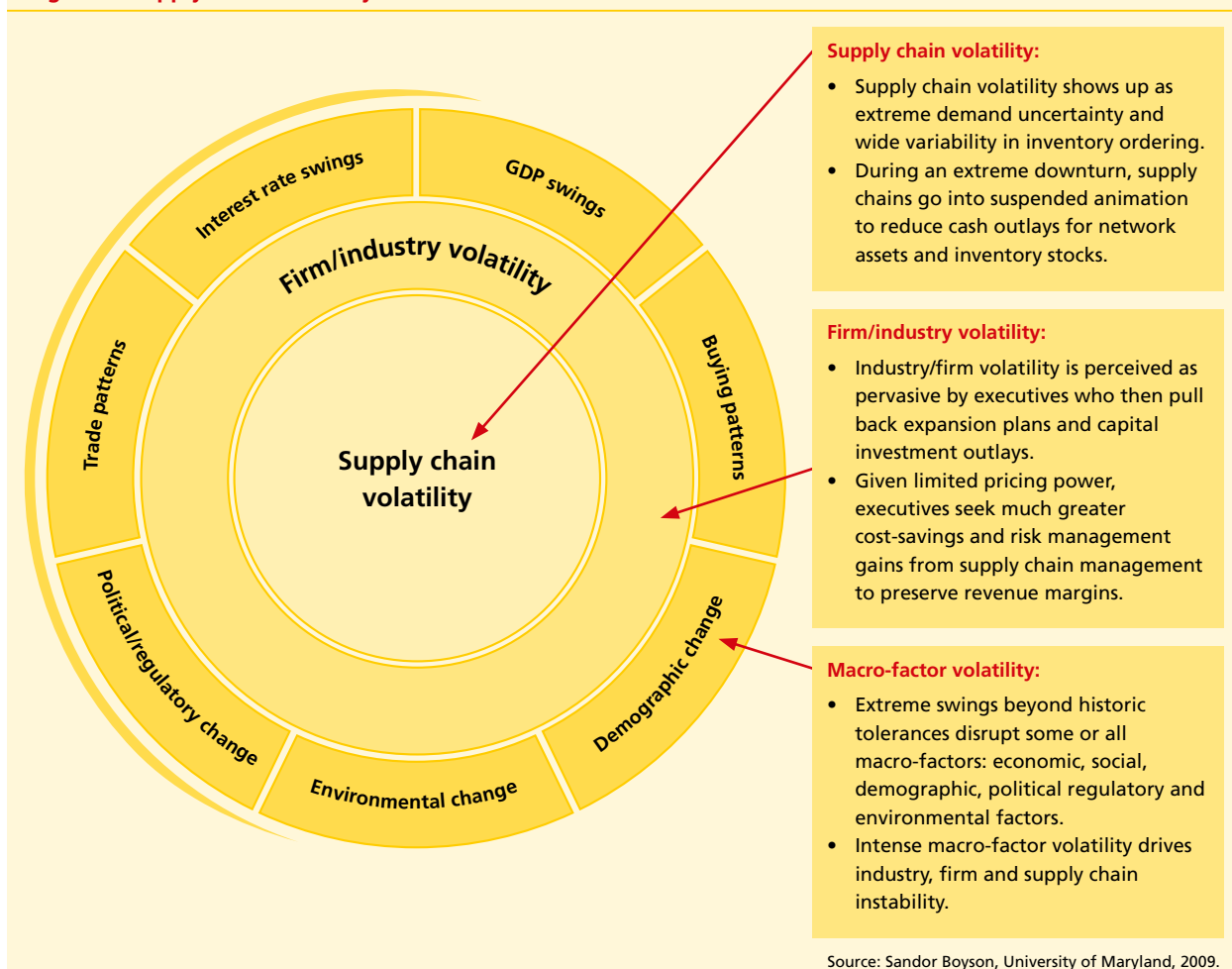


Figure 3: Supply chain volatility model



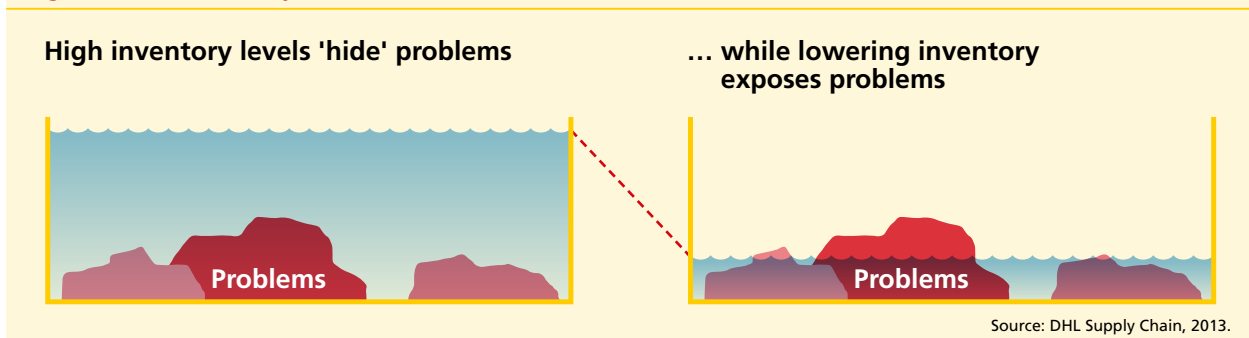
The basis for this supply chain volatility ecosystem lies in the prevailing business best practices of the last 20 years. Most organizations competing in the global marketplace over the past 20 years have organized their supply chain around three key criteria: efficiency, low cost and speed to market. They adopted a number of strategies to achieve these principles, among them:¹⁴

- Outsourcing
- Consolidation of physical assets and suppliers
- Lean and just-in-time manufacturing; and
- Low-cost country sourcing and production.

¹⁴ Lynch, p. 3.

These strategies cut operating costs, shorten lead times, reduce inventory, improve margins and provide operating flexibility. They help accelerate new product launches which, in turn, can translate into capture of market share. At the same time, they add complexity to supply chains – expanding their geographic reach, creating dependencies and interdependencies (often hidden), eliminating redundancies, and forcing organizations to rely on more tiers of suppliers. All of this has meant a lack of resilience and an increased risk profile – and more vulnerability to natural catastrophes and other events.¹⁵

¹⁵ Ibid, p. 3.

Figure 4: Lean inventory and risk

Take current thinking in inventory management, for example. With the advent of just-in-time and lean manufacturing, highly extended supply chains operate without historical inventory buffers and “fat.” While this strategy saves money, it carries a risk. “High inventory levels hide supply chain problems; lean inventory, on the other hand, exposes them” (Figure 4) notes Alexander Pilar, CIO, DHL Supply Chain. “And it is not uncommon for inventory to be positioned in the wrong place in the wrong amount – or it is just plain invisible because of disconnects in the supply chain, partners and tiers.”¹⁶

Emerging markets

“Because of lackluster performance and modest growth potential in mature markets, companies are looking at emerging markets as their pathway to the future,” states Jose Nava, President, DHL Supply Chain Latin America and Technology & Service Logistics – Americas. “In the past, emerging markets were seen as a potential place for sourcing products into mature markets. But that paradigm has changed. Emerging markets are fast becoming engines of demand, a trend that carries implications for all industry sectors and their supply chains.”

Two demographic tidal waves are driving this trend:

- Urbanization and the rise of cities, and
- The rise of the global middle class.

Today there are 21 cities with more than 10 million inhabitants, most of them in developing countries. By 2050, roughly 70% of the world’s population will live in urban centers. The number of cities with populations greater than eight million is expected to double by 2015. By 2020, Mumbai, Delhi, Mexico City, Sao Paulo, New York, Dhaka, Jakarta and Lagos will have achieved meta-city status (more than 20 million people). These mega- and meta-cities present significant supply and logistical challenges.¹⁷

The rise of cities in emerging markets is not limited to the mega-centers. “The high-growth emerging markets of the world are building new cities where residents, companies, universities, and opportunities for prosperity are creating attractive new markets that are unfamiliar to many companies,” says David C. Michael of the Boston Consulting Group. “The number of cities that are arising in emerging markets is staggering. Today there are nearly 700 emerging-market cities with populations of more than half a million – and there are only 240 such cities in the West. In the next 20 years, there will be more new cities created in emerging markets than exist today in the West.”

Concurrent with the rise in new cities is the rapid growth of the global middle class. “About 125 million

¹⁶ Alexander Pilar, *Chaos Tolerant Supply Chain: Real Thing or Hype? Defining the Challenge for IT*, DHL Supply Chain, 2013, p. 8.

¹⁷ David C. Michael, Boston Consulting Group, *Keeping Up with Emerging-Market Growth*, May 24, 2012.

households in emerging-market cities will enter the middle class from 2010 to 2015 – an increase of 70 percent,” Michael continues. “At the same time, the geographic distribution of this group is widening, which creates a need for companies to explore markets that they may never have considered before.”

The World Bank predicts that by 2030, more than one billion people in the developing world will belong to the middle class, more than twice the number fitting that description in 2005.

“A new model is emerging: the regionalized global supply chain in which goods are produced and sold/consumed in the same geographic region.”

“Access to the Internet and media is creating consumers in emerging markets that look very much like what we have in mature markets in terms of service expectations,” Nava observes. “However, these expectations bump up against a significant execution gap. The reality is that emerging markets are not evolving at the same speed as mature markets in terms of their ability to deliver on higher service expectations. Lack of transport and telecommunications infrastructure, lack of adequate warehousing space, and even lack of supply chain expertise all hamper a supply chain’s ability to deliver.”

The rise of regionalization

Supply chains are contracting. Trade flows, which were long-distance, east-west oriented for nearly two decades, are shifting. They are being replaced, at least in part, by shorter, regionally-based trade flows. A new model is emerging: the regionalized global supply chain in which goods are produced and sold/consumed in the same geographic region.¹⁸

¹⁸ Lisa Harrington, *Nearshoring Latin America: A closer Look*, Inbound Logistics, March 2012.



There are many reasons for this contraction, but one of the primary ones is risk management.

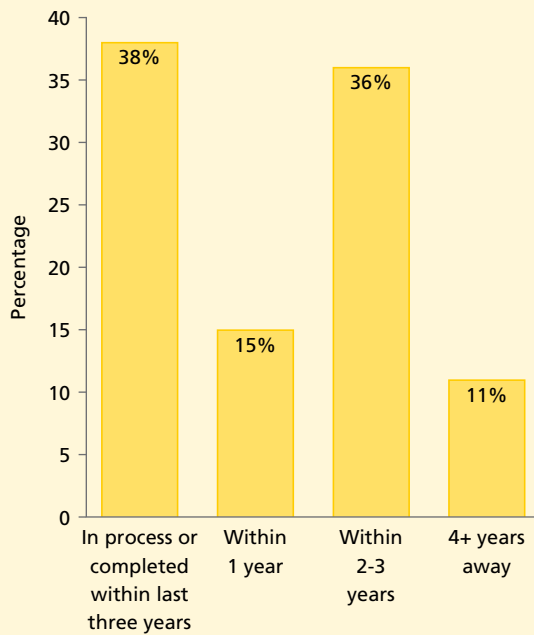
There is a new awareness of the length, complexity and fragility of technology supply chains for instance. For demand in the Americas, for example, companies are starting to move production back to the United States or

pursue near shoring to Mexico. The same trend is occurring in Europe, with a resurgence in Eastern Europe as a production center.

The Boston Consulting Group estimates that as a result of its increasing competitiveness in manufacturing, the United States will capture \$70 billion to \$115 billion in annual exports from other nations by the end of the decade.¹⁹ The findings of an AlixPartners survey of 116 senior executives in manufacturing companies that sell into the U.S. market showed that more than half are either in the process of near-shoring now or will be in the next two years.²⁰

Figure 5: Nearshoring trends

How soon is your company likely to nearshore to meet U.S. demand requirements?



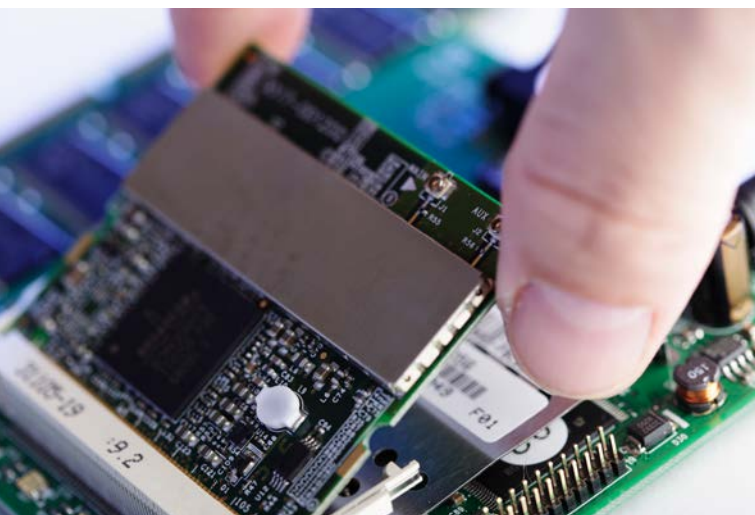
"The primary drivers are reduced supply chain costs, speed to market, access to market in response to government requirements or tariffs, and support for locally manufactured content."

The automotive sector is at the forefront of this trend. Manufacturers have moved from manufacturing in their home countries and shipping finished vehicles to market, to a model of geographically regionalized production – i.e. manufacturing at, or near, the point of demand. "This means the industry is setting up regionalized manufacturing plants and supplier clusters in new locations all over the world," says Dennis Drinan, Vice President, Global Sector Products & Head of LLP Service, DHL Supply Chain.

Companies are not necessarily pursuing this strategy to take advantage of lower labor rates. Instead, the primary drivers are reduced supply chain costs, speed to market, access to market in response to government requirements or tariffs, and support for locally manufactured content. Once sales volumes reach a certain point, it no longer makes sense to ship finished vehicles across oceans.

¹⁹ Harold L. Sirkin, Michael Zinser, and Justin Rose, *The U.S. as One of the Developed World's Lowest-Cost Manufacturers: Behind the American Export Surge*, Boston Consulting Group, August 20, 2013.

²⁰ AlixPartners, *Executives' Perspective on Near-Shoring*, 2012.



Part 2: The resiliency index

What does it take to build a resilient supply chain? What are its key attributes and characteristics? In this section, we outline a supply chain resiliency model and provide an index of where five key industry sectors fall in this model. To preface the model and index, we first map out three key assumptions that underpin our case for building the resilient supply chain.²¹

- 1** The need for a wholly new model of supply chain risk management that goes beyond a narrow, sequential identification and management of operational risks. This new model must account for systemic risk because of the increasing fragility of interlocked systems and networks. It must also fully recognize that the supply chain itself is a source of extreme volatility and acts as a destabilizing agent in ways that are rarely openly acknowledged. It must be holistic in scope, encompassing all aspects of supply chain risk and disruption – from negative, neutral and positive viewpoints.
- 2** The need for a wholly new model of supply chain network efficiency that replaces traditional economies

of scale and scope with those that are based on ‘contingent scale.’ Contingent scale is the ability of the enterprise to rapidly size its assets and services up or down, as required by extreme demand fluctuations. These resizing capabilities are executed through flexible contracts with external providers.

Companies are looking for more flexible ways in which to build robust networks that can scale capacity and throughput up or down with speed that matches the rapid rate of change in market conditions. These new contingent scale networks have a tremendous competitive benefit to companies: they create the supply chain resiliency needed to bounce back from disruptions and capitalize on adjacent opportunities.

- 3** The need for a new model of managing the activities, flows and processes of the new supply chain to build and sustain resiliency. This requires moving beyond supply chain integration to orchestration, based on the concept of the supply chain control tower, which we explain in part 3 of this paper.

²¹ Lisa Harrington, Sandor Boyson, Thomas Corsi, Richard Douglass, X-SCM: The New Science of X-treme Supply Chain Management, *The European Business Review*, Nov. 15, 2010.



Resiliency model: Four stages

There are four basic stages a company goes through in its evolution towards supply chain resiliency²². These stages are based on research conducted by MIT and PwC.

Stage 1 – React. This stage is characterized by an individual functional approach to supply chain management and ad-hoc, reactive management of risk. There is little integration across functional boundaries. Other traits include:

- High duplication of activities
- Internally and externally disconnected processes
- Lack of coordination with supply chain partners
- Limited supply chain visibility.

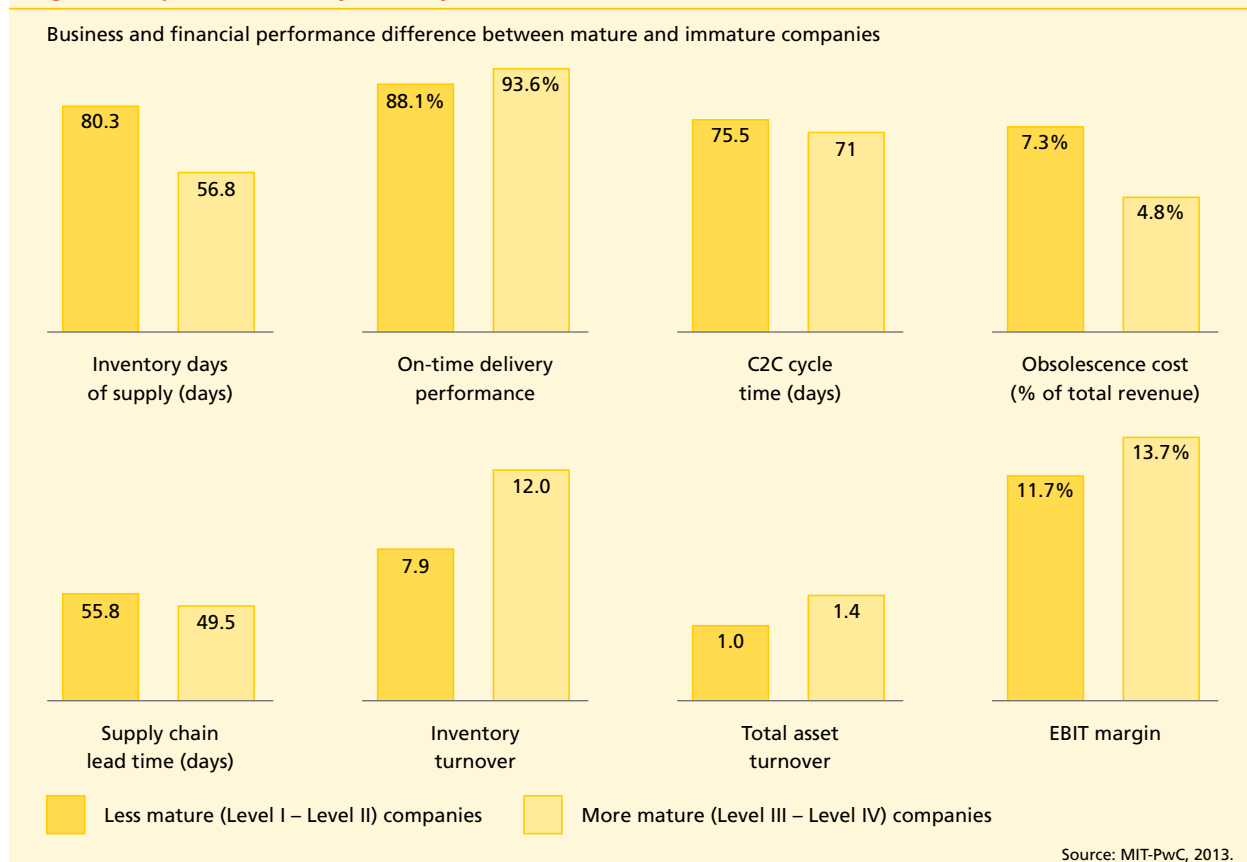
Stage 2 – Anticipate. At this stage, supply chains are cross-functionally organized, internal processes are integrated, and there is structured visibility between

functions, with alignment of performance objectives. Risk management processes are documented and integrated internally. Basic threats and vulnerabilities are analyzed. Risk management activities, such as scenario planning and product postponement, help the organization begin to anticipate volatility more effectively. The focus, however, remains largely internal.

Stage 3 – Collaborate. At this stage, supply chains move to external collaboration and proactive risk sharing and response. Information sharing is extensive and visibility is high, geared to set up sensors and predictors of change and variability. This visibility enables the organization to proactively design and execute response mechanisms in collaboration with at least its key external partners. Risks are formally quantified. Suppliers and partners are monitored for resilience levels and business continuity plans are created.

²² PwC and the MIT Forum for Supply Chain Innovation, Making the Right Risk Decisions to Strengthen Operations Performance, PwC 2013, pp. 11-12.



Figure 6: Impact of resiliency maturity

Stage 4 – Orchestrate. Companies are fully aligned with their supply chain partners on the key value dimensions across the extended enterprise. Their individual strategies and operations are guided by common objectives. Their supply chain is fully flexible to interact and adapt to complex dynamic environments. Supply chain risk strategy is segmented to the value at risk (e.g. financial loss, market share loss, damage to brand), and tiered response playbooks are developed to reflect this segmentation.

Does investing in supply chain resiliency pay off? Yes, according to the MIT-PwC research. Companies with mature capabilities in supply chain management and risk management perform better than immature

companies. They carry less inventory, have faster cash-to-cash cycle times, operate with shorter supply chain lead times and, importantly, have a 2% EBIT margin advantage (see Figure 6).

This finding suggests that there is a direct link between having a mature, resilient supply chain and higher overall performance.

Based on our research and interviews, we indexed five industry sectors against the four-stage resiliency maturity model (Figure 7). The indexing reflects a high-level, aggregate view of each industry's general level of maturity when it comes to building, operating and sustaining a resilient supply chain. Individual

companies and sub-sectors may perform differently – with either higher or lower individual scores. However, no companies in any sector have reached Stage 4 maturity.

“Building appropriate supply chain resiliency is all about balancing efficiency versus effectiveness,” says Graham Clark, Business Continuity Manager, DHL Supply Chain, Europe, in discussing the evolution toward resiliency. “You could make a supply chain 100% resilient, but it would cost a fortune. The question then becomes, are you willing to spend x amount of money to make the supply chain reach optimal resiliency? To make these decisions, we have to understand the risk, understand where the critical weaknesses are, whether the risk is an acceptable one or not, and if not, what can we do to mitigate it?”

Figure 7: Sector resiliency maturity index

Industry Sector	Resiliency Index Ranking based on Maturity Model Stages (Aggregate)
Technology	3 to 3+
Automotive	3 to 3+
Consumer Goods/ Retail	3
Life Sciences and Healthcare	2
Engineering & Industrial	2

Source: Lisa Harrington, University of Maryland, 2013.



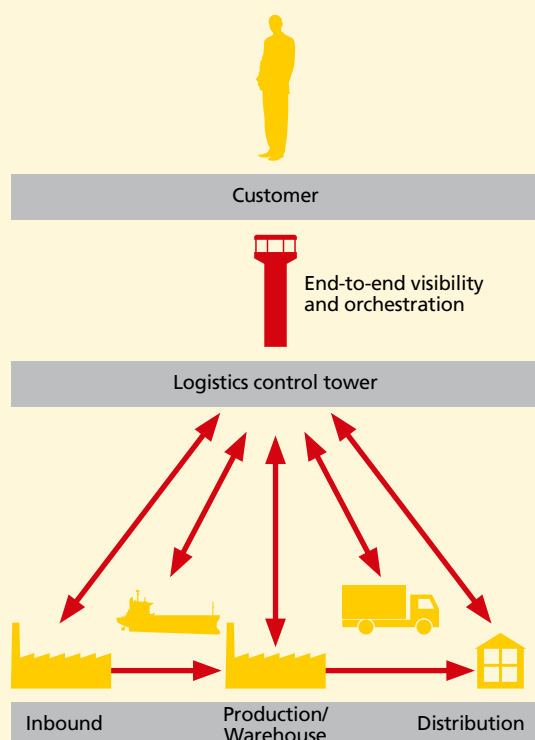
Part 3: The new supply chain

Building a supply chain that is both lean and resilient means creating a new hybrid that balances the need to reduce costs with effective use of redundancy, contingent scale and capacity. This is no easy task, and the solutions are dependent on multiple variables. They differ by customer, by geography and by provider.

Although approaches differ by industry sector, certain attributes are emerging as the hallmarks of this lean-resilient supply chain hybrid. We discuss these below.

Figure 8: The supply chain control tower concept

CONTROL TOWER – By coordinating logistics providers, DHL ensures that labor and assets are utilized efficiently and effectively and site congestion is minimized.



The services are delivered by a fully defined, qualified and experienced team, backed by a supporting management structure and an organization with the size, scale and capability to respond immediately to the changing nature of the logistics service.

The control tower approach

Integrating supply chains so that all the upstream and downstream partners can see the full picture enables them to plan ahead more accurately and manage demand more cost-effectively.²³ It also reduces risk, because the supply chain is operating according to a single plan and a single ‘version of the truth.’

This kind of collaborative model already exists in industries like automotive and technology – and is beginning to be adopted by other sectors as well. The model, called the supply chain control tower or lead logistics provider, is executed by some third party logistics companies.

Exactly what is a supply chain control tower? “Picture a room with computer consoles and overhead displays. Instead of air traffic controllers, you have a dedicated staff of supply chain experts monitoring those screens, which allow them to track freight movements and stay on top of any relevant developments. That visibility results in rapid notification of disruptions, allowing companies to take corrective action.”²⁴

At the heart of the control tower concept is real-time visibility across the extended supply chain – incorporating suppliers, manufacturing nodes, carriers and third party logistics service companies, and customers. A lead logistics provider (LLP) sits at the top of the control tower, using real-time visibility tools to constantly monitor and assess the condition and performance of the supply chain. Thanks to alerting systems, potential or real problems can be identified and addressed proactively – before they disrupt the supply chain.

Real-time visibility enables the supply chain to be orchestrated in a collaborative fashion, reducing risk from the unknown and thereby improving resiliency. Global best-in-class LLPs can provide what amounts to

²³ PwC, From Vision to Decision - Pharma 2020, 2012, p. 14.

²⁴ James A. Cooke, Should You Build a Control Tower? DCVelocity, April 9, 2012.

an on-the-ground sensor grid in their countries of operations, geared to continuously monitoring supply chain conditions. This capability is particularly important for companies that are expanding their geographic footprint in new markets.

The control tower model can be a highly effective way to manage the daily operations of a global supply chain, and, on a more strategic level, identify and manage risk and disruptions. Better visibility also reduces inventory in the channel. And supply chain network design, a hallmark of the control tower model, optimizes the network for both cost and service.

Visibility and the “smarter” supply chain

Supply chains move goods, but they run on information. The global, interconnected and technology-enabled supply chain operates like a giant neural network, carrying ‘signals’ at lightning speed throughout the network. Creating this neural network has improved efficiency, reduced costs, expanded commerce, accelerated product flows and created all kinds of value. But the network is only as good as its connections and the visibility they provide.

Ideally, the goal of the information supply chain is end-to-end visibility. Without adequate end-to-end visibility, including all internal and external tiers, the globally connected supply chain is doomed to suffer the consequences of volatility – and in many cases, experience amplified consequences.

Unfortunately, most companies still struggle with information disconnects and black holes. This is not a technology issue in most cases. Rather it is a lack of investment in, and attention to, integration.

“At a time when, generally speaking, information is abundant and connectivity is more feasible than ever, supply chain executives still rank visibility as their

greatest management challenge,” observes a recent report from IBM Global Services. “Although more information is available, proportionally less is being effectively captured, managed, analyzed and made available to people who need it.”²⁵

Smarter supply chains will take advantage of unprecedented levels of interaction – not only with customers, suppliers and IT systems in general, but also with objects that are monitoring or even flowing through the supply chain. These objects include RFID sensors and other monitoring devices. “Besides creating a more holistic view of the supply chain, this extensive interconnectivity will also facilitate collaboration on a massive scale,” IBM says. “Worldwide networks of supply chains will be able to plan and make decisions collectively.”²⁶

Figure 9 illustrates the difference between the traditional, disconnected linear supply chain with poor visibility across boundaries, and the new supply chain, which operates as an information sharing collective. In the traditional linear model, every disconnect potentially injects risk into the supply chain.

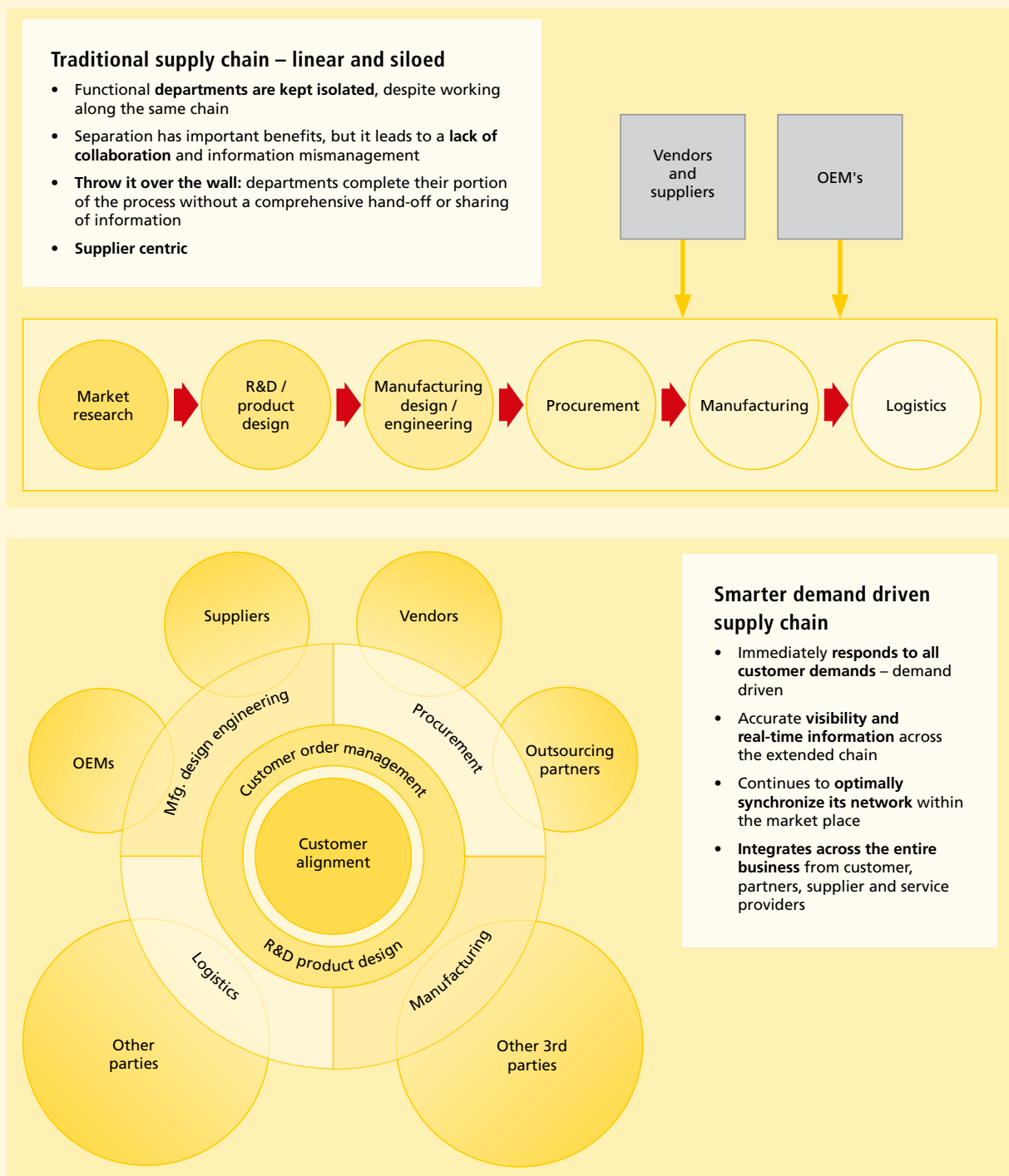
“Visibility is critical to resiliency,” observes Pilar of DHL Supply Chain. “The more visibility you have, the more time you have to react. If you extend the visibility boundaries of your supply chain, you can see issues earlier in their development cycle, and gain more time to respond. This requires that the whole supply chain cooperates to share data and visibility.”

Best-in-class global LLPs can provide this visibility. Their supply chain software solutions and risk management tools deliver visibility into supplier production, inventory and in-transit goods in both the inbound and outbound supply chain. This visibility is critical to managing risk and building resiliency across a supply chain network.

²⁵ IBM Global Business Services, *The Smarter Supply Chain of the Future*, 2010, p. 17.

²⁶ *Ibid*, p. 33.

Figure 9: Old and new supply chain visibility models



Source: Based on a presentation given by Richard Douglass, IBM, at the University of Maryland, 2013.

Shared supply chains

Some industries and companies are starting to recognize that, in the long run, the supply chain may not be a main basis for competing. Instead, the source of competitive advantage will derive from product, innovation and branding.

“This means that more companies are willing to share – or at least consider sharing – logistics infrastructure – including warehousing and transportation, in an effort to optimize service performance while managing costs,” reports Graham Inglis, CEO, DHL Supply Chain Europe. “The model is based on economies of scale – i.e. spreading the cost of a best practice distribution operation across multiple companies. The core assumption is that high quality supply chain capability provided by an external logistics service provider is available, consistent and cost effective.”

A shared supply chain model spreads risk – e.g. assets, infrastructure, people, IT, transportation – across multiple parties. It creates a more robust supply chain capability that can cost effectively flex and flux with demand cycles, while ensuring high service levels. And in situations where access and capacity constraints are growing – for example increasing urban congestion and time-of-day driving restrictions – a shared supply chain acts as a hedge against the negative impact of such constraints.

In Europe, Kimberly-Clark Corp. and Lever Fabergé (now Unilever's Home and Personal Care unit) began experimenting with the shared supply chain concept 10 years ago, with joint deliveries to customers.²⁷ The experiment was a success and the practice is spreading within other companies throughout Europe, the United States and elsewhere.

Pharmaceutical and medical device manufacturers have also embraced the shared logistics services model.

“Typically, these companies have customer overlap, with multiple companies shipping to the same group of customers,” Nava explains. “Manufacturers reduce redundancy by using a single logistics service provider to create a shared, multi-customer supply chain solution that aggregates the flow of products to the hospitals or healthcare facilities. Sharing transportation further complements the shared services model.

The shared services model reduces costs for manufacturers as well as their customers. It spreads risk across multiple parties, and ensures an optimized flow of product to the customer.

In the coming years, urban congestion will likely force more companies to adopt a shared supply chain approach. In its 2013 report “Planning and Design for Sustainable Urban Mobility,” UN-Habitat²⁸ discussed this issue and described a potential model for mitigating the issue of supplying goods to cities facing gridlock. The concept calls for creating urban logistics zones on the city perimeter – a logistics “ring” in which logistics service providers consolidate goods for shared, rationalized deliveries to the city.

Sharing supply chains within a single industry is the first step toward a much bigger idea – that of sharing supply chains across different industry sectors. “As OEMs reach their apex in logistics efficiency and procurement optimization, their next frontier will need to include broader approaches towards collaboration in their industries and sectors,” says Todd Starbuck, Executive Vice President, Business Development, DHL Supply Chain Europe. “The next logical step will be to further strengthen cross-sector relationships such as retail and consumer, to drive optimization that will reduce duplicate transport networks, value add centers, regional distribution centers and much more.” In such a scenario, an ‘orchestrator’ third party, which has visibility into

²⁷ James A. Cooke, Sharing supply chains for mutual gain, Supply Chain Quarterly, Q2, 2011.

²⁸ UN-Habitat, Planning and Design for Sustainable Urban Mobility, 2013.

CATERPILLAR'S PATH TOWARD RESILIENCY

Caterpillar, like many companies, has faced an onslaught of competition from new entrants to its once nearly captive market. As a result, the company has embarked on a mission to rebuild its business model – and in so doing, push its supply chain to be more agile and resilient.

“We have shifted how we look at our business,” says Ed O’Neil, Director, Integrated Logistics Services, Caterpillar. “In the past, our strategy was to plan our supply chain around protecting our customers and our manufacturing operations. Hope for the best but plan for the worst.”

The result was unacceptably high inventory levels, as well as redundancies and inefficiencies in the company’s supply chain. Now, Caterpillar’s strategy is to work toward optimizing the supply chain as a whole, through improved visibility and leveraging a centralized network but with a supply chain designed to meet the needs of its unique products and customers. Cloud-based visibility enables this strategy – a control tower view. “I can see everything in motion,” says O’Neil. “Now I can respond effectively to disruptions, see how the network is flowing, see delays

and the costs they incur. I can manage a single disruption like a port labor strike but also tune my network. I can optimize because I can see everything. That allows me to drive better predictability. And I couple that with analytics to figure out what dials and levers to adjust to make improvements. That gives me a much better supply chain.”

Caterpillar’s efforts are paying off. The company rose from No. 20 to No. 18 in the 2013 Gartner Supply Chain Top 25. As Gartner said in its assessment: “Caterpillar continues to broaden its integrated supply chain initiatives. [It] is also continuing to pursue global flexibility and scale, and manage its supply chain horizontally rather than vertically. The company is establishing in-region manufacturing around the world... to provide faster delivery to customers...”

“Our ability to get more adaptive and still drive resiliency is a big change for us,” O’Neil acknowledges. “While Caterpillar is experiencing record results in quality and velocity across the enterprise, there is considerably more opportunity in our customer order-to-delivery processes. Our cycles are moving much faster, and we need to be able to respond.”

customer supply chains of all types, would provide the shared supply chain capability.

Such cross-sector sharing and optimization does more than just cut costs. It provides access to a portfolio of capabilities and best practices that enable companies to create supply chains that not only are ‘fit for purpose’ today, but can adapt to the requirements of the future. “For companies that hesitate to share their supply chain within their own sector for competitive reasons,” Starbuck adds, “this cross-sector sharing model eliminates these concerns while providing all the benefits.”

Conclusion: The resilience imperative

The lessons learned over the past few years from disasters, disruptions and high levels of volatility make several points clear. “The increasing vulnerability of supply chains requires a new focus on managing and mitigating risk which extends beyond the four walls of the single firm.”²⁹ Supply chain vulnerability is a network-wide issue, and must be addressed on a network-wide basis. This requires higher levels of information sharing across the supply chain, particularly with the logistics service providers charged with executing the collective supply chain operations.

²⁹ Martin Christopher and Helen Peck, Logistics Europe, February 2004, p. 17-21.

RESILIENCE 360 RISK MANAGEMENT SOLUTION

“You can’t eliminate risks, or stop them from happening,” says Tobias Larsson, head of the DHL Resilience Team, “but you can manage them to help prevent them from significantly impacting your business.” Doing so in a supply chain, however, requires real-time visibility into network risks and vulnerabilities. It requires a standardized, sustainable framework to gauge and manage risk – proactively, holistically.

To assist companies in building supply chain resiliency, DHL has developed a new supply chain risk management solution, Resilience360. The tool provides a single platform for supply chain risk management. With collaborative input from the customer, DHL and partners, Resilience360 allows users (customers) to assess critical hot spots in their specific supply chains; visualize them and build a risk profile of their supply chain in order to initiate potential mitigation activities.

The tool is metrics- and numbers-based. Established on the basis of the four critical aspects of supply chain risk – operations, hazards, socio-political and market risks – the tool links information on natural disasters, theft, geopolitical and other risks with a customer’s manufacturing and distribution footprint.

Larsson explains, “We provide a logical methodology that makes the supply chain manager able to think and go through the logical steps to assess acceptable risk. What is the acceptable tolerance for that part of the business going down? If we lose that location for two days, will it have a massive impact on our customers?”

The structured approach analyzes four key areas to identify which sites a customer needs to focus

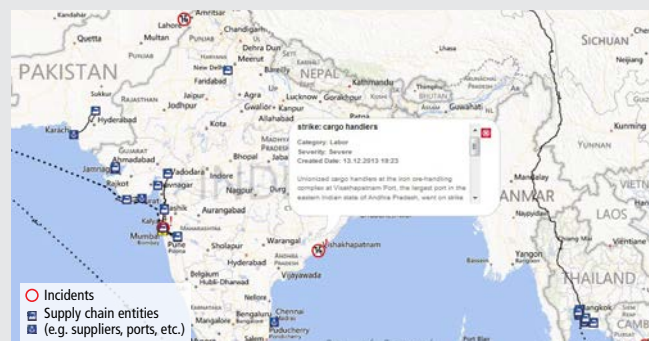
on to increase their supply chain’s resiliency. Additionally, the tool generates risk and resiliency reports for overall network statistics for single supply chain entities as well as real-time Incident Monitoring for rapid response.

DuPont recently used Resilience360 to identify the major risk areas to its business. “We had never looked at this issue holistically before,” says An D’haenens, logistics manager, Europe Middle East Africa, DuPont.

She and her team worked with DHL, using the Resilience360 tool in a major risk and resilience assessment exercise. The results, says An D’haenens, have been “eye-opening.”

The tool showed that one of the biggest risks for DuPont was potential disruption to the ports of Rotterdam and Antwerp. “We have a lot of inbound and outbound freight at those locations,” says D’haenens. “That’s a pretty intuitive problem for us – but the tool allowed us to quantify just how big that problem is, and highlighted that we have to do something different than just ship to another harbor. Another big identified risk for us was IT-related. So now we are initiating an IT project because we have realized that IT contingency planning is not enough.”

Resilience360 screen shot showing a cargo handlers strike at the port of Vishakhapatnam, India



Best practice companies are partnering with global LLPs to re-balance their supply chains, to strike the right tradeoffs between risk and reward and the cost for both. This re-balancing is based on the ability to flex and flux in response to volatility of any kind – be it an unexpected sales spike or a fire at a major supplier. And do so effectively and affordably.

This means building out capabilities, strategies, and tactics that:

- Assess, quantify and value supply chain vulnerabilities and determine the value at risk resulting from those vulnerabilities

- Deliver agility, appropriate redundancy and contingent capacity that can be switched on at a moment's notice
- Provide control tower orchestration – based on visibility and technology tools – across the supply chain
- Develop innovative approaches to anticipate future supply chain challenges, risks and vulnerabilities; and develop strategies, practices and tools to address them.

To reiterate our initial assertion: A resilient supply chain not only reduces risks but also anticipates, rapidly adjusts, recovers and even capitalizes on unanticipated supply chain events or disruptions. True supply chain resiliency is about growth and competitive advantage – not just disruption avoidance and mitigation.

About the author

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DHL is part of Deutsche Post DHL. The Group generated revenue of more than 55 billion euros in 2012.

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